

New 2000 upgrade... Lighter Thinner Stronger Faster !



## ZAGI-3C

**Features a 3 Carbon Fiber Spar Matrix**

Wing span	48"
Wing area	3.33 sq. ft.
Airfoil	ZAGI 2000
Weight	17-19 oz.
Speed range	6 to 45+ mph
Radio	2 channels w/mixing

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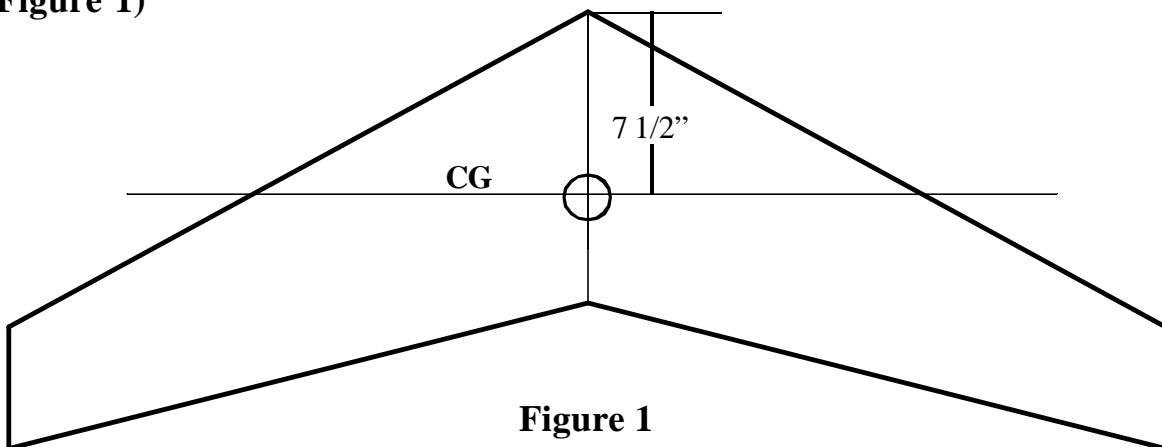
## Recommendations and Notes

These instructions are updated with each new production run. Any mods or changes to the kit are included with each run.

3M Super 77 spray adhesive is the recommended adhesive for the assembly of the Zagi-3C. Shoe Goo, Goop, or any of the other Goo or goop adhesives can be used with a weight penalty of one to three ounces. The Zagi-3C can be built for various conditions - light weight or rough duty. There are references to these different functions in the appropriate place in the text following. The construction you choose will determine the final weight of the airplane. It roughly translates to 17 oz. for light duty to 19 oz. for rough duty or combat. The weight differences are simply the amount of fiber tape used.

**Balancing** The Zagi-3C balances at 7 1/2 inches back from the nose. This means that most of the outboard wing panels are behind center of gravity (CG). Adding weight behind CG means that more weight will be needed in the nose to achieve balance. So you pay a weight penalty twice or even more for adding the extra weight behind the CG.

(See Figure 1)



**Wing Panels** The wings panels are die cut for standard servos. The die cut battery bay will accept a square AA size battery pack or NiCd batteries from 220 mAh to 600 mAh. A small 220 mAh battery may be used for extra light conditions. Notice that the battery bay is wide enough for the battery and some nose weight if necessary. The receiver bay will accommodate almost any receiver size plus enough room to stow the extra servo wire. The die-cut servo bays can be glued back in place and re-cut if different size radio gear is preferred. Just push them out and spray them with the adhesive and replace them. Balsa shims can also be used to assure a snug fit. The wing is thick enough for the radio installation within the original contours of the airfoil. For maximum performance, install all of the radio gear, wires, and nose weight flush. Radio gear should be invisible when it's covered. The switch should be installed so that it is not above the surface of the wing. After turning the switch on, put a piece of tape over the switch slot before launching.

### **The Zagi-3C Kit Contents:**

- 2 Expanded polypropylene (EPP) wing panels and beds
- 2 Pre-cut balsa elevons
- 1 Roll 2.2 mil color poly tape
- 2 Control horns with 2 screw plates and 4 screws
- 2 Threaded 2-56 control rods
- 2 Threaded 2-56 clevises
- 2 Die-cut clear plastic winglets
- 1 1 1/2" x 2" x 8" EPP foam block for repair and reinforcement
- 1 Roll of 2" wide fiber filament tape

### **Needed Components:**

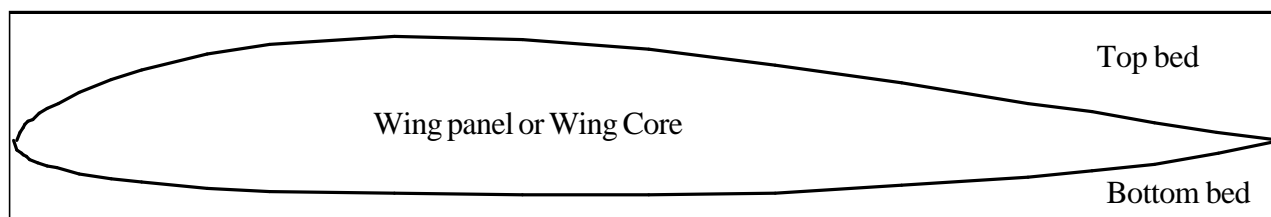
- 1 Receiver (RX)
- 2 Standard servos (cutouts are for "standard" servos but minis may be used)
- 1 Battery A 600 mAh NiCd AA size battery will allow several hours of flying before recharging.

### **Tools and Materials Needed:**

- Small 90 degree square
- Sanding block
- 150 to 320 grit sandpaper
- X-acto knife with #11 blade
- Dremel (optional)
- Spray adhesive (3M Super 77)
- Lead weights for balancing (if needed)
- Additional roll 2.2 mil color poly tape in contrasting color (optional) - see text
- Round pencil or ball point pen
- Mixing (popsicle) sticks
- Wax paper and/or clear wrap
- Scissors
- Z-bend pliers (optional)

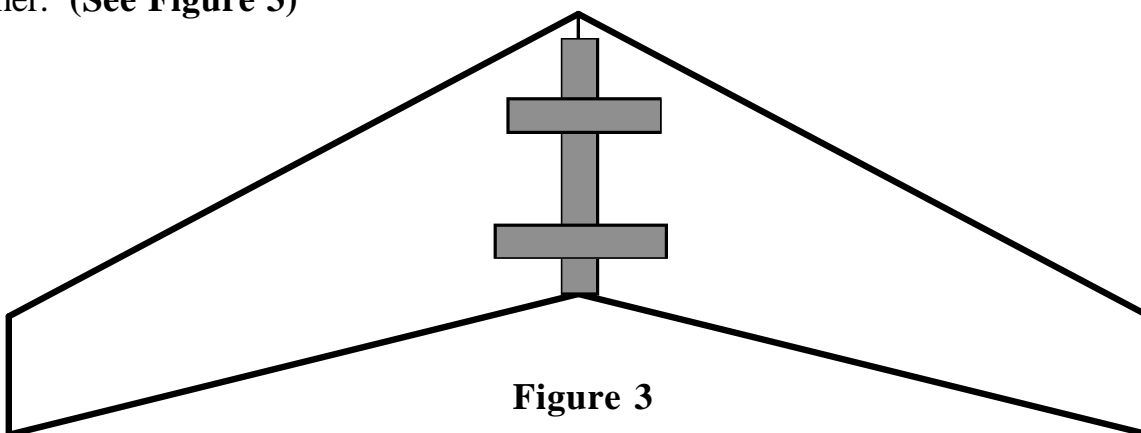
**Assemble Wings** There are three parts to each wing panel. The wing core is shipped between the top and bottom beds. The beds are used as construction jigs. Always use the beds as a base when working on the wings. They will be useful for storage and for tune-ups and repairs, so save them.

