Assembly Manual

All EPP Foam
CNC Precision cut
Light plywood brace
5 flat carbon spar matrix
Transverse battery position
Carbon prop w/machined hub
Die cut servo and battery bays
Airfoil shaped, constant cord elevons
Hard point motor mount for brushless motor

Zagi-HP

Airfoil	Zagi 101.4
Flying Weight	25.5 oz
Wing span	48"
Wing area	2.8 sq ft
Wing loading	8.75 oz sq ft
Servos	Micro
Radio	w/mixer
Stock #	ZH402

Visit: www.Zagi.com Email: e-sales@Zagi.com Sales: (360) 275-6853 Fax: (360) 275-6940

TRICK WINGS PO BOX 2089 BELFAIR, WA 98528

Recommendations and Notes. Read the entire manual before beginning construction !

To avoid injury or damage to the electronic speed control, do not plug the battery into the speed control or install the prop on the motor until all of the installation steps have been followed.

Do not use the motor to cycle batteries. Do not run the motor over 30 seconds on the bench or while holding the airplane. The motor and ESC are high performance electronics and require air flow for cooling. The pusher configuration does not provide prop wash for cooling.

The Zagi Pusher Motor is a custom-designed dedicated reverse rotation 6-volt motor. The red (positive) and blue (negative) wires from the electronic speed control should be soldered to the motor tabs. Solder the red (+) wire on the terminal next to the red dot and the blue wire (-) to the other tab. Remember to install the prop for reverse rotation. The 8-cell 1800 mAh NIMH battery pack used with the Zagi HP is made with high-rate cells. These high-rate cells deliver current up to 25 amps--more than enough to power the Zagi Pusher.

Batteries are rated according the potential energy capacity; how much energy from a charger can the battery pack store. The capacity is rated in milliampere (mAh). There are 1000 mAh in one amp. So a 2500 mAh battery is 2.5 amps. The "C" rating is the discharge potential of the battery; Or how big an amp load can the battery safely handle. A battery pack rated at 15C means that the discharge potential of the battery pack is 15 times "C" the capacity. If the capacity is 2.5 amps and the discharge rating is 15C than (2.5 X 15 = 37.5 amps) That means that 37.5 amps is the maximum continuous discharge load. Some battery packs display two "C" or discharge ratings: (15C/25C). The first discharge rating, 15C (37.5 amps) is the continuous maximum load rating and the second discharge rating of 25C (62.5 amps) is the maximum momentary burst or spike load discharge rating.

A separate battery is not required for the receiver and servos. The Zagi Pusher models are powered by the 1800 mAh 8 cell (9.6 V Nimh) battery. The brushless model is powered by a 2200 mAh 3 cell (11.1 V LIPO) battery. Either Electronic Speed Control (ESC) has a Battery Elimination Circuit (BEC). When the motor drains the battery to a certain level the low voltage cutoff will turn the motor off leaving sufficient power to control the plane long enough for a landing. The BEC for the LIPO is programmed to protect the battery from discharging below 3 V per cell.

The target weight for the Zagi HP is 25.5 oz. The airplane is designed to balance at 8"-- measured back from the nose. To achieve these two objectives, the Zagi Pusher or the brushless powerpacks should be used. Any modifications, reinforcements or substitutions not described in this manual must be considered carefully to maintain the correct weight and balance. If all the procedures in this manual are followed, the Zagi HP should not need nose weight.

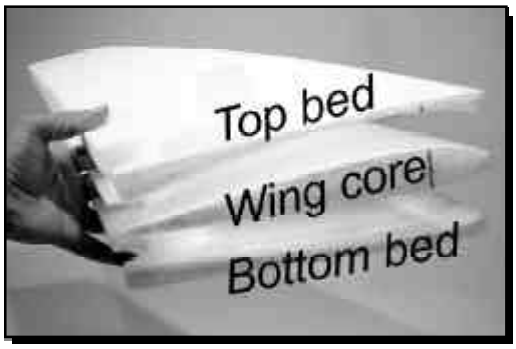
3M Super 77 or 87 Spray Adhesives are the recommended adhesives for assembly. 3M 77 Spray Adhesive will not dissolve EPP foam when it is sprayed with a heavy coat or at close range. If a substitute adhesive is selected, test spray a piece of scrap foam before spraying the cores. Epoxy, Shoe Goo or Goop adhesives are not recommended for assembly.

An extra roll of poly tape in a contrasting color is recommended for visual orientation in flight. It is best to cover the top with a light color and the bottom dark. Trick Wings did not test nor do we recommend any covering materials such as UltraCote, MonoKote, Solarfilm, or any other iron-on materials. If an alternate covering material is chosen, test a patch on the beds first. The wing geometry can be changed by uneven heating and shrinkage of iron-on heat shrink coverings.

Tools and materials needed:

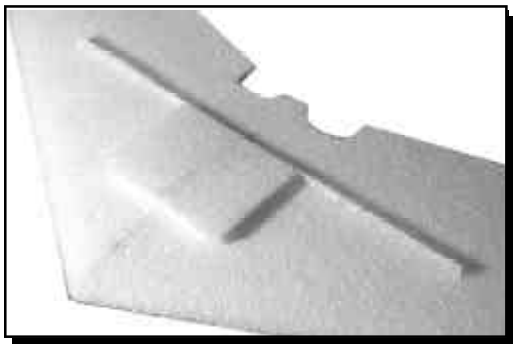
Optional: a second roll of contrasting color poly tape
Sanding block
150 to 320 grit sandpaper
X-Acto knife or Dermal
3M Super 77 or 87 Spray Adhesive
Longnose pliers
Soldering iron

The wing core is shipped between the top and bottom beds. The beds are used as construction jigs; so do not discard them.

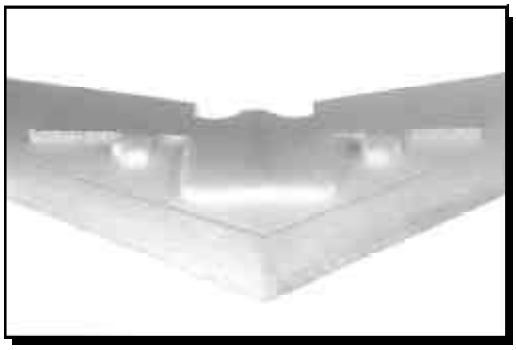


There are three parts to each wing panel. The top of the wing can be identified by its greater curvature. The left wing is the wing that would be on your left if you were in the cockpit. The right and left panels can be identified by the color mark at the root (the big end of the wing panel): Red on the right.

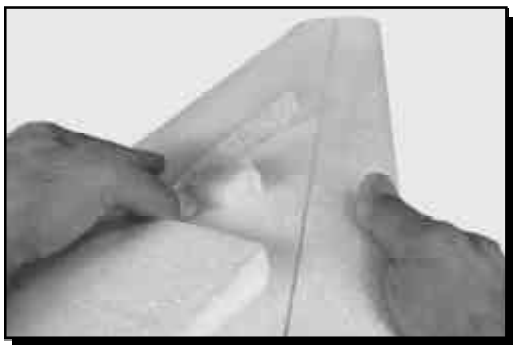
DO NOT REMOVE ANY PRE-CUT PARTS AT THIS TIME!



