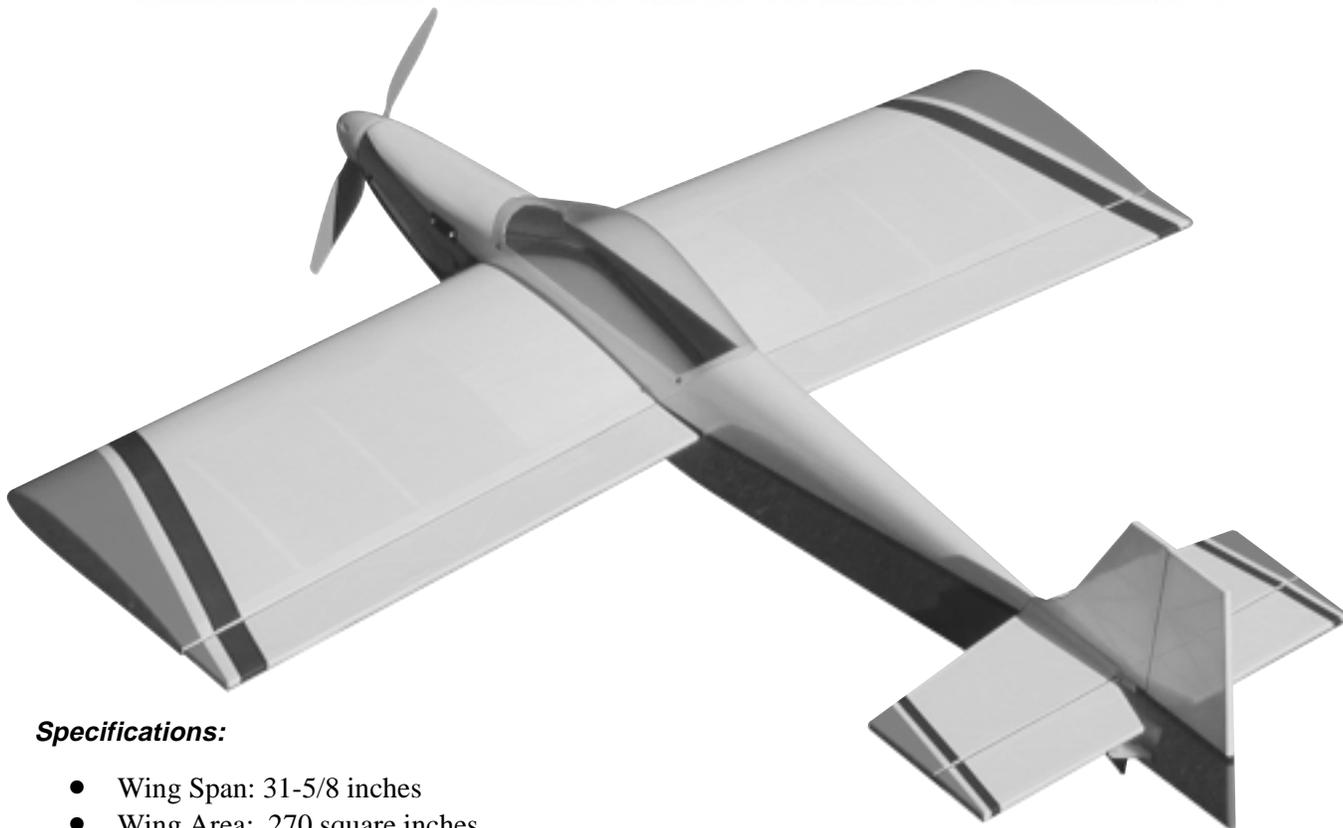


WATTAGE CRAZY-8 EP



Specifications:

- Wing Span: 31-5/8 inches
- Wing Area: 270 square inches
- Length: 32.5 inches
- Weight: 25 - 28 ounces
- Functions: Ailerons, Rudder, Elevator, Throttle
- Radio: 4 Channel Micro System

INSTRUCTIONS FOR FINAL ASSEMBLY

FOR YOUR INFORMATION

To make your modeling experience totally enjoyable, we recommend that you get experienced, knowledgeable help with assembly and during your first flights. Your local hobby shop has information about flying clubs in your area whose membership includes qualified instructors. If there is no hobby shop in your area, we recommend that you contact the AMA at the address below. They will be able to help you locate a flying field near you.

Academy of Model Aeronautics
5151 East Memorial Drive
Muncie IN 47302-9252
(800) 435-9262
www.modelaircraft.org

TABLE OF CONTENTS

Safety Warning	2
Introduction	3
Our Recommendations	4
Kit Contents	5
Metric Conversion Chart	5
Tools and Supplies Required	6
Replacement Parts	6
A Note About Covering	7
Section 1: Hinging the Control Surfaces	7
Section 2: Mounting the Wing	8
Section 3: Mounting the Horizontal Stabilizer	10
Section 4: Mounting the Vertical Stabilizer	13
Section 5: Installing the Landing Gear	14
Section 6: Installing the Motor	16
Section 7: Installing the Servos	19
Section 8: Installing the Elevator Pushrod	21
Section 9: Installing the Rudder Pushrod	24
Section 10: Installing the Aileron Pushrods	26
Section 11: Installing the Cowl	28
Section 12: Installing the Canopy	29
Section 13: Final Assembly	30
Section 14: Balancing	33
Section 15: Control Throws	34
Section 16: Radio Setup for 3D Flying	34
Section 17: Preflight Check and Safety	35
Section 18: Flying the Crazy-8 EP	37
Trim Chart	38
Product Evaluation Sheet	39

SAFETY WARNING

This R/C airplane is not a toy! If misused or abused, it can cause serious bodily injury and/or damage to property. Fly only in open areas and preferably at a dedicated R/C flying site. We suggest having a qualified instructor carefully inspect your airplane before its first flight. Please carefully read and follow all instructions included with this airplane, your radio control system and any other components purchased separately.

OUR GUARANTEE:

Wattage guarantees this kit to be free from defects in both material and workmanship, at the date of purchase. This does not cover any component parts damaged by use, misuse or modification. **In no case shall Wattage's liability exceed the original cost of the purchased kit.**

In that Wattage has no control over the final assembly or material used for final assembly, no liability shall be assumed for any damage resulting from the use by the user of the final user-assembled product. By the act of using the final user-assembled product, the user accepts all resulting liability.

INTRODUCTION

Thank you for purchasing the new Wattage Crazy-8 EP ARF. Before completing the final assembly of your new airplane, please carefully read through this instruction manual in its entirety. Doing so will ensure success the first time around!

The Crazy-8 is a four channel, built-up electric aerobatic airplane built specifically for flying in small parks or fields. When set up with a standard four channel radio the Crazy-8 is a stable flyer, yet capable of most aerobatics. To get the most out of the Crazy-8 we recommend using a radio system with mixing capabilities. Because the Crazy-8 uses two aileron servos, you will be able to mix flaperons and spoilerons with up and down elevator to make an extreme 3D flying machine - all in your local park or soccer field!

Crazy-8 EP ARF Features:

- All wood construction
- Factory-covered in real iron-on covering
- Molded plastic cowl and clear canopy
- Strong wire landing gear with lightweight wheels
- Hand-launch or ROG
- 3D flight-capable with mixing-equipped transmitter and receiver
- Two aileron servos for precise, flutter-free control
- High power-to-weight ratio means exciting flying
- Final assembly is quick and easy - over 50 photos and drawings included

This instruction manual is designed to guide you through the entire final assembly process of your new airplane in the least amount of time possible. Along the way you'll learn how to properly assemble your new airplane and also learn tips that will help you in the future. We have listed some of our recommendations below. Please read through them before beginning assembly.

- Please read through each step before beginning assembly. You should find the layout very complete and straightforward. Our goal is to guide you through assembly without any of the headaches and hassles that you might expect.
- There are check boxes next to each step. After you complete a step, check off the box. This will help prevent you from losing your place.
- Cover your work table with brown paper or a soft cloth, both to protect the table and to protect the parts.
- Keep a couple of small bowls or jars handy to put the small parts in after you open the accessory bags.
- We're all excited to get a new airplane in the air, but take your time. This will ensure you build a straight, strong and great-flying airplane.
- If you come across this symbol , it means that this is an important point or an assembly hint.

If you should find a part missing or damaged, or have any questions about assembly, please contact us at the address below:

**Wattage Customer Service
18480 Bandilier Circle
Fountain Valley CA 92728**

Phone: (714) 963-0329

Fax: (714) 964-6236

E-mail: service@globalhobby.net

OUR RECOMMENDATIONS

This section lists the items you will need to purchase for your new Crazy-8 EP. These suggestions are not set in stone, but they should provide you with a good starting point.

- There are numerous different types and combinations of accessories available that will work with your Crazy-8. The way you want the airplane to fly should ultimately determine the types of accessories you choose. We strongly suggest using motor, propeller and battery combinations that will produce approximately 120 - 150 watts, using 7 - 10 cells, and that draws 15 - 30 amps.
- For good performance, it's important to keep the overall weight down. This can be accomplished by removing the case from your receiver, using a strong motor that has a good power-to-weight ratio and using NiMH battery packs. Keep in mind, "lighter is better."
- Your choice in receivers will have an impact on the mixing capabilities of the airplane. For instance, you will not be able to have flaperon or spoileron mixing if using a four channel receiver. This is the case with most five channel receivers, too. In most, but not all instances, you will need to use a 7 or 8 channel receiver if you plan on using the mixing functions of your transmitter. We've been using a Hitec "Super Slim" 8 channel receiver (with the case removed) in our Crazy-8 with no problems at all.

For General Sport Flying You Will Need:

Hitec 555 Micro Receiver

Hitec RX Crystal

P/N 239036 Multiplex Turbo 450 Motor (for direct drive)

P/N 131335 Wattage Propeller Hub Adaptor

P/N 608152 APC 7 x 5E Propeller

P/N 444227 Cirrus CS-21 Micro Servos (3 pieces)

P/N 128486 Wattage IC-30A ESC

P/N 128561 Wattage 8C 800Mah AR NiCD Flight Battery

P/N 885650 Promax Activator AC/DC Peak Charger

P/N 444728 Cirrus Y-Harness

P/N 869020 Dubro Double-Sided Tape

P/N 568906 Dubro Hook & Loop Mounting Material

optional P/N 444713 Cirrus 12" Servo Extension

P/N 128560 Wattage 8C 1600Mah NiMH Flight Battery

For 3D Flying with Mixing Capabilities You Will Need:

Hitec Supreme "Super Slim" 8 Channel Receiver

Hitec RX Crystal

P/N 239036 Multiplex Turbo 450 Motor (for direct drive)

P/N 131335 Wattage Propeller Hub Adaptor

P/N 608152 APC 7 x 5E Propeller

P/N 444227 Cirrus CS-21 Micro Servos (3 pieces)

P/N 128486 Wattage IC-30A ESC

P/N 128561 Wattage 8C 800Mah AR NiCD Flight Battery

P/N 885650 Promax Activator AC/DC Peak Charger

P/N 869020 Dubro Double-Sided Tape

P/N 568906 Dubro Hook & Loop Mounting Material

optional P/N 444713 Cirrus 12" Servo Extensions (3 pieces)

P/N 128560 Wattage 8C 1600Mah NiMH Flight Battery

KIT CONTENTS

We have organized the parts as they come out of the box for easier identification during assembly. Before you begin assembly, group the parts as we list them below. This will ensure that you have all of the parts before you begin assembly and it will also help you become familiar with each part. If you find any parts missing or damaged, please contact us at the address listed below:

***Wattage Customer Service
18480 Bandilier Circle
Fountain Valley CA 92728***

Phone: (714) 963-0329

Fax: (714) 964-6236

E-mail: service@globalhobby.net

AIRFRAME ASSEMBLIES

- {1} Fuselage w/Belly Pan
- {1} Wing w/Ailerons
- {1} Horizontal Stabilizer w/Elevator
- {1} Vertical Stabilizer w/Rudder
- {1} Molded Plastic Cowl
- {1} Molded Clear Canopy

LANDING GEAR ASSEMBLY

- {2} Prebent Main Gear Wires w/Wheels
- {2} Nylon Landing Gear Straps
- {4} 2mm x 10mm Wood Screws

MISCELLANEOUS ITEMS

- {1} 3mm x 20mm Machine Screw
- {2} 3mm x 10mm Machine Screws
- {3} 3mm Flat Washers
- {9} 2mm x 6mm Wood Screws
- {1} Precovered Balsa Filler Block
- {1} Decal Set

MOTOR MOUNT ASSEMBLY

- {1} Motor Strap Set for Direct Drive
- {1} Motor Strap Set for Gear Boxes
- {1} Plywood Shim (D-26)
- {4} 3mm x 12mm Wood Screws

PUSHROD ASSEMBLIES

- {1} 1.5mm x 325mm Pushrod Wire
- {1} 1.5mm x 305mm Pushrod Wire
- {2} 1.5mm x 85mm Pushrod Wires
- {4} Nylon Control Horns w/Backplates
- {4} Nylon Clevises
- {8} 2mm x 16mm Machine Screws
- {1} Clevis Retainer Tubing

SPINNER ASSEMBLY

- {1} Molded Spinner
- {2} 2mm x 10mm Wood Screws

METRIC CONVERSION CHART

To convert inches into millimeters: Inches x 25.4 = mm

1/64"	=	.4mm	3/16"	=	4.8mm	1"	=	25.4mm	21"	=	533.4mm
1/32"	=	.8mm	1/4"	=	6.4mm	2"	=	50.8mm	24"	=	609.6mm
1/16"	=	1.6mm	3/8"	=	9.5mm	3"	=	76.2mm	30"	=	762.0mm
3/32"	=	2.4mm	1/2"	=	12.7mm	6"	=	152.4mm	36"	=	914.4mm
1/8"	=	3.2mm	5/8"	=	15.9mm	12"	=	304.8mm			
5/32"	=	4.0mm	3/4"	=	19.0mm	18"	=	457.2mm			

TOOLS AND SUPPLIES REQUIRED

- Kwik Bond Thin C/A # 887500
- Kwik Bond Thick C/A # 887510
- Kwik Bond 5 Minute Epoxy # 887560
- Kwik Bond C/A Debonder # 887545
- # 0 Phillips Head Screwdriver
- # 1 Phillips Head Screwdriver
- Wire Cutters
- Needle Nose Pliers
- Adjustable Wrench
- Excel Modeling Knife # 692801
- Scissors
- Electric Drill
- Assorted Drill Bits
- Ernst Airplane Stand # 223977
- Ruler
- Pencil
- Builder's Triangle
- 220 Grit Sandpaper w/Sanding Block
- Dubro T-Pins # 567677
- Masking Tape
- Scotch® Tape
- Paper Towels
- Rubbing Alcohol
- NHP Epoxy Mixing Sticks # 864204
- NHP Epoxy Mixing Cups # 864205

REPLACEMENT PARTS

Wattage stocks a complete line of replacement parts for your Crazy-8 EP ARF. Listed below are the replacement parts that are available along with their respective part numbers for easy ordering convenience. These replacement parts can be ordered through your local hobby dealer or directly from Wattage by calling 1-714-963-0329.

Instruction Manual	-	150515	Molded Cowling	-	150520
Wing Set	-	150516	Molded Clear Canopy	-	150521
Fuselage Set	-	150517	Hardware Set	-	150522
Belly Pan Only	-	150518	Landing Gear Set w/Wheels	-	150523
Stabilizer Set	-	150519	Decal Sheet	-	150524

A NOTE ABOUT COVERING

The covering material used on your airplane is real iron-on heat shrink covering material, not cheap "shelf paper." Because of this, it is possible with heat and humidity changes that the covering on your airplane may wrinkle or sag. This trait is inherent in all types of heat shrink material. To remove any wrinkles that might be visible you will need to purchase, or borrow from a fellow modeler, a heat iron. If you need to purchase one, the **Global Heat Sealing Iron # 360900** is recommended.

Follow this simple procedure to remove the wrinkles:

- Plug in and turn on the sealing iron to the medium-high temperature setting. Allow the iron to heat up for approximately 5 - 7 minutes.
- After the iron has reached temperature, lightly apply the iron to the wrinkled section of the covering. Move the iron slowly over the wrinkled section until the covering tightens and the wrinkles disappear. You will notice that the color of the covering will darken when it is heated. When the covering cools back down, it will return to its normal color.
-  If the color layer smears from any of the seams the temperature of the iron is too hot. Turn the temperature dial down and wait about 5 minutes for the iron to adjust to the lower temperature. You can remove any excess color streaks using a paper towel soaked with a small quantity of Acetone.

WARNING

We do not suggest storing your airplane in an extremely hot environment (like the back of your car in direct sunlight) for any length of time. The extreme heat could cause the covering material to wrinkle and possibly damage the fragile components of the radio system, ESC or batteries.

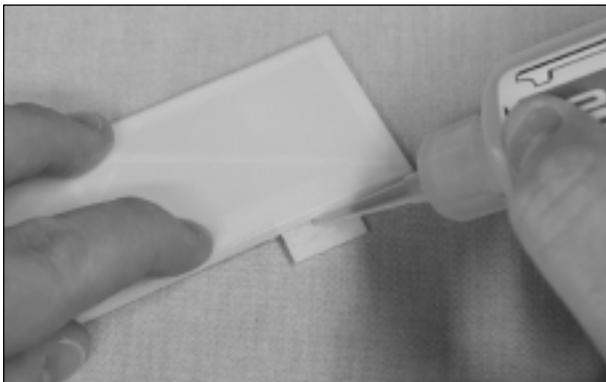
SECTION 1: HINGING THE CONTROL SURFACES

YOU'LL NEED THE FOLLOWING SUPPLIES:

- Kwik Bond Thin C/A
- Kwik Bond C/A Debonder
- Paper Towels

Step 1: Hinging the Ailerons

- Remove the ailerons and hinges from the wing.



- Slide one hinge into each hinge slot in one aileron.
- Center each hinge within its slot and double-check to make sure the centerline of the hinges is flush with the leading edge of the aileron.
- Glue each hinge into place using 5-6 drops of Kwik Bond Thin C/A. Allow a few seconds between drops for the C/A to "wick" into the hinges, then turn the aileron over and apply 5-6 drops on the other side of each hinge. Let the C/A dry for about 10 minutes before proceeding.

 If any C/A gets onto the aileron, it can be removed promptly using a paper towel soaked with a small quantity of Kwik Bond C/A Debonder.

- ❑ Slide the aileron and its hinges into the hinge slots in the trailing edge of the wing. Adjust the aileron so that the tip of it is even with the tip of the wing.



- ❑ While holding the aileron tight against the wing, pivot the aileron down about 45° and apply 5-6 drops of thin C/A to the exposed area of each hinge. Turn the wing over and repeat for the other side of the hinges.

✎ Remove any C/A that may run down the hinge line using C/A Debonder.

- ❑ After the C/A has dried completely - about 15 minutes - pivot the aileron up and down to free up the hinges.

IMPORTANT

After the C/A has fully cured, *gently* grasp the aileron and pull on it like you are trying to pull out the hinges. The hinges should hold securely. If one or more hinges feels loose, apply more C/A to the hinge(s) and allow it to completely cure.

- ❑ Repeat the procedures above to hinge the second aileron.

Step 2: Hinging the Elevator and Rudder

- ❑ Hinge the elevator and rudder using the same method as hinging the ailerons.

IMPORTANT

Make sure that the tips of the elevator and rudder are even with the tips of the horizontal and vertical stabilizers.

SECTION 2: MOUNTING THE WING

YOU'LL NEED THE FOLLOWING PARTS:

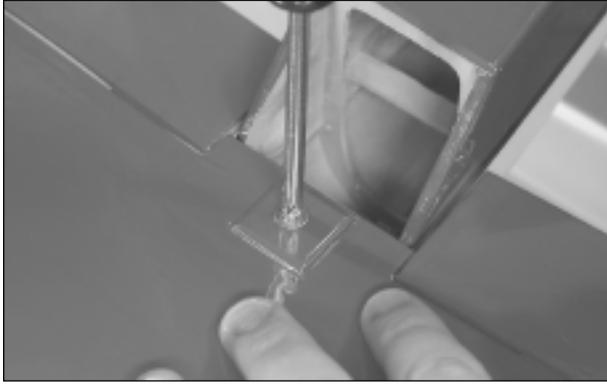
- ❑ {1} Fuselage w/Belly Pan
- ❑ {2} 3mm x 10mm Machine Screws
- ❑ {1} 3mm x 20mm Machine Screw
- ❑ {3} 3mm Flat Washers

YOU'LL NEED THE FOLLOWING SUPPLIES:

- ❑ # 1 Phillips Head Screwdriver
- ❑ Ernst Airplane Stand
- ❑ Excel Modeling Knife
- ❑ Ruler

Step 1: Mounting the Wing

- ❑ Remove the belly pan from the fuselage and set it aside for now.
- ❑ Using a modeling knife, remove the covering material from over the top and bottom of the predrilled hole in the wing. The hole is located on the centerline of the wing, 1/2" in front of the trailing edge.
- ❑ Set the wing into the wing saddle and align it. The plywood tab in the leading edge of the wing should fully engage the forward bulkhead and the predrilled hole in the back of the wing should line up with the hole in the wing hold-down block inside the fuselage.



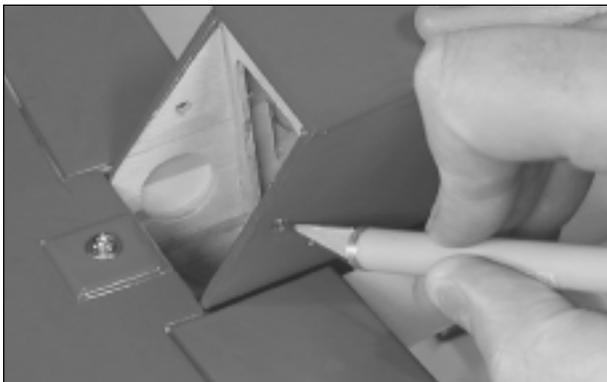
❑ Secure the wing into place using the 3mm x 20mm machine screw and one 3mm flat washer.

☞ Don't overtighten the screw. You don't want to crush the wing or distort the trailing edge.

Step 2: Installing the Belly Pan

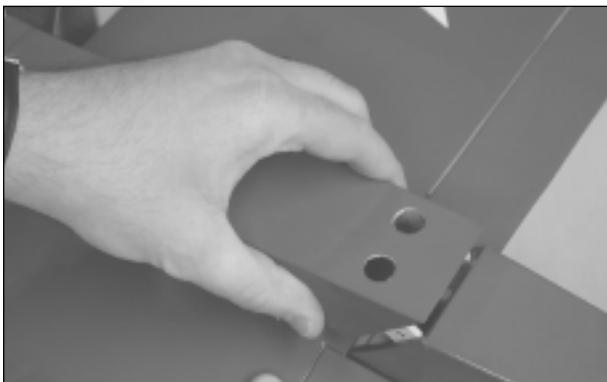


❑ Using a modeling knife, remove the covering from over the two air-exit holes in the bottom of the belly pan.