Remove the hairs and zigzags from the wing cores and beds by lightly rubbing on them with a scrap piece of foam. Lay the bottom right and left wing beds on a flat surface. Set the wing cores on the beds and lightly block sand the wing panels (cores) with #320 paper and round the leading edge (LE). (See Figure 2)



**Figure 2**

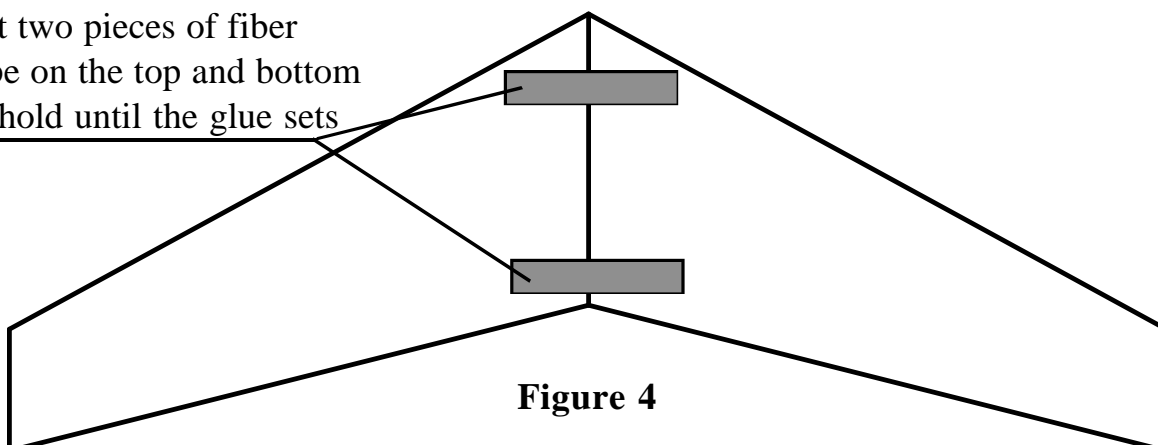
With fiber filament tape, tape the top beds together and then tape the bottom beds together. (See Figure 3)



**Figure 3**

Lay the top bed on a flat surface. Spray the root (wide) end of the 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 get tacky dry to the touch. Put the wing panels together. Make sure that the spar slots are aligned. Put two pieces of fiber tape on the top and bottom. (See Figure 4)

Put two pieces of fiber tape on the top and bottom to hold until the glue sets



**Figure 4**

Put the wing panels in the top bed bottom side up. Use weights to hold the panels in place. The weights are very important to maintain alignment and wing geometry.

Hold the spray head 1 inch from the middle of the spar slot. Spray one long puddle of 3M Super 77 spray adhesive the length of the two long spar slots. Use the end of the spar as a spatula to spread the glue evenly. A mixing (popsicle) stick can be used to direct the excess adhesive into the spar slot. Repeat this until the entire groove is wet with adhesive. Make sure that the side walls of the spar slot are covered. Lay the spars on a piece of wax paper or aluminum foil and spray the spars with the adhesive. Align the spars to meet at the center of the wing panel and push them in place. Place weights on the wing panels to hold the correct alignment. (See Figure 5)

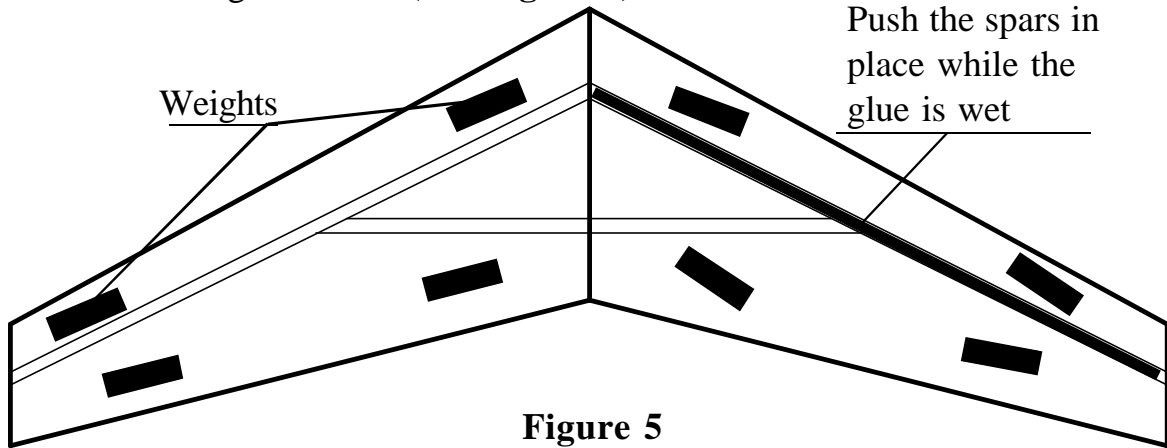


Figure 5

Spray one long puddle of 3M Super 77 spray adhesive the length of the short spar slot. Lay the spar on a piece of wax paper and spray the short cross spar with the adhesive. Push the spar in place. The glue will reach maximum strength overnight. (See Figure 6)

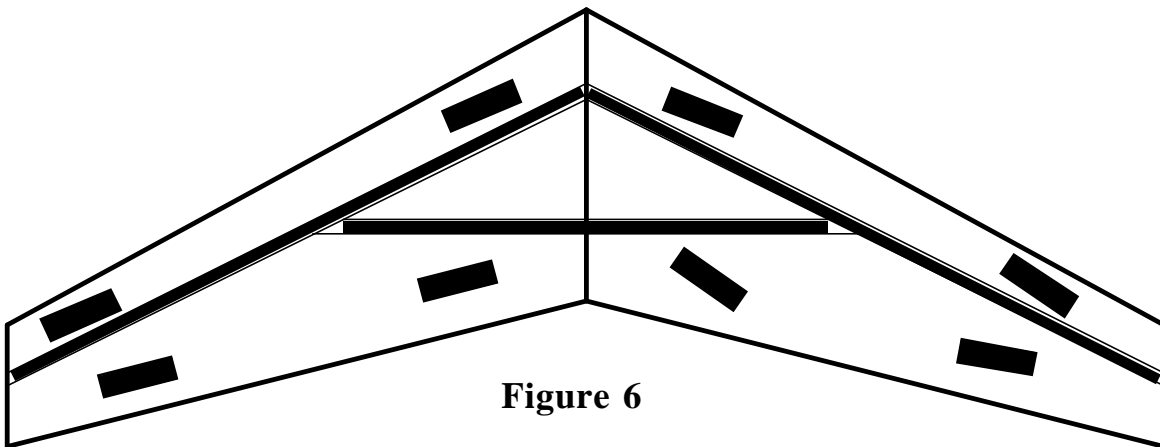
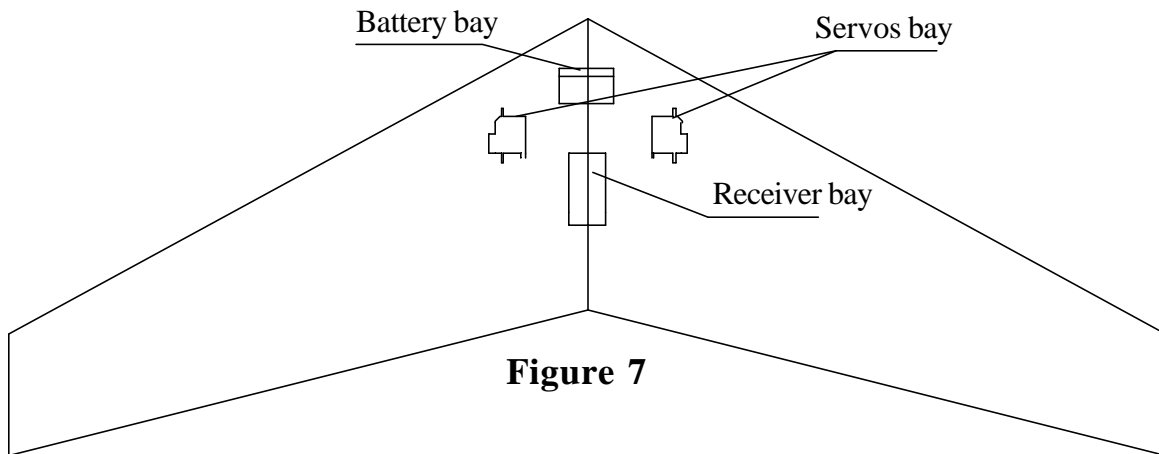