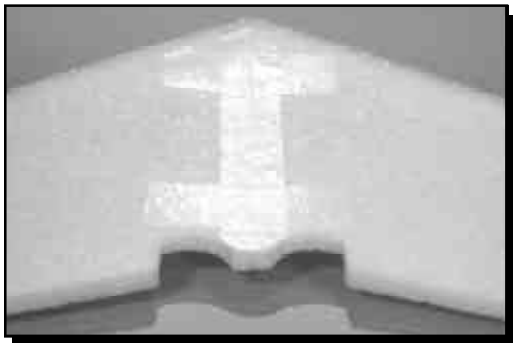
There are three important pre-cut features on the wing panels. The electronics bay and plywood spar channel are die-cut. These come out as an assembly after joining the wing panels.



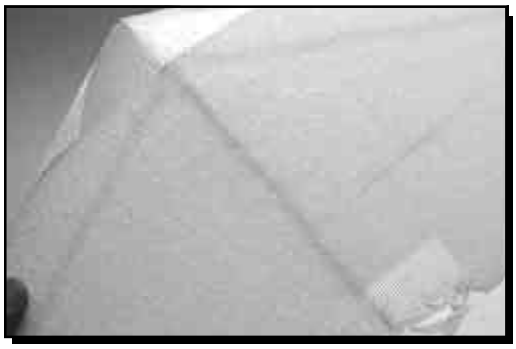
The servo bays are also die-cut. They are hard to see. An easy way to find them is to rub the surface just behind the plywood spar channel.



The four carbon fiber spar channels extend the full length of both wing panels on both sides.

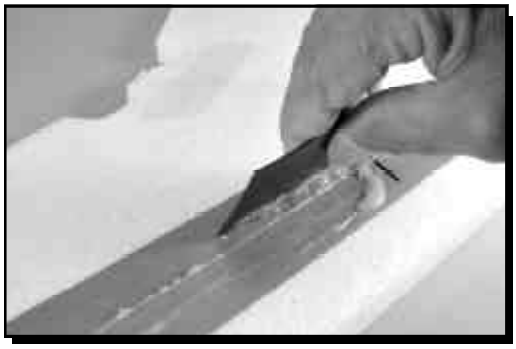


Use fiber filament tape to tape the top beds together. Then tape the bottom beds together. Remove the hairs and zigzags from the wing cores and beds by rubbing them with a scrap piece of EPP foam. Lay the bottom right and left wing beds on a flat surface. Set the wing cores on the beds and lightly blocksand the wing panels (cores) with #100 or #80 sandpaper.



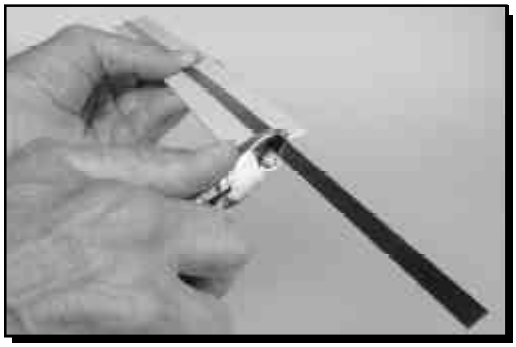
Spray the root (wide end) of the wing panels with 3M Super 77 Adhesive. Hold the spray head 1 inch from the root. Spray a long bead along the root edge. Spread the bead with a small brush, a mixing popsicle stick, or scrap foam. Let the adhesive dry to the touch. Join the wing panels together. Put two pieces of fiber tape on the top to hold the wing panels together while the glue dries.

Glue the carbon fiber spars in the bottom side first. Lay the top beds on a flat surface. Mask the spar slot on each side with masking tape. The spar should start at the corner of the motor tray and end 1/2 inch from the tip. Mark the spar position on the tape. Spray 3M 77 spray adhesive into a container. A plastic cup will work. STYROFOAM WILL NOT WORK. Stirr the glue to evaporate some of the solvent. Pour the glue slurry along the length of the slot.

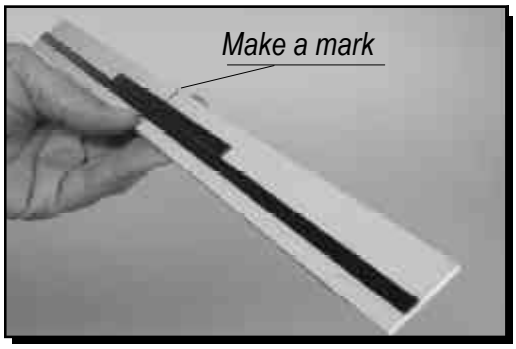


Use a Squeegee (like a credit card) to press the adhesive into the spar slot. Repeat this until the entire inside of the groove is wet with adhesive.

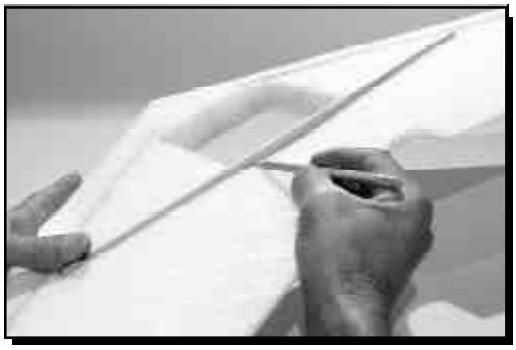
Hold the carbon spar over a piece of newspaper and spray it with adhesive. Do not let the glue dry. Starting at the mark at the corner of the battery bay, push the spars into the channel while the glue is still wet. Make sure that the entire spar is below the wing surface. Squeegee any glue that might bubble up out of the slot. Remove the masking tape. Shake some talc, (baby powder or similar) on the slot to prevent the core from sticking to the beds. Let the glue set for an hour or two. Repeat the carbon fiber gluing procedure on the top side of the wing.



Cut the remaining flat carbon spar to the 18 inches; the same length as the plywood brace. Use strong wire cutters.

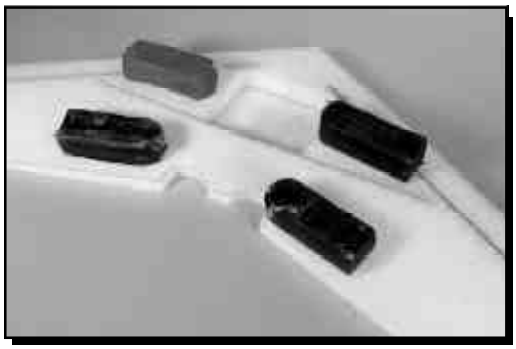


Make a mark across the center of the plywood brace. Glue the carbon spars to the plywood spar with 77, CA or epoxy. Spread adhesive along the length of both carbon spars. Center the long and short carbon spars in the middle of the plywood brace.



Remove the plug for the electronics bay and plywood spar groove as a unit. Push the plywood brace into the slot with the carbon spars facing the electronics bay. Center the brace. Make a mark on the brace to match the contour of the wing on the top and bottom of the brace. Cut and sand the brace to the contour of the wing.

Spray the center plywood brace channel with adhesive. Lay the 18 inch plywood brace on a sheet of newspaper and spray both sides with adhesive. Place the wings in the bottom beds on a flat surface, Push the brace into the channel. Make sure that the spar is flush with the top and bottom of the wing. Use weights to hold the panels in place. If necessary, use tape to pull the foam against the plywood brace.



