PLUMA

INSTRUCTION MANUAL

Wingspan: 32.5 in [830mm]
Wing Area: 518 in^2 [33.4dm^2]
Weight: 8.4 – 9.5 oz [240 – 270g]
Wing Loading: 2.3 – 2.6 oz/ft^2 [7 – 8g/dm^2]
Length: 38 in [955mm]
Radio: 4-channel radio system with micro receiver and three micro servos
Motor & Propeller: RimFire™ 28-22-1380 with APC 8" x 3.8 slo flyer prop (APCQ5000) or
GWS 8" x 4 (GWSQ2009) **-OR-**
RimFire 28-26-1000 with GP 10" x 4.5 slo-flyer prop (GPMQ6660)

READ THROUGH THIS MANUAL BEFORE STARTING CONSTRUCTION. IT CONTAINS IMPORTANT INSTRUCTIONS AND WARNINGS CONCERNING THE ASSEMBLY AND USE OF THIS MODEL.

GREAT PLANES®
MODEL MANUFACTURING COMPANY

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TABLE OF CONTENTS

INTRODUCTION

For the latest technical updates or manual corrections to the Pluma 3D ARF visit the Great Planes web site at **www.greatplanes.com**. Open the "Airplanes" link and then select the Pluma 3D ARF. If there is new technical information or changes to this model a "tech notice" box will appear in the upper left corner of the page.

AMA

If you are not already a member of the AMA, please join! The AMA is the governing body of model aviation and membership provides liability insurance coverage, protects modelers' rights and interests and is required to fly at most R/C sites.

Academy of Model Aeronautics
5151 East Memorial Drive
Muncie, IN 47302-9252
Tele. (800) 435-9262
Fax (765) 741-0057
Or via the Internet at:
http://www.modelaircraft.org

IMPORTANT!!! Two of the most important things you can do to preserve the radio controlled aircraft hobby are to avoid flying near full-scale aircraft and avoid flying near or over groups of people.

PROTECT YOUR MODEL, YOURSELF & OTHERS....FOLLOW THESE IMPORTANT SAFETY PRECAUTIONS

1. Your Pluma 3D ARF should not be considered a toy, but rather a sophisticated, working model that functions very much like a full-size airplane. Because of its performance capabilities, the Pluma 3D ARF, if not assembled and operated correctly, could possibly cause injury to yourself or spectators and damage to property.

2. You must assemble the model **according to the instructions**. Do not alter or modify the model, as doing so may result in an unsafe or unflyable model. In a few cases the instructions may differ slightly from the photos. In those instances the written instructions should be considered as correct.

3. You must take time to **build straight, true** and **strong**.

4. You must use an R/C radio system that is in first-class condition, and a correctly sized motor and components throughout the building process.

5. You must correctly install all R/C and other components so that the model operates correctly on the ground and in the air.

6. You must check the operation of the model before **every** flight to insure that all equipment is operating and that the model has remained structurally sound. Be sure to check the pushrods, heat shrink tubing and Z-bends or other connectors often and replace them if they show any signs of wear or fatigue.

7. If you are not an experienced pilot or have not flown this type of model before, we recommend that you get the assistance of an experienced pilot in your R/C club for your first flights. If you're not a member of a club, your local hobby shop has information about clubs in your area whose membership includes experienced pilots.

8. While this kit has been flight tested to exceed normal use, if the plane will be used for extremely high stress flying, such as racing, or if a motor larger than one in the recommended range is used, the modeler is responsible for taking steps to reinforce the high stress points and/or substituting hardware more suitable for the increased stress.

We, as the kit manufacturer, provide you with a top quality, thoroughly tested kit and instructions, but ultimately the quality and flyability of your finished model depends on how you build it. Therefore, we cannot in any way guarantee the performance of your completed model, and no representations are expressed or implied as to the performance or safety of your completed model.

Remember: Take your time and follow the instructions to end up with a well-built model that is straight and true.

LITHIUM BATTERY HANDLING & USAGE

WARNING!! Read the entire instruction sheet included with the battery. Failure to follow all instructions could cause permanent damage to the battery and its surroundings, and cause bodily harm!

- ONLY use a LiPo approved charger.

- NEVER charge in excess of 4.20V per cell.

- ONLY charge through the "charge" lead. NEVER charge through the "discharge" lead.

- NEVER charge at currents greater than 1C.

- ALWAYS set charger's output volts to match battery volts.

- ALWAYS charge in a fireproof location.

- NEVER trickle charge.

- NEVER allow battery temperature to exceed 150° F [65° C].

- NEVER disassemble or modify pack wiring in any way or puncture cells.

- NEVER discharge below 2.5V per cell.

- NEVER place on combustible materials or leave unattended during charge or discharge.

- ALWAYS KEEP OUT OF REACH OF CHILDREN.

DECISIONS YOU MUST MAKE

This is a partial list of items required to finish the Pluma 3D ARF that may require planning or decision making before starting to build. Order numbers are provided in parentheses.

Radio Equipment

A 4-channel radio system with four micro servos and a micro receiver are required for this plane.

- (3) Futaba® S3114 Micro HT Servo (FUTM0414)
- Futaba 156F Micro FM Receiver (FUTL0641)
- Receiver Crystal (FUTL62/63**)
-OR-
- Futaba R617FS FASST™ Receiver (FUTL7621)

Motor, Propeller, Battery & ESC Recommendations

Based on the type of flying you'll primarily do, we have listed two different motor/prop/ESC combinations. The lightest weight setup is referred to as the "indoor setup," while the "outdoor setup" is a bit heavier (better stability to handle wind gusts).

Indoor
- Motor – RimFire™ 28-22-1380 (GPMG4505)
- Prop – APC 8" x 3.8 slo flyer prop (APCQ5000) or GWS 8" x 4 (GWSQ2009)
- Battery – Power Series 11.1V 300mAh LiPo 20C (GPMP0595)
- ESC – Silver Series 8 amp Brushless (GPMM1800)

Outdoor
- Motor – RimFire 28-26-1000 (GPMG4525)
- Prop – GP 10" x 4.5 slo-flyer prop (GPMQ6660)
- Battery – Power Series 11.1V 640mAh LiPo 20C (GPMP0601)
- ESC – Silver Series 12 amp Brushless (GPMM1810)

ADDITIONAL ITEMS REQUIRED

Required Hardware & Accessories

This is the list of adhesive and building supplies required to finish the Pluma 3D ARF. Order numbers are provided in parentheses.

❏ 1 oz. [30g] Thin Foam-Safe CA (HOTR1040)
❏ 1 oz. [30g] Thick Foam-Safe CA (HOTR1050)
❏ 1 oz. [30g] Medium Foam-Safe CA (GPMR6069)
❏ 1/2 oz. [15g] Thin Pro™ CA (GPMR6001)
❏ 1/2 oz. [15g] Medium Pro CA+ (GPMR6007)
❏ Drill bits: #57 [1mm], 1/16" [1.6mm]
❏ #1 Hobby knife (HCAR0105)
❏ #11 Blades (5-pack, HCAR0211)
❏ Hobbico® steel T-pins 1" (100) (HCAR5100)
❏ Great Planes Pro Threadlocker (GPMR6060)
❏ CA applicator tips (HCAR3780)
❏ 150-grit Sandpaper
❏ Bru Line hemostat – curved 5-1/2" (BRUR1303)
❏ Hobbico flexible 18" ruler stainless steel (HCAR0460)
❏ Builder's triangle set (HCAR0480)
❏ 2 oz. [57g] Spray CA activator (GPMR6035)

Optional Supplies & Tools

Here is a list of optional tools mentioned in the manual that will help you build the Pluma 3D ARF.

❏ Great Planes double-sided servo tape 1" x 3' (GPMQ4442)
❏ Panel Line Pen (TOPQ2510)
❏ Denatured alcohol
❏ Rotary tool such as Dremel® with cutoff wheel
❏ PolyCharge4™ LiPo battery charger (GPMM3015)
❏ Hobbico 12 Volt DC power supply (HCAP0250)
❏ Equinox™ 1 to 5 cell LiPo cell balancer (GPMM3160)

IMPORTANT BUILDING NOTES

• When you see the term **test fit** in the instructions, it means that you should first position the part on the assembly **without using any glue**, then slightly modify or *custom fit* the part as necessary for the best fit.

• Whenever the term **glue** is written you should rely upon your experience to decide what type of glue to use. When a specific type of adhesive works best for that step, the instructions will make a recommendation.

• **Photos** and **sketches** are placed **before** the step they refer to. Frequently you can study photos in following steps to get another view of the same parts.

• The stabilizer and wing incidences and motor thrust angles have been factory-built into this model. However, some technically-minded modelers may wish to check these measurements anyway. To view this information visit the web site at **www.greatplanes.com** and click on "Technical Data." Due to manufacturing tolerances which will have little or no effect on the way your model will fly, please expect slight deviations between your model and the published values.