Figure 6

**Install Servos** On the table, plug the servos into the receiver, typically the right one in slot 1 and the left in slot 2. Turn on the transmitter (TX) then plug the battery in the receiver (RX) (always turn the TX on before the RX and turn off the RX before the TX). Use the “X” servo control arm. Cut three of the arms off of the X, using the longest if different sizes. Attach the arm to the servo in as nearly vertical position as possible but make sure both arms are close to the same angle. Make sure servos move in correct direction, forward with the stick back; right one forward, left one to rear for right stick movement. Reverse TX controls if necessary to provide correct elevon movement. Disconnect battery and turn off TX. Remove servo wires from the RX.

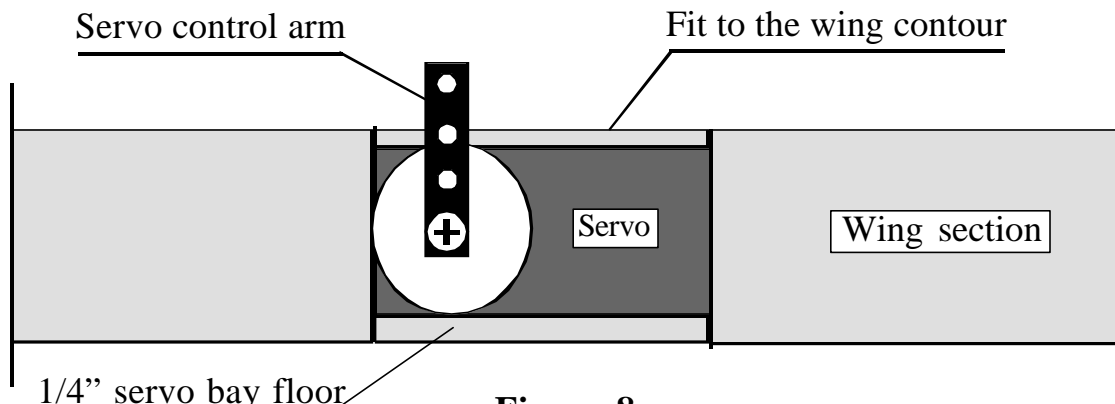
The control rods may not fit in the servo control arm. The end of the control rod can be filed to fit in the servo control arm or the top hole in the servo control arms can be reamed by spinning an X-acto #11 blade in the hole or drilling with a #48 drill (.076”).

The wing thickness will accommodate standard servos. Servo control arms should be straight up facing outboard-toward wing tips. Some standard servos are bigger than others. It may be necessary to cut or router the servo holes to a tight squeaky fit so that no glue is necessary. Locate the servo cut out in the wing panel. Push the cookie cut-out out of the wing. Slice a 1/4" wafer off the bottom of the cookie. The X-acto Extra Fine Saw Blade does an excellent job of slicing EPP wafers. Spray a puddle of 3M Super 77 adhesive on a piece of wax paper or aluminum foil. Touch the edges of the parts to be glued in the puddle. Glue the wafer back in the bottom of the servo bay as a servo bay floor. Push the servo into the bay and cut the top of the cookie to fit as a servo bay lid. Make sure the lid is flush with the top of the wing. (See Figure 7)



**Figure 7**

**Install Radio** Push the battery bay and receiver cookies out of the center of the wing panels. Cut 1/8" wafer off of the bottom of the receiver cookie using the X-acto Extra Fine Saw Blade to make a floor for the receiver bay. Cut a 1/4" wafer off the bottom of the battery cookie to make a floor for the battery bay. Make sure that the floors match the contour of the wing surfaces. (See Figure 8)



**Figure 8**

Drill a hole between the battery bay and the receiver bay big enough to push the connectors through. Use a 3/8" brass tube with one edge filed sharp. Twist the tube while pushing to make a clean cut through the foam. Do the same between the servo bays and receiver bay. A hole can also be burned in the foam by heating a wire. Do not overheat the wire. Do a few tests on a piece of scrap before trying it on the wing. Allow space in front of the RX bay to install the switch. If needed, make a small space next to the switch to stow the battery charge wire. (NOTE: If using AA batteries a battery charge wire is not used.) Mount the switch below the surface of the wing for two reasons. Reason one, drag. Reason two, contact can turn it off in flight. Make a line with a straight edge from the RX bay to the wing tip parallel to the wing spars. Cut a 1/4 inch deep cut on the line. Push the antenna into the slot with a flat blade screwdriver. Let the extra antenna wire hang off the wing tip. Install the servos, battery, switch, and receiver using double backed tape. The switch may be taped to the RX for a solid mount. Cut a wafer off of the top of the RX and battery cookies, making sure they match the contours of the wing surfaces. Put the servo, battery, and receiver bay covers in place, leaving an opening for the switch. Rotate the servo control arms out of the way of the servo tops. Push the antenna wire into the spar. Apply a piece of fiber tape over the covers. (See figure 9)