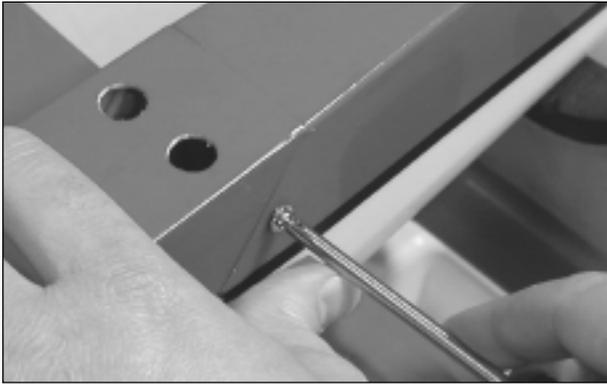


❑ Using a modeling knife, remove the covering from over the two belly pan mounting holes in the fuselage sides. One hole is located in each side of the fuselage, 1" up from the bottom of the fuselage and 1/4" behind the wing saddle.

❑ Set the belly pan into place, making sure the dowel-pins in the front of the belly pan are firmly pushed into the corresponding holes in the forward bulkhead.



❑ Push the back of the belly pan down until it is setting firmly on the wing. The blind nuts preinstalled in the two plywood mounting tabs should line up with the two holes in the sides of the fuselage.



Secure the belly pan into place using two 3mm x 10mm machine screws and two 3mm flat washers.

 Don't overtighten the screws or they will crush the sides of the fuselage.

IMPORTANT

Leave the wing installed for now. It needs to be in place to help you align and mount the horizontal stabilizer in the next section.

SECTION 3: MOUNTING THE HORIZONTAL STABILIZER

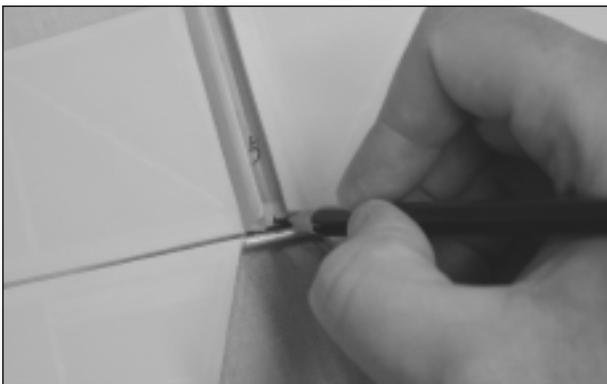
YOU'LL NEED THE FOLLOWING PARTS:

- | | |
|---|--|
| <input type="checkbox"/> {1} Horizontal Stabilizer w/Elevator | <input type="checkbox"/> {1} Precovered Balsa Filler Block |
|---|--|

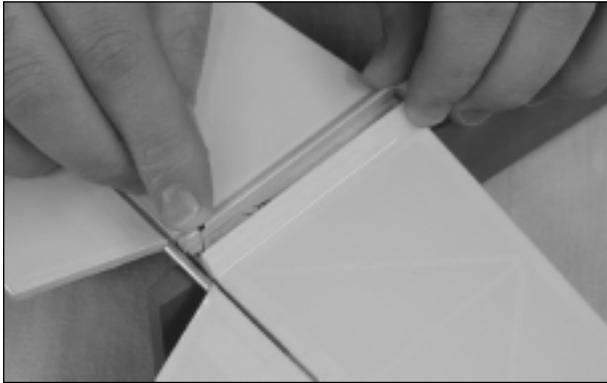
YOU'LL NEED THE FOLLOWING SUPPLIES:

- | | |
|---|---|
| <input type="checkbox"/> Kwik Bond Thick C/A | <input type="checkbox"/> 220 Grit Sandpaper w/Sanding Block |
| <input type="checkbox"/> Kwik Bond 5 Minute Epoxy | <input type="checkbox"/> Dubro T-Pins |
| <input type="checkbox"/> Kwik Bond C/A Debonder | <input type="checkbox"/> Paper Towels |
| <input type="checkbox"/> Excel Modeling Knife | <input type="checkbox"/> Rubbing Alcohol |
| <input type="checkbox"/> Ernst Airplane Stand | <input type="checkbox"/> NHP Epoxy Mixing Sticks |
| <input type="checkbox"/> Pencil | <input type="checkbox"/> NHP Epoxy Mixing Cups |

Step 1: Aligning the Horizontal Stabilizer



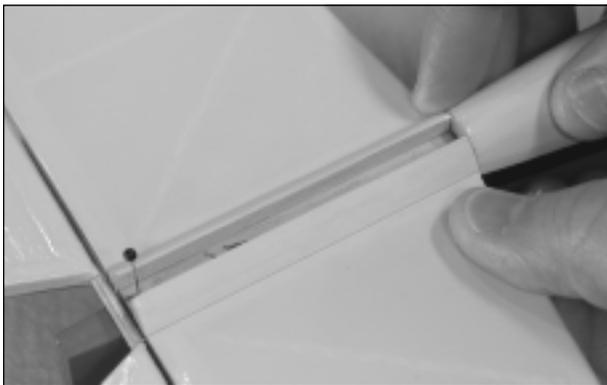
Using a pencil, draw a centerline mark on *top* of the stabilizer, at the trailing edge.



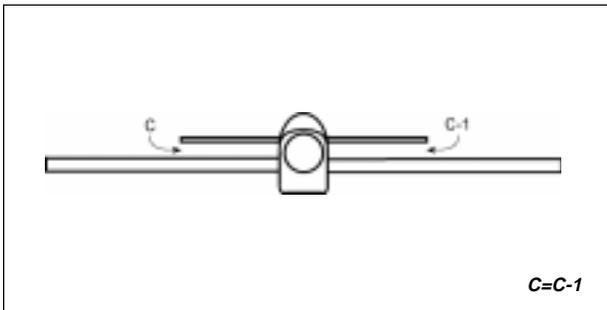
- ❑ Set the stabilizer onto the fuselage.
- ❑ Line up the centerline mark you drew on the trailing edge of the stabilizer with the center of the fuselage.
- ❑ Hold the stabilizer temporarily in place (only at the trailing edge) using a pin.

IMPORTANT

The stabilizer should be pushed forward completely. A precovered balsa block is provided to fill the gap behind the stabilizer and will be installed later.



- ❑ With the trailing edge centered, pivot the front of the stabilizer until the triangle stock lines up with the fuselage sides.
- ❑ When satisfied with the alignment, hold the front of the stabilizer in place with a pin.



- ❑ Making sure the stabilizer is held firmly in place, look from the front of the airplane at both the wing and the stabilizer. When aligned properly, the stabilizer should be parallel to the wing.

IMPORTANT

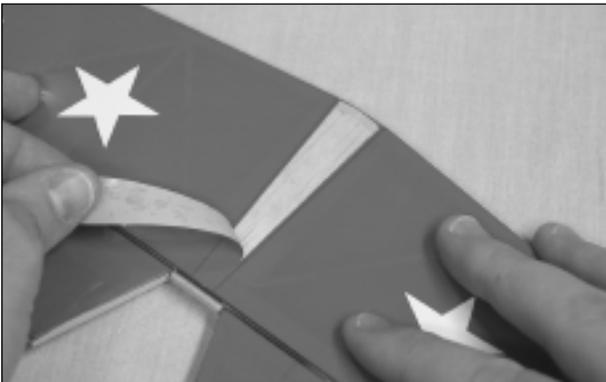
If the stabilizer is out of alignment, remove it and use 220 grit sandpaper with a sanding block to sand down the higher side of the stabilizer mounting platform, then reinstall the stabilizer and check the alignment again. Repeat this procedure until you are satisfied with the alignment.

☞ If the stabilizer is not parallel to the wing, the airplane will not fly straight.

Step 2: Mounting the Horizontal Stabilizer



- ❑ Once you're satisfied with the alignment, use a pencil to draw a line on the bottom of each side of the stabilizer where it meets the fuselage sides.
- ❑ After drawing the lines, remove the stabilizer.



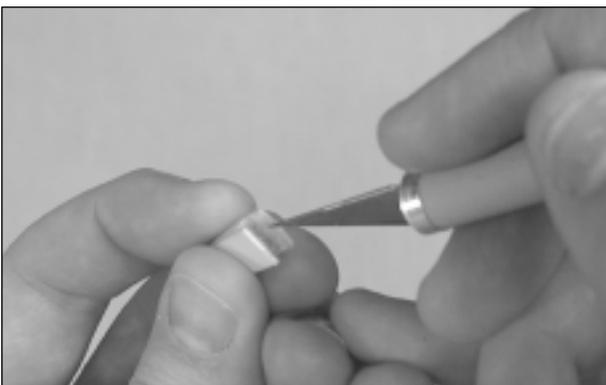
- ❑ Using a modeling knife, cut away the covering from between the lines.

IMPORTANT

Glue does not stick well to covering material. For the strongest joint, it's important to remove as much covering from the gluing surfaces as possible.

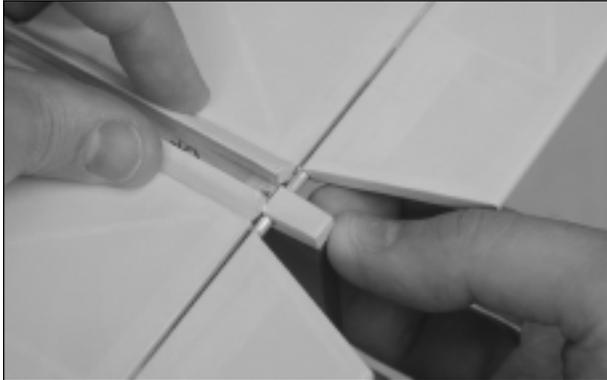
- ❑ Using a modeling knife, carefully cut away the covering from the stabilizer mounting sides on the fuselage.
- ❑ Mix a generous amount of 5 minute epoxy. Apply a layer to the gluing surfaces on both the fuselage and the stabilizer. Be sure to use enough epoxy to fill any gaps.
- ❑ Set the stabilizer into place and realign it, double-checking all of your measurements once more before the epoxy sets up. Quickly remove any excess epoxy using a paper towel and rubbing alcohol, and hold the stabilizer in place until the epoxy sets up.

Step 3: Installing the Balsa Filler Block



- ❑ Using a modeling knife, cut away the covering from the precut notch in the front of the balsa filler block.

👉 This notch will slide over the elevator joiner wire.



- Test-fit the filler block into place, making sure that it is flush with the sides and back edge of the fuselage.
- When satisfied with the fit, remove the covering material from the gluing surfaces and glue the filler block into place using thick C/A.

WARNING

Be careful not to get any glue on the elevator joiner wire.

SECTION 4: MOUNTING THE VERTICAL STABILIZER

YOU'LL NEED THE FOLLOWING PARTS:

- {1} Vertical Stabilizer w/Rudder

YOU'LL NEED THE FOLLOWING SUPPLIES:

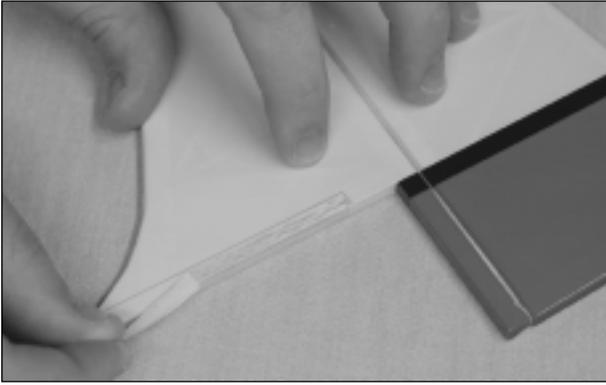
- | | |
|---|--|
| <input type="checkbox"/> Kwik Bond 5 Minute Epoxy | <input type="checkbox"/> Masking Tape |
| <input type="checkbox"/> Excel Modeling Knife | <input type="checkbox"/> Paper Towels |
| <input type="checkbox"/> Ernst Airplane Stand | <input type="checkbox"/> Rubbing Alcohol |
| <input type="checkbox"/> Pencil | <input type="checkbox"/> NHP Epoxy Mixing Sticks |
| <input type="checkbox"/> Builder's Triangle | <input type="checkbox"/> NHP Epoxy Mixing Cups |

Step 1: Aligning the Vertical Stabilizer

- Set the vertical stabilizer into place. To align the stabilizer properly, it should be pushed down firmly and the vertical post should be pushed firmly against (and centered with) the back edge of the fuselage.