Weights are very important to maintain alignment and wing geometry. Pictured here are five-pound fishing weights wrapped with duct tape. Let the wing assembly dry for a couple of hours and go on to the next step.

Locate the plywood hard point incert on the underside of the motor tray. Drip some thin CA (Krazy Glue, Zap) between the styrene and the plywood all the way around the plywood.

The motor tray is easier to cut from the molded part if it is done in three stages. Cracking and tearing the finished part can be avoided by removing the skirt before making the final cut. Removing the skirt will allow the styrene to roll away from the scissors. The motor tray is designed with an overhang at the back end. Notice that the indented cut lines transition from the skirt to the top of the molded part. Place the tray right side up. Cut the skirt off the back of the motor tray. Make sure that the first cut is below the final cut-line.

Cut along the cut line on the skirt at the rear of the motor tray.

Transition the cut from the cut line on the skirt to the top of the motor traty.

Continue cutting from the rear corner of the motor tray. Cut along the indented cut lines of the motor tray until you reach the opposite corner. Remember, the rear of the motor tray has the cut lines on the overhang. The final cut should leave an overhang on the back end of the motor tray.

Block sand the sides and round the sharp edges.

Cut the bottom out of the tray. Cut along the bottom angle with several successive medium pressure scoring strokes.

Locate the center of the motor mount. Center the blade in the middle. Spin the blade with light pressure. Cut the hole large enough to fit the flange on the front of the Zagi Pusher motor or the shaft of the brushless motor.

The horizontally opposed holes in the motor mount are the holes that fit the Zagi Pusher motor. The Zagi Pusher motor uses 2.4mm machine screws. The brushless motors use the same holes but use 3mm screws. Cut the holes with a blade or use a 1/8 inch drill. Measure the hole pattern on the motor if a different motor is chosen.

Observe the opposed 2.5mm threaded holes in the front of the Zagi Pusher motor. Set the motor in place to check the alignment of the motor with the holes in the motor mount. Make sure that the motor seats flush against the mount.

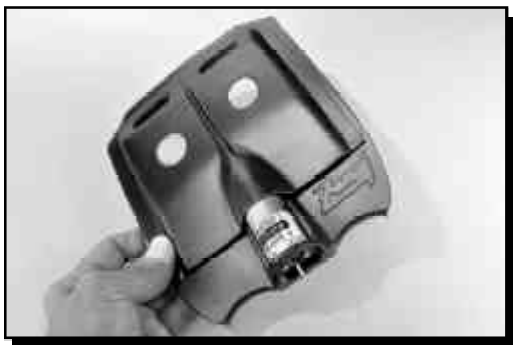
Cut out the canopy along the cut lines. Remove the rear bulkhead of the canopy motor fairing. Cut out the vent holes on top and the vent holes in the front.

TIP: *The vent holes can be cut with the back side of the Xacto blade using repeated strokes. Once the plug is removed the hole can be dressed with the back side of the blade.*

Brushless motors have three wires with bullet connectors. The motor should rotate in the clockwise direction when viewed from the back of the wing. The rotation direction of the motor can be changed by reversing any two wires pluged into the ESC.

Remember the Zagi Pusher is a reverse rotation motor. Solder the red wire to the terminal next to the red dot ! The thin wires on the motor solder terminal go to the built-in capacitors. The brushed ESC has three sets of wires. The two heavy battery wires are connected to a male Deans plug. The radio three-conductor ribbon wire is connected to a universal receiver plug. The remaining two tinned wires; red and black or red and blue are soldered ot the tabs on the motor. Red is always positive (+) and blue or black is negative (-).

Cut out the exit fairings. Cut along the cut lines and remove the ends. Exit fairings are aerodinamic and keep dirt and debris out of the servos.



The canopy is offset to the left to allow room for a tape hinge. Put the styrene parts aside for later asselmbly.

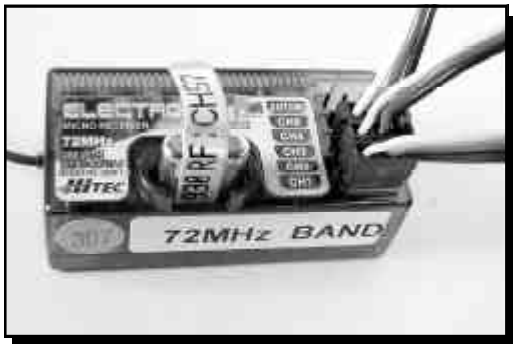
The Zagi HP servo bay was designed to fit a 1.17 X 1.17 X .47 inch micro servo. The Hitec HS-81 is a moderately priced, readily available servo with adequate torque. The servo bay may be expanded or shimmed to fit a different size servo. Since the servos are mounted so close to the center of gravity (CG), different size servos may be used without affecting the balance. Find the "X" shaped control arm with four tabs in the parts bag supplied with the servo.

Cut three of the tabs off of the control arm, leaving only one tab.

If the servo is supplied without a four tab "X" shaped control arm, use the straight two-tab arm and remove one of the tabs.

Remove the round servo control arm. Avoid stressing the gears by holding the edges of the round control arm to prevent travel when removing and replacing the screw. Do not over tighten the screw. Snug is tight enough. To maximize servo life, never move the servo control arm with the radio off.

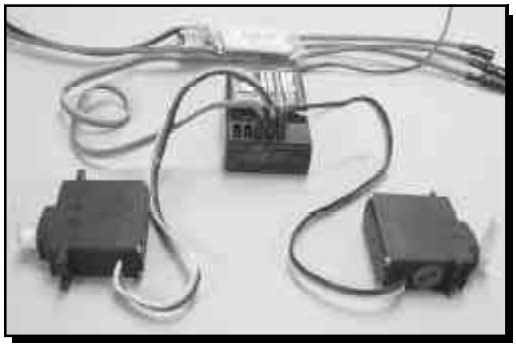
The servos must be centered with the radio powered up before installation.



The Zagi requires electronic mixing to operate the elevons. (elevator/aileron). Computer radios have settings for elevon mixing. Check the radio manual for flying wing, elevon or delta mix setting. V-tail settings will not work. Set the transmitter for mixing and refer to the radio manual for the appropriate receiver slots for the servos--usually elevator and aileron.

The trim levers are located on the transmitter to the left and below the control stick. Some trim controls are electronic and others are mechanical. Trim levers are provided for in-flight adjustments to achieve level flight. It is important to set the trim levers at the zero or center position.

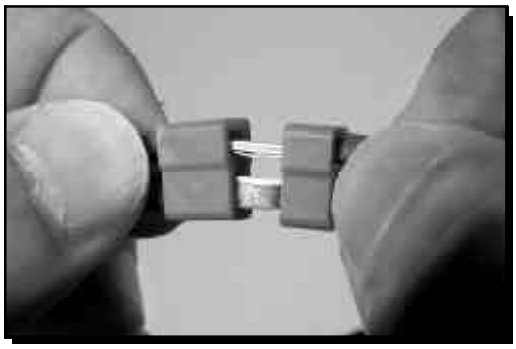
Do not connect the motor wires or install the prop and hub yet !



The servos must be centered before installation. Apply insulation tape to the bare wires of the brushed ESC to prevent shorting during the servo centering procedure. Before installing any of the electronics, lay out the receiver (RX), battery, servos and ESC in the configuration that they will be in the airplane. Layout the components as shown, making sure to align the servos with the lead wire and the control arm toward the back. The top of this picture would be the nose of the airplane. The servo bay cutouts in the wings show the servo orientation.