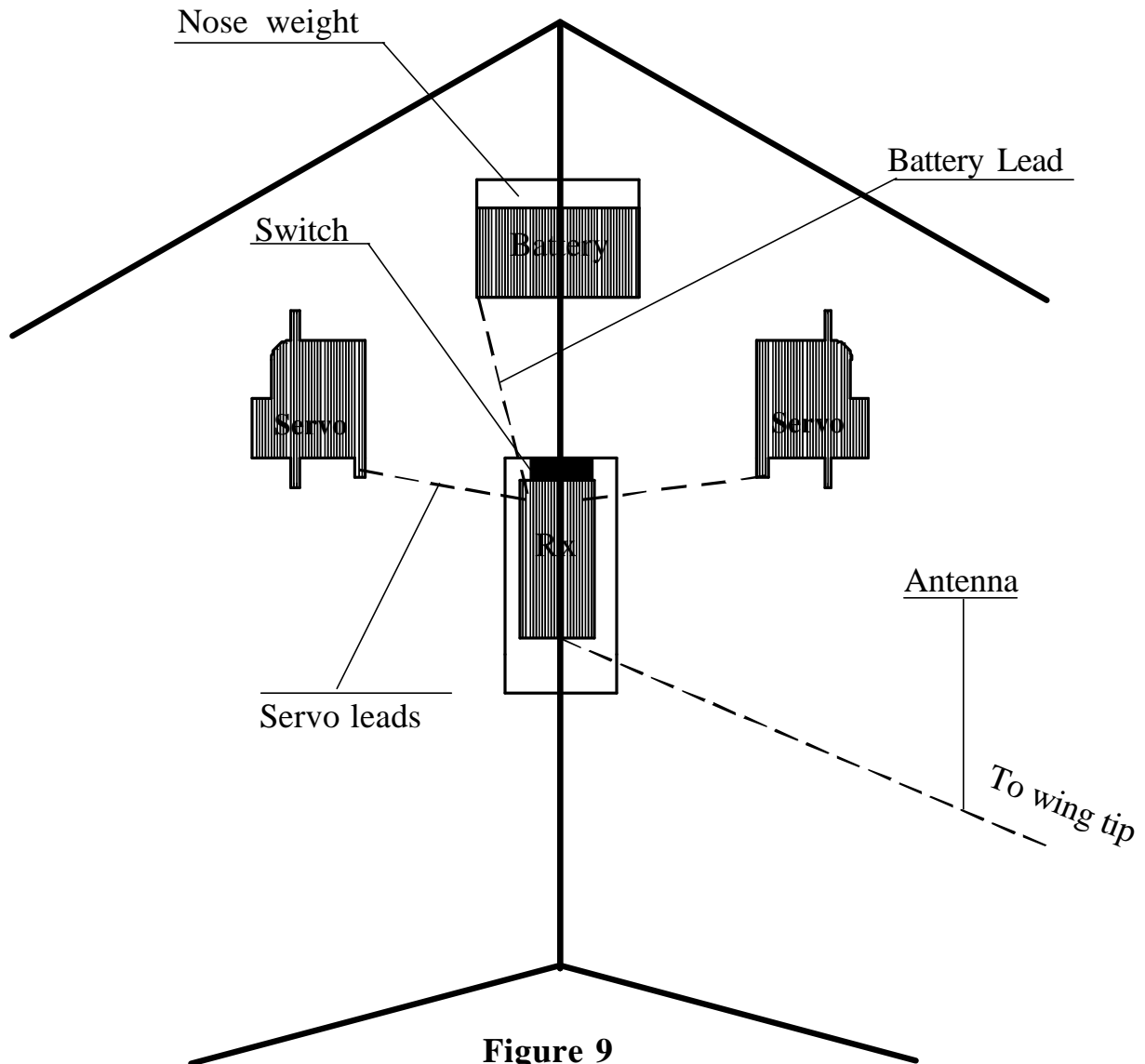
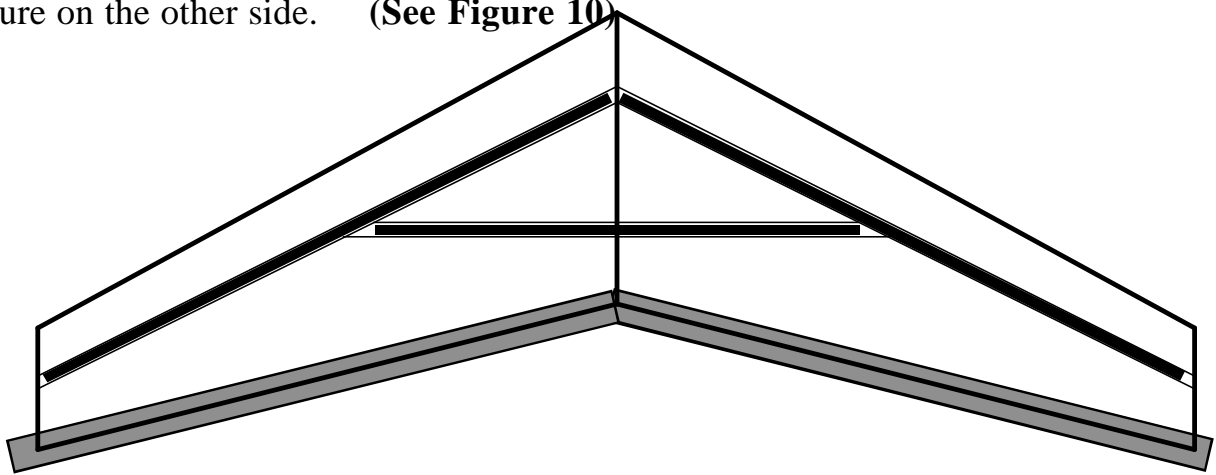
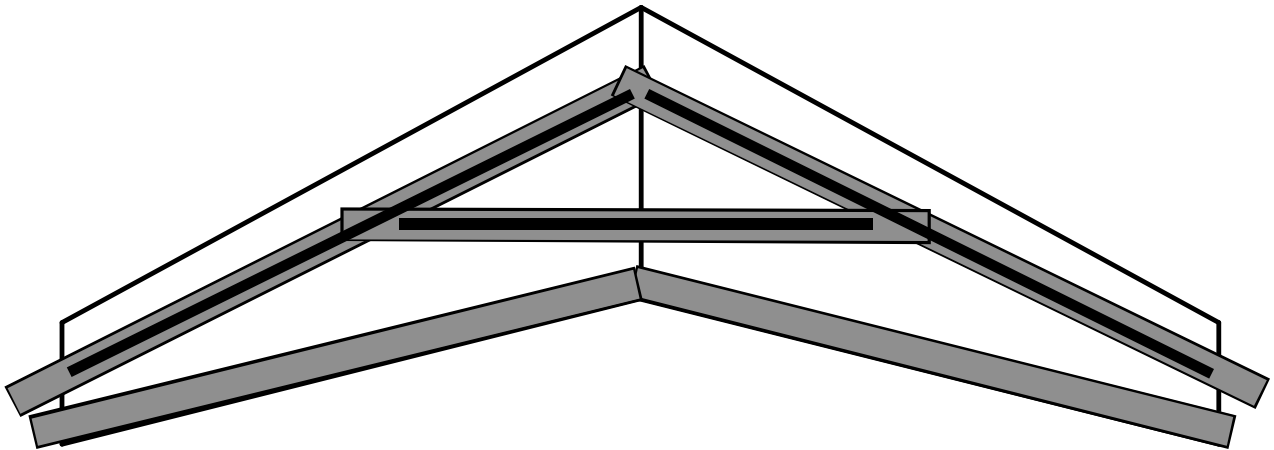