Before starting to build, take an inventory of this kit to make sure it is complete and inspect the parts to make sure they are of acceptable quality. If any parts are missing or are not of acceptable quality, or if you need assistance with assembly, contact **Great Planes Product Support**. When reporting defective or missing parts, use the part names exactly as they are written in the Kit Contents list.
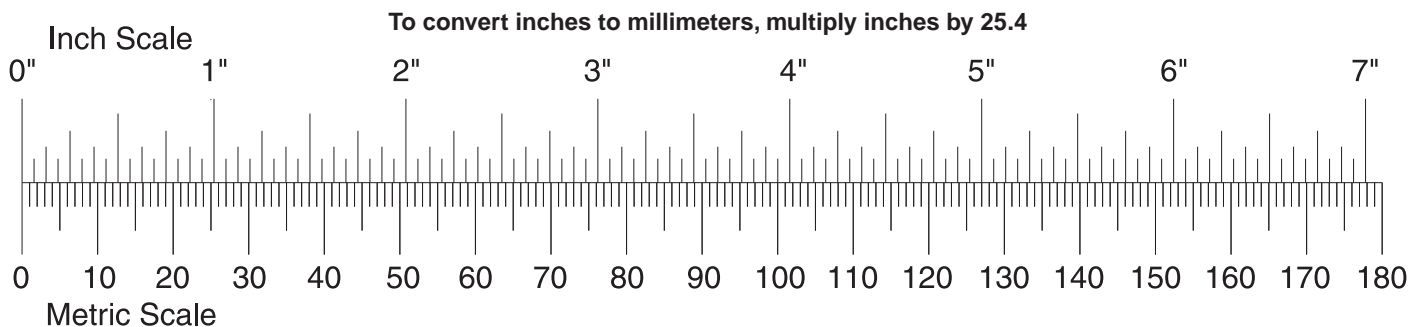
Great Planes Product Support:
3002 N. Apollo Drive, Suite 1
Champaign, IL 61822
Telephone: (217) 398-8970, ext. 5
Fax: (217) 398-7721
E-mail: airsupport@greatplanes.com

KIT CONTENTS
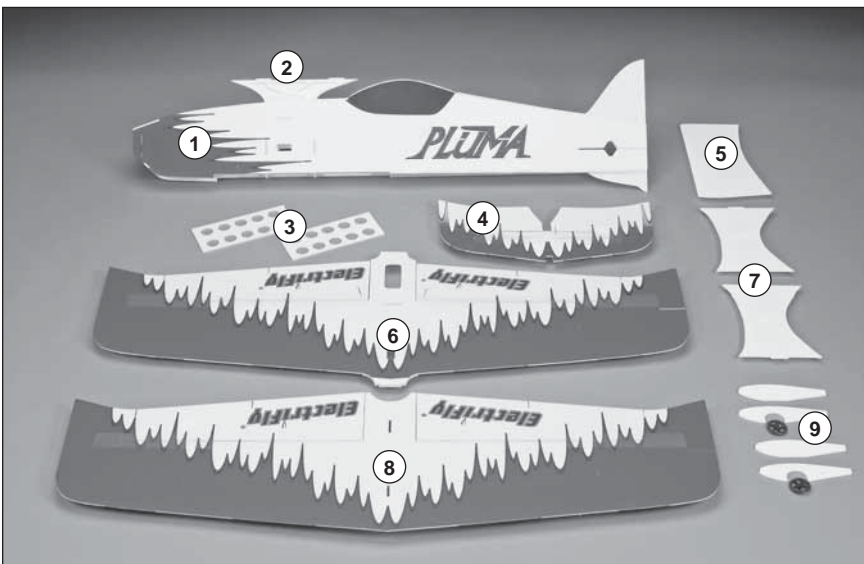
Kit Contents

1	Fuselage
2	Center Cabane Strut
3	Speed Brakes (2)
4	Horizontal Stabilizer & Elevators
5	Rudder
6	Bottom Wing w/Ailerons
7	Interplane Struts (L&R)
8	Top Wing w/Ailerons
9	Inner & Outer Wheel Pants (L&R) & Wheels (2)

To convert inches to millimeters, multiply inches by 25.4

Inch Scale
0"   1"   2"   3"   4"   5"   6"   7"

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180
Metric Scale

Take the time to look over your Pluma 3D ARF. Assembly is pretty simple and straight-forward, as you've already seen by looking over the table of contents section in this manual. Look for damage to the foam or broken parts. The Pluma 3D ARF uses a light-weight type of flat foam that has a "skin" applied to its outer surfaces. This creates a strong and rigid airframe when completed, but special care is needed while handling individual parts during build-up. Bending foam parts can cause the skin to tear and severely weaken the foam, so be careful not to force things into place.
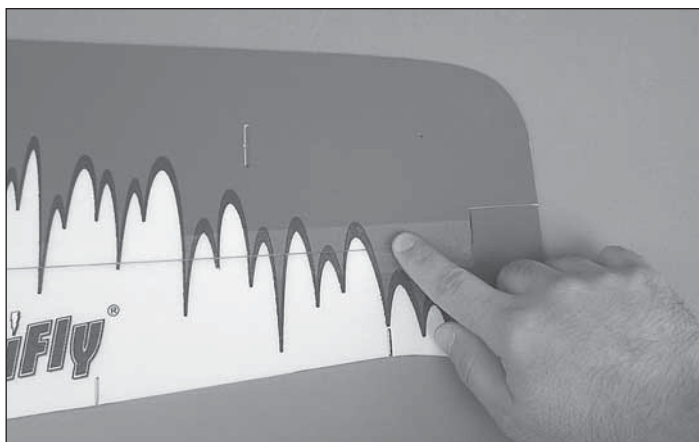

❏ 1. Lay the wing panels and horizontal tail on a flat work surface. Gently run your finger over the taped hinges to form a secure bond between the tape and the foam.


EXPERT TIP
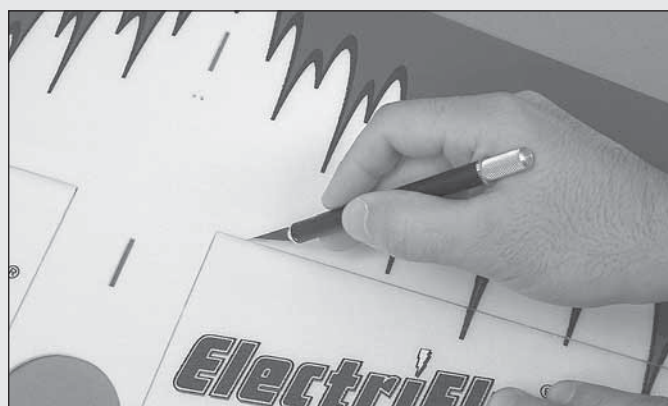
If you ever need to remove a control surface DO NOT attempt to pull the hinge tape off – this damages the skinned layer of the foam – use a hobby knife to cut the hinge tape along the hinge line. Replacement hinge tape is available from your local hobby shop. Order Dubro Electric Flyer Hinge Tape (DUBQ0916).
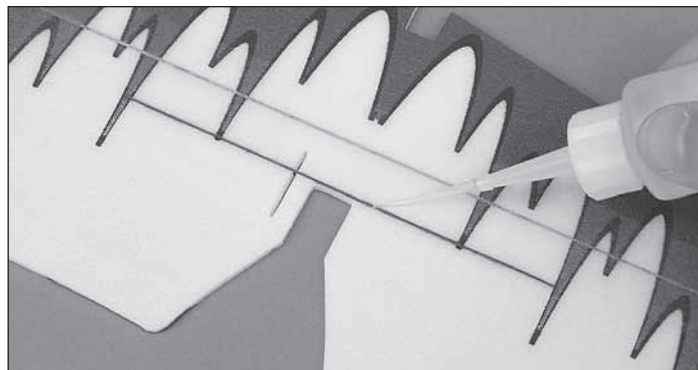
❏ 2. Apply a bead of thin foam-safe CA to both sides of the140mm carbon fiber elevator joiner.

WING INSTALLATION

Install the Wings

NOTE SERVO HOLE

FORWARD
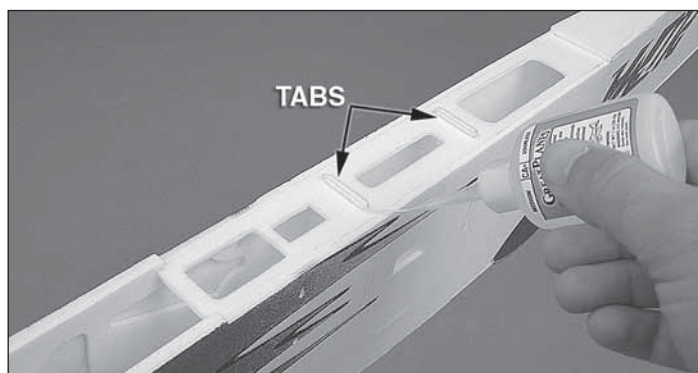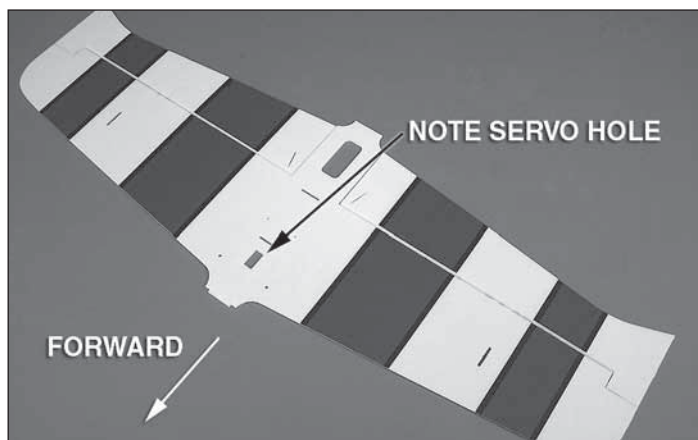
TABS

❏ 1. Glue the bottom wing to the bottom of the fuselage. Apply a bead of medium or thick foam-safe CA to the wing saddle and the two fuselage former tabs and mount the wing. **Note:** The bottom wing can be identified by the servo hole and the protruding LE stop.

