



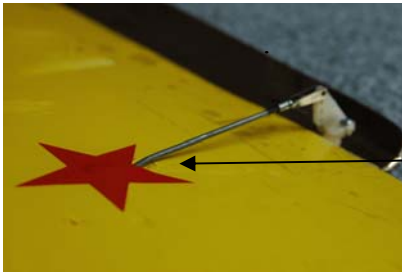
**“Presented by Burns Model Aircraft, for the R/C Flyer, is the Z-Wing
A flying wing that is nearly indestructible.”**

The Z-Wing combat, slope, thermal or electric Flyer, designed with computer design software, is an outstanding flying wing for use in combat flying or just plain leisurely flying fun. However, you want to fly it is up to you.

Combined with an overall light flying weight of sixteen ounces (or less, depending on the radio used) and a fast semi-symmetrical airfoil with low stall characteristics, the Z-Wing is a smooth, fast and highly maneuverable flying wing, which can stay aloft even in the lightest of wind. It thermals very well. Pilots with flying skills from beginner through advanced will enjoy the Z-Wing design. The Z-Wing is **extremely** enjoyable to fly in close to the rim of a cliff or to skim the slope, and is capable of swift high-speed turns quickly returning for the next run. The Z-Wing is made of Expanded Polypropylene Foam (EPP), a forgiving flexible foam material that returns to its original shape when bent. A single Carbon Fiber Spar joins the center of the wing and helps to make it a crash resistant airplane. The Z-Wing is quick and easy to assemble. You can even add an electric motor for high-speed flying at your flying field without a slope, or fly with a high-start or up-start (bungee cord assist). Try thermal flying as well. We hope you enjoy your new Z-Wing and we wish you many hours of great flying fun!

THE FOLLOWING SUGGESTED RADIO INSTALLATION METHOD, IS FOR ADVANCED BUILDERS AND BEGINNERS WHO WANT A VERY CLEAN UPPER AIRFOIL:

Exposure of servo arms or wheels on top of the wing makes them vulnerable to air strikes that can destroy the servo arms, or worse, destroy the servo gears. Installation of the radio on the bottom leaves a very clean upper wing surface for a smooth, unobstructed airfoil without evidence of the receiver, servos, battery or battery switch showing and minimal exposure of the pushrods. Only about three inches of pushrod length remains exposed at the upper trailing edge using this method. Since using this method, we have not had any damaged servo arms or gears on our Z-Wings. Before using this method, it was common in heavy combat to suffer loss of servo gears or arms.



This is where the pushrods exit



SUGGESTED RADIO INSTALLATION FOR A CLEAN UPPER AIRFOIL

For installation of the radio on the underside of the wing, you will need to mount the pushrods diagonally through the foam. **DO NOT** mount the pushrods FROM THE SERVO TO THE ELEVONS ON THE UNDERSIDE; landing on the ground could possibly catch the control horn and damage your servos.

- 1) Measure from the center of the wing (root) to the **temporarily installed servo wheel**, (about 4 ¼ inches from the center of wing to the servo's wheel).
- 2) Mark a line from each servo wheel to the trailing edge.
- 3) Measure 3 inches **from** the trailing edge along the scribed line and make a mark. This mark will be the exit hole for the pushrod, which runs diagonally through the wing from the servo wheel.
- 4) Drill a guide-hole with a 1/8-inch by 12-inch diameter drill bit or a pushrod sharpened on one end.
- 5) Purchase a 5/16 x 12-inch brass tube from the hobby store and use it for drilling the larger hole.
- 6) Prepare the brass tube as a drill bit. Use a small pair of dykes (side cutters) or use a Dremel® tool with a cutting wheel for cutting small triangle notches on the end of the brass tube so it acts as a cutting drill bit for cutting through the foam or just simply sharpen the end of the tube
- 7) Insert the brass rod over the pushrod or drill bit, which you **leave inserted into the foam** as a guide. . Do not worry about the drilled holes causing any structural damage even if you have to drill and re-drill several times to get the proper alignment.
- 8) Use a 4-inch piece of outer plastic tubing from a Goldenrod® (usually supplied with the kit) for pressing through the hole; it acts as a bearing, which allows little resistance to the pushrod. The pushrod moving back and forth through the foam can bind up and cause the servo to stall if the plastic tube is not used.

Preparing the wing:

- 1) Rub each wing surface with the foam scrap block to remove the excess kerf strands (material left behind from the cutting of the wing); not too hard or it will rough up the surface.
- 2) You can also just pick the kerf off the wing, but is more time consuming.
- 3) After removing the kerf, sand the wings lightly with sandpaper (100 - 240 grit), but it is not required.
- 4) By the time, you have finished putting on the tape and spraying the contact cement, it will be smooth
- 5) Align the wing halves together; check location of your receiver, battery pack, and switch harness to make sure they match the pre-marked outlines. If not, redraw them and make your cutouts before joining the halves permanently.
- 6) Use a #11-razor knife or an X-ACTO® knife to cut out the receiver, battery and switch harness cavities on each half of the wing. This saves some time on cutting the cavities out and makes for neater cuts and less mess.