Refer to the radio instructions for power-up procedures. Check the battery condition indicator on the transmitter to make sure that the battery is charged. Make sure that the throttle is in the full down (off) position.

NOTE: Some 2.4 ghz radios have different start-up and binding procedures. Always follow the radio user manual for power-up procedure.



The motor should not be attached to the ESC at this time. The motor will be tested and run when it is attached to the motor mount and without the prop installed. Remember that the potential energy of this power system will turn the prop at 22,000 rpm and propel this airplane over 85 mph. Plug the ESC into a charged battery. The male and female connectors have a polarity lock. They will only mate in one position, make sure the wires match: red to red and black to black.

Center the trim levers on all of the controls. With the radio on, inspect the servos to see that the control arm is at 90 degrees to the servo case in the hands-off, neutral stick position. Adjust the control arm by removing the control arm and replacing it at 90 degrees to the servo case. Only use the trim lever to make in-flight trim adjustments.

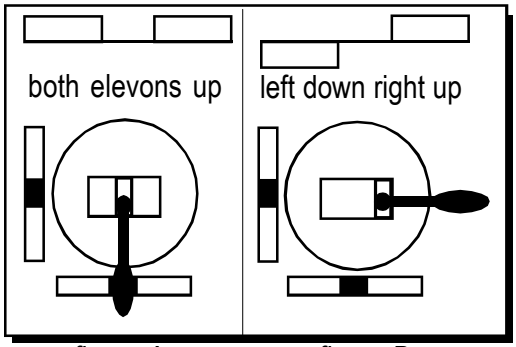


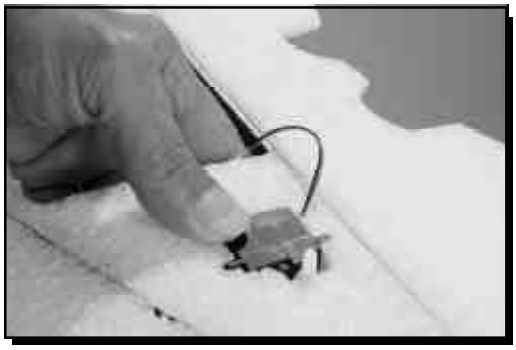
figure:A figure:B

Figures A and B are illustrations of the motion of the same control stick being moved in two different directions. When the elevon control stick on the transmitter is pulled back, (Figure A), both servo control arms should move forward. This motion will move both of the elevons up. When the stick is moved to the right, (Figure B), the right servo control arm should move forward and the left servo control arm moves back. This opposed motion will move the right elevon up and the left elevon down. Reverse the plugs in the RX if the servo motion is not correct.

The die cut servo bay is a cookie cutout in the shape of a servo. The recommended servo is the Hitec HS-81 (Hitec p/n 31081S) Gear set (56403). The servo bay is die-cut for a servo that measures 1.17 X 0.47 X 1.16 inches (29.7 X 12 X 29.6 millimeters). The cutouts are not easy to see. Poking a finger from the bottom while inspecting the top helps. Locate the cutout and push the cookie about halfway through into the bottom of the wing.

The shape of the cutout indicates the orientation of the servo. Push the servo into the cutout forcing the cookie to the bottom side of the wing.

A smaller size servo can be substituted by making shims out of scrap foam to snug the servo in place.



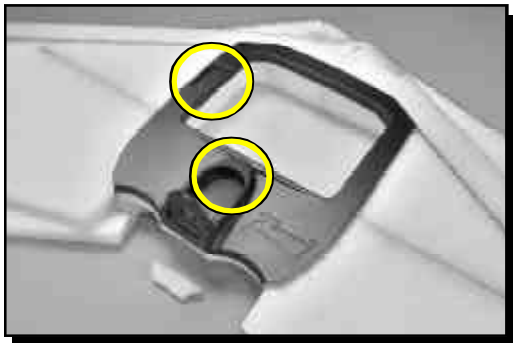
Align the servo so that it is flush with the top of the wing.

A sharp kitchen knife works well to make a flush cut. Another method is to mark the perimeter of the cookie with a pencil, remove the cookie and make the cut.

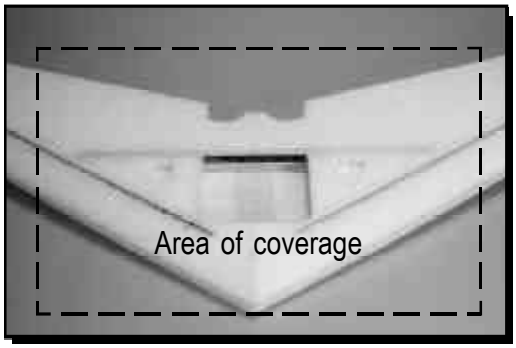
Remove the servo. Push the cookie from top to bottom of the wing about 1/4 inch. Spray a small amount of adhesive on two sides of the cookie and push the cookie back in place.

Align the motor tray over the electronic bay cutout. Notice that the motor tray is about a half inch shorter than the back of the wing. Align the scallops of the wing with the motor tray. Mark a cut line using the motor tray as a guide.

Cut the tab off. Make the cut inside of the line.

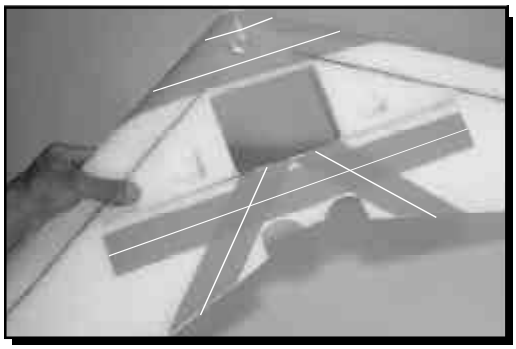


Position the motor tray over the cutout. Notice that there are two spots that the tray will not seat. One spot is the canopy hatch velcro cut out. The other spot is the motor cutout floor. Remove enough foam beneath these two spots to allow the tray to seat. Do not attach the motor tray to the wing at this time.



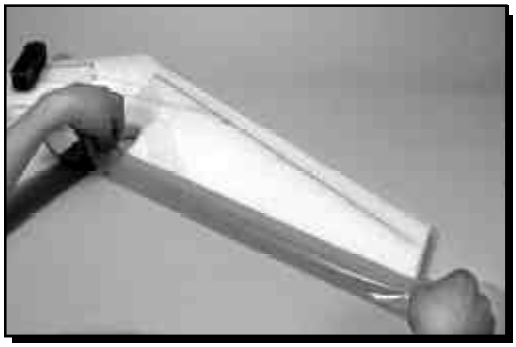
Lay the wing in the bottom beds. Spray a light coat of adhesive on the center portion of the top side of the wing where the tape will be applied in the bottom illustration. Make sure that the back wall of the battery and receiver bay is sprayed. Let the adhesive dry for 20 minutes.

TIP: The way to determine that the glue is dry enough to apply the tape is when the glue will not come off on your finger with a light touch.



Apply fiber filament tape to the wing following the pattern pictured left. Taping the nose is optional depending on the competency of the pilot. Place the wing in the top beds and repeat the same procedures on the bottom side of the wing.

NOTE: The fiber tape will not appear as dark as pictured here. Darker tape was used in these pictures to enhance contrast visibility. Apply two pieces of the one inch wide fiber tape side by side to make a two-inch-wide strip.