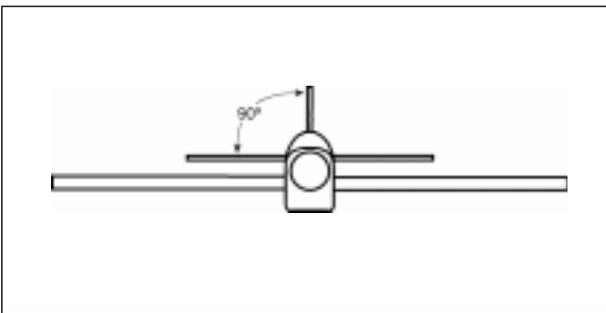


- When satisfied with the fit, use pieces of masking tape to hold the stabilizer aligned.
- Using a pencil, draw an outline on each side of the stabilizer where it meets the triangle support stock.



- Remove the stabilizer.
- Using a modeling knife, cut away the covering from below the outlines you drew.

- Remove the covering from the remaining gluing surfaces. This includes the back edge of the fuselage, the front edge of the vertical post, the bottom of the vertical stabilizer, the top of the filler block and inside the triangle support stock.



- Set the stabilizer back into place and realign it.
- Using a builder's triangle, check to make sure that the vertical stabilizer is aligned 90° to the horizontal stabilizer.

Step 2: Mounting the Vertical Stabilizer

- Apply a generous amount of 5 minute epoxy to the gluing surfaces of the stabilizer and the fuselage.
- Set the stabilizer into place and realign it, double-checking all of your measurements once more before the epoxy sets up. Quickly remove any excess epoxy and hold the stabilizer in place until the epoxy has set up.

SECTION 5: INSTALLING THE LANDING GEAR

YOU'LL NEED THE FOLLOWING PARTS:

- {2} Prebent Main Gear Wires w/Wheels
- {2} Nylon Landing Gear Straps
- {4} 2mm x 10mm Wood Screws

YOU'LL NEED THE FOLLOWING SUPPLIES:

- # 1 Phillips Head Screwdriver
- Excel Modeling Knife
- Electric Drill
- 1/16" Drill Bit
- Ernst Airplane Stand
- Pencil

Step 1: Installing the Landing Gear Wires

- Using a modeling knife, remove the covering material from over the landing gear mounting slot in the bottom of the fuselage. The middle of the slot is located 1/4" in front of the wing saddle.



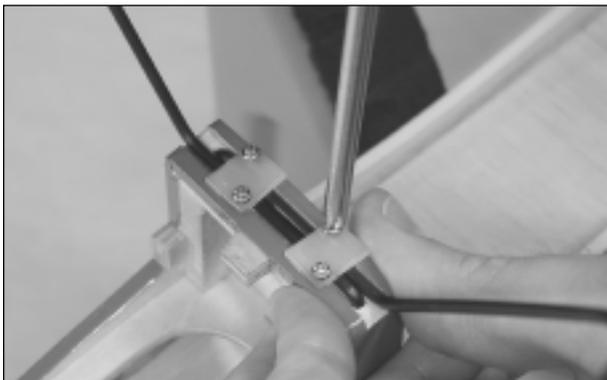
- ❑ Line up the 90° bend in each landing gear wire with the predrilled holes in the landing gear block.
- ❑ Firmly push the wires into the holes. When aligned properly, both wires should be flush with the bottom of the fuselage.

Step 2: Installing the Landing Gear Straps



- ❑ The landing gear wires are held in place using two nylon landing gear straps. Position the straps equal distances from the end of each wire.
- ❑ Use a pencil to mark the locations of the mounting screws.
- ☞ Make sure that the straps do not hang over the edges of the wing saddle or the cowl opening.

- ❑ Remove the straps and drill 1/16" pilot holes into the fuselage at the locations you marked.



- ❑ Install the straps using four 2mm x 10mm wood screws. Tighten the screws completely to secure the landing gear wires into place.

SECTION 6: INSTALLING THE MOTOR

YOU'LL NEED THE FOLLOWING PARTS:

- {1} Motor Strap Set for Direct Drive
- {1} Motor Strap Set for Gear Boxes
- {1} Plywood Shim (D-26)
- {4} 3mm x 12mm Wood Screws
- {1} Molded Spinner

YOU'LL NEED THE FOLLOWING SUPPLIES:

- # 1 Phillips Head Screwdriver
- Wire Cutters
- Adjustable Wrench
- Excel Modeling Knife
- Electric Drill
- 1/16" Drill Bit
- Ernst Airplane Stand
- Pencil

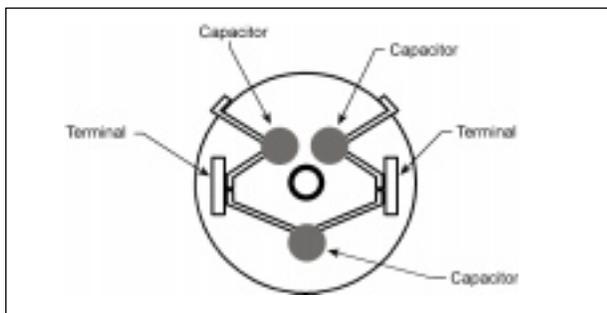
IMPORTANT

The Crazy-8 EP contains two sets of motor mount straps. One set is used to mount direct drive motors and the other set is used to mount motors that use gear boxes. You can tell the difference between the two quite easily. The set with the deeper bottom straps and shallower upper straps are for use with direct drive motors.

A plywood shim (D-26) is included to shim up the motor straps if using a motor with a gear box. This is necessary to compensate for the off-set of the gear box, so that the spinner will line up properly with the fuselage. If you use the included straps to mount your motor (with gear box only), cut the shim into four equal lengths and place one piece under each mounting flange. If your gear box assembly uses a built-in mount (i.e. with molded mounting flanges), cut the shim in half and place one piece under each mounting flange.

☞ Depending on the make and model of your gear box, you may need to modify the thickness of the shims so that the spinner will line up with the fuselage.

This instruction manual shows the installation of a direct drive Turbo 450 motor.



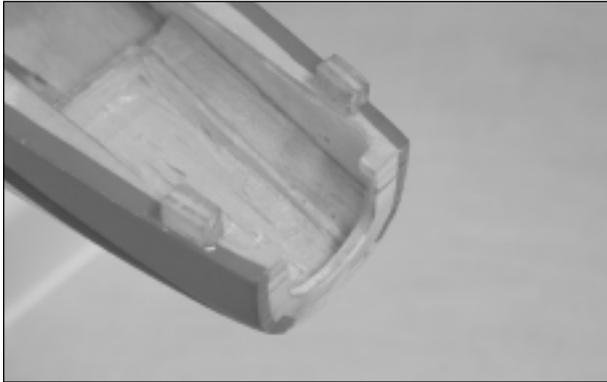
IMPORTANT

To prevent radio interference caused by the motor, it's extremely important to make sure there are three capacitors soldered to the back of the motor. One capacitor should be soldered between each motor terminal and the motor can. The third capacitor should be soldered between the two motor terminals.

Step 1: Aligning the Motor

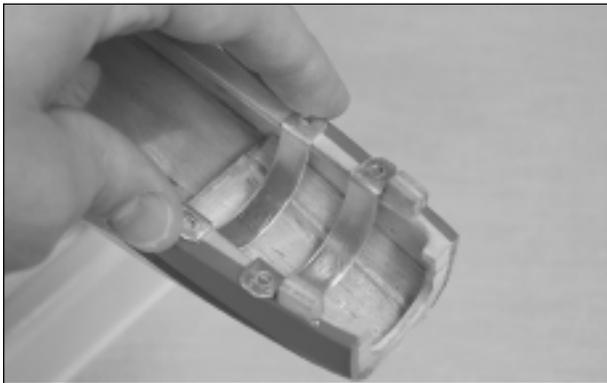
- Install the propeller adaptor (not included) onto the motor shaft of your motor (not included).
- Slide the spinner backplate onto the propeller adaptor and secure it into place by tightening the propeller nut.

☞ You may need to enlarge the hole in the spinner backplate to fit the diameter of your propeller adaptor.



❑ Using a modeling knife, carefully cut away and remove the plywood support brace that's built across the nose of the fuselage.

☞ This must be removed to allow clearance for the propeller adaptor shaft.



❑ Set the lower mounting straps (the deeper ones) onto the motor mounting plate. The forward strap should be just behind the cowl mounting blocks and the rear strap should be about 3/4" behind the front one.

☞ You may have to position the straps differently depending on your particular motor setup.

IMPORTANT

If the front mounting strap hangs over the sides of the fuselage, you can trim the edges of the strap using a pair of wire cutters. The edges of the strap should be about 1/16" in from the fuselage sides to allow room for the cowl when it is installed later.



❑ Set the motor onto the mounting straps.

❑ To align the motor properly, center the spinner backplate with the front of the fuselage. So the backplate doesn't touch, make sure there is a 3/32" gap between it and the front of the fuselage.

IMPORTANT

Depending on the length of your motor assembly, you may have to trim away some of the sub-bulkhead behind the rear mounting strap so that the motor can be aligned properly.

Step 2: Mounting the Motor

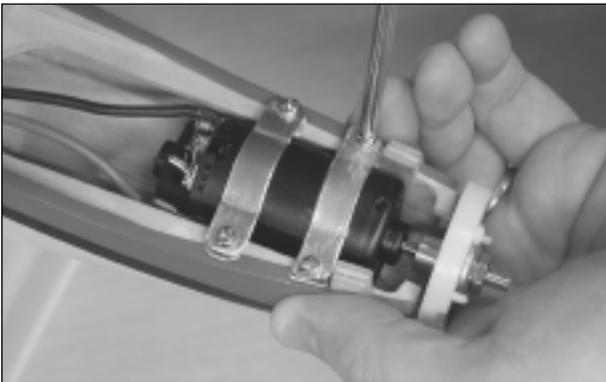


- ❑ While holding the motor assembly aligned, use a pencil to mark the locations of the four mounting screws.

- ❑ Remove the motor assembly and the mounting straps.
- ❑ Drill 1/16" pilot holes through the plywood mounting plate at the marks you drew.

WARNING

Be careful not to drill through the sides of the fuselage.



- ❑ Set the motor clamps and the motor back into place and realign them.
- ❑ Place the two upper mounting straps (the shallower ones) in position and secure them into place using four 3mm x 12mm wood screws.
- ☞ Make sure to tighten the screws evenly so you don't distort the mounting straps.

IMPORTANT

If the front, upper mounting strap overhangs the sides of the fuselage, trim the ends of the strap flush with the ends of the lower strap.

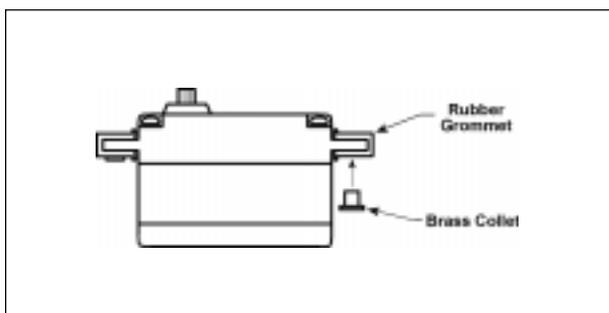
- ❑ Gently grasp the spinner backplate and lightly pull on the motor assembly to verify it is held securely in place.
- ❑ Remove the spinner backplate and set it aside for now.