Joining the Wing Halves: (Page 6)

Washout:

Washout minimizes stall during turns while flying. To add washout to your wing, you will need to warp the trailing edge of the wing up about 1/8 of an inch or more at the wing tip while ironing on the covering. If you use tape for the covering material, you will need to leave the wing in the wing bed with something like scrap foam, balsa or other material under the trailing wing tip. This will warp the tip up while covering the wing. You should always cover the bottom of the wing first. Allow the excess Shrink covering or colored packing tape (about ½ inch), to wrap around the edges. Make sure the top is covering is cut to allow the material to wrap around the edges, about ¼ inch to ½ inch, or you may prefer to cut it even with the leading and trailing edge so the top of the wing will have a neater look, since most people will see your wing from the top. This is also best for lift because the top of the wing creates the lift. *(Page 6)*

Installing the battery:

Cut and remove the foam and install the battery. Cut for a tight fit. *(Page 6)*

Installation of the receiver and antenna:

Mark the size of the servos and receivers for a tight fit, then cut, remove the foam, and install the receiver and servos by pressing them into place. *(Page 6)*

Installation of the servos:

Optional installation, but not recommended: you can glue servos in; but you may have to remove them sometime for service on the wheel, arms or gears. If you wish to glue them, wrap masking tape around the servo to protect it. *(Page 7)*

Preparing the wing and overlaying the tape:

Use Fiber re-enforced tape for strength and apply to top and bottom of wing; also apply tape to the leading and trailing edges and center of wing over the charging wire. *(Page 8)*

Wing Covering:

Cover with Ultracote®, Easycoat®, or Flitekote® covering or any covering, but Monokote®, which we do not recommended. *(Page 9)*

Alternate Method to Cover the Wing:

Use polypropylene (2. 2 mil) tape, which is available from your local hobby shop or us. Colors: red, white, black, blue, yellow, orange and green) *(Page 10)*

Preparing the Elevons:

Bevel the leading edge of the elevons and cover the elevons with 2mil polypropylene tape. *(Page 10)*

Applying Hinges:

Use Strips of packing tape (Procedure below). Use Clear Plastic packing tape for the hinges along the entire length of the elevons. *(Page 10 & 11)*

Winglets:

Glue winglets with Shoe Goo®, Goop® or silicon (use two to four straight pins to hold in place while curing) *(Page 11)*

Balancing the Model:

Center of Gravity set at 7½ to 7 5/8 from nose. *(Page 12)*

THE DETAILED BUILDING SEQUENCE:



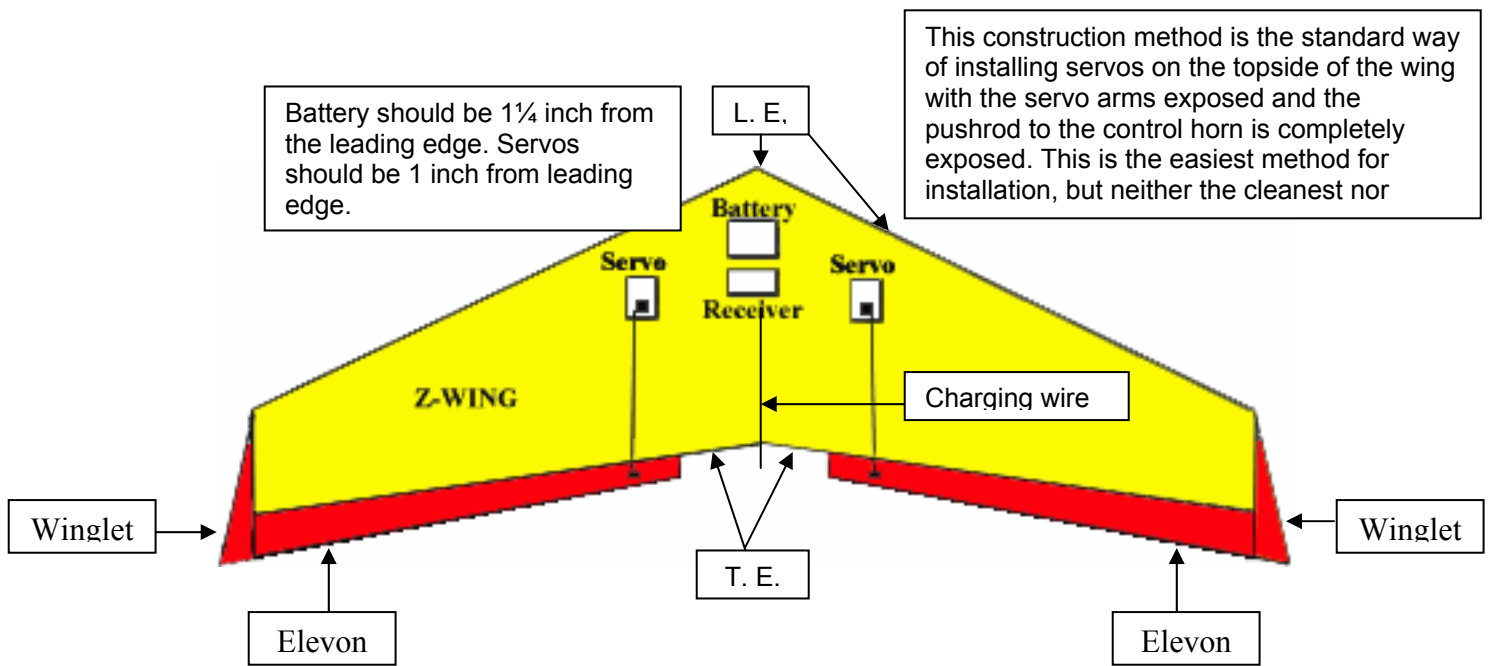
“SIR BRINKLEY, Our Mascot”