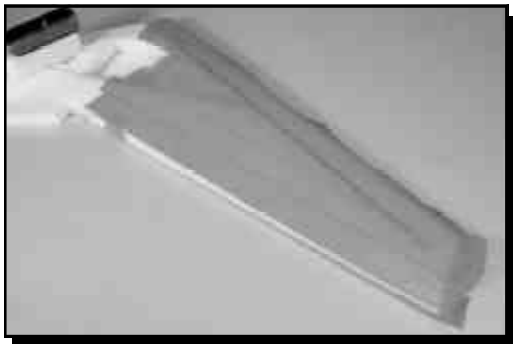
Spray adhesive on all top surfaces of the wing including the areas covered with fiber tape. Make sure to spray the tips and trailing edges. Spray 2 inches of the bottom of the wing at the trailing edge (TE). Let the adhesive dry for 20 minutes.

Put the wing top side up in the bottom beds. Put a weight on the left panel to hold it steady while taping. Start taping at the TE and work forward.

Covering the top and bottom of the wing in contrasting colors makes the plane much easier to fly. Use the darker color on the bottom surface. An optional roll of color tape will be required.

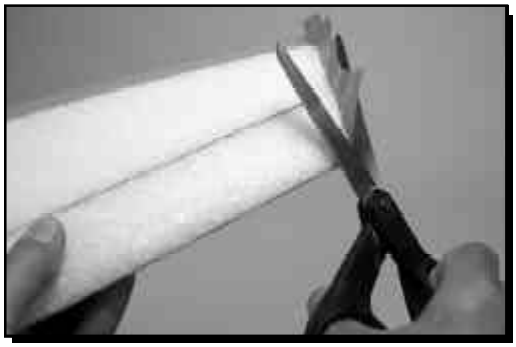
The first strip of tape is wrapped around the TE from the top to the bottom, being careful to follow the shape.

Apply strips of tape working forward from the TE. Overlap each strip of tape 1/4 inch. Extend the tape 2 inches beyond the center line of the wing. Extend the tape 2 inches beyond the tips.

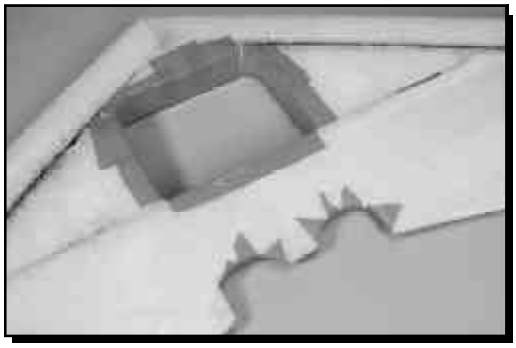


Continue overlapping the strips of tape until the entire top right wing panel is covered.

Trim the tape that extends beyond the leading edge (LE).



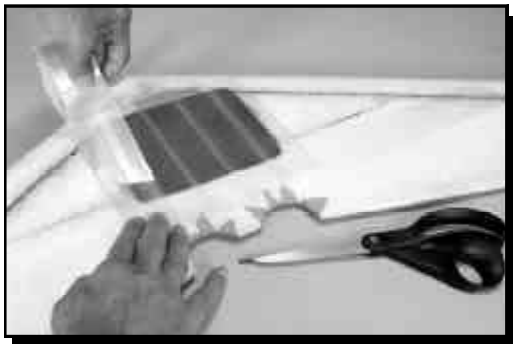
Fold the tape around the tip and cut it to the contour of the bottom surface. Trim and fold the tape into the servo and electronics bays.



Cover and trim the top left wing panel. Repeat the same taping procedures as on the right panel.

After the right and left top panels are covered, add some strips of color tape to the walls of the electronics bay.

Round the corners of the 6 1/2" X 5" styrene battery bay floor. Center the finished part over the battery bay cutout on the bottom side of the wing. Mark the parimeter for positioning. Apply some glue inside of the positioning marks on the foam. Lay the finished part on a piece of newspaper and spray a mist coat of 77 adhesive. Let the glue dry for a few minutes. Align the glued side of the floor with the position marks and press it in place.
Tip: *The edges of the outside of the floor can be feathered to make a smooth transition when taped in place.*

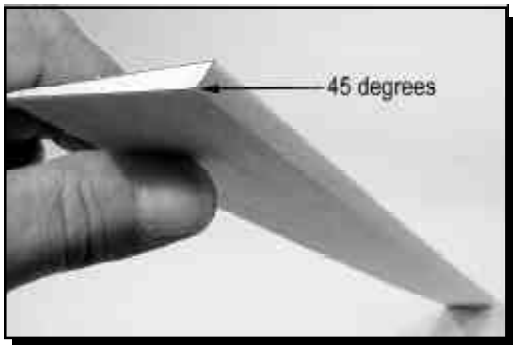


Apply strips of fiber tape cordwise (parallel to the center line) to completely cover the electronics bay floor beyond the edges. Spray a mist coat of adhesive to the new tape.

Complete the color tape covering the bottom of the wing working from TE to LE.

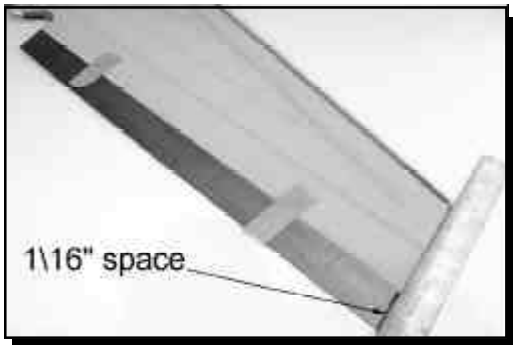
When the entire top and bottom are covered, wrap a spanwise strip of color tape around the LE.

Position the elevon with the 90 degree surface down. Hold the elevon against the TE. Make a mark to match the wing tip. Trim the end of the elevon to match the angle of the wing tip.

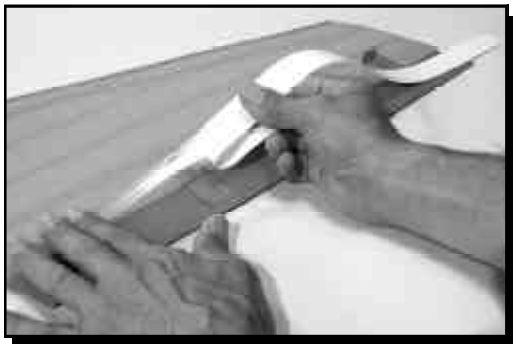


Sand a 45 degree angle into the front of the elevon. Sand the elevons and smooth all the surfaces. Spray the elevons with any spray enamel. Primer works well. Apply a light coat of paint and immediately wipe it with a cloth before it soaks in and dries. Let the paint dry.

For rough duty, the elevons may be covered with color tape.

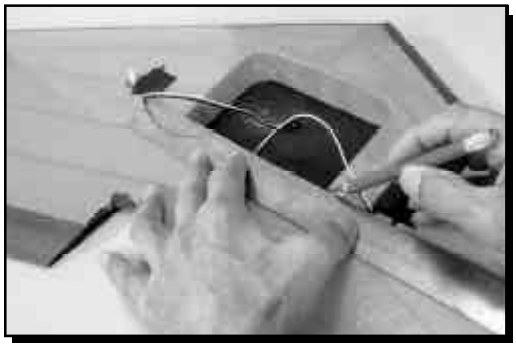


Position the elevon on the trailing edge of the wing. Align a straightedge with the wing tip. Leave a 1/16" space between the end of the elevon and the straight edge. Use small pieces of masking tape to hold it in position temporarily. Leave a corner of the tape turned up for easy removal.