SECTION 7: INSTALLING THE SERVOS

YOU'LL NEED THE FOLLOWING SUPPLIES:

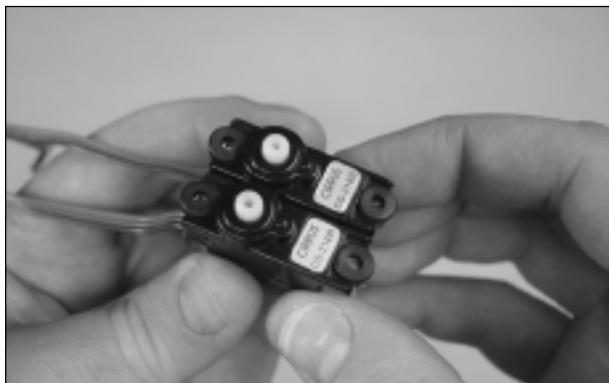
- # 1 Phillips Head Screwdriver
- Excel Modeling Knife
- Electric Drill
- 1/16" Drill Bit
- Ernst Airplane Stand
- Ruler
- Masking Tape

Step 1: Installing the Rudder & Elevator Servos



- Install the rubber grommets and brass collets onto your elevator and rudder servos. Make sure to install the collets with the flanges toward the bottom of the servos.

- Carefully remove the servo hatch cover from the bottom of the fuselage (behind the wing saddle). The hatch cover is temporarily held in place from the factory with double-sided tape.



- Use a piece of masking tape to hold the elevator and rudder servos together side-by-side as shown.



- Set the servos onto the servo rails taking note of their location and the position of the servo output shafts.

☞ So that the servo arms will be lined up with the pushrods when they are installed later, the servos should be centered between the fuselage sides .

IMPORTANT

Run the servo leads out toward the front of the airplane, underneath the wing hold-down block.

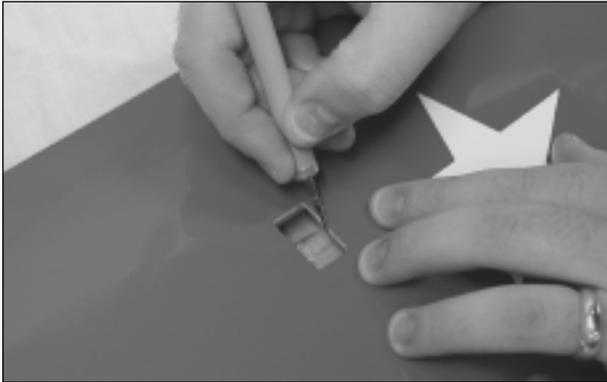
- ❑ While holding the servos in place, drill 1/16" pilot holes through the servo rails for the mounting screws.

☞ It's important to drill pilot holes to prevent the rails from splitting.

- ❑ Install the servos using the wood screws provided with your radio system.

Step 2: Installing the Aileron Servos

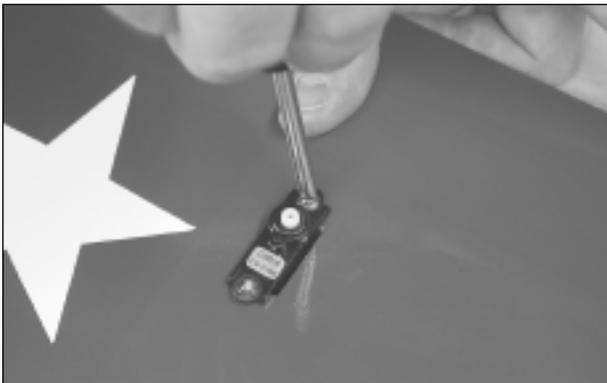
- ❑ Install the rubber grommets and brass collets onto your two aileron servos. Make sure to install the collets with the flanges toward the bottom of the servos.



- ❑ Using a modeling knife, remove the covering from over the two servo mounting holes in the bottom of the wing. One hole is located in each half of the wing, 11-1/2" in from the wing tip and 3-7/8" in front of the aileron hinge line.

- ❑ Using a modeling knife, remove the covering from over the servo lead exit hole in the top, center of the wing. You can see the hole through the covering material if you look closely.

- ❑ Working with one servo for now, feed the servo lead through the wing and pull it out through the exit hole in the top of the wing.



- ❑ Push the servo into place, taking note of the position of the output shaft. It should be toward the leading edge.
- ❑ Install the servo using the same technique as with the elevator and rudder servos.

WARNING

When drilling the pilot holes, be careful not to drill through the top of the wing.

- ❑ Repeat the procedures above to install the second aileron servo.

IMPORTANT

If you plan on using a Y-harness to join the two aileron servos, plug that into the servo leads now. If you plan on plugging each aileron servo lead separately into the receiver, plug individual servo extensions into each servo lead now.

☞ You will need servo extensions to reach the receiver when it is installed later.

SECTION 8: INSTALLING THE ELEVATOR PUSHROD

YOU'LL NEED THE FOLLOWING PARTS:

- {1} 1.5mm x 305mm Pushrod Wire
- {1} Nylon Control Horn w/Backplate
- {1} Nylon Clevis
- {2} 2mm x 16mm Machine Screws
- {1} Clevis Retainer Tubing

YOU'LL NEED THE FOLLOWING SUPPLIES:

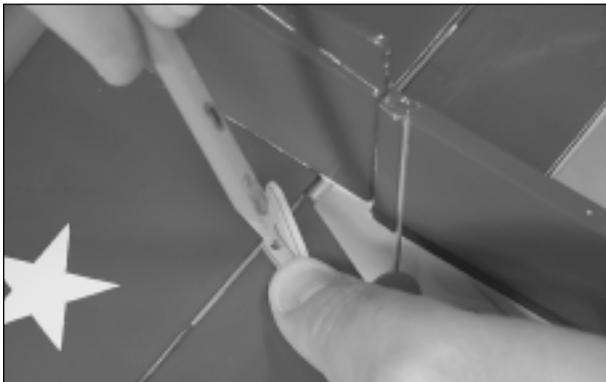
- # 1 Phillips Head Screwdriver
- Needle Nose Pliers
- Excel Modeling Knife
- Electric Drill
- 1/16" Drill Bit
- 5/64" Drill Bit
- Ernst Airplane Stand
- Ruler
- Pencil
- Masking Tape

Step 1: Installing the Control Horn

IMPORTANT

The control horn used for the elevator is the one that has one-half of the base and backplate removed.

- Using a ruler and a pencil, measure out 5/8" from the right side of the fuselage, at the elevator hinge line, and draw a mark on the bottom of the elevator.



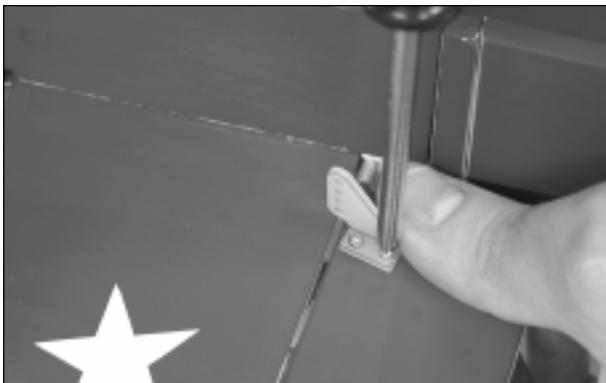
- Position the control horn onto the bottom of the elevator, aligning the centerline of the control horn with the mark you drew. Angle the control horn about 1/16" toward the fuselage side so the pushrod will line up better. Adjust the control horn so that the clevis attachment holes are directly over the hinge line.

- Mark the positions for the mounting screws, then remove the control horn.

- Drill 5/64" holes through the elevator for the mounting screws.

IMPORTANT

Make sure to drill the holes straight down and not at an angle.



- Mount the control horn assembly to the elevator using two 2mm x 16mm machine screws.

- Don't overtighten the screws. You don't want to crush the elevator.

Step 2: Installing the Pushrod

- ❑ Using a modeling knife remove the covering material from over the elevator pushrod exit hole in the *right* side of the fuselage. The hole is located $9/16$ " down from the bottom of the stabilizer and $2-7/8$ " in front of the rudder hinge line.
- ❑ Using a modeling knife, remove all but one arm from a small "4-point" servo horn. The remaining arm should have at least four holes in it.



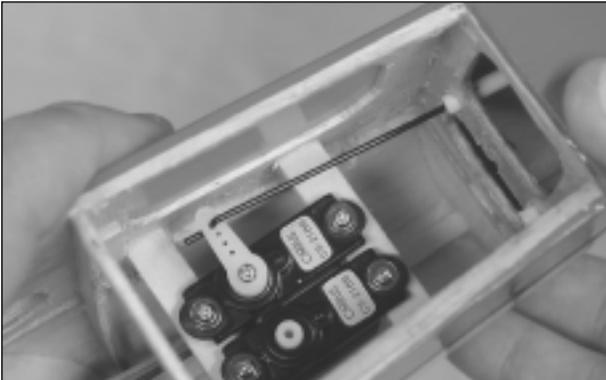
- ❑ Insert the Z-Bend in the 305mm long pushrod wire into the *fourth* hole out from the center of the servo arm.

☞ You will have to enlarge the hole using a $1/16$ " drill bit so the pushrod will fit properly.

IMPORTANT

Make sure the longer portion of the pushrod wire is toward the top of the servo arm.

- ❑ Connect your radio system and plug the elevator servo into the receiver. Double-check that the elevator trim lever on your transmitter is centered and turn on the radio system.



- ❑ Slide the pushrod into the pushrod housing (on the left side of the fuselage) and install the servo horn onto the servo, making sure it's centered.

☞ The servo horn should point toward the fuselage side, as shown.

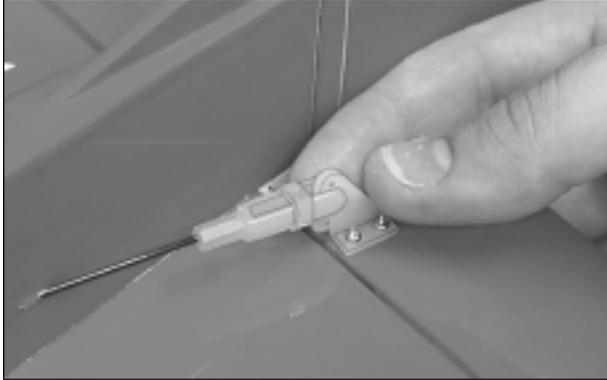
- ❑ Install the retaining screw to secure the servo horn into place.



- ❑ Using a modeling knife, cut off a $1/4$ " long piece of clevis retainer tubing.

- ❑ Slip the piece of tubing onto the base of one clevis.

- ❑ Use a couple of pieces of masking tape to hold the elevator centered.



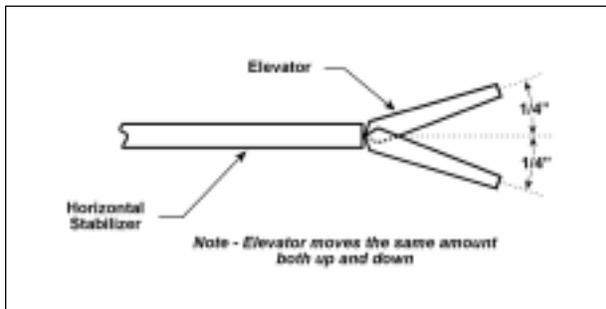
- ❑ Thread the nylon clevis onto the threaded end of the pushrod wire until the clevis lines up with the holes in the control horn.