GETTING STARTED:

(Check each item off as you go)

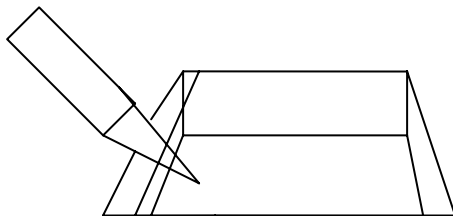
JOINING THE WING HALVES:

- 1) Locate a place on your workbench that is straight and free of warps. Your finished wing will only be as straight and true as the building surface. Rub wing surface with foam scrap block and sand smooth with sandpaper. Make sure you do not let the kerf particles ball up or they will groove the surface of the wing. This is not a problem for flying, but for the aesthetic look (good looks of your plane).
- 2) Before joining the halves, Place wax paper over the lower beds to keep the wing from gluing to them.
- 3) Spray a coat of 3M-77 Contact Spray on the root end (center) of each wing half.
- 4) If you feel uncomfortable using the 3M-77, because it is hard to separate the two halves once joined, then use the Shoe Goo®, Goop® or silicon to join them. You will have longer set times for proper alignment if you use the silicon glues.
- 5) Set the wings aside for about 10-15 minutes to dry (you can speed the process with a hair dryer).
- 6) Lightly coat ½ of the 10 inch carbon spar with your choice of glue such as Shoe Goo®, Goop® or silicon and insert into one half of the wing (DO NOT USE 3M-77 on the carbon spar; you need time to push the spar into the hole).
- 7) Add glue to other half of the carbon spar (and to the root end of the right and left wing halves if you are using the silicon.)
- 8) Carefully align the two wing halves and slide the spar into place in the other half of the wing.
 - a. Make sure that the height between right and left wing halves are the same.
 - b. Lay the wings in the bottom beds and secure them with weights; this will give you the proper “zero” wing dihedral while the glue dries.
 - c. Use masking tape strips or pins to hold the wing halves together.
 - d. Check the glue joint fit. Allow drying for 3 to 4 hours or overnight (best) if you are not in a hurry.
 - e. Unfortunately, this can leave a small ridge of dried silicon glue if it gets too close to the upper and lower edges of the wing.
 - f. Clean the silicon glue with rubbing alcohol and a rag.
 - g. If you do not clean it before it dries, trim it down with an X-ACTO® blade after it is dry.
 - h. Do not try to sand the silicon glue. Silicon does not sand well and you can end up with a shallow groove on either side of the foam.



BATTERY INSTALLATION:

- ❑ Use four AA size Nickel cadmium 900mah rechargeable batteries as a flat battery pack.
- ❑ Center the battery approximately 1¼ inch from LE nose.
- ❑ Mark an outline around the battery for a tight and flush fit. The on/off switch goes between the battery and receiver or behind the receiver (preferred).
- ❑ Cut on the outline approximately 1¼ inch deep with an X-ACTO® knife, which is a #11 X-ACTO® blade. Cut at a 45-degree angle around the cut.



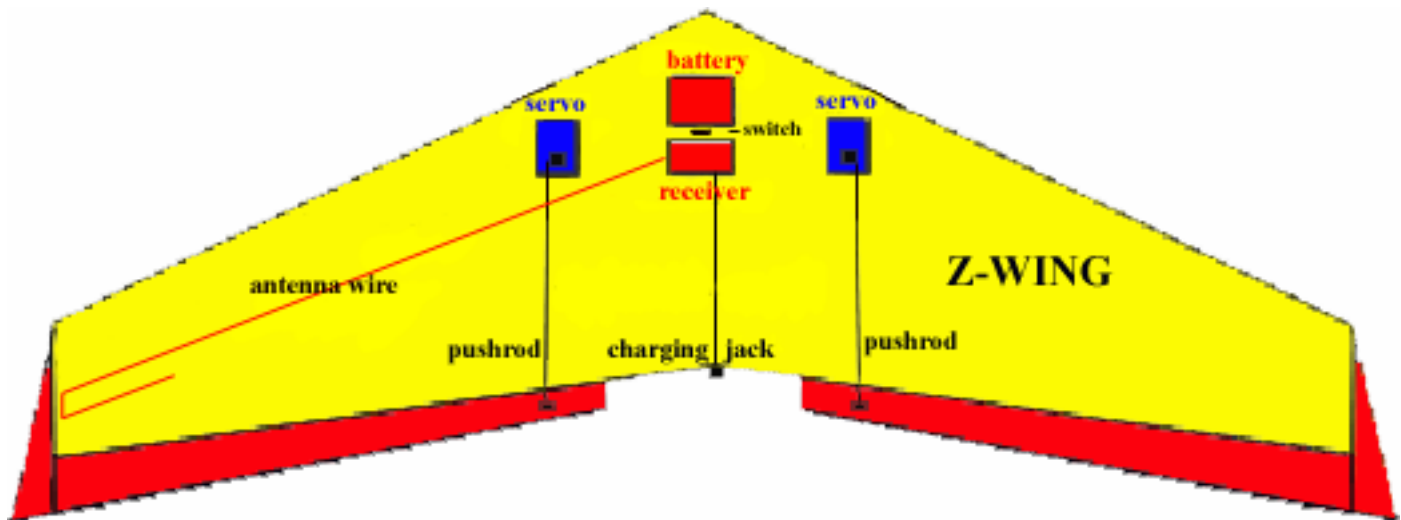
- ❑ If possible, cut the foam so that you can have a ¼-inch foam cover over the battery. You can use the supplied scrap from the wing beds to make the hatch cover for the battery compartment if you wish or purchase a battery harness with a charging receptacle so that you can mount the battery permanently in the plane with the charging jack exposed for charging at home or in the field.
- ❑ Install the battery pack with the wire or harness to the rear.