FORWARD

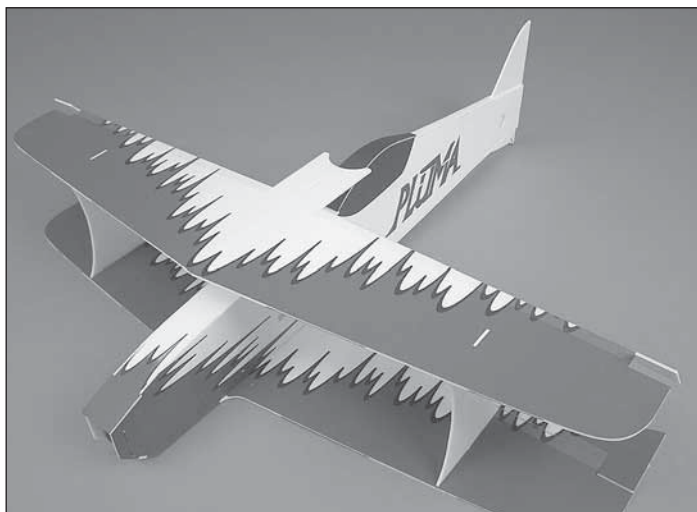PLEASE NOTE THE CURVE HERE
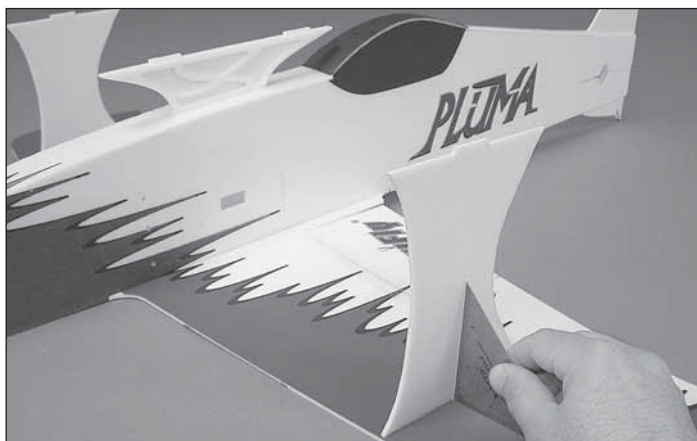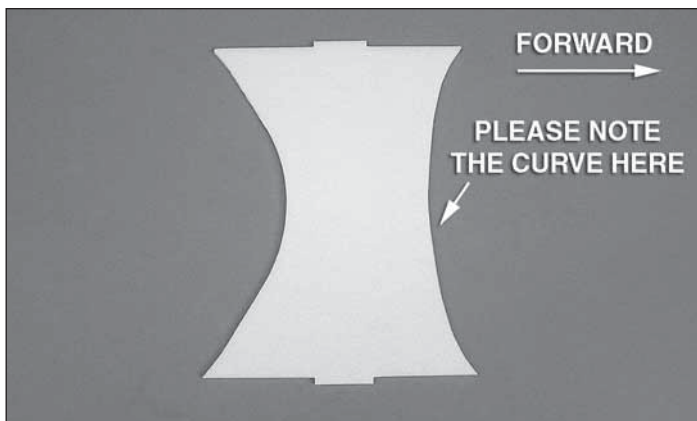
❑ 2. Glue the interplane struts to the bottom wings using thin foam-safe CA. Use a 90° builder's square or the template provided in the back of this manual to properly align the interplane struts vertically. **Note:** The front edge of the interplane struts has less curvature than the aft edge.


❑ 3. Apply thin foam-safe CA to the tabs on the interplane struts and the center cabane strut. Install the top wing.

Aileron Link Rods - (4) Required

2-1/8" [156mm]

1mm Gap
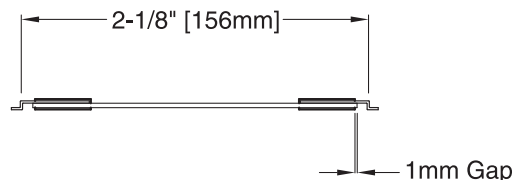
❑ 1. Locate four 1 x 145mm carbon pushrods, eight 1 x 30mm Z-bends, and eight 25mm pieces of heat shrink tubing. Assemble four **aileron link rods** as shown in the sketch above so that they measure 2-1/8" [156mm] from Z-bend center to Z-bend center. See the **Expert Tip** below on how to assemble pushrods.

EXPERT TIP

How to Assemble Pushrods
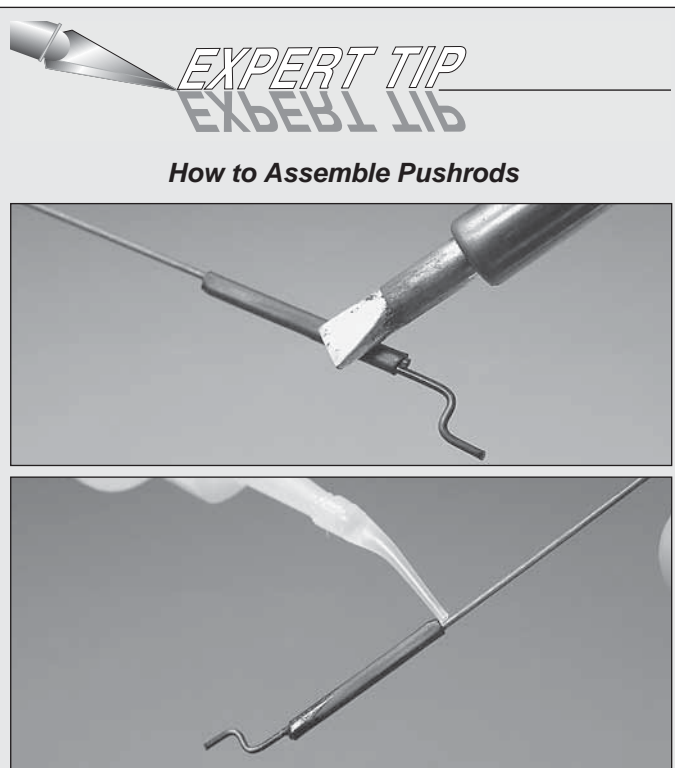
To join a wire Z-bend to a 1mm carbon pushrod, first slide a piece of heat shrink tubing onto the carbon rod. Next, place the wire Z-bend alongside of the carbon rod. Slide the heat shrink tubing over the joint and heat it. If you are working near foam, use a hot soldering iron to shrink the heat shrink tubing. Run the tip along the sides of the tubing, applying heat all around the heat shrink tubing. Check to see that the length of the pushrod is still correct. If you're careful, you can reposition the Z-bend after the heat shrink tubing is completely shrunk, but it's good to check it before you've completely shrunk the tubing. When you're satisfied, apply one drop of thin CA to the end of the heat shrink tubing that is farthest away from the Z-bend. Be careful not to allow the CA to wick into the Z-bend if the Z-bend is attached to a control horn.
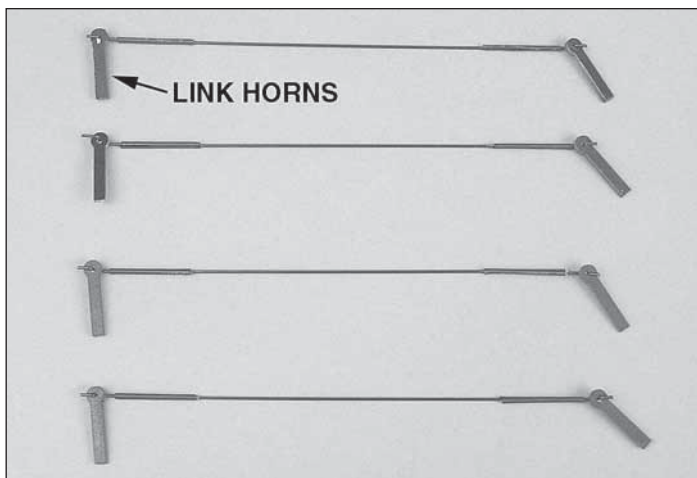
LINK HORNS

❏ 2. Locate eight **aileron link horns**. Fit them to the four aileron links that you made.

CONTROL SURFACE CENTERING TOOL

GLUE THIS PIECE HERE
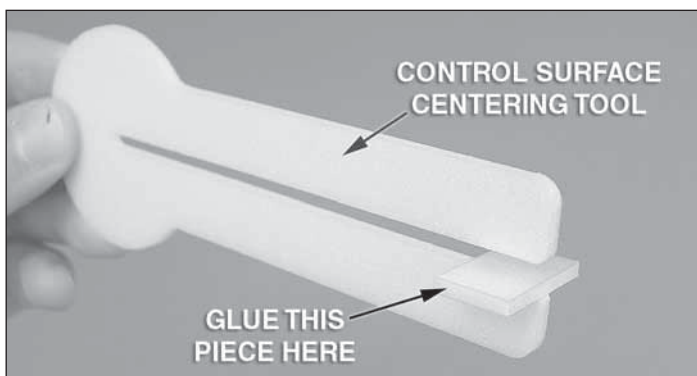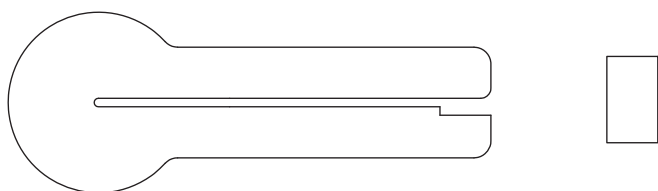
❏ 3. Locate the foam parts shown above and build two control surface alignment tools. **Note:** Setting the rectangular pad at 90 degrees is not critical.

HANG THE LINKS OVER TABLE EDGE SO WING STAYS FLAT
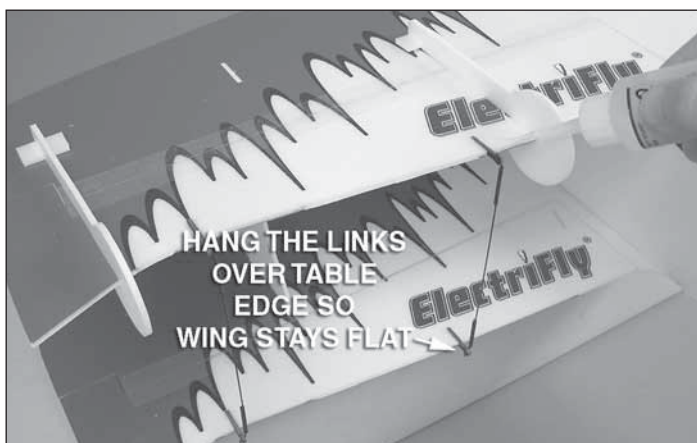
❏ ❏ 4. Set your model down on a flat work surface with the TE of the aileron hanging over the edge. Working with one wing at a time, fit the alignment tools to the top aileron. Test fit two aileron link rods by inserting the link horns into the slots in the upper and lower ailerons. Adjust the position of the link

horns until the top and bottom ailerons are completely parallel with zero control throw. When you're satisfied with the aileron position, use thin foam-safe CA to glue the aileron link horns securely to each aileron. Run a bead along both sides of each link horn and let the model sit until the CA cures.

❏ ❏ 5. Flip the model over and apply thin foam-safe CA to the bottom side of each link horn. Let the CA cure.

❏ 6. Repeat steps 4 and 5 for the opposite wing.