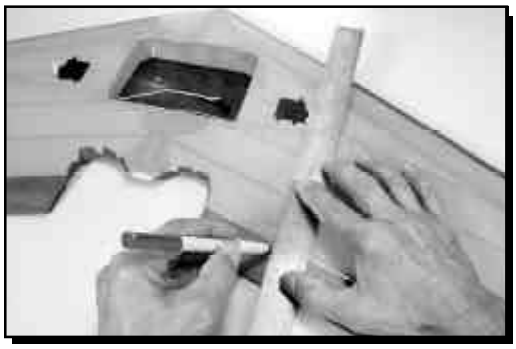


Peel the short paper backing tab from the 1" x 3 mil vinyl hinge tape. Align the hinge tape at one end. Holding the peeled end of the tape over the seam press the hinge tape in place while peeling the backing. Remove the small pieces of masking tape ahead of the hinge tape. Press the hinge tape down along the length of the elevon with a squeegee. Save one of the short ends of hinge tape for the hatch hinge.

Press the servo in place with the control arms centered at 90 degrees to the servo case. (See page 10)



Using a straight edge as a guide, make a 1/2" deep cut for a servo wire channel. The channel goes between the servo wire (where it exits the servo) to the middle of the receiver bay. Push the servo wire into the channel with a flat blade screwdriver. A cleaner installation can be made by drilling or burning a hole between the servo bay and the electronics bay. Burning a hole can be done with a heated wire. Practice on scrap foam.

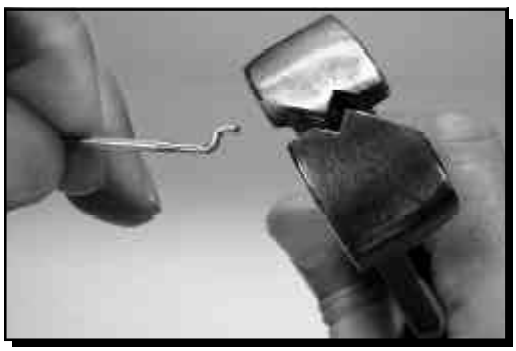


Make a line from the outboard side of the servo control arm to the elevon. The line should be parallel to the center line. Make a mark on the elevon. That is where to center the control horn.

Center the control horn on the line on the elevon. Use a punch or any pointed tool to mark the position of the holes in the control horn foot. Drill two holes big enough for the 2 x 56 self tapping machine screws. Thread the machine screws through the elevon into the nylon locking pad. Snug the screws to make a slight impression in the balsa wood. Do not over tighten!

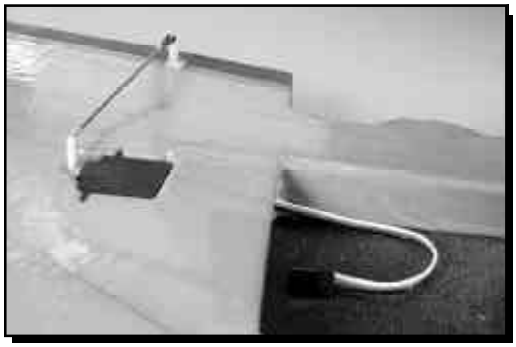
Screw the threaded clevis onto the control rod so that equal threads are showing on both sides of the clevis. Hold the elevon in the neutral position and make a mark where the rod matches the holes in the control arm.

NOTE: Make sure that the servos are centered with the radio on with the trim levers centered.

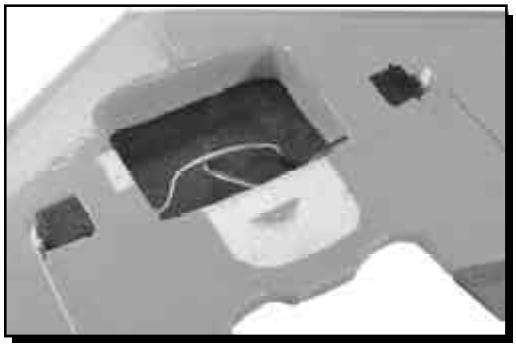


The diameter of the control rod may be reduced with a file or belt sander to fit better into the control arm. The control arm hole may be enlarged with a drill or by spinning an X-Acto blade in the hole.

Attach control rods to the servo control arms with a Z-Bend. (NOTE: Z-bend pliers may be purchased from your local hobby dealer to make this operation easier.) Long-nose pliers will also work to make a Z-bend.

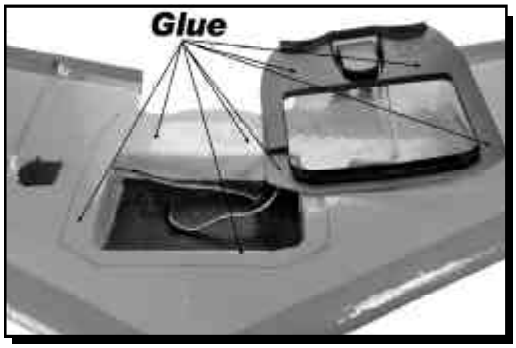


Mechanical fine tuning of the elevon can be achieved by removing the clevis from the control horn and screwing it in or out.

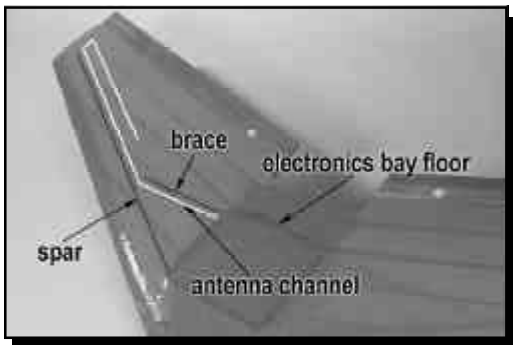


Remove the tape from the Velcro cutout. Remove a 2 X 3 section of tape from beneath the motor tray. Remove enough foam beneath these two spots to allow the tray to seat.

Press the motor tray in place to make sure that it will seat. Cut a piece of hook-side Velcro to fit inside the motor tray Velcro cutout. Hold the motor tray in place and make a mark all the way around the perimeter.

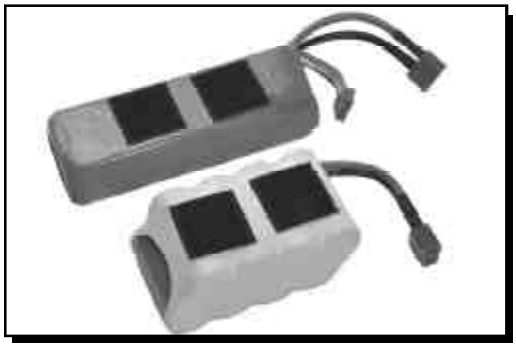


Spray some glue in a cup. Stir the glue to evaporate some of the solvent. Brush the glue on the bottom side of the motor tray around the area marked on the top of the wing. Let the glue dry for twenty minutes. Press the motor tray in place.