RECEIVER INSTALLATION:

- ❑ Center the receiver 1¼ inch behind the battery pack.
- ❑ Mark an outline around the receiver and remove the foam.
- ❑ Keep it tight; the foam of the wing is the receiver's insulation from shock.

INSTALLATION OF THE RECEIVER ANTENNA:

- ❑ Do not cut the antenna because you think it is too long. This will shorten the range and you could lose control of your aircraft.
- ❑ Draw a straight line with a straightedge from the receiver to the wingtip.
- ❑ Make a cut with an X-ACTO® from the receiver to within ¼ to ½ inch from the wingtip and ¼ inch deep. If your antenna is too long, you can make a second cut ½ inch parallel to the first one from ¼ to ½ inch from the wingtip to accommodate the rest of the length of the antenna.
- ❑ After the receiver is in place, use your finger to press the antenna into the cut. Once started, you can drag your finger along the cut over the antenna and the antenna will disappear into the cut. Do not worry about these extra cuts weakening the wing; you will be covering the cuts with strapping tape.
- ❑ If you have the wire harness that includes a charging receptacle, you can also consider making a shallow cut to the trailing edge to allow the extra charging wire to stick out the back. If you use this method, overlap 4-inch strips of strapping tape over the cut starting from the trailing edge to the receiver.
- ❑ Look at the illustration for a sample layout.
- ❑ Some flyers do not use the charging jack and prefer to have a cut around the battery on three sides to remove it and charge it. If this method is used, then use clear polypropylene tape to hold the flap down. Some flyers leave a small loop of the battery wire and connector sticking out, and just pull it apart when not flying. This could result in damage to the wiring when landing; therefore, we do not recommend this for bottom mounting. The final decision how you wish to do it and the aesthetic look is up to you.



SUGGESTED RADIO LAYOUT

SERVO INSTALLATION:

- ❑ Position the servos on their sides at the pre-marked locations. If using a servo arm, make sure the arm points up and closest to the rear of the wing. Wheels are less apt to break during combat.
- ❑ Mark an outline around the servo and remove the foam for a tight fit. Make sure the servo is deep enough, covered with a 1/8th inch thick EPP scrap, and sanded to the wings surface contour.
- ❑ Plug in your servos and power up the receiver and transmitter. Center your servos in “elevon mode”. If using arms, adjust servo arms so that they are straight up out of the wing. Use the third or outermost hole on the arm. If using wheels, make sure to connect the pushrod to the connecting hole that is at top center.
- ❑ Fold extra servo wire back and forth along bottom of servo and cover servo case with packing tape. You can wrap the servos in strapping tape and glue them in the cavities if you wish, although it is not necessary. The servo arms must move freely and not bind up against the foam.

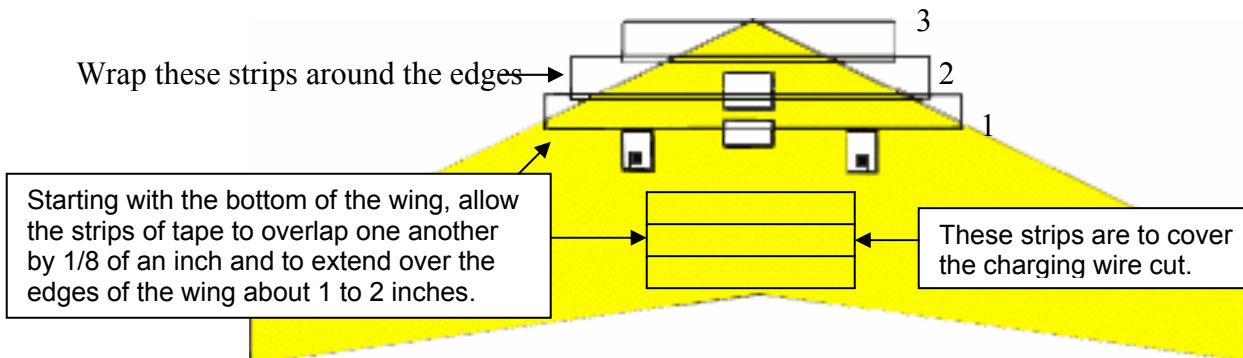
PREPARING THE WING FOR TAPE OVERLAY:

- Lightly sand and round the leading edge.
- Lightly scrape both sides of the wing with the extra scrap foam block provided to remove the kerf fibers. On the other hand, you can simply pick them off, but this time consuming. **Do not use** sandpaper for kerf removal.
- This step is not required but you can now lightly sand the entire wing with 100 - 240 fine-grit sandpaper. Vacuum or wipe down both sides of the wing surface to remove the dust and foam fibers. This provides a clean surface for the strapping tape, adhesive glue and covering.
- Lightly spray 3M 77® adhesive to both sides of the wing and the leading and trailing edges of the wing, and then set it aside for at least 15 minutes to tack up.