HORIZONTAL & VERTICAL TAIL INSTALLATION

Install the Horizontal Stabilizer

SPREAD THIS SEAM CAREFULLY
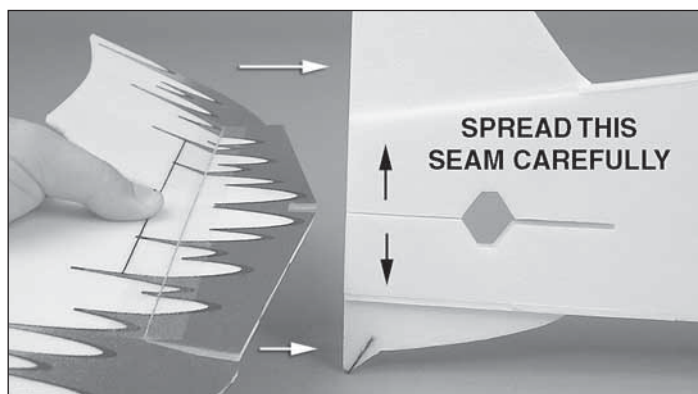
❏ 1. Test fit the horizontal stab to the fuselage, installing it from the rear. You'll need to spread the fuselage seam apart a bit to get the stab in, so use care.

A   A

A=A

B   B

B=B
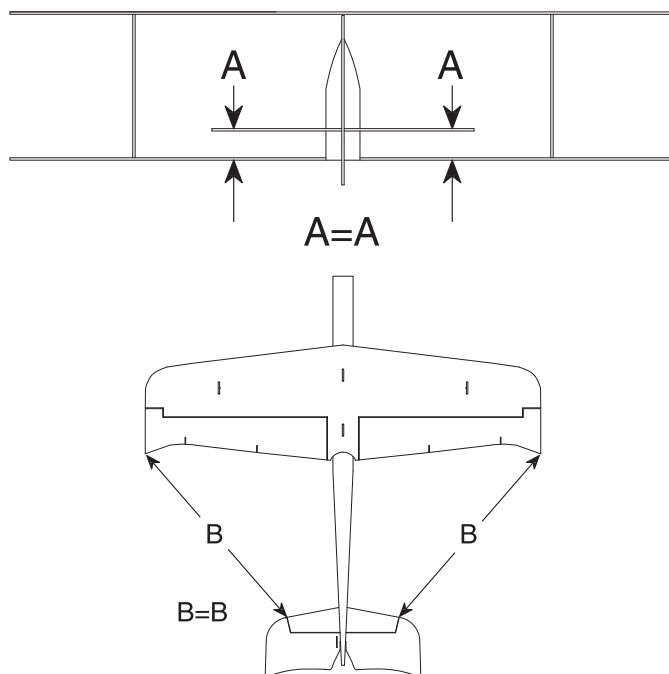
❏ 2. Align the stab vertically and horizontally as shown in the sketches above. If the stab doesn't sit parallel with the plane

of the wings, lightly sand the slot using 150-grit sandpaper until the stab is aligned.
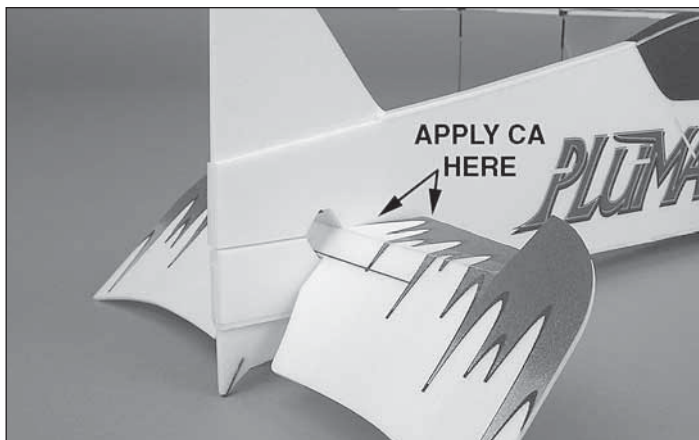
❏ 3. When you're satisfied with the fit of the horizontal stab, run a generous bead of thin foam-safe CA down the left and right stab to the fuselage joints. Turn the model over and glue the bottom of each joint as well.

❏ 4. Make sure that the upper and lower fuselage is aligned. Apply a few drops of foam-safe CA to the aft fuselage seam and glue the seam together.

❏ 5. Deflect the elevator up and down, checking for free travel.

❏ 1. Locate the 7-1/2" [190mm] strip of hinge tape. Cut the tape so that you have one 4" [100mm] piece, one 2-3/4" [70mm] piece, and one 3/4" [20mm] piece.

Hinge tape goes on this side of the bevel
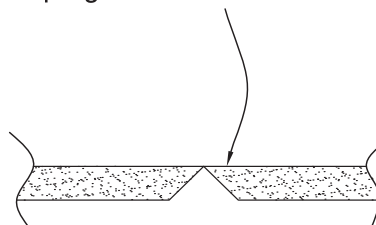
❏ 2. Position the rudder so that the LE of the rudder gently touches the vertical fin and that the top of the rudder is even with the top of the fin. Remove the backing paper and apply the 100mm strip of tape to the top of the rudder on the **right side**. Apply the 20mm piece to the bottom of the rudder. **Note:** Pushing the rudder too hard against the fin can fold the beveled edge over and cause limited rudder throw.
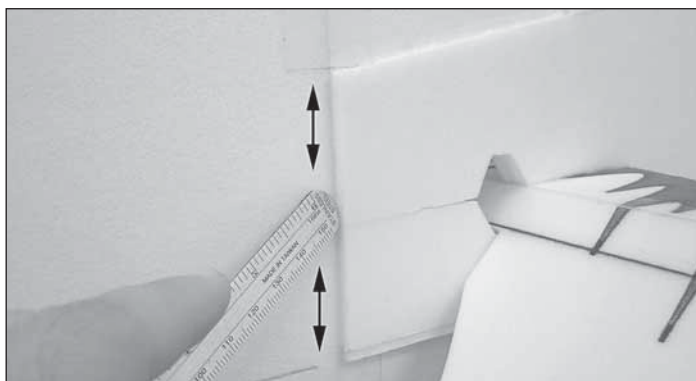
❏ 3. Apply the 70mm piece to the center section of the rudder, making sure that you press the tape tightly into the crease. A straightedge is helpful here.

❏ 4. Deflect the rudder left and right and check for free travel.

INSTALL THE SERVOS

❏ 1. Remove the servo arm screws and the servo arms from all three of your servos. Use your radio to center the servos. Retain the servo arm screws.

❏ 2. Place one drop of foam-safe CA on the bottom of the servo mounting tabs. Install the **rudder servo** on the right side of the fuselage with the **output shaft facing aft**. Guide the servo leads forward through the fuselage and apply a bead of CA along the side of the servo case where it meets the fuselage.
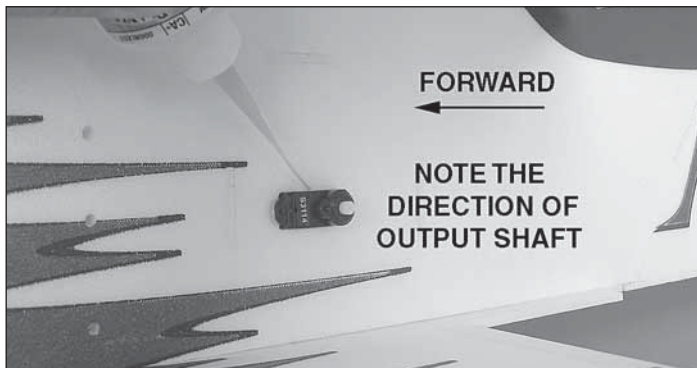
❏ 3. Install the **elevator servo** on the left side of the fuselage with the output shaft facing aft. Guide the servo leads forward through the fuselage. **Note:** The aileron servo will be installed later.
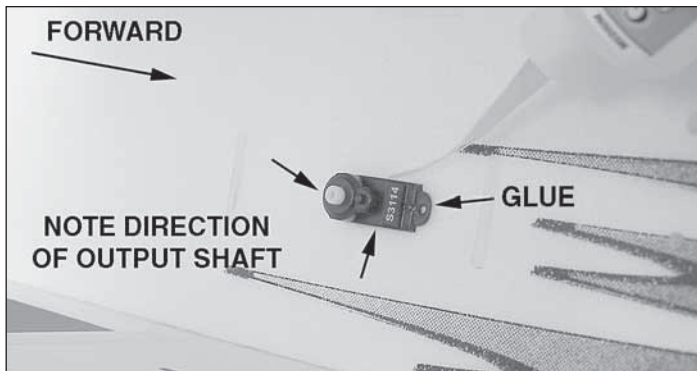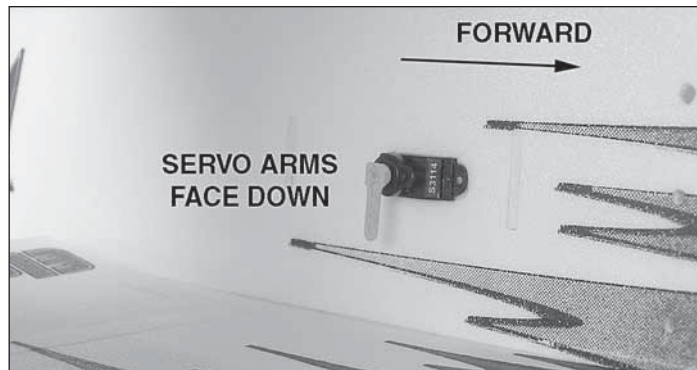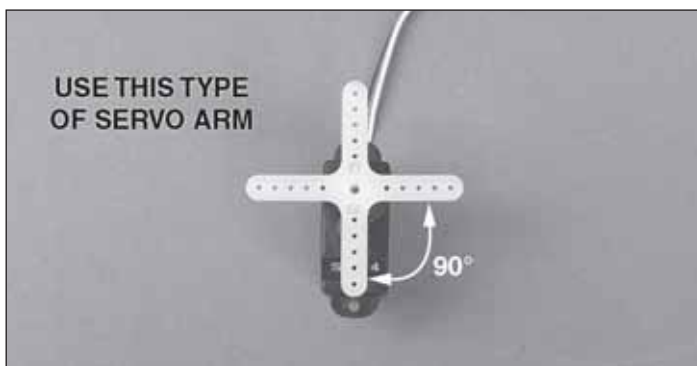

❏ 4. Locate the longest servo arms that came with your servos. Since we used Futaba 3114 micro servos, we chose the optional five-hole "X" arms that Futaba supplied with each servo. With the elevator and rudder servos centered, test fit the servo arm to find the long arm that aligns perpendicular with the servo case. Clip off the other unused arms and temporarily fit each arm to each servo with the arm facing down. Do not install the servo arm screw yet.