Figure 9

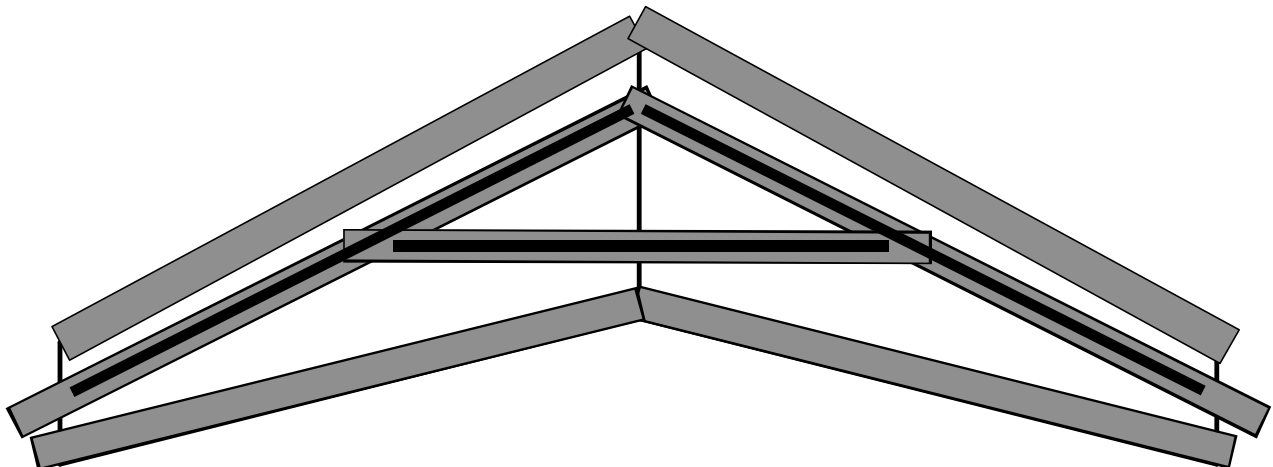
**Taping Wings For Strength** Vacuum the dust from the cores, beds and the work bench. Make sure that all of the radio parts are covered before spraying. Lay the wing in the bottom bed top-side up. Apply a coat of 3M Super 77 spray adhesive to cover the top of the entire wing. Allow the adhesive spray to dry at least 30 minutes. Repeat this procedure on the other side. (See Figure 10)



Wrap a strip of 2" fiber tape around the trailing edge.



Make sure that the glue used to hold the spars is dry. Apply a strip of 2" fiber tape over the spars.



Wrap a strip of 2" fiber tape around the leading edge.

**Figure 10**



## Optional Taping Scheme if Weight is Not a Factor

The Zagi-3C can be built for rough conditions. The construction you choose will determine the final weight of the airplane. It roughly translates to the light weight at about 17 oz., rough duty about 19 oz. The weight differences are simply the amount of fiber tape used. Below is a suggestion for a fiber tape schedule for rough duty. If you do not fly combat or in rough conditions, skip Figure 11. (See Figure 11)