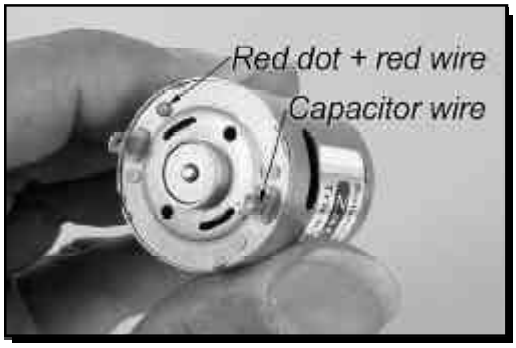


Drill a hole in the wall at the rear corner of the electronics bay at an angle to miss the floor plate. Make the hole big enough for the antenna wire to fit through. Push the wire through leaving a couple of inches of antenna in the electronics bay for positioning. Using a straight edge as a guide, make a 1/4 inch deep cut in the wing surface for an antenna wire channel. Cut the antenna channel to the end of the carbon spar. Then circle back about an inch from the first channel. Push the antenna wire into the channel with a flat blade screwdriver. **DO NOT CUT THE ANTENNA WIRE!**

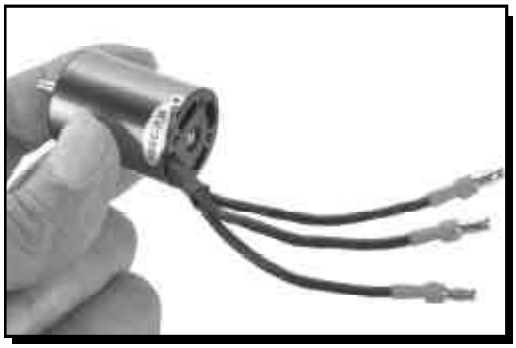
Locate the 3 inch Velcro strips in the parts bag. Center the strips 3/4 inches apart on the battery bay floor.



Center the other Velcro on the battery on the opposite side of the label. The battery may now be mounted anywhere along the length of the battery bay depending on the desired center of gravity (CG).



The Zagi Pusher brushed motor has two terminals. The brushed electronic speed control (ESC) has three sets of wires. The two heavy battery wires are connected to a male Deans plug. The radio three conductor ribbon wire is connected to a universal receiver plug that plugs into the throttle slot. The remaining two wire set (red and black or red and blue) are the motor wires. Solder the motor wires to the tabs on the motor. Solder the red wire to the terminal next to the red dot and the other wire to the opposite terminal.



Brushless motors do not need to be soldered. The male bullet connectors plug into the female connectors on the ESC. Do not attempt to run the motor until it is bolted to the motor tray and the tray is glued in place.

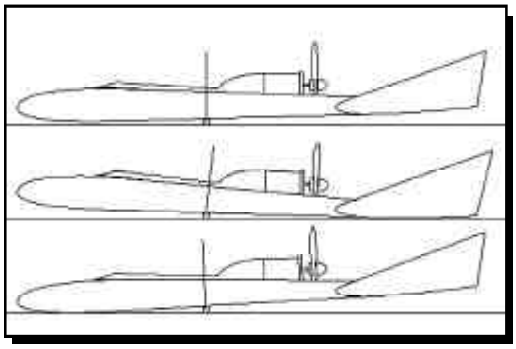
Use a 1 x 1 Velcro set to hold the RX in the bay. Plug the universal RX connector into the throttle slot in the receiver to control motor speed. The three-wire ribbon connector will provide power for the receiver and servos. No other receiver battery is necessary. The universal connector will work with all radios except the old Airtronics. *The red and brown wires must be reversed in the plastic housing to change to the old Airtronics system.*

Center the motor fairing with the motor. Notice that the hatch is even with the motor tray on the left side. Make a hatch hinge with two short pieces of fiber tape on the top and bottom of the hatch. Apply the Velcro piece on the hatch opposite the Velcro on the motor tray. Apply a strip of color tape over the servos. Tape the exit fairings in place with clear tape. Make sure that the control arms have full travel before taping. The exit fairings can be glued in place but the glue method is less serviceable.

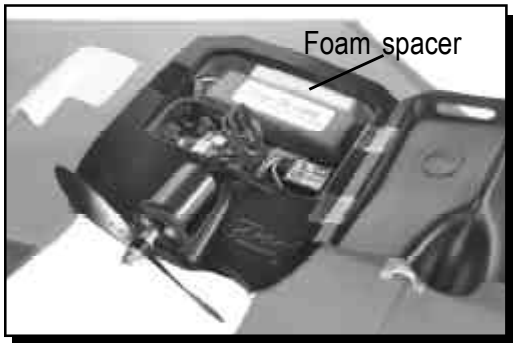
Put a piece of fiber filament tape through the winglet slot to the top of the wing and wrap it around to the bottom of the wing. Add two more pieces of tape to secure the winglet in place. Make sure that the elevon will not bind against the winglet as it moves.

The winglets are at the very back of the airframe where excess weight is a real balance factor. The tape method of fastening is both light and strong. If a different winglet fastening system is preferred, keep the weight down to the weight of two short strips of tape.

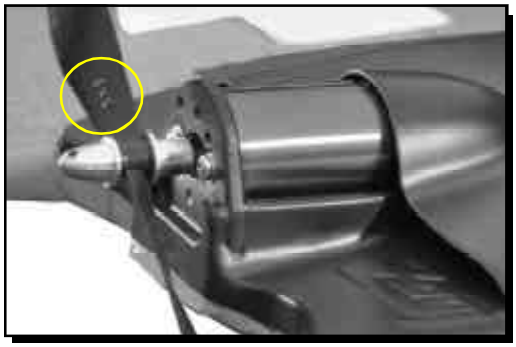
Lay the wing bottom-side-up. Tape a 1/4" dowel 8 inches back from the nose, at the plywood spar. A round pencil can be used.



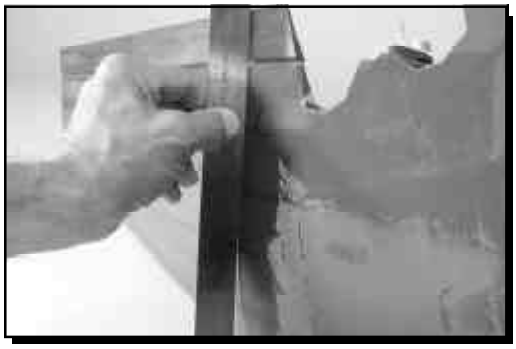
Install the prop for balance purposes only. Do not plug-in the battery at this time. Place the wing right-side-up on a flat surface. Install the receiver, battery and ESC in the electronics bay. Move the battery forward if the wing will not stay in the nose-down position. Move the battery aft if the wing will not stay in the tail-down position. Balance is achieved when the wing stays in the nose up and nose down position. Repeat this procedure for each different size battery that will be used. Nose weight is usually not necessary but one or two ounces may be used if the battery reaches the forward limit. *See The website zagi.com for video building tips.*



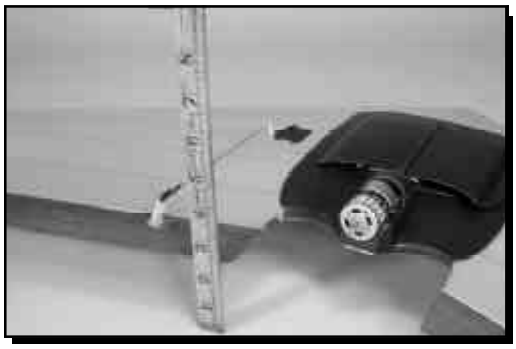
Cut a piece of foam the size of the space between the battery and the front of the battery bay. Glue or tape the foam spacer in front of the battery or tape it to the battery. Label the foam spacer if you balance the airplane with different size batteries. The spacer will guide the battery to the exact balance point for replacement and works as a shock absorber for unexpected landings.