PUSHROD & CONTROL HORN INSTALLATION

Install the Control Horns
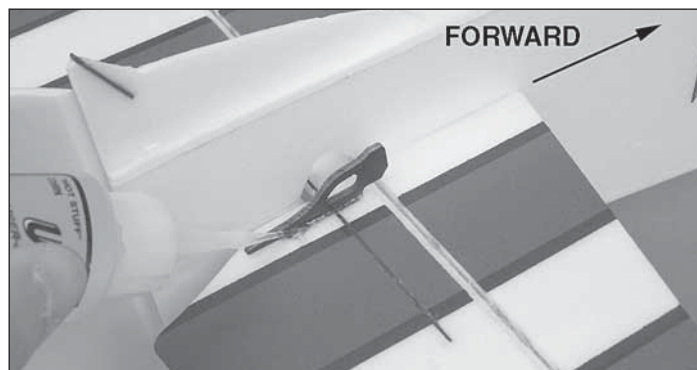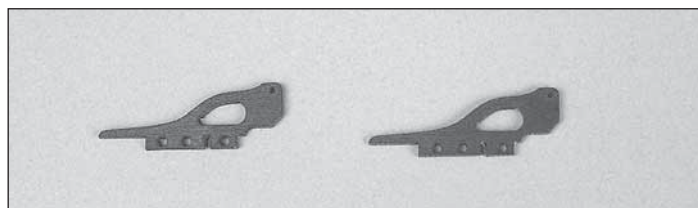
❏ 1. Locate two control horns. Turn your model over and install one control horn to the bottom of the left elevator. Apply a bead of thin foam-safe CA around the base of the control horn.

FORWARD

GLUE THE HORN
TO THE RIGHT SIDE

UP

❏ 2. Install the other control horn to the right side of the rudder as shown. Apply a bead of thin foam-safe CA around the base of the control horn.

Install the Pushrods

PUSHROD SUPPORTS

❏ ❏ 1. Using a 1 x 560mm carbon pushrod, one metal **Z-bend**, and one piece of 25mm **heat shrink tubing**, build one end of the **rudder pushrod**. Slide three pushrod supports onto the pushrod. Do not assemble the other end of the pushrod yet.

❏ ❏ 2. Remove the servo arm that you temporarily fitted to your rudder servo. Use a #57 [1mm] drill bit to enlarge the outermost servo arm hole. Fit the rudder pushrod to the outermost hole. **Note:** If you don't have a #57 drill bit, carefully use your hobby knife to enlarge the hole.

INSTALL CONTROL CENTERING TOOL HERE

❏ ❏ 3. Install one control alignment tool onto the vertical stabilizer to hold the rudder straight.

❏ ❏ 4. Fit the servo arm onto the rudder servo and extend the pushrod all the way back to the rudder control horn. Fit a Z-bend to the rudder control horn. Attach the Z-bend to the rudd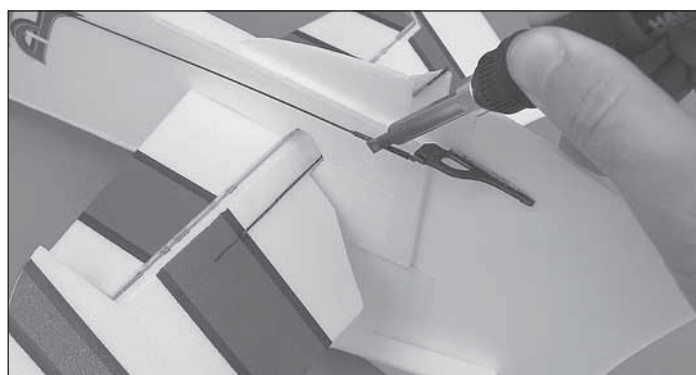er pushrod using a 25mm piece of heat shrink tubing. Shrink the tubing with a hot soldering iron. **Note: DO NOT attempt to use a torch, cigarette lighter or heat gun near the foam!** It is nearly impossible to use these without melting the foam.

EVENLY SPACE THE PUSHROD SUPPORTS

RUDDER PUSHROD

❏ ❏ 5. With the pushrod straight, cut 2mm wide slots in the fuselage for the pushrod supports using a hobby knife. Cut the first slot so that it is 5-1/2" [140mm] from the Z-bend. Space the next slot 5-1/2" [140mm] from that and so on. Ensure that the pushrod is completely straight and use foam-safe CA to glue the supports into the fuselage.

❏ 6. Repeat steps 1 through 5 for the elevator. Use the 1 x 490mm carbon rod and space the pushrod supports 4-7/8" [123mm] apart.

❏ 7. Install the servo arm screws.

❏ 3. If you are installing the more powerful RimFire motor, apply a bead of thick foam-safe CA to the fuselage-to-firewall joint.

MOTOR & ESC INSTALLATION

For this build-up we chose to install the Great Planes 28-26-1000 RimFire. We recommend this motor if you plan on doing most of your flying outdoors.
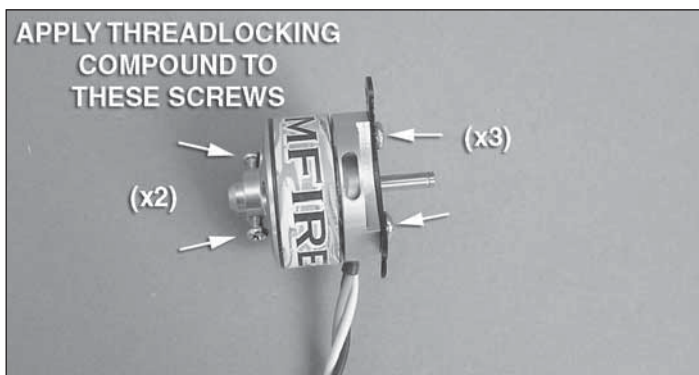
❏ 1. Remove the three screws holding the Y-mount to the back of the motor and the two screws for the prop saver. Apply threadlocking compound to the screw threads and reinstall the screws.
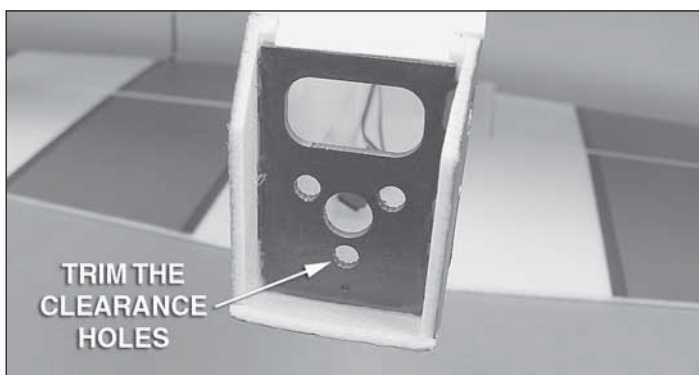
❏ 2. Test fit your motor by holding it in place up against the firewall. Make sure that the Y-mount screws fit inside of the clearance holes in the firewall. If it is necessary, carefully enlarge the holes using a Dremel® tool or a sharp hobby knife.
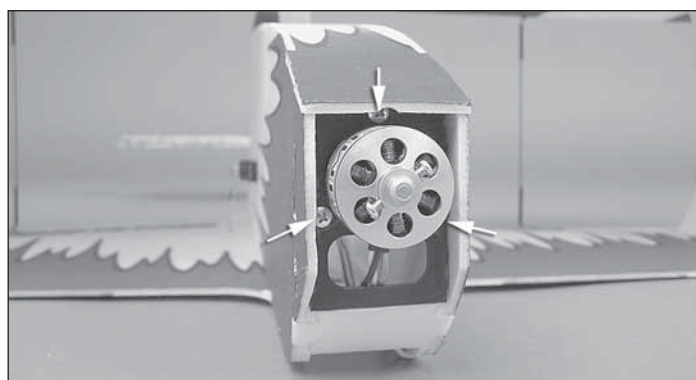
❏ 4. Install the motor using three 2.5 x 8mm self-tapping screws. Remove the screws and the motor and harden the screw holes with one drop of thin regular CA. Be careful not to drip any regular CA onto the foam.
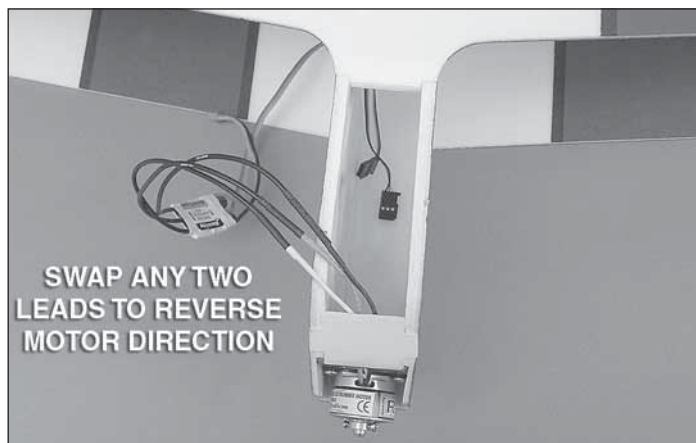
❏ 5. Route the motor wires through the firewall and connect them to the ESC. Use your radio to test the direction of motor rotation. If the motor rotates in the wrong direction, swap the position of any two of the three motor leads and re-check the direction of rotation. It's easier to do this now than to find out you have to swap the leads later after everything is mounted and tucked away.

❏ 6. Cut a 1" [25mm] strip from the supplied adhesive-backed hook and loop material. Peel the backing paper off and stick the loop side (fuzzy side) onto the back of your ESC. Peel the backing paper off of the hook side and place a few thin beads of thin foam-safe CA on the sticky backing. Mount it in the plane in the location shown.