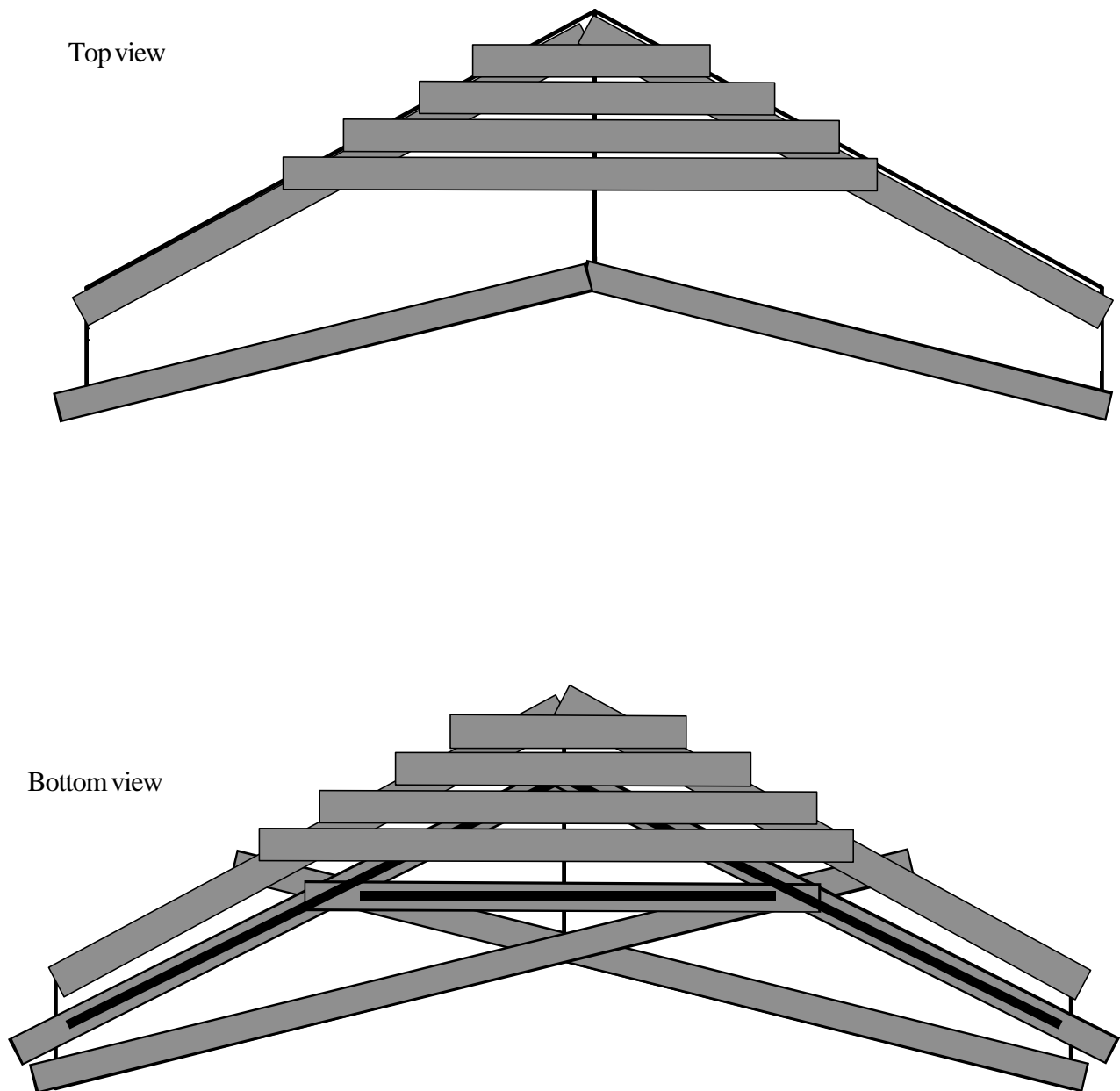


Figure 11

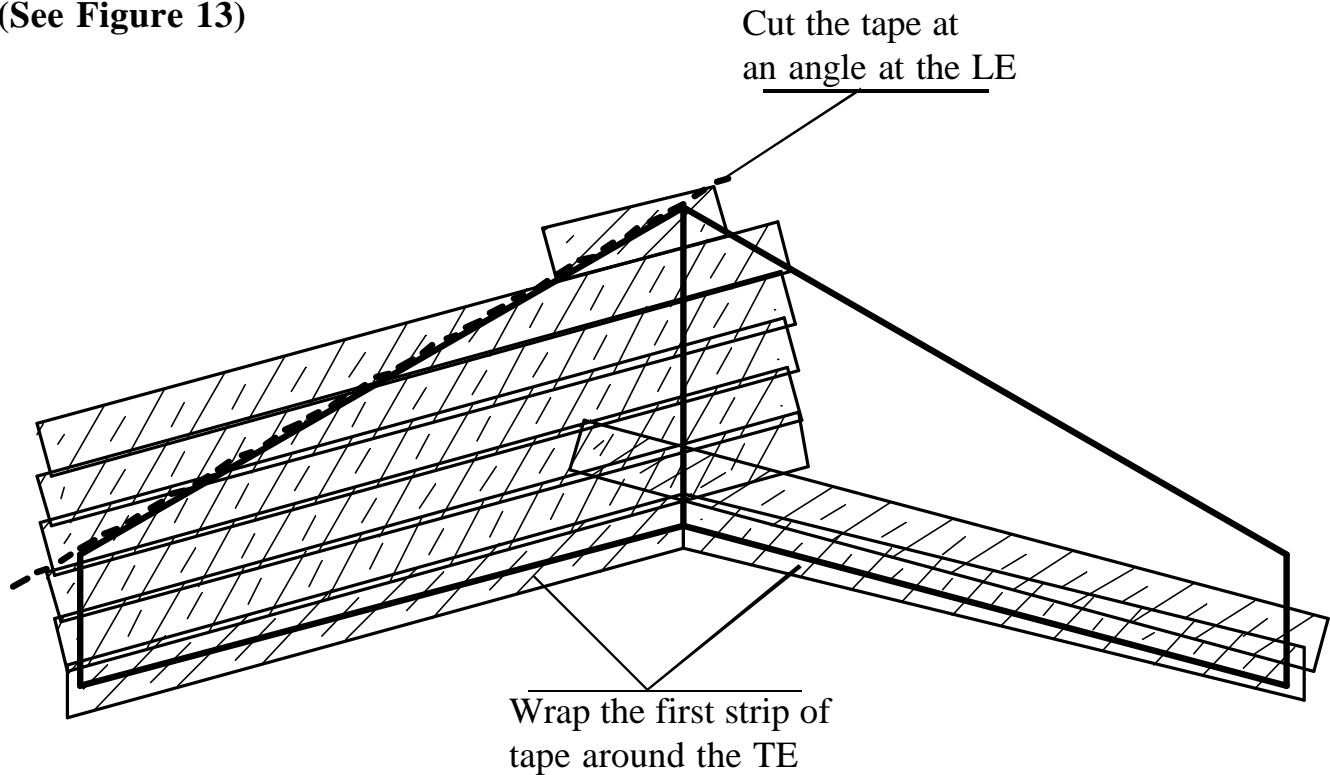
**Cover with Colored Tape** Having the top and bottom of the wing in sharply contrasting colors makes the plane much easier to fly, typically with the darker color on the bottom surface. An optional roll of color tape will be required to do this.

Spray the fiber tape with 3M Super 77 adhesive and let it dry for about 30 minutes. Start the color tape covering at the trailing edge (TE) of the wing by wrapping a strip of tape around the TE being careful to follow the shape. Work from the TE forward. Lay strips of tape from tip to at least 4 inches past the center. (See **Figure 12**)

Overlap the tape 1/4" all the way from the center to the tip. Cut the tape at an angle at the LE.

Place the wing in the top bed and repeat the taping procedure working from TE forward to the LE.

Finish the leading edge with a single spanwise piece of tape wrapped around the LE. (See **Figure 13**)



**Figure 12**

Wrap the leading edge with a single spanwise piece of tape

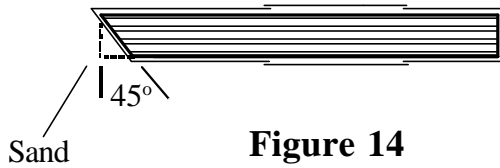
Overlap the tape 1/4"



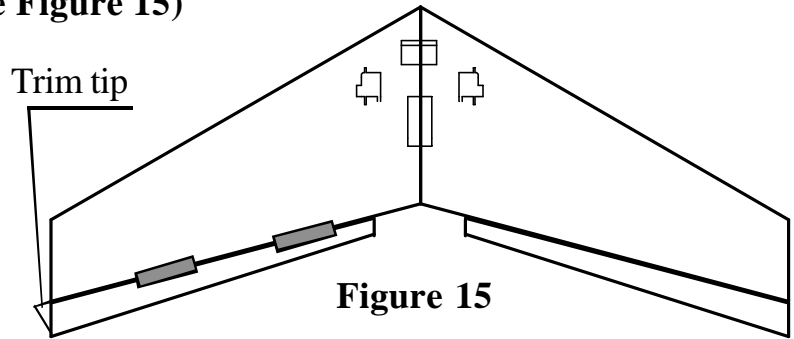
**Figure 13**

**Prepare and Attach Elevons** Hold the elevons together and sand them until they are identical. Trim the end to match the angle of the wing tip. Sand a 45 degree angle into the front of the elevon then completely cover the elevons with the color tape, making sure the edges are wrapped.  
(See **Figure 14**)

Position the elevon on the trailing edge of the wing with small pieces of tape. Leave about 1/16" from edge of elevon to wing tip to make sure the elevons don't rub against the winglets after they are installed. (See **Figure 15**)

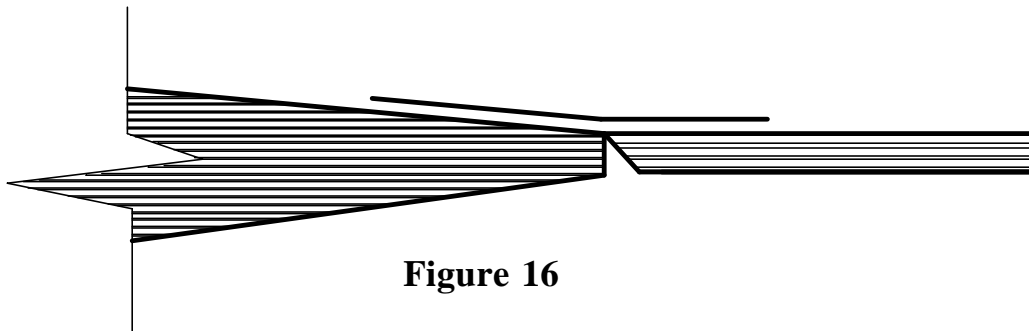


**Figure 14**

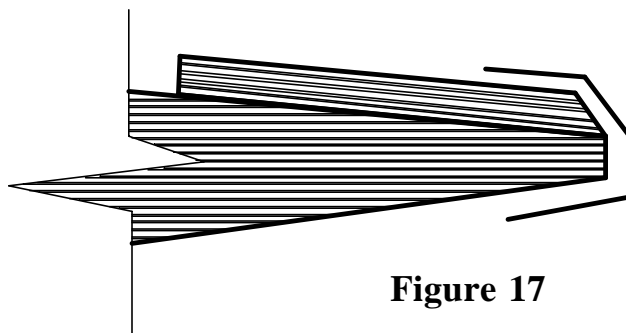


**Figure 15**

Make a tape hinge the full length of each elevon of color tape. (See **Figure 16**) Swing the elevon to the top of the wing and lay flat. Use a small piece of tape to hold it there. Complete the hinge with another full length strip of color tape on the bottom as shown. (See **Figure 17**)