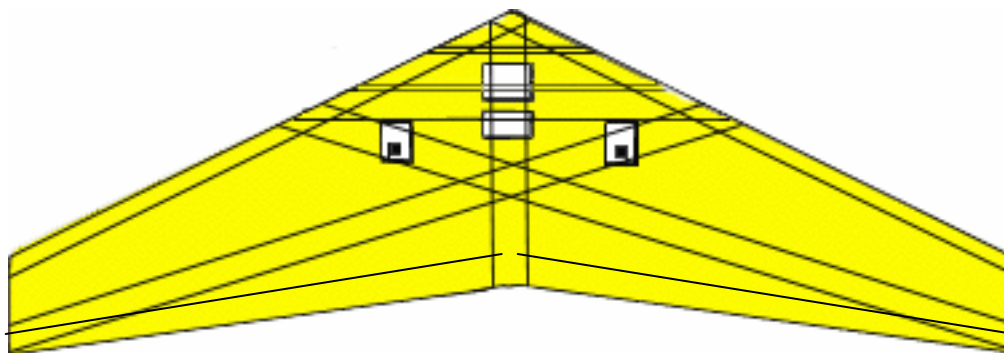
APPLYING FIBER REINFORCED STRAPPING TAPE:

When applying tape to the wing, the reason for starting with the bottom of the wing is so the first tape strips which are laid down on the bottom of the wing are covered up with the tape which wraps around from the top of the wing; this leaves the smoothest surface on the top of the wing.

- 1) **Start with the bottom** of the wing
- 2) Starting near the middle of the wing and working towards the nose, apply 2-inch strips of fiber-reinforced packing tape across the wing, over-lapping $\frac{1}{4}$ of an inch each time and another longer piece behind that one and then another one; fold the tape over the leading edge. It is not necessary to add more tape than we suggest here and will only make the plane heavier if you do. By the way, this is your plane and the tape layout we show is for consideration. Whether you will do it like we suggest or not will not matter, however, we are suggesting by experience.
- 3) Repeat this step on the top as well.



- 4) Next lay a strip of 2-inch wide tape along each leading edge and fold it around as neatly as possible.
- 5) Apply tape as shown from right wingtip to left leading edge and trailing edge and visa versa as shown.



- 6) Do not pull the tape too tight or the wing will bow, use weights to hold the wing down in its beds or on a table if you do not have the beds for this. Repeat this tape step on the bottom also.
- 7) Spray another coat of 3M 77 glue to top and bottom of wing after taping is complete.

THE COVERING:

For covering the wings, use Ultracote® heat shrink covering or Polypropylene tape (2mil). Monokote® it is too heavy and requires too much heat, therefore it is not recommended. If you want an unbroken finish on the top wing when using Ultracote®, Easycoat®, or Flitecote® or any other covering material other than tape, you can do so, or you can cover each half of the wing with a seam in the middle. The unbroken finish is the most appealing.

If you do not want an ugly mess with wrinkles, then don't try to iron the material down on the bulk of the wing surface (against the foam) until you have gone over the wing lightly with the iron to shrink the material (pre-shrinking).

You need to be careful when ironing the material because too much heat may melt the material. Too little heat causes the material not to shrink properly.

TO COVER THE WING WITHOUT A SEAM:

This will require two rolls for unbroken finish top and bottom. You can use two alternate colors for making it easy to tell top from bottom when flying at a distance or in close for a nice looking Z-Wing. At a distance, you can also depend on the wing tips for orientation.

Use the Ultracote application instructions, but be careful not to over heat or over-pull the covering especially at the trailing edge of the wing.

- ❑ Roll out the covering on the floor or large tabletop and trace around the wing with a pen or marker with about ½ to ¾ overhang. You can do the tracing on the back (adhesive side before you remove the backing or if you are an experienced modeler/flyer, just cut the material using your own judgment without tracing.
 - ❑ You may begin with the top or bottom of the wing (see the **alternate wing covering** section below).
 - ❑ **Begin with the bottom if you do not want the seams noticed.** The top material will wrap around and cover the seams.
 - ❑ Regardless of which method you use, the following applies to both wing halves. **Use Minimal Stretching** or you will warp the wing and it is hard to take the warps out of a severely warped wing without starting over.
- 1) Start in the **middle of the bottom** of the wing.
 - 2) Tack down the **root leading edge** (approximately ¼-inch inward).
 - 3) Tack down the **root trailing edge** (approximately ¼-inch inward).
 - 4) Tack down the **wing tips at the leading and trailing edges** of both wing halves.
 - 5) Tack the **tip** of both halves from **leading to trailing edge**.
 - 6) Beginning with one wing half without stretching the covering, tack down the covering on **the leading edge** from **root to tip** with **½-inch overlap**.
 - 7) Next, begin removing the wrinkles by "**gently**" pulling and tacking the covering onto **the trailing edge** from **root to tip** with **½-inch overlap**.
 - 8) This may start to bow the wing until the top of the wing is covered; use some weights to hold it flat. When trimming the **bottom covering** leave no overhang at the trailing edge. This covering method helps keeps the trailing edge from pulling in and bowing the anchoring point for the elevons.
 - 9) Repeat process 1-7 for each wing half.
 - 10) Lightly iron the entire surface of the wing beginning with the top surface. Make sure you do not apply too much pressure to the foam until the material is pre-shrunk. Repeat for bottom surface. After both surfaces are preshrunk, iron the material down onto the surface of the foam. Once again, this is not required, but some flyers prefer to iron the material firmly to the entire surface of the wing. Just do not try this until you have preshrunk the entire wing first or you will have, "**a wrinkle in the sky offending your eye.**"