FINAL ASSEMBLY

Install the Wing Braces

For this section it is important that you set your model on a flat surface facing up. Hang the tail over the end of the table or work with the model on an elevated box or sheet of thick wood. Do not disturb the model until you have finished the rigging process – doing so may result in a warped wing and will affect the flying characteristics.
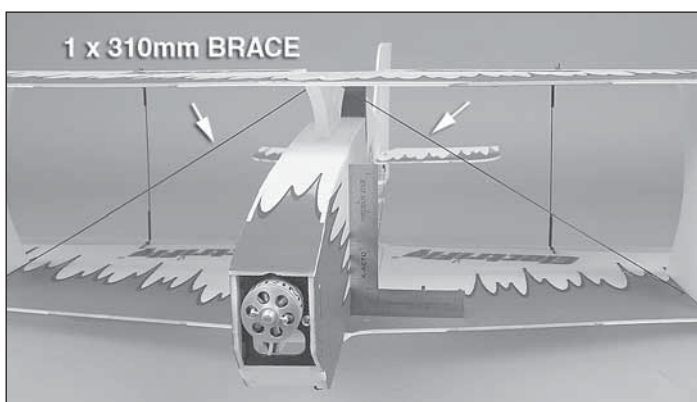
❏ 1. With your plane on a level surface, install a 1 x 310mm carbon rod through the hole in the center of the top wing. Run it down to the hole at the base of the interplane strut on the bottom wing. Install the other 1 x 310mm rod on the opposite wing. Use a 90° square or the template in the back of this manual to make sure that the fuselage is perpendicular to the lower wing and that the wing struts are perpendicular to the lower wing. When you're satisfied that everything is square, apply two drops of thin foam-safe CA to the ends of each wing brace.
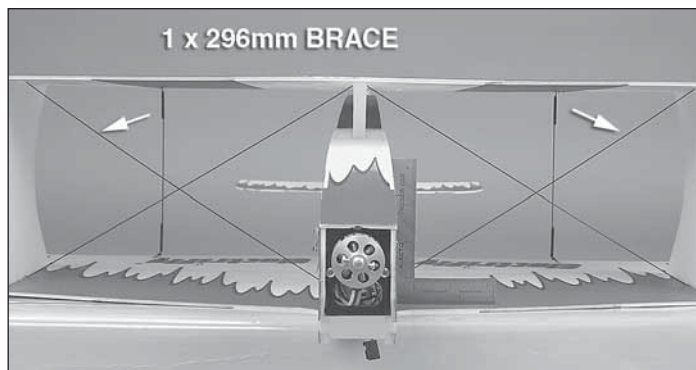
❏ 2. Install the 1 x 296mm carbon rods in the wings as shown. Square the fuselage with the wing and glue the wing braces in place.
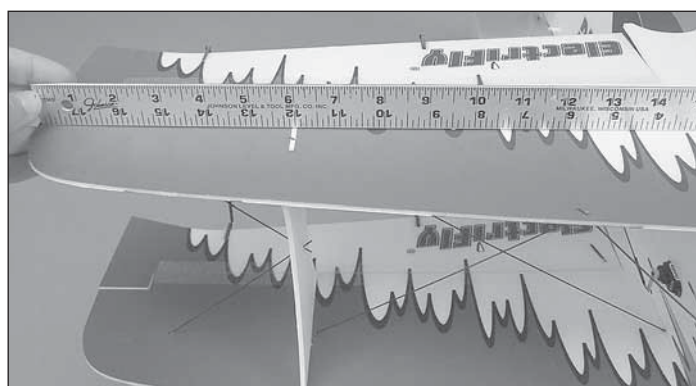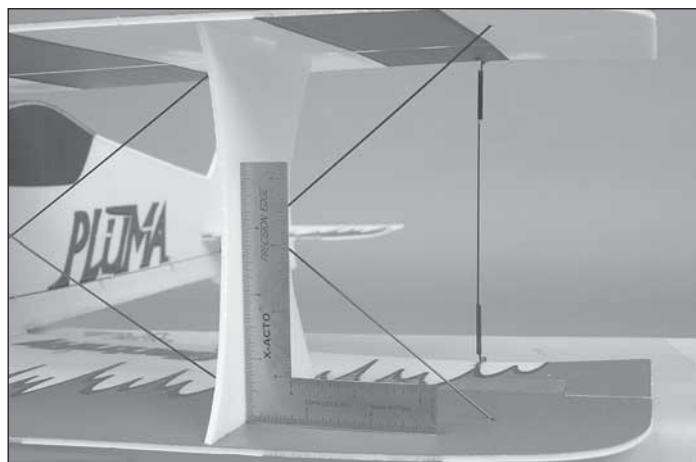
❏ 3. Locate the four 1 x 135mm outer wing braces. Two will be used for the left wing and two for the right wing. With the braces fitted and the lower wing still flat on the table, hold a straightedged ruler against the top wing. Align the wings and glue the braces in place.

B=B
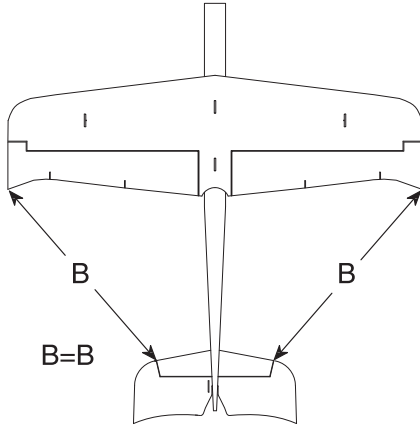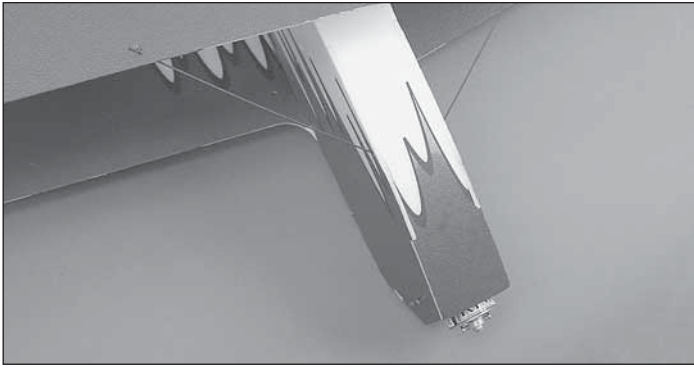
❏ 4. Locate the two 1 x 145mm front wing supports. Route each through its respective hole in the LE of the upper wing and into the holes in the forward fuselage. Before you glue them in place, check to see that the upper wing is still aligned with the horizontal stab. When you're satisfied, glue the front supports in place.
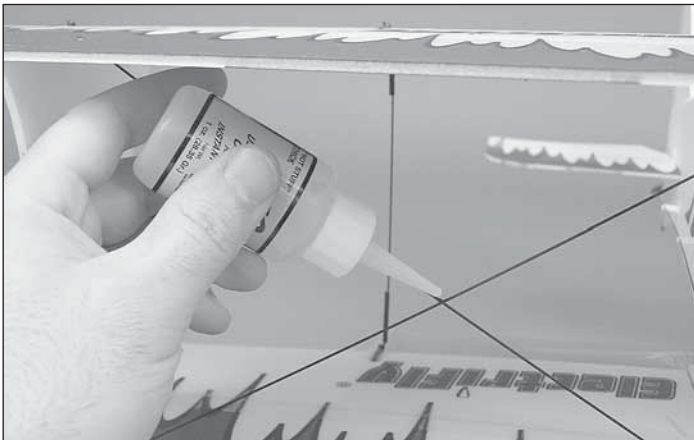
❏ 5. With the wings square, place a drop of thick foam-safe CA at the junction of the main wing braces. CA accelerator is helpful here.

❏ 6. After the CA cures, pick up the plane and check all the wing brace glue joints. Go back and add CA to each side of every joint.

Install the Aileron Servo
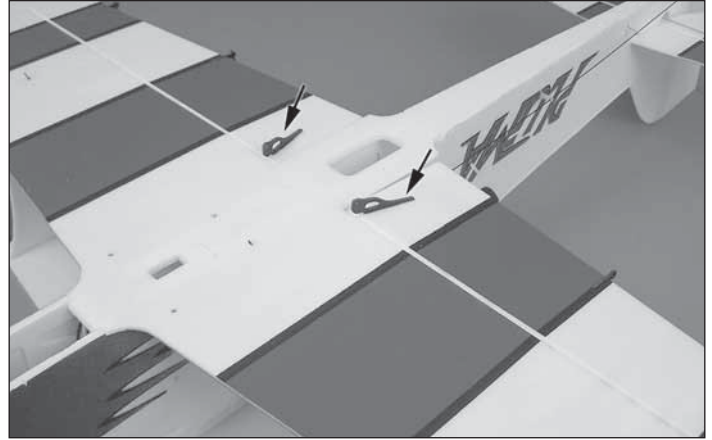
❏ 1. Turn the model over. Locate the two remaining control horns. Glue them into the slots provided in the bottom of each lower aileron.

USE THIS SERVO ARM

S3114

❏ 2. Center your aileron servo using your radio.

FORWARD

INSTALL SCREWS FROM BOTTOM

S3114
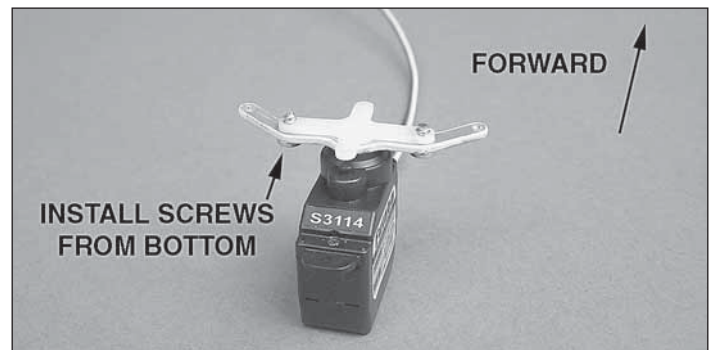
❏ 3. Locate the plastic servo arm provided in the kit. Remove the servo arm from your servo. Mount the servo arm to your standard servo arm with the arms swept forward. Use the supplied 1.5 x 4mm self-tapping screws to install the extended arm to the standard servo arm. Install the screws from the bottom so that the heads of the screws face the body of the servo. **Note:** The output shaft of the servo will face toward the front of the model.