✎ Use needle nose pliers to keep the pushrod wire from twisting.

- ❑ Carefully snap the clevis into the *third* hole out from the base of the control horn and slide the piece of silicon tubing up over the clevis to secure it into place.

Step 3: Adjusting the Pushrod & Control Throw

- ❑ Remove the masking tape from the elevator.
- ❑ With your radio system plugged in and turned on, check to make sure the elevator and the elevator servo are centered. If necessary, use the trim lever on the transmitter and/or thread the clevis in or out to center the elevator.
- ❑ Double-check that the elevator is moving in the proper direction.



- ❑ Check the control surface throw by measuring from the widest point of the control surface. The elevator should move both up and down 1/4".

IMPORTANT

Remember, you can adjust the control throws by moving the ends of the pushrods in and out on both the control horn and the servo arm. Moving the pushrod toward the control surface will increase the control throw. Moving it away will decrease the throw. Moving the pushrod toward the center of the servo arm will decrease the control throw and moving it away from the center will increase the throw.

WARNING

We strongly suggest using the recommended elevator control throw listed above for your first few test flights, or at least until you are familiar with the flying characteristics of the airplane. Using a higher control throw without being familiar with the flight characteristics will only result in excessive pitch control which will likely lead to over-controlling.

SECTION 9: INSTALLING THE RUDDER PUSHROD

YOU'LL NEED THE FOLLOWING PARTS:

- {1} 1.5mm x 325mm Pushrod Wire
- {1} Nylon Control Horn w/Backplate
- {1} Nylon Clevis
- {2} 2mm x 16mm Machine Screws
- {1} Clevis Retainer Tubing

YOU'LL NEED THE FOLLOWING SUPPLIES:

- # 1 Phillips Head Screwdriver
- Needle Nose Pliers
- Excel Modeling Knife
- Electric Drill
- 1/16" Drill Bit
- 5/64" Drill Bit
- Ernst Airplane Stand
- Ruler
- Pencil
- Masking Tape

IMPORTANT

The rudder pushrod is installed using the same technique as the elevator pushrod. There are only minor differences which are noted.

Step 1: Installing the Control Horn

IMPORTANT

The control horn used for the rudder is the one that has one-half of the base and backplate removed.

- Using a ruler and a pencil, measure up $7/16$ " from the bottom of the rudder (on the left side), at the hinge line, and draw a mark.



- Install the control horn onto the rudder using the same technique as with the elevator.

IMPORTANT

Make sure that the control horn is mounted perpendicular to the hinge line, as shown.

Step 2: Installing the Pushrod

- Using a modeling knife remove the covering material from over the rudder pushrod exit hole in the *left* side of the fuselage. The hole is located $1-1/8$ " down from the bottom of the stabilizer and $2-7/8$ " in front of the rudder hinge line.
- Using a modeling knife, remove all but one arm from a small "4-point" servo horn. The remaining arm should have at least four holes in it.

- ❑ Insert the Z-Bend in the 325mm long pushrod wire into the *fourth* hole out from the center of the arm.

☞ You will have to enlarge the hole using a 1/16" drill bit so the pushrod will fit properly.

IMPORTANT

Make sure the longer portion of the pushrod wire is toward the top of the servo arm.

- ❑ Connect your radio system and plug the rudder servo into the receiver. Double-check that the rudder trim lever on your transmitter is centered and turn on the radio system.



- ❑ Slide the pushrod into the pushrod housing and install the servo horn onto the servo, making sure it's centered.

☞ The servo horn should point toward the fuselage side, as shown.

- ❑ Install the retaining screw to secure the servo horn into place.

- ❑ Using a modeling knife, cut off a 1/4" long piece of clevis retainer tubing. Slip the piece of tubing onto the base of one clevis.

- ❑ Use a couple of pieces of masking tape to hold the rudder centered.



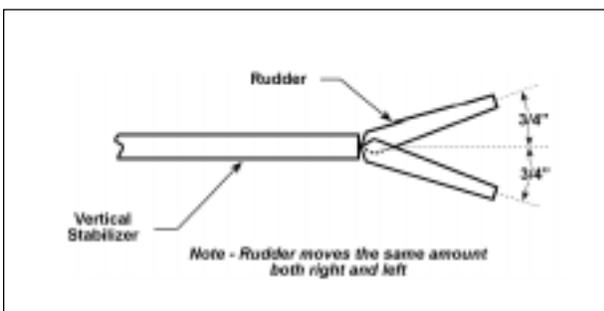
- ❑ Thread the nylon clevis onto the threaded end of the pushrod wire until the clevis lines up with the holes in the control horn.

- ❑ Carefully snap the clevis into the *third* hole out from the base of the control horn and slide the piece of silicon tubing up over the clevis to secure it into place.

- ❑ Remove the masking tape from the rudder.

Step 3: Adjusting the Pushrod & Control Throw

- ❑ With your radio system plugged in and turned on, check to make sure the rudder and the rudder servo are centered. If necessary, use the trim lever on the transmitter and/or thread the clevis in or out to center the rudder. Double-check that the rudder is moving in the proper direction.



- ❑ Check the control surface throw by measuring from the widest point of the control surface. The rudder should move both right and left 3/4".

- ❑ If necessary, make adjustments to the control throw using the same technique as with the elevator.

SECTION 10: INSTALLING THE AILERON PUSHRODS

YOU'LL NEED THE FOLLOWING PARTS:

- {2} 1.5mm x 85mm Pushrod Wires
- {2} Nylon Control Horns w/Backplates
- {2} Nylon Clevises
- {4} 2mm x 16mm Machine Screws
- {1} Clevis Retainer Tubing

YOU'LL NEED THE FOLLOWING SUPPLIES:

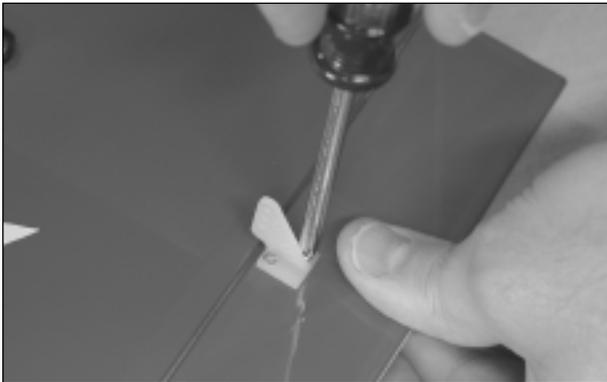
- # 1 Phillips Head Screwdriver
- Needle Nose Pliers
- Excel Modeling Knife
- Electric Drill
- 1/16" Drill Bit
- 5/64" Drill Bit
- Ruler
- Pencil
- Masking Tape

IMPORTANT

The aileron pushrods are installed using the same technique as the elevator and rudder pushrods. There are only minor differences which are noted.

Step 1: Installing the Control Horns

- Using a ruler and a pencil, measure out 3-3/8" from the inside edge of one aileron, at the hinge line, and draw a mark.



- Install the control horn onto the aileron using the same technique as with the elevator and rudder.

IMPORTANT

Make sure that the control horn is mounted perpendicular to the hinge line and that the holes in the control horn are even with the hinge line.

- Repeat the previous procedures to install the second control horn onto the other aileron.

Step 2: Installing the Pushrods

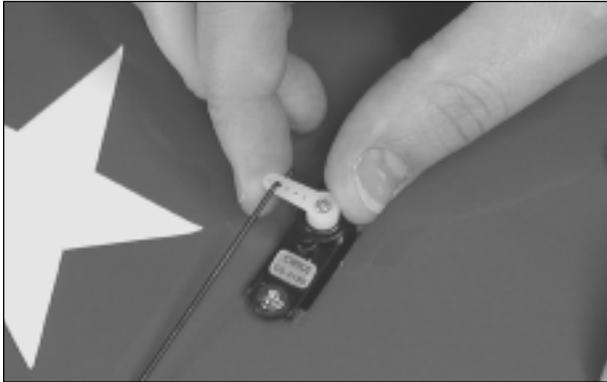
- Using a modeling knife, remove all but one arm from a small "4-point" servo horn. The remaining arm should have at least four holes in it.
- Insert the Z-Bend in one pushrod wire into the *fourth* hole out from the center of the arm.

👉 You will have to enlarge the hole using a 1/16" drill bit so the pushrod will fit properly.

IMPORTANT

Make sure the longer portion of the pushrod wire is toward the top of the servo arm.

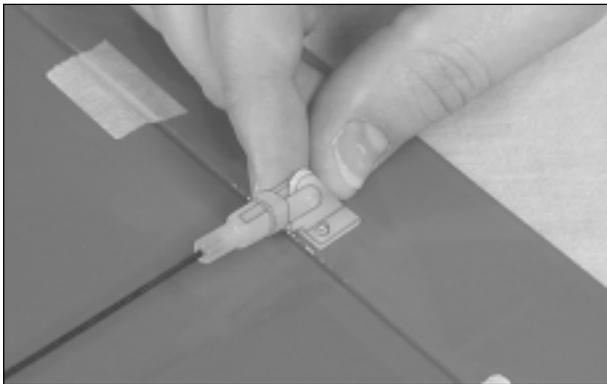
- ❑ Connect your radio system and plug the aileron servo into the receiver. Double-check that the aileron trim lever on your transmitter is centered and turn on the radio system.



- ❑ Install the servo horn onto the servo, making sure it's centered.
- ☞ The servo horn should point toward the wing tip.
- ❑ Install the retaining screw to secure the servo horn into place.

- ❑ Using a modeling knife, cut off a 1/4" long piece of clevis retainer tubing. Slip the piece of tubing onto the base of one clevis.

- ❑ Use a couple of pieces of masking tape to hold the aileron centered.

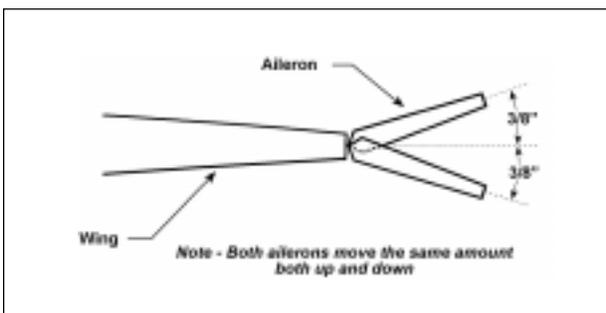


- ❑ Thread the nylon clevis onto the threaded end of the pushrod wire until the clevis lines up with the holes in the control horn.
- ❑ Carefully snap the clevis into the *third* hole out from the base of the control horn and slide the piece of silicon tubing up over the clevis to secure it into place.
- ❑ Remove the masking tape from the aileron.

- ❑ Repeat the previous procedures to install the second aileron pushrod assembly.

Step 3: Adjusting the Pushrods & Control Throws

- ❑ With your radio system plugged in and turned on, check to make sure both ailerons and aileron servos are centered. If necessary, use the trim lever on the transmitter and/or thread the clevises in or out to center them. Double-check that the ailerons are moving in the proper direction.



- ❑ Check the control surface throws by measuring from the widest point of each control surface. Both ailerons should move both up and down 3/8".
- ❑ If necessary, make adjustments to the control throws using the same technique as with the elevator rudder.