ALTERNATE WING COVERING METHOD:

After covering the top of the wing, flip the wing over and spray 3M/77. Cover the bottom with polypropylene tape (or you can use Ultracote® on the bottom). The wing will have a slight bow until the bottom is covered; use some weights to hold it flat. When trimming the bottom covering leave no overhang at the trailing edge. On the top leading edge, allow 1/8th inch wrap around, or cut through both top and bottom of wing covering with a new X-ACTO® on the leading edge from nose to tip (about 1/16th inch deep) which creates a straight line between top and bottom of the leading edge. This will not degrade the strength or integrity of the wing. Then, center and apply 2-inch wide clear polypropylene tape on the leading edge seam from nose to tip, with equal amount on top and bottom of wing; this helps prevent the covering from peeling back over time. In addition, a four to six inch strip of clear polypropylene tape in the center of the wing bottom from leading to trailing edge helps to keep scuffing down. Also you can put your name, address and **AMA** number on the bottom of the wing near the trailing edge under the clear polypropylene tape just in case of a fly away. **AMA** is the Academy of Model Aeronautics for model aircraft flyers with insurance coverage up to \$2,500,000. Go here to apply for the insurance: <http://www.modelaircraft.org> HIGHLY RECOMMENDED!

PEPARING THE ELEVONS

Straight leading edges on the balsa elevons and trailing edges of the wing need to be straight if they are to match and are gapless the full length of the elevons. If they are not, the elevons will flip up and down and not want to relax in neutral. (You can fix a completely covered wing by re-cutting the trailing edge with a new X-ACTO® and a long straight edge (re-cut max 1/8"). Then apply a strip of covering and clear polypropylene tape over the trailing edge of the wing and attach the elevons. Sand a single bevel to the front edge of the elevons (illustration) for movement clearance.

Leading edge 

Check the beveled edge for a fit along both wing trailing edges. A good fit here is necessary to have “free moving” elevons. Do not sand a bow or curve in the balsa elevons to match the wing trailing edge.

- Cover the elevons, top and bottom with colored polypropylene tape.
- Lay an elevon on a cutting surface or a counter top in your kitchen, but be careful not to cut the counter top.
- Press the end of the tape down onto the cutting surface and pull the tape over the length of the elevons.
- Use your finger to press the tape down onto them.
- When one side is covered, use an X-ACTO® knife to trim 1/4" around the elevons and fold the tape over.
- Repeat for other side, except trim off all of the excess material.

APPLYING HINGES:

The following are two methods of fastening elevons. Either method works well, but the clear polypropylene tape method is the best looking and easiest to apply. Remember, anything you add to the wing is a penalty in weight, no matter how light the material is. It all adds up.

CLEAR POLYPROPYLENE TAPE METHOD: No Gap (or minimal gap)

Check the fit and make sure the wing's trailing edge is straight between root trailing edge and tip trailing edge and not bowed, which would leave a space or gap between the elevon's leading edge and the wing's trailing edge.

Lay the **finished wing** on a table with the trailing edge hanging about two inches over the edge. Place two five-pound weights or a ten-pound weight on the wing centered between the root and the tip.

Lay the **finished elevon** on a cutting board (Formica counter top is best). Apply a strip of clear polypropylene tape on the leading edge of each of the elevons (overlap 50 percent) and trim off excess tape at each end of the elevons.

Carefully lift each of the elevons from the cutting surface. Pull edgewise not flat or you will break the elevon.

With the elevon in the down position (about 45 degrees), **1/8th inch from tip**, carefully line up the elevon with the trailing edge, even with the upper airfoil, then press the tape down along the **immediate trailing edge** of the wing and finally press all of the tape down onto the wing. The elevons should move up and down without “flipping up or down.” If either elevon flips up or down then remove the tape and start over. Only one strip of tape on top is required.

OVER & UNDER TAPE HINGE METHOD:

To make some “over and under tape hinges” with **Fiber Reinforced Tape**, peel off a ¼-inch wide strip of strapping tape and cut it in ½-inch length. Next, peel off another same size strip and attach it to the first one, by applying the sticky ends, facing each other, together for a 1/8-inch bond. This makes one hinge; make four for each top wing half and four for each bottom wing half, for a total of twelve. These are applied approximately 6 inches apart on each half, enough to keep the flying surface from bowing. Keep elevons upper edge in-line with the airfoil. (In other words, the wing top is flush with the elevon top). **IMPORTANT:** Check the elevon down movement; it must rotate freely and down at least 45 degrees. Adjust or redo by loosening the top hinge tape if necessary.

RADIO and LINKAGE SETUP:

Power up the radio and set the trims to center.

Screw the clevis onto the pushrod and connect the clevis to the control horn.

Fasten the control horns to the elevons with the control horn holes over or near the hinge line, lined up with the pushrod. Cut or grind off excess screw length points smoothly (this will help you avoid a nasty cut later).

Next, with the servos centered, align the hole in the arm or wheel with the pushrod and mark the pushrod with a marker.