❏ 4. Install your aileron servo with the output shaft facing forward. Remember to install the servo arm screw.

❏ 5. Locate the two 1 x 112mm carbon aileron pushrods, four pieces of heat shrink tubing, and the remaining four Z-bends. Assemble one end of the pushrods as shown.

❏ 6. Install one control surface alignment tool on each aileron.
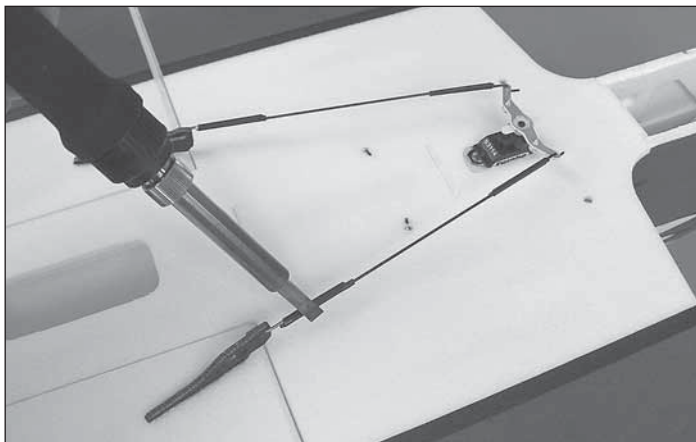
❏ 7. Fit the pushrods to the servo arm. Fit the remaining Z-bends to the aileron control horns and slide a piece of heat shrink tubing onto the carbon rods. Shrink the tubing with a hot soldering iron, making sure that your ailerons stay centered in the process.

❏ 8. Install the aileron servo arm screw.

Install the Radio, Landing Gear & Propeller

❏ 1. Plug your elevator, aileron, and rudder servos into their proper channels. Plug the ESC signal lead into the receiver.

❏ 2. Cut a 1" [25mm] long piece of hook and loop material. Stick the hook side (fuzzy side) to the back side of your receiver. Mount the receiver just ahead of the LE of the lower wing.

❏ 3. Locate the landing gear doubler plate. Roughen one surface of the doubler plate using 150-grit sandpaper.

❏ 4. Apply several generous beads of medium or thick foam-safe CA to the back side of the landing gear doubler (the side you just sanded). Center the doubler over the holes in the bottom of the lower wing and glue it in place.

❏ 5. Locate the two pre-assembled landing gear legs and the two foam wheel pants. You should have a right and a left side of each of these.

❏ 6. Use medium or thick foam-safe CA to attach the wheel pants to the landing gear legs.
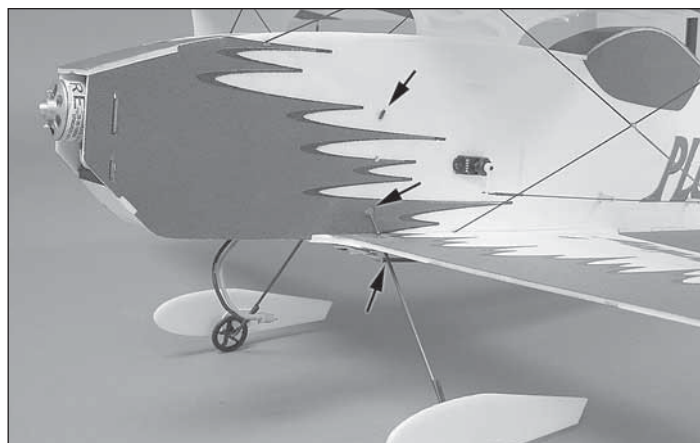
❏ 7. Slide each landing gear leg though the holes provided in the wing. They will go through the wing holes first, then the fuselage side, and then cross over to the opposite fuselage side. Rotate the landing gear rod until the wheels point straight ahead. Glue the landing gear in place.
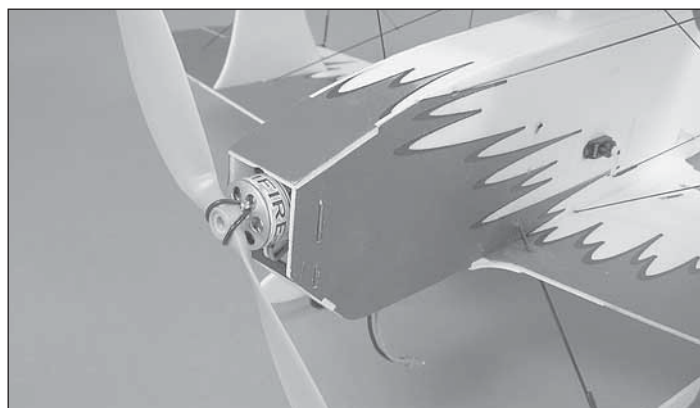
❏ 8. Mount the recommended propeller using a prop saver O-ring. Please see the *"Motor, Propeller, Battery, & ESC Recommendations"* section on page 3 of this manual to match the correct prop to your motor.

❏ 9. With the hook and loop material that you have left over, separate the hook side from the loop side and stick the hook side (bristly side) inside the fuselage. Apply the remaining loop material to your battery packs.
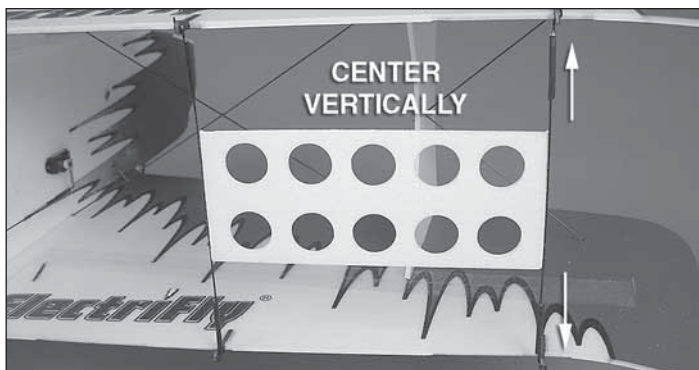
❏ 10. Speed brakes have been provided for you if you fly indoors. These are optional and should not be installed until the model has been test-flown and properly trimmed out. Install them between the aileron link rods so that they are centered vertically. Use thick foam-safe CA or tape to attach these to the link rods. These should only be used indoors and will help keep speed constant during up and downline maneuvers.

BALANCE THE MODEL (C.G.)

Set the C.G.

In order to properly set the C.G. (center of gravity) you will need to configure the airplane with all of the equipment it will have on board when you're flying. To do this you'll need to install the battery pack in place and have the propeller attached.

> To ensure a successful first flight, fly your model set up only according to the C.G. and control surface throws specified in this manual. The throws and C.G. are not arbitrary, but have been determined through extensive testing and accurate record-keeping. This provides you with the best chance for success and enjoyable first flights that should be surprise-free. Additionally, the throws and C.G. shown are true, real data which will allow the model to perform in the manner in which it was intended when flown by a pilot of the skill level for which it was intended. **DO NOT OVERLOOK THESE IMPORTANT PROCEDURES.** A model that is not properly setup may be unstable and possibly unflyable.
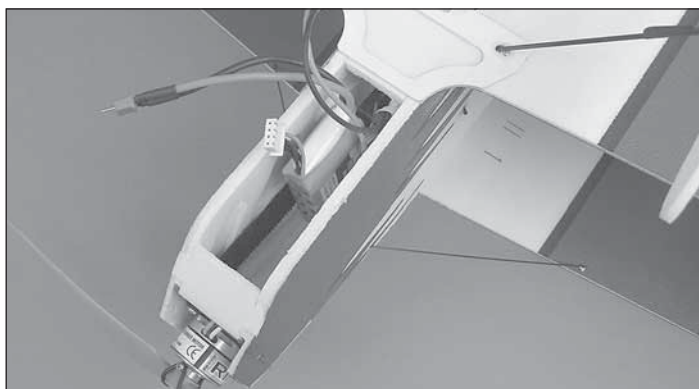
❏ 1. Place the battery pack in the plane. **Do not** connect the battery to the ESC.
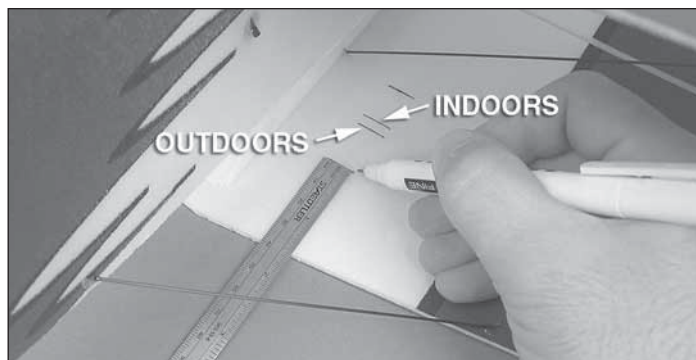
❏ 2. Use a felt-tip pen or 1/8" [3mm]-wide tape to accurately mark the C.G. on the bottom of the upper wing on both sides of the center cabane strut. If you are flying indoors primarily, make two marks that are 2-5/8" [67mm] from the LE of the upper wing. If you are flying outdoors, make two C.G. marks that are 2-1/2" [63mm] from the LE of the upper wing. The total C.G. range is from 1-3/4" [44mm] forward to 3-5/16" [85mm] aft. Do not fly your model outside of this range.

❏ 3. Place your fingers on the C.G. marks that you made. Hold the plane up with your fingertips and see where it balances.

❏ 4. If the tail drops, the model is "tail heavy" and the battery pack must be shifted forward or weight must be added to the nose to balance. If the nose drops, the model is "nose heavy" and the battery pack must be shifted aft or weight must be added to the tail to balance. If additional weight is required, use Great Planes (GPMQ4485) "stick-on" lead.

❏ 5. **IMPORTANT:** If you found it necessary to add any weight, recheck the C.G. after the weight has been installed.

Balance the Model Laterally

❏ 1. With the wings level, lift the model by the motor propeller shaft and the bottom of the fuselage under the TE of the fin. Do this several times.