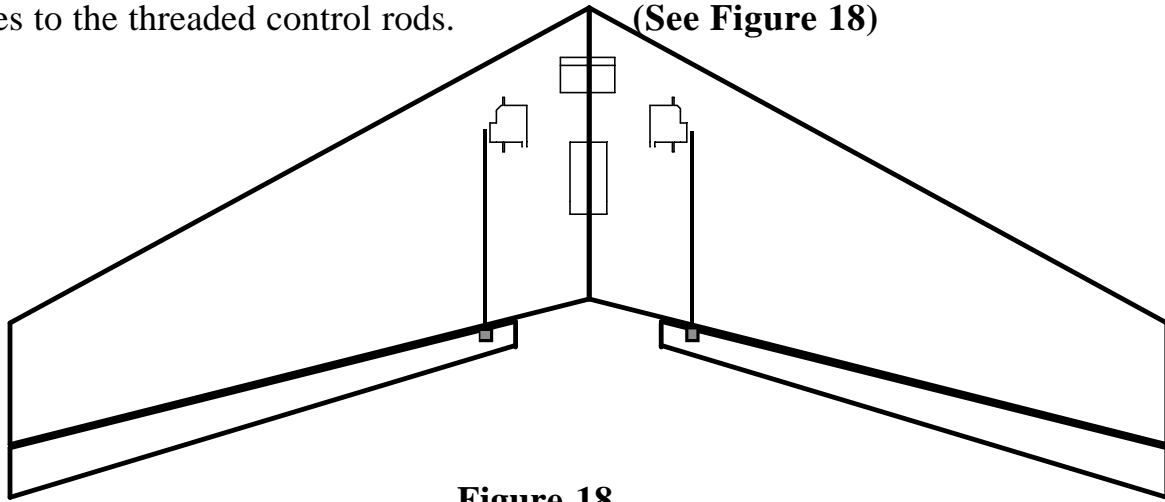


**Figure 16**



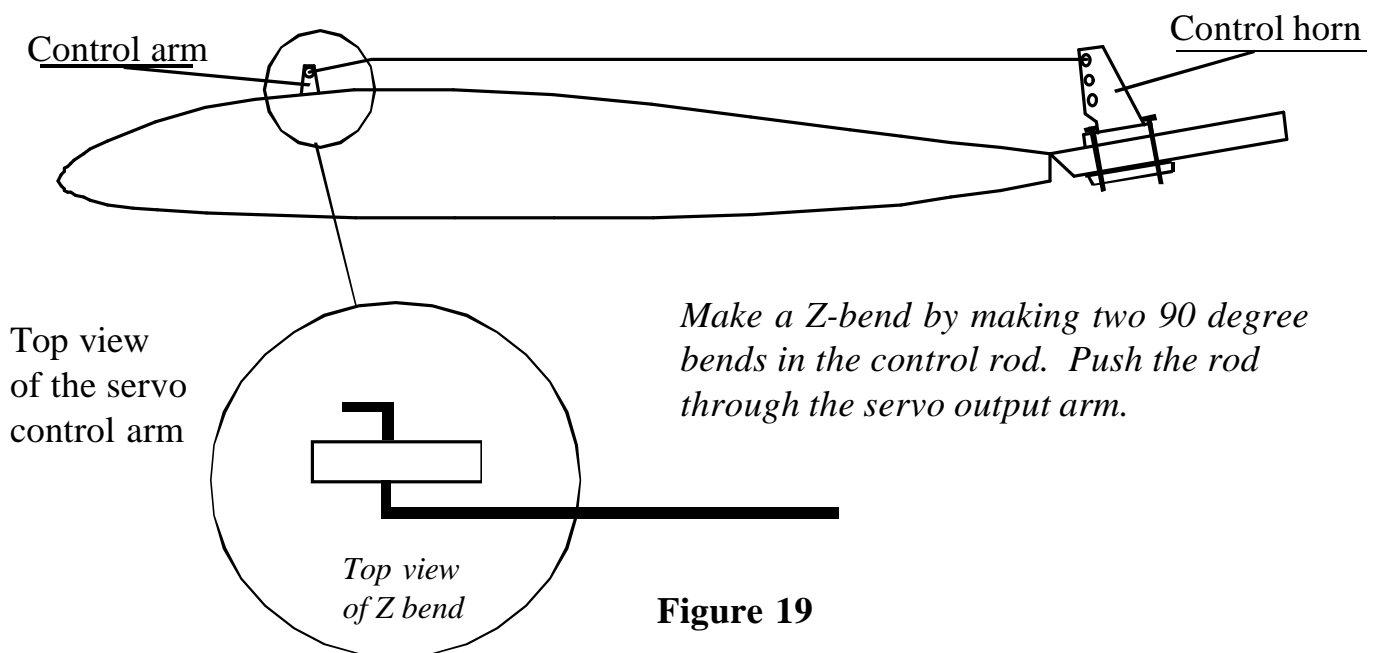
**Figure 17**

**Attach Elevons to Servos** Attach control rods to the servo control arms with a Z-bend. (NOTE: Z-bend pliers may be purchased from your local hobby store to make this operation easier.) (See Figure 19) Position the control horns on the elevon directly behind the servo control arm close to the hinged edge but be sure the control horn and screw plate do not interfere with the movement of the elevons. Mark the position of the control horns. Drill two holes with 3/32" drill for each control horn. Install the control horns on the elevons. Note that the two screws will self thread into the plastic screw plate. Attach the control rods to the top hole of the servo control arms. Attach the clevises to the threaded control rods. (See Figure 18)



**Figure 18**

Make a 10 degree bend in the control rods 1 inch behind the servo to prevent binding. Beginning flyers put the clevis in the 1st or 2nd hole from the top for less response. Experienced flyers put the clevis in the 3rd or 4th hole from the top for more response. (See Figure 19)