Bend the rod at the mark with a “Z” bend. You can purchase a “Z” Bend tool from Hobby People or you can bend the wire (harder this way) with needle nose pliers.

With the radio trim centered, make sure the elevons are up about 1/8 inch from neutral.

TWO METHODS FOR FASTENING WINGLETS:

(1) The easiest and best method:

Simply glue the winglets on with Shoe Goo® or other silicon glue and pin them into place for about 1 – 2 hours before flight. In a pinch, I have glued the winglets on, pinned them and flown my Z-Wing within the hour.

(2) Some other modelers use this method:

Using an X-ACTO® knife or Dremel Moto® tool with a cut off disk, cut four small slots for ½-inch fiber tape to pass through slots cut level with the top and bottom of the wing tip and centered two inches apart between the leading and trailing edge.

Pull the fiber tape through the slots and attach to the wing on top and bottom of the wing tip.

Check and assure elevons do not bind on winglets.

Balancing the Z-Wing

Balance the wing at 7 ½ to 7 5/8 inch from the Nose leading edge. Normally, added weight is **not** required.



Limits of liability:

Burns Model Aircraft® assumes no liability for improper use of this product. The user of this product should expect to purchase proper liability insurance. We are not responsible for inexperienced model aircraft pilots and are not accountable for the training or any equipment used in, on, or with the aircraft. AMA Insurance (Academy of Model Aeronautics) or home liability insurance should be purchased prior to flying this or any other model aircraft. User will assume all risk and determine the suitability of the product for his or her intended use. Anyone injured or any property damaged by use of this product is the sole responsibility of the user.

Covering materials and techniques: The covering on an EPP foam airplane is a primary element of its structural strength and acts as a stressed skin over the very flexible foam, which causes the foam to be surprisingly firm and resilient. This is accomplished by combining the contact adhesive to ensure adequate bonding, fiberglass reinforced packaging (“strapping”) tape to resist tension loads, and iron-on or self-adhesive films to increase torsion stiffness and prevent tearing.

Variations of this process include using tape exclusively or almost tape-free schemes that utilize high tensile strength, light-gauge films such as Mylar or Mica film. The most popular method is strapping tape.

Because of its availability, good color selection, and lightweight, considers using Ultracote®.

Purchase strapping tape from any office supply store. Two brands that work well are 3M® Super Strength and Tesa’s Strapping tape. Two-inch wide strapping tape is the most used size for making models on the market today. You can purchase Ultracote® covering in hobby shops.

EPP will handle twice the heat that EPS will, and you will need the heat to cause the adhesives to activate. Cover EPP at the same temperature used over wood structures-about 80% power on a TopFlite® iron.

One method for getting a good, tight covering job:

If you would like an unbroken finish on the top wing when using Ultracote®, Easycote, or Flitecote or any other covering material other than tape, you can do so, or you can cover each half of the wing with a seam in the middle. The unbroken finish is the preferred method.

Do not apply a full shrink until a wing is completely covered. Cover a wing by covering the bottom surfaces first, going over the film quickly with the iron (perhaps at slightly lower temperature) to get it secured, positioned and smooth, then trim the edges. Cover the top surface the same way; the film may still have minor wrinkles and lightly stuck areas at this stage. Carefully seal all of the edges, using about a ¼ -inch overlap on the seams. You have created a “bag” around the part. With the heat up, give this “bag” a good, uniform shrinking with firm pressure on the surface. Keep the iron moving at all times; if you sit in one place too long, you can ultimately make the foam sag. Keep an eye on the component as you go; sight the washout angles, leading edges, etc. When you are finished, you have a nice, tight, well-adhered covering job. If you get wrinkles from Combat or crash damage, it is simple to shrink them out at home with a covering iron, or to patch areas that are torn. These wings rarely break, but they eventually wear out from constant battle. The wings will stay in good working order and looking good with regular maintenance. Few modelers have had good results with Monokote®, on EPP. Avoid it for use directly over the EPP; it is fine for trim over previously applied film. Applying these materials can be critical to your success. First, all of the parts should have contact cement applied over the surface area where they need to be covered. It’s a good idea to let the cement set for a little while, making the part less sticky to handle. After that, tape or covering is generally applied. The primary thing to guard against while applying tape is stretching it; that can introduce serious geometric distortions that are difficult to tune out on the finished airplane. This is particularly true for wings. One trick for good application of tape is to lay the tape gently on the part, properly positioned, and then smooth it gently with a cotton rag wrapped around your fingers. The rag will slide over it easily and you can apply uniform pressure without stretching it. With strapping tape, you will find that it is easy to wrap smoothly around compound curves. By slicing the Strapping tape parallel to the filaments with a knife, you can get it to lie down in overlapping “sections.” Do not cut across the filaments, it will destroy the

tape's strength. It is also handy to cut the tape into narrow widths by the same method. After applying tape, sand it gently before application of the film. The tape has a release agent applied to let it come off the roll, and you will want to get rid of the coating. Apply the film as you would on any other model. Use adequate heat! Use the wing beds to hold the wings in place to keep wings from warping while covering them and make sure iron temperature will not melt the covering by testing on a scrap piece of covering, not on the glue side. The EPP wing will twist easily with Ultracote® covering. Use the wing beds to check the twist (washout) after building. Purchase Econocote® covering or Ultracote® covering from most hobby stores. On the other hand, you may purchase it from us at the number below. We recommended that you not use Monokote® because EPP foam requires low heat and Monokote® is heavier.