SECTION 11: INSTALLING THE COWL

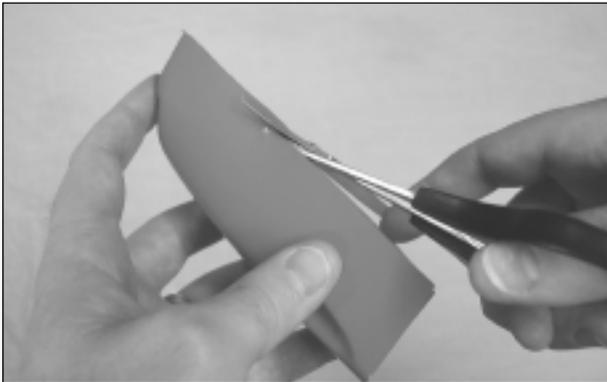
YOU'LL NEED THE FOLLOWING PARTS:

- {1} Molded Plastic Cowl
- {4} 2mm x 6mm Wood Screws

YOU'LL NEED THE FOLLOWING SUPPLIES:

- # 0 Phillips Head Screwdriver
- Ernst Airplane Stand
- Excel Modeling Knife
- Pencil
- Scissors
- 220 Grit Sandpaper w/Sanding Block
- Electric Drill
- Masking Tape
- 1/16" Drill Bit

Step 1: Aligning the Cowl



- Using a pair of scissors, cut out the cowl along its molded scribe line.
- Sand the edges of the cowl smooth and straight using 220 grit sandpaper with a sanding block.

- Set the cowl onto the fuselage and align it.

🔧 You may have to trim the edges of the cowl slightly to get a perfect fit.



- When satisfied with the fit, use pieces of masking tape to hold the cowl firmly in place.
- Using a pencil, mark the locations of the five mounting screw holes onto the cowl.

IMPORTANT

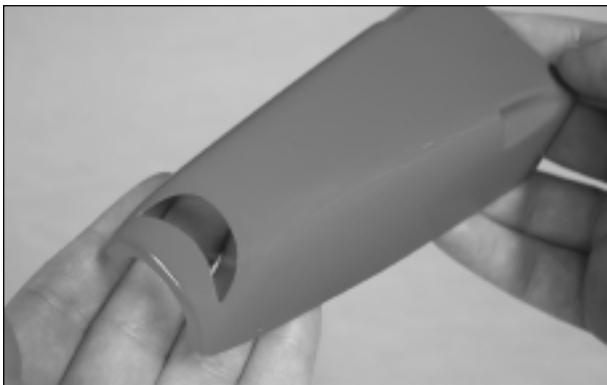
If you hold the fuselage up against a bright light, you can easily see the cowl mounting blocks within the cowl. This will make it easy to position the holes.

Step 2: Mounting the Cowl



- Drill 1/16" pilot holes into the cowl and through the cowl mounting blocks for the wood screws.

 Do not install the cowl yet.



- Remove the masking tape and cowl from the fuselage.
- Using a modeling knife, carefully cut open the two molded air-exit holes in the back of the cowl and cut an air-intake hole in the front of the cowl.

WARNING

It's imperative to have sufficient airflow through the cowling and belly pan to cool the motor, ESC and flight battery.

- Install the cowl using five 2mm x 6mm wood screws. Be careful not to overtighten the screws or they might split or distort the plastic.

SECTION 12: INSTALLING THE CANOPY

YOU'LL NEED THE FOLLOWING PARTS:

- {1} Molded Clear Canopy
- {4} 2mm x 6mm Wood Screws

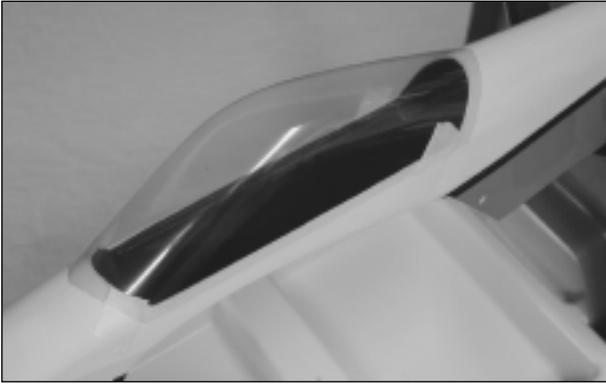
YOU'LL NEED THE FOLLOWING SUPPLIES:

- # 0 Phillips Head Screwdriver
- Ernst Airplane Stand
- Scissors
- Pencil
- Electric Drill
- 220 Grit Sandpaper w/Sanding Block
- 1/16" Drill Bit
- Masking Tape

Step 1: Aligning the Canopy

- Using a pair of scissors, cut out the canopy along its molded scribe line.
- Sand the edges of the canopy smooth and straight using 220 grit sandpaper with a sanding block.

- Set the canopy onto the fuselage and center it over the cockpit opening. Look from the front to make sure the canopy is centered with the middle of the fuselage, too.



- When satisfied with the fit, use pieces of masking tape to hold the canopy in place.

Step 2: Mounting the Canopy



- Carefully drill four 1/16" pilot holes through the canopy and into the fuselage for the mounting screws. Locate two holes on each side of the canopy, one near the front and one near the back.

- Install the canopy using four 2mm x 6mm wood screws. Be careful not to overtighten the screws or they may strip.

SECTION 13: FINAL ASSEMBLY

YOU'LL NEED THE FOLLOWING PARTS:

- {1} Decal Set
- {1} Molded Spinner
- {2} 2mm x 10mm Wood Screws

YOU'LL NEED THE FOLLOWING SUPPLIES:

- # 1 Phillips Head Screwdriver
- Adjustable Wrench
- Excel Modeling Knife
- Scissors
- Electric Drill
- 5/64" Drill Bit
- Ernst Airplane Stand
- Ruler
- Scotch® Tape

Step 1: Applying the Decals

- Using a clean cloth, wipe the airframe down completely to remove dust, debris and oil.

❑ Cut out each of the decals and apply them using the box cover photos for reference.

☞ If any air bubbles form under the decals you can "prick" the bubbles with a pin to release the air.

Step 2: Installing the Electronic Speed Control (ESC)

❑ Remove the cowl from the fuselage and set it aside for now.

❑ Connect the motor leads to the ESC leads making sure that the polarity is correct.

☞ The ESC will be mounted behind the motor, so adjust the length of the motor and ESC leads accordingly.



❑ Mount the ESC to the fuselage side (or the fuselage floor) behind the motor using a piece of double-sided tape (not included).

IMPORTANT

The flight battery will be mounted inside the belly pan; therefore, slide the battery connector on the ESC through the lower hole in the forward bulkhead for easy access.

❑ There is a precut hole in the left side of the fuselage to mount your ESC's on/off switch (if your ESC has a switch). To mount the switch, remove the covering from over the hole and install the switch using the hardware provided with the switch. The hole is 4" behind the front of the fuselage, and 5/8" up from the bottom of the fuselage side.

☞ There is also a predrilled hole next to the switch for an arming switch. If your ESC is equipped with an arming switch, install that into the hole at this time.

Step 3: Installing the Receiver



❑ Plug the elevator, rudder, ESC and aileron servo extension leads into their proper slots in the receiver.

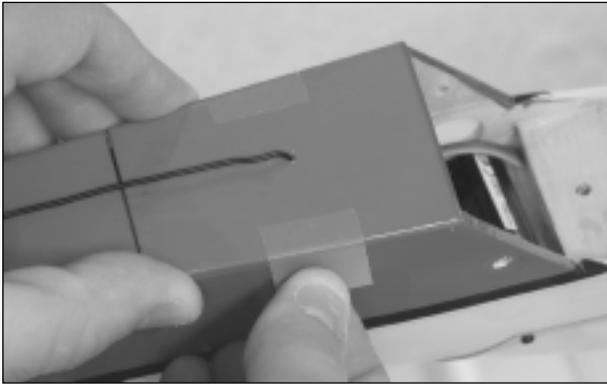
❑ If your receiver is small enough, mount it in front of the servos, on the back side of the canopy deck, using a piece of double-sided tape.

☞ If your receiver is larger, like the Hitec 8 Channel Slim receiver, it can be mounted under the elevator and rudder servos and held in place with a small piece of foam.

IMPORTANT

Depending on the length of your ESC lead, you may need to use an extension to reach the receiver.

☞ If you are using a lightweight motor assembly, the airplane may balance tail-heavy with the receiver mounted as shown. If this is the case, the receiver can be mounted directly behind the motor. If you decide to mount the receiver behind the motor you will need to use servo extensions for the elevator and rudder servos.



- ❑ Drill a 5/64" hole through the center of the servo hatch cover.
- ❑ Thread the end of the receiver antenna through the hole and set the hatch cover into place.
- ❑ Use a couple of short pieces of Scotch® tape to hold the hatch cover securely in place.

- ❑ Secure the antenna to the back of the fuselage using a piece of Scotch® tape.

Step 4: Installing the Flight Battery



- ❑ Mount the flight battery into the bottom of the belly pan using a strip of Velcro® to hold it securely in place.

☞ Depending on the size and configuration of your flight battery, you may need to enlarge the center bulkhead in the belly pan to allow clearance.

IMPORTANT

In order to balance the airplane (in the next section) you may have to move the battery forward or aft. After you find the optimum location, place marks on the belly pan and battery so you can install the battery in the same location every time.

- ❑ Making sure that there is no power to the motor, plug the flight battery into the ESC.
- ❑ Install the belly pan using the machine screws and flat washers provided.

Step 5: Installing the Propeller & Spinner



- ❑ Slide the spinner backplate and the propeller onto the propeller shaft.

- ❑ Thread the machine screw and washer onto the front of the shaft and tighten them against the propeller.

☞ Make sure when you install the propeller that its edges are up against the two molded pins; otherwise, the spinner cone will not line up properly with the backplate.

- ❑ Push the plastic spinner cone over the propeller and align it with the molded grooves in the backplate. Secure the spinner cone in place using two 2mm x 10mm wood screws.

SECTION 14: BALANCING

YOU'LL NEED THE FOLLOWING SUPPLIES:

- # 1 Phillips Head Screwdriver
- Masking Tape
- Ruler

IMPORTANT

It is critical that your airplane be balanced correctly. Improper balance will cause your airplane to lose control and crash!

Center of Gravity Location:

2-7/8" back from the leading edge of the wing, at the fuselage sides.

WARNING

This location is recommended for initial test flying. The C.G. can be moved fore or aft up to 1/4", but it is not recommended that the C.G. be located any farther back than 3-1/8".

✎ Balance the Crazy-8 with the flight battery *installed*.

- Install the wing and belly pan onto the fuselage.
- Apply two pieces of masking tape onto the *top* of the wing, 2-7/8" back from the leading edge, at the fuselage sides.
- Turn the airplane upside down, place your fingers on the masking tape, and carefully lift the airplane. If the nose of the airplane falls, the airplane is nose heavy. To correct this, move the battery pack and/or receiver back far enough to bring the airplane into balance. If the tail of the airplane falls, the airplane is tail heavy. To correct this, move the battery pack and/or receiver forward enough to bring the airplane into balance. When balanced correctly, the airplane should sit level or slightly nose down when you lift it up with your fingers at the C.G. location.

✎ Once you have flown and become familiar with the flight characteristics of the airplane, the C.G. can be moved fore or aft up to 1/4" in each direction to change the flight performance. Moving the C.G. back will cause the airplane to be more responsive, but less stable. Moving the C.G. forward will cause the airplane to be more stable, but less responsive.

Do not fly the airplane beyond the recommended balance range or an uncontrollable crash could result!

SECTION 15: CONTROL THROWS

We recommend setting up the Crazy-8 using the control throws recommended in the pushrod installation steps. Those control throws are suggested for initial test flying. If you haven't set up the control throws yet, we have listed them here again. Please refer back to those pages for the proper technique for adjusting the control throws. These settings will allow the airplane to fly smoother and make it easier to control.

TEST FLYING

<i>Elevator:</i>	<i>1/4" Up</i>	<i>1/4" Down</i>
<i>Rudder:</i>	<i>3/4" Right</i>	<i>3/4" Left</i>
<i>Ailerons:</i>	<i>3/8" Up</i>	<i>3/8" Down</i>

After you have become familiar with the flying characteristics of the airplane, you may want to increase the control throws to the settings listed below. These throws will provide greater performance.