Assemble the prop and hub so that the 5 X 5 raised lettering on the prop is facing away from the motor.

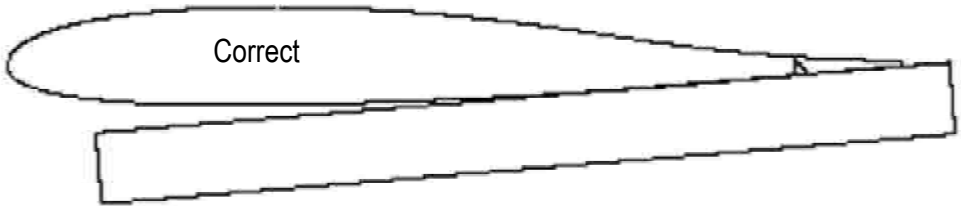


Adjust the zero setting of the elevons. Remove the prop. Turn the transmitter on and then the receiver. The initial trim settings should be adjusted while holding a straight edge against the bottom of the wing at the TE. The elevon should be flush with the bottom of the wing for the last three inches. Use the threaded clevis to adjust them to the proper position. Do not use the trim levers on the transmitter.



Adjust the throw settings of the elevons. Remove the prop. Turn the transmitter on and then the receiver. Set the wing on a couple of rolls of tape or anything that will let the elevons move freely. Hold a ruler near the elevon. Pull the elevator stick back to the full up position without any right or left movement. The throw should be 3/8". The full down throw should be the same. Now push the stick to the full right position. The right elevon should move up and the left move down.

The wing is nose heavy if it requires too much (up elevator) for level flight. The weight in the nose pushes the nose down and elevons must compensate in the up elevator position to maintain level flight. A nose heavy wing will fly in a very narrow speed envelope. A nose heavy wing will stall in turns, will not achieve its top speed potential and stall abruptly at low speed.



The wing will fly with the elevons in a slightly up-elevator position called "reflex." Slight reflex is the natural airfoil shape for flying wings. The suggested starting point for balance is 8 inches back from the nose. The best way to find the balance point in flight is to keep moving the battery back between flights in 1/8" increments until it is almost unflyable (too elevator sensitive). Reducing the elevator throw can compensate for over sensitivity.

Preflight check and glide test

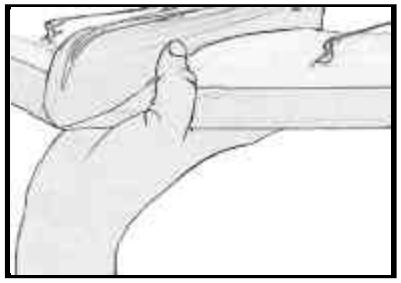
Do a preflight check before every flight. Always turn the transmitter power on before the motor battery in the airplane is plugged in. Make sure that the throttle control stick is in the full down position. Make sure that the controls are working properly. Check the trim levers on the transmitter. Pull the elevator control stick back and observe that both elevons move upward. Push the control stick to the right and observe that the right elevon moves up and the left elevon moves down. Hold the wing securely by the nose. Move the throttle stick to the half throttle position momentarily. The first glide test should be done on flat land in a light breeze. The wing should be held by the nose with your palm up over your head and your thumb wrapped around to the top. Hold the wing over your head with the nose pointed straight ahead. Run slowly into the wind. Give it a gentle push STRAIGHT AHEAD. Do not point the nose upward. Correct the flight path with the radio control stick. The test is successful when the wing flies straight ahead with a slow sink rate to a sliding landing. If the wing turns in either direction after the launch, compensate by adding 2 or 3 clicks of trim in the opposite direction. If the wing pitches up and immediately dives, add 2 or 3 clicks of down trim. Repeat the glide test until the Zagi HP flies straight ahead with a slow sink rate to a sliding landing. Increase the launch speed each time to provide longer control flights.

First flight

Check the frequencies (channel number) of all pilots within visual range before turning on your transmitter. Turning on your transmitter with the same channel number as someone who is flying will certainly cause his plane to crash.

The Zagi HP is capable of high speed. Flights at a high rate of speed can cause considerable damage to someone or something if a collision occurs. Please exercise caution while flying. It is recommended that you join the Academy of Model Aeronautics (AMA) (1-800-435-9262) to provide insurance, awareness of safe flying practices, and knowledge of what's going on in the modeling field. At some flying sites it is mandatory that you are a member of the AMA.

Do not launch the Zagi HP with the motor running. Hold the wing by the nose with your palm up over your head and your thumb wrapped around to the top. Take a step or two forward and give the wing a good strong throw into the wind. A follow through with a little finger tip will increase the launch speed. Slide the throttle stick to the full forward position when the Zagi HP is a comfortable distance from the ground. Get some altitude and experiment with some throttle settings. Full motor is fun but will use up the battery quickly.



Zagi-HP

Troubleshooting:

"Tipstall" -- (1) A stall in a turn will result in a spin. Spins happen because of too much control or too little speed. The control surface travel can be reduced mechanically by moving the control rod down one hole on the servo control arm. Some radios have separate dual rate settings for aileron and elevator. Set the dual rate to 60% to start and make adjustments till it feels right.

"Tipstall" -- (2) A nose heavy wing will slide and try to dive in a turn. Rebalance the wing. The CG can be moved slightly forward no more than 1/2" if the elevator seems too touchy.

Lithium polymer cells have very strict charging requirements.

Always use chargers specifically designed for lithium polymer cells or packs.
Always test your charger to assure it is functioning properly.
Always charge your lithium polymer cells or packs in a low fire risk area or a fire proof container.
Always store lithium polymer packs in a fire proof container.
Always have sand or dry fire extinguisher handy in the event of fire.
Always handle lithium polymer cells and packs with great care.
Always purchase a factory authorized built pack instead of building your own.
Always observe the correct polarity when connecting cells or packs to charger or application.
Always seek medical attention if electrolyte gets in your eyes (flush with cold water immediately).
Always scrub with soap and water if electrolyte comes in contact with your skin.

Never charge lithium polymer cells or packs unattended.
Never charge lithium polymer beyond factory specifications.
Never charge lithium polymer inside your car, home or garage or where other physical damage can occur.
Never charge lithium polymer while in the application as the hot pack may ignite certain materials.
Never charge lithium polymer on flammable materials such as wood, foam or plastic.
Never extinguish a lithium polymer fire with water.
Never disassemble a lithium polymer cell or pack.
Never short circuit lithium polymer cells or packs.
Never use a lithium polymer cell or pack that has been damaged (see Damaged notes below).
Never keep cells or packs in temperatures that exceed 60C/140F.
Never exceed the factories maximum specified discharge rates.
Never combine different sizes packs or capacities together in parallel.

Visit: www.Zagi.com Email: e-sales@Zagi.com Sales: (360) 275-6853 Fax: (360) 275-6940

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