Another method for covering is with “thin film colored packing tape” called Polypropylene tape (some flyers call it Poly tape) and is sold in Hobby People stores or most other hobby stores. We also sell it as well. You can cover a wing with one roll. However, you may want to have a multicolored wing requiring another roll or two. You can purchase these in various colors. If you have trouble finding a source of covering material, call us at (310) 326-7771 or email us at LBurns@BurnsModelAircraft.com

TIP: Build Combat Wings light if you want maneuverability.

SOME REASONS FOR POOR PERFORMANCE

- **Elevons only move down a little and feel like they are binding:** You can feel this by pushing down on the elevon with the control rod removed from the servo. Elevons should move up and down freely when they detached to the pushrod.
- **Elevons either stick or are hard to move.** (Do not fly until this is corrected) *(Page 9 & 10)*
- **Location of the CG is too far forward because it is too tail-heavy:** unstable, snap spins.
- **Location of the CG is too far to the rear because it is nose-heavy:** unstable, slower turns.
- **Elevons act as spoilers:** too much up, not in line with the airfoil, slower flight.
- **Improper washout:** Too little washout or a twist in one wing panel will cause snap spins; too much washout will cause slower flying characteristics but very stable.
- **When setting up your elevons for elevator and aileron throw:** It is best to have **equal or more** throw in your ailerons than in your elevator. Too much “up” throw in the elevator causes your plane to pitch up and down or spin out in turns.
- **Linkage or servo slop:** (caused by poor servo fit in the servo cavities) this will cause your plane to fly with a mushy feel to it and you will not have the positive control you need for combat wings.
- **SERVOS WILL NOT CENTER:** Pushrods or servos are binding against walls. This is the reason for using the outer tubing. **Some old servos will not hold center position.**
- **Purchasing ball bearing servos and metal gear servos will cut down on broken gears.**

TOOLS NEEDED:

- X-ACTO® knife handle with supply of #11 Blades (it greatly helps to have a generous supply, so consider purchasing a box of 100 #11 blades from the hobby store.**
- Straight edge (24-36 inch)**
- Sanding block or sandpaper**
- Covering Iron, (commonly called a Monokote® iron) used for tacking down the Ultracote® covering.**
- Heat gun (used for shrinking the bulk of the covering, but with care, the Monokote® iron can suffice.**
- Basic Tools: (Razor saw, small screwdriver, Popsicle sticks for applying glue).**

Contents Checklist

- | | |
|---|--|
| <input type="checkbox"/> Wings (2) | <input type="checkbox"/> Ailerons (2) |
| <input type="checkbox"/> Pushrods (2) | <input type="checkbox"/> Plastic Control Horns (2) |
| <input type="checkbox"/> Metal Clevises (2) | <input type="checkbox"/> Carbon Spar (1) |
| <input type="checkbox"/> Coroplast Winglets (2) | <input type="checkbox"/> Manual (1) |

Required or suggested items for finishing the Z-Wing

- Shoe Goo®, GOOP®, or Silicone:** Do not use epoxy for joining the wings because it becomes too brittle, is too hard to sand, and not recommended for securing the servos because it is too hard to remove them for later maintenance.
- (1) Two-inch strapping tape:** (Available at Office Depot, Home Office Supply, Staples or any other Office Supply).
- Use Ultracote® heat shrink covering, Econocote® heat shrink covering or Colored Polypropylene tape (2mil) for the covering:** The following colors are available from the local hobby or from us: **red, blue, yellow, and orange, green, black and white).**

ADDITIONAL HELPFUL ITEMS:

- ✓ **Large solid head steel nickel-plated pins, corsage pins, hatpins or “T” Pins.** (These are great for holding the winglets on while the glue sets). In addition, you can leave two or three of the **large solid head steel nickel-plated pins** in the ends of the wings through the winglets for extra securing. This helps greatly when dog fighting.

You can purchase these items from BurnsModelAircraft.com or you can purchase them at your local craft store. These pins are also the same type of pins used for dissection assist in biology.

- ✓ **Masking Tape**

You can purchase these items listed here from your local hobby shop or from: <http://www.burnsmodelaircraft.com>

Call (310) 326-7771 to order or send check or money order to:

Larry Burns

1065 Lomita Blvd #43

Harbor City, CA 90710

NOTE: *The following information concerns manual setup. Do not use this method unless you have no other resource. It is too difficult for this type of model aircraft and mostly used on conventional aircraft. Use this as a last resort only.

For Standard radios without electronic elevon mixing capabilities*

Standard servos are recommended (Use Airtronics® 94102 or Hitec® 300/303s or 422/425BB), Ball bearing, high-speed servos are best. Use any aircraft radio. However, you need to make sure that your radio has the **elevon mixing capability** or you will have to use a *manual configuration, which is more difficult and requires two in-line servos to accomplish mixing with a manual mixer as shown. This is for older radios and some newer ones that do not incorporate electronic mixing. If you do not have one of the newer elevon capable radios, you should purchase an electronic mixer at hobby people, tower hobbies or your favorite hobby shop. (This would be a better solution than the mechanical one). This is for informational purposes only.



The part above is available at Tower Hobbies, <http://towerhobbies.com/>

Part # LXD951

Dubro® V-Tail Mixer

Z-Wing®