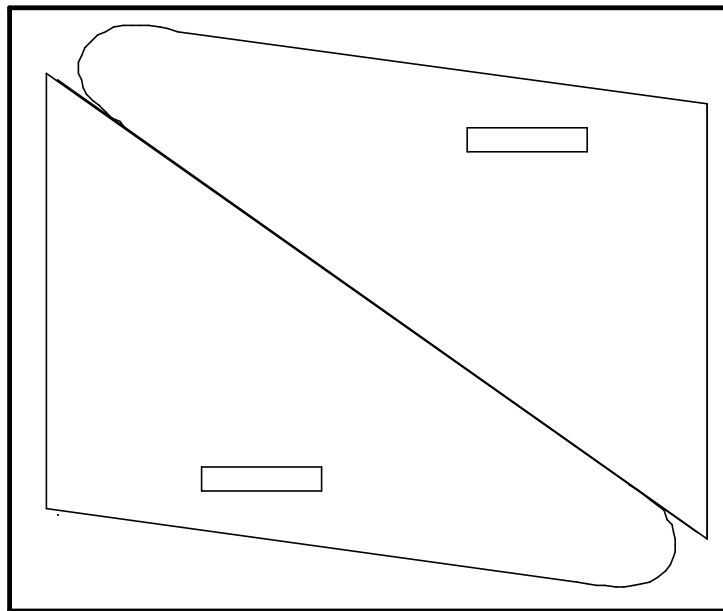


**Figure 19**

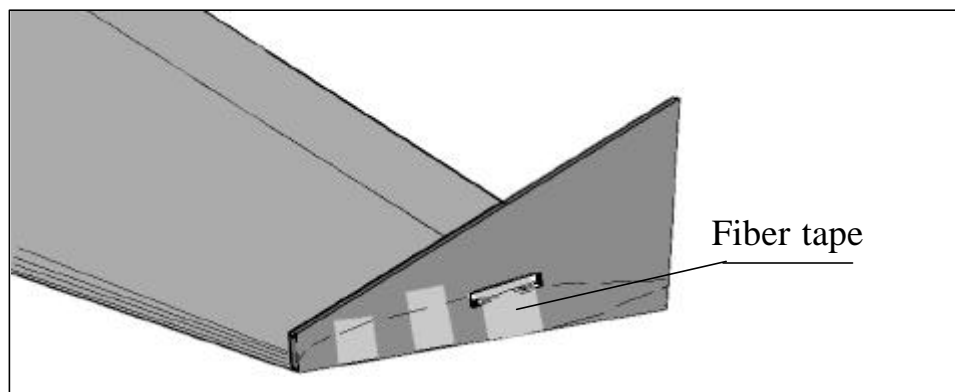
**Attach Winglets** Punch-out and separate the two nested clear plastic winglets. Punch-out the 1 1/4" x 1/4" slot in the winglet. (See **Figure 20** )

Put a piece of filament fiber tape through the 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. (See **Figure 21**)

**The winglets are at the very back of the airframe so they will seriously impact the balance of the plane. 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 three short strips of tape.**

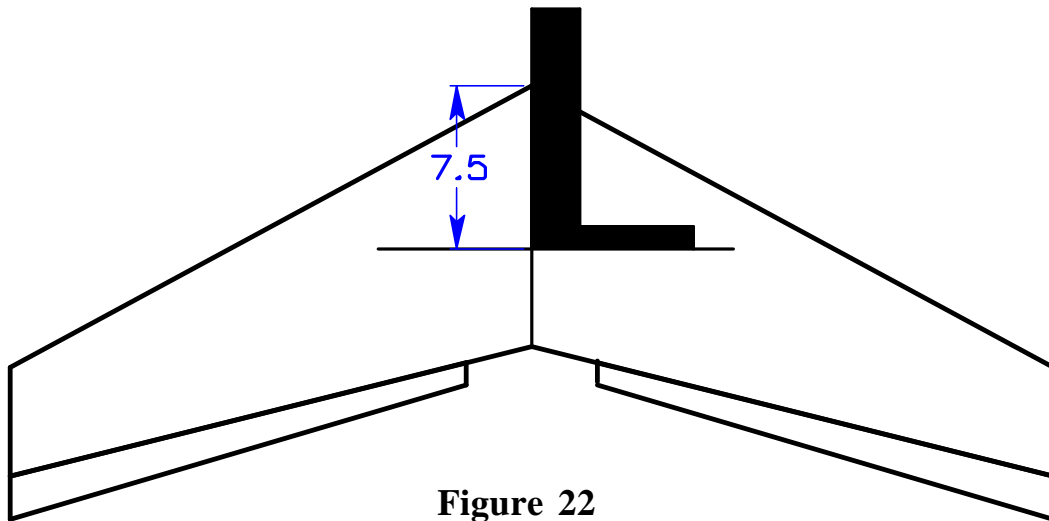


**Figure 20**



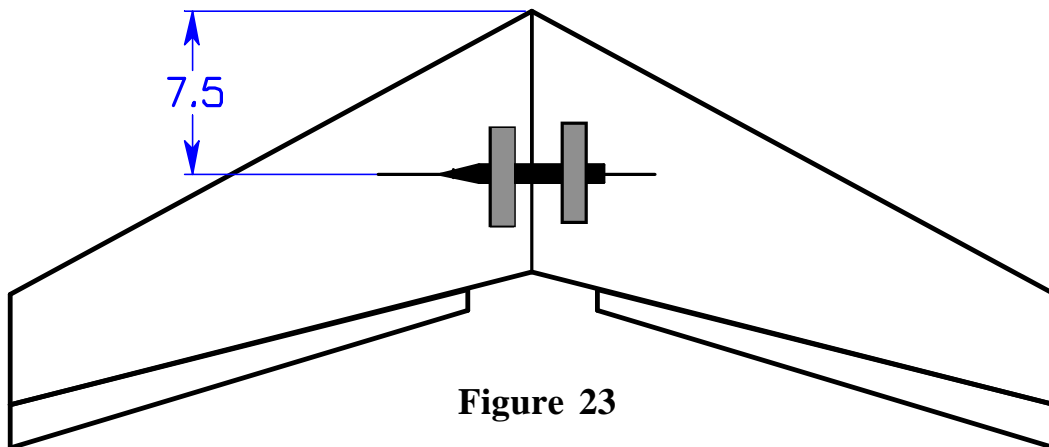
**Figure 21**

**Balance** Lay the wing bottom-side-up. Using a square, mark the CG by making a line perpendicular to the center line 7 1/2" back from the nose on both panels.  
(See Figure 22)



**Figure 22**

Tape a round pencil or ball-point pen 7 1/2" back from the nose, directly over the CG line.  
(See Figure 23)



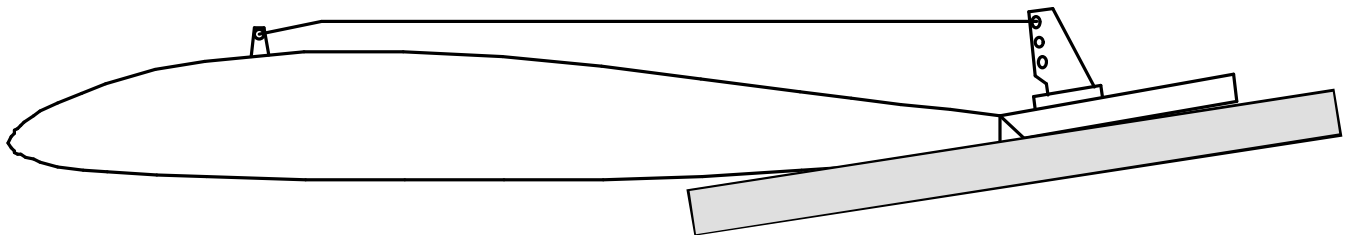
**Figure 23**

Place the wing top-side-up on a flat surface. Balance is achieved when the wing balances momentarily on the pencil. Add lead weight to the battery bay in front of the battery if necessary to achieve balance.

Locating the CG within a flyable range is a matter of experience and personal preference. The Zagi-3C performs well with the CG between 7 and 8 inches back from the nose. A 7 1/2" setting is a good place to start. Moving the CG back 1/2" forward or back will yield some different flight characteristics. So experiment by moving the CG until it feels right. Weights can be temporarily taped on while experimenting.

**Setting Trim and Throw** With the TX on and the battery on (in that order), set the elevon neutral setting by laying a straight edge under the wing at the trailing edge. The elevons should appear to have a few degrees of reflex. (up elevator) (See Figure 24)

Move the transmitter aileron stick from full right to full left (not up or down). The elevon throw should be 3/8" in each direction measured 1" from the tip (no differential) When moving the elevator stick full up to full down, the throw should be 3/8" in each direction.



**Figure 24**

### **First flight**

**IMPORTANT:** Please check the frequencies (channel number) of all pilots at your site 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!

**CAUTION:** While the Zagi-3C is made of foam, traveling 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 be a member of the AMA.

Good luck,  
JT

# Go fly!