SPORT FLYING

<i>Elevator:</i>	<i>3/8" Up</i>	<i>3/8" Down</i>
<i>Rudder:</i>	<i>1" Right</i>	<i>1" Left</i>
<i>Ailerons:</i>	<i>1/2" Up</i>	<i>1/2" Down</i>

WARNING

The control throws listed above are the maximum we would recommend for most sport flyers. Using higher control throws than we recommend can cause excessive pitch and roll if you are not "easy on the sticks" and especially if the airplane is balanced at all tail heavy.

SECTION 16: RADIO SET UP FOR 3D FLYING

Although you don't have to use a computer radio to enjoy the flying qualities of the Crazy-8, if you're planning on doing 3D aerobatics it is recommended. Before making any adjustments, please read and understand your radio's setup manual.

EXPONENTIAL

Expo, as it's more commonly referred to, softens the control feel around neutral. This is especially helpful when flying an airplane that uses a lot of control throw, like the Crazy-8. Softening the neutral point makes the airplane fly more smoothly and makes it more likely that you won't over-control. Obviously you may want to change the expo settings to suit your flying style, but here are some good starting points:

	<i><u>SPORT FLYING</u></i>	<i><u>3D FLYING</u></i>
<i>Elevator:</i>	<i>30%</i>	<i>60%</i>
<i>Ailerons:</i>	<i>35%</i>	<i>50%</i>
<i>Rudder:</i>	<i>25%</i>	<i>50%</i>

☞ If you are not used to flying with expo, we suggest starting with lower percentages until you become more accustomed to the feel of the controls.

FLAPERON AND SPOILERON MIXING

Because the Crazy-8 uses individual aileron servos, they can be plugged separately into the receiver and will allow the use of flaperons (both ailerons down at the same time) and spoilerons (both ailerons up at the same time). These functions can then be mixed with the elevator for extreme pitch changes useful in 3D maneuvers.

Elevator: 1/2" Up and Flaperons (down) 1/4"

Elevator: 1/2" Down and Spoilerons (up) 1/4"

☞ We do not recommend using flaperon and spoileron to elevator mixing during general sport flying, especially during takeoff and landing. This mixing should only be used for 3D maneuvers.

3D FLYING CONTROL SURFACE THROWS

Elevator: 1/2" Up 1/2" Down

Ailerons: 5/8" Up 5/8" Down

Rudder: 1-1/2" Right 1-1/2" Left

☞ The 3D control surface throws are our preferences. The airplane flies very good using them; however, these recommendations are not set in stone. Feel free to make adjustments to suit your flying style. Have fun experimenting!

SECTION 17: PREFLIGHT CHECK & SAFETY

- Check the operation of the throttle. To do this, do the following:

A) Plug in your flight battery and turn on the radio system.

WARNING

Do not turn the receiver on unless the transmitter is turned on first. Always turn the transmitter on first. Never allow hands or clothing to get in the way of the propeller when the radio is turned on. Sudden unwanted radio signals, or turning the radio on with the throttle stick set at full throttle, can turn the motor on unintentionally. Always make sure that the throttle control stick is set to idle before turning on the transmitter.

B) When the throttle control stick is at the idle position, the motor should be off. Moving the stick forward should turn on the motor. Gradually moving the stick to the full forward position should result in the motor running at full power.

☞ Some ESCs will give you more proportional control than others. Your ESC may also have a manual control adjustment screw that must be adjusted prior to using the ESC. (Refer to your ESC's operating guide for further information.)

- Cycle the flight battery three times. When NiCD and NiMH batteries are new they need to be used 2-3 times before they will produce their top voltage and duration. To cycle them, simply charge the battery and then run the motor until the motor stops. Allow the battery and motor to cool, then repeat this procedure two more times.

- Check the condition of the transmitter batteries. They should be fully charged.
- Check every bolt and every glue joint in the Crazy-8 to ensure that everything is tight and well-bonded. This should include all of the control surface hinges, too.
- Double-check the balance of the airplane. ***Do this with the flight battery installed.***
- Check the control surfaces. They should move in the correct direction and not bind.
- Check to ensure that the control surfaces are moving the proper amount.
- Check the receiver antenna. It should be fully extended and not coiled up inside the fuselage.
- We do not suggest storing your airplane in an extremely hot environment (like the back of your car in direct sunlight) for any length of time. The extreme heat could cause the covering material to wrinkle and possibly damage the fragile components of the radio system, ESC or batteries.

The following are our general guidelines for your safety and the safety of others. Please read and understand these safety guidelines before going out to the flying field for the first time.

- Do not test fly your model for the first time without first having it safety-checked by an experienced modeler.
- Do not fly your model higher than approximately 400 feet within 3 miles of an airport without having an observer with you. The observer should tell you about any full-size aircraft in your vicinity and you should always give the right-of-way to full-scale aircraft.
- When flying at a flying field with established rules, you should abide by those rules. You should not deliberately fly your model in a reckless and/or dangerous manner.
- While flying, you should not deliberately fly behind the flight line. If your model should inadvertently fly behind the flight line, you should change course immediately.
- You should complete a successful range check of your radio equipment prior to each new day of flying, or prior to the first flight of a new or repaired model.
- You should perform your initial turn after take-off away from the flightline and/or spectator area.
- You should not knowingly operate your R/C radio system within 3 miles of a preexisting model club flying field without a frequency sharing agreement with that club.

SECTION 18: FLYING THE CRAZY-8 EP

The Crazy-8 can take off from the ground or be hand-launched. We recommend ground take-offs only from hard smooth surfaces or very short grass.

Taking Off from the Ground

With the airplane pointing into the wind, apply full power and feed in right rudder to keep the airplane tracking straight as it rolls down the runway. Once sufficient airspeed has been reached, gently apply up elevator to lift the airplane off the ground. Climb out straight ahead in a shallow climb to build up speed. Do not climb steeply or make any steep turns right after take-off or you may stall the airplane.

Hand Launching

Hand Launching should always be done into the wind.

To hand-launch the airplane, gently grasp the belly pan between your thumb and forefingers at the C.G. location. Hold the airplane above shoulder level and turn on the motor to full power. With the motor running at full power, firmly throw the airplane straight ahead and level. Do not throw it up at an angle or throw it too hard or wild. Let the airplane fly straight and level to pick up airspeed, then climb to your desired altitude. Be careful not to climb too steeply after hand-launching or you could stall the airplane.

In the Air

In the air the Crazy-8 is smooth and predictable. It will fly as docile or as wild and aerobatic as you want it to. It has a broad speed range and doesn't exhibit any bad characteristics. Flying should be done in a large park because the airplane is quite fast and will eat up sky quickly. We suggest flying only in low to non-existent winds until you become familiar with the airplane. Once you are familiar with the flying characteristics, you will realize that the Crazy-8 will handle moderate winds quite easily.

With the Sport Flying control throws and full power, the Crazy-8 will do basic aerobatics with ease. Set up with 3D Flying control throws and mixing, the Crazy-8 is an exciting high-performance airplane that will do exactly what you want it to. Your glow-powered flying buddies will be jealous!

Landing

Landings should always be done into the wind. Prepare for landing by reducing power and allowing the Crazy-8 to slow down and descend. Just before touch-down, turn the motor off and let the airplane settle near the ground. Flair just before touch-down and you will be rewarded with a slow 3-point landing. As always, when landing, be careful not to over-control. Over-controlling leads to excessive oscillations which don't make for good landings.

TRIM CHART

After you have test flown and done the initial trim changes to the aircraft, use the Trim Chart below to begin trimming your airplane. Following and adhering to this chart will result in the ability to diagnose trim problems and correct those problems using the simple adjustments shown below. Making these observations and related corrections will result in a straighter and truer flying airplane.

<u>TRIM FEATURE</u>	<u>MANEUVER</u>	<u>OBSERVATION</u>	<u>CORRECTION</u>
Control Centering	Fly general circles and random maneuvers	Try for hands off straight and level flight	Readjust linkages so the transmitter trim levers are centered
Control Throws	Fly random maneuvers	A) Too sensitive, jerky controls B) Not sufficient control	<i>If A)</i> Adjust linkages to reduce control throws <i>If B)</i> Adjust linkages to increase control throws
Engine Thrust Angle*	From straight and level flight, chop the throttle quickly	A) Airplane continues in a level path for a short distance B) Airplane pitches nose up C) Airplane pitches nose down	<i>If A)</i> Engine thrust angle is correct <i>If B)</i> Decrease down-thrust <i>If C)</i> Increase down-thrust
Center of Gravity and Longitudinal Balance	From level flight, roll to a 45° bank and neutralize the controls	A) Airplane continues in the bank for a moderate distance B) The nose pitches up C) The nose drops	<i>If A)</i> Trim settings are good <i>If B)</i> Add nose weight <i>If C)</i> Remove nose weight
Yaw**	Into the wind, do inside loops using only elevator. Repeat test doing outside loops from an inverted entry	A) Wings are level throughout B) Yaws to right in both inside and outside loops C) Yaws to left in both inside and outside loops D) Yaws to the right on inside loops and yaws to the left on outside loops E) Yaws to the left on inside loops and yaws to the right on outside loops	<i>If A)</i> Trim settings are good <i>If B)</i> Add left rudder trim <i>If C)</i> Add right rudder trim <i>If D)</i> Add left aileron trim <i>If E)</i> Add right aileron trim
Lateral Balance	Into the wind, do tight inside loops	A) Wing are level and plane falls to either side B) Falls off to the left in loops. Worsens as loops tighten C) Fall off to the right in loops. Worsens as loops tighten	<i>If A)</i> Trim settings are good <i>If B)</i> Add weight to right wing tip <i>If C)</i> Add weight to left wing tip
Aileron Rigging	Wing the wings level pull to a vertical climb and neutralize the controls	A) Climb continues along the same path B) Nose tends to go toward an inside loop C) Nose tends to go toward an outside loop	<i>If A)</i> Trim settings are good <i>If B)</i> Raise both ailerons very slightly <i>If C)</i> Lower both ailerons very slightly

*Engine thrust angle and center of gravity interact. Check both.

**Yaw and lateral balance produce similar symptoms. Note that the fin may be crooked. Make certain both elevator halves are even with each other and that they both produce the same amount of control deflection throughout the complete deflection range. Right and left references are as if you were in the cockpit.

PRODUCT EVALUATION SHEET

Telling us what you like and don't like determines what model kits we make and how we make them. We would appreciate it if you would take a few minutes of your time to answer the following questions about this kit. Simply fold this form on the dotted lines, seal with tape and mail it to us. *Do not use staples and make sure our address faces out.*

1) Kit: **Wattage Crazy-8 EP ARF**

2) Where did you learn about this kit?

- Magazine Ads Friend
 Hobby Shop Other
 Internet

3) What influenced you the most to buy this kit?

- Magazine Ads Price
 Type of Model Box Art
 Recommendation Other
 Internet

4) Did you have any trouble understanding the written instructions? If yes, please explain.

- Yes No

5) Did you have any trouble understanding any of the photographs? If yes, please explain.

- Yes No

6) Were any of the kit parts:

- Damaged Wrong Size
 Missing Wrong Shape

If you checked any of the boxes above, did you contact our Customer Service Department to resolve the problem?

- Yes No

7) Was any of the assembly difficult for you? If yes, please explain.

- Yes No

8) What did you like most about this kit?

- Assembly Manual Parts Fit
 Hardware Supplied Price
 Other

9) What did you like least about this kit?

- Assembly Manual Parts Fit
 Hardware Supplied Price
 Other

10) Are you satisfied with the finished model? If no, please explain.

- Yes No

11) How does this kit compare to similar kits by other manufacturers?

- Better As Good
 Not as Good

Additional Comments: _____

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