❏ 2. If one wing always drops when you lift the model, it means that side is heavy. Balance the airplane by adding weight to the other wing tip. **An airplane that has been laterally balanced will track better in loops and other maneuvers.**

Check the Control Directions

❑ 1. Turn on the transmitter and receiver and center the trims. If necessary, remove the servo arms from the servos and reposition them so they are centered. Reinstall the screws that hold on the servo arms.

❑ 2. With the transmitter and receiver still on, check all the control surfaces to see if they are centered. If necessary, adjust the clevises on the pushrods to center the control surfaces.

4-CHANNEL RADIO SETUP
(STANDARD MODE 2)

ELEVATOR MOVES UP

RIGHT AILERON MOVES UP
LEFT AILERON MOVES DOWN

RUDDER MOVES RIGHT

FULL THROTTLE
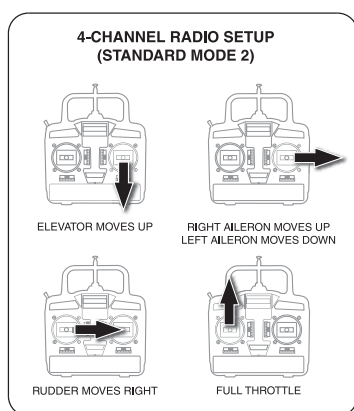
❑ 3. Make certain that the control surfaces and the motor respond in the correct direction as shown in the diagram. If any of the controls respond in the wrong direction, use the servo reversing in the transmitter to reverse the servos connected to those controls. Be certain the control surfaces have remained centered. Adjust if necessary.

Set the Control Throws
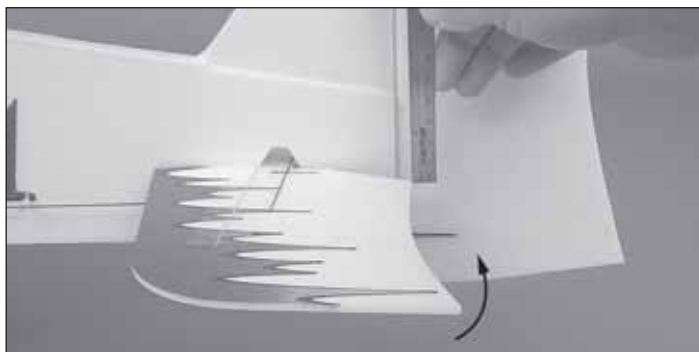
Use a ruler or the templates provided in the back of this manual to accurately measure and set the control throw of each control surface as indicated in the chart that follows. If your radio does not have dual rates, we recommend setting the throws at the **low rate** setting. **Note:** The throws are measured at the **widest part** (inboard or lowest part) of the elevators, ailerons, and rudder.

These are the recommended control surface throws:

HIGH RATE	
ELEVATOR:	1-3/8" [35mm], 26° up 1-3/8" [35mm], 26° down
RUDDER:	2-3/4" [70mm], 36° left 2-3/4" [70mm], 36° right
AILERONS:	2-3/8" [60mm], 43° up 2-3/8" [60mm], 43° down

LOW RATE	
ELEVATOR:	1" [25mm], 17° up 1" [25mm], 17° down
RUDDER:	1-9/16" [40mm], 19° left 1-9/16" [40mm], 19° right
AILERONS:	1-9/16" [40mm], 27° up 1-9/16" [40mm], 27° down

3D RATE	
ELEVATOR:	2-1/8" [55mm], 46° up 2-1/8" [55mm], 46° down
RUDDER:	3-7/8" [100mm], 56° left 3-7/8" [100mm], 56° right
AILERONS:	2-7/8" [75mm], 58° up 2-7/8" [75mm], 58° down

PREFLIGHT

Identify Your Model

No matter if you fly at an AMA sanctioned R/C club site or if you fly somewhere on your own, you should always have your name, address, telephone number and AMA number on or inside your model. It is required at all AMA R/C club flying sites and AMA sanctioned flying events. Fill out the identification tag on page 21 and place it on or inside your model.

Charge the Batteries

Follow the battery charging instructions that came with your radio control system to charge the batteries. You should always charge your radio batteries the night before you go flying, and at other times as recommended by the radio manufacturer.

CAUTION: Unless the instructions that came with your radio system state differently, the **initial** charge on **new** transmitter and receiver batteries should be done for 15 hours **using the slow-charger that came with the radio system**. This will "condition" the batteries so that the next charge may be done using the fast-charger of your choice. If the initial charge is done with a fast-charger the batteries may not reach their full capacity and you may be flying with batteries that are only partially charged.

Balance Propellers

Carefully balance your propeller and spare propellers before you fly. An unbalanced prop can be the single most significant cause of vibration that can damage your model. Not on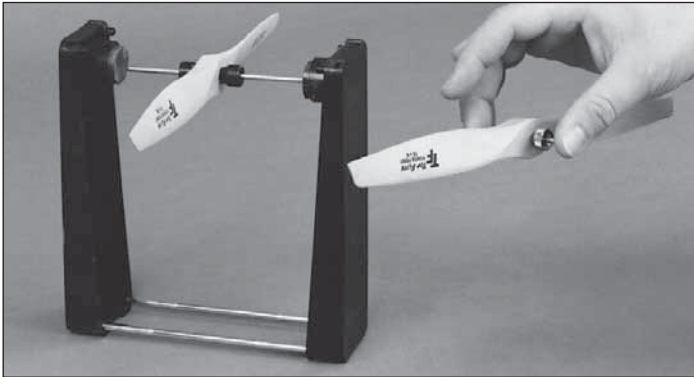ly can screws and bolts loosen, possibly with disastrous effect, but vibration may also damage your radio receiver and battery.

We use a Top Flite Precision Magnetic Prop Balancer (TOPQ5700) in the workshop and keep a Great Planes Fingertip Prop Balancer (GPMQ5000) in our flight box.

Ground Check & Range Check

Always ground check the operational range of your radio before the first flight of the day following the manufacturer's instructions that came with your radio. This should be done once with the motor off and once with motor running at various speeds. If the control surfaces do not respond correctly, **do not fly!** Find and correct the problem first. Look for loose servo connections or broken wires, corroded wires on old servo connectors, poor solder joints in your battery pack or a defective cell, or a damaged receiver crystal from a previous crash.

MOTOR SAFETY PRECAUTIONS

Failure to follow these safety precautions may result in severe injury to yourself and others.

Get help from an experienced pilot when learning to operate electric motors.

Use safety glasses when running electric motors.

Do not operate the motor in an area of loose gravel or sand; the propeller may throw such material in your face or eyes.

Keep your face and body as well as all spectators away from the plane of rotation of the propeller as you run the motor.

Keep these items away from the prop: loose clothing, shirt sleeves, ties, scarfs, long hair or loose objects such as pencils or screwdrivers that may fall out of shirt or jacket pockets into the prop.

The motor gets hot! Do not touch it during or right after operation.

Do not throw anything into the propeller of a running motor.

AMA SAFETY CODE (excerpts)

Read and abide by the following excerpts from the Academy of Model Aeronautics Safety Code. For the complete Safety Code refer to *Model Aviation* magazine, the AMA web site or the Code that came with your AMA license.

General

1) I will not fly my model aircraft in sanctioned events, air shows, or model flying demonstrations until it has been proven to be airworthy by having been previously, successfully flight tested.

2) I will not fly my model aircraft higher than approximately 400 feet within 3 miles of an airport without notifying the airport operator. I will give right-of-way and avoid flying in the proximity of full-scale aircraft. Where necessary, an observer shall be utilized to supervise flying to avoid having models fly in the proximity of full-scale aircraft.

3) Where established, I will abide by the safety rules for the flying site I use, and I will not willfully and deliberately fly my models in a careless, reckless and/or dangerous manner.

5) I will not fly my model unless it is identified with my name and address or AMA number, on or in the model. **Note:** This does not apply to models while being flown indoors.

7) I will not operate models with pyrotechnics (any device that explodes, burns, or propels a projectile of any kind).

Radio Control

1) I will have completed a successful radio equipment ground check before the first flight of a new or repaired model.

2) I will not fly my model aircraft in the presence of spectators until I become a qualified flier, unless assisted by an experienced helper.

3) At all flying sites a straight or curved line(s) must be established in front of which all flying takes place with the other side for spectators. Only personnel involved with flying the aircraft are allowed at or in the front of the flight line. Intentional flying behind the flight line is prohibited.

4) I will operate my model using only radio control frequencies currently allowed by the Federal Communications Commission.

5) **I will not knowingly operate my model within three miles of any pre-existing flying site except in accordance with the frequency sharing agreement listed** (in the complete AMA Safety Code).

9) Under no circumstances may a pilot or other person touch a powered model in flight; **nor should any part of the model other than the landing gear, intentionally touch the ground, except while landing**.

CHECK LIST

During the last few moments of preparation your mind may be elsewhere anticipating the excitement of the first flight. Because of this, you may be more likely to overlook certain checks and procedures that should be performed before the model is flown. To help avoid this, a check list is provided to make sure these important areas are not overlooked. Many are covered in the instruction manual, so where appropriate, refer to the manual for complete instructions. Be sure to check the items off as they are completed.

❏ 1. Check the motor for secure attachment.
❏ 2. Balance your propeller (and spare propellers).
❏ 3. Inspect your propeller for proper attachment. Replace any prop saver that shows evidence of damage or one that has cracks in it.
❏ 4. Check the wheels for free rotation, the axles and landing gear for security, and add a drop of light machine oil to the axles.
❏ 5. Make sure all hinges are **securely** stuck to the flight controls.
❏ 6. Check the control horns for secure attachment to the control surfaces.
❏ 7. Pull / push on each of the pushrods and check to see that the connections do not slip.

❏ 8. Check the servo arms for secure attachment and make sure that the arm screws are in place and are tight.
❏ 9. Reinforce holes for wood screws with thin CA where appropriate
❏ 10. Check that all servo connectors are fully plugged into their respective channels on the receiver.
❏ 11. Make sure any servo extension cords you may have used do not interfere with other systems (servo arms, pushrods, etc.).
❏ 12. Check the receiver for secure attachment. This must not be "stuffed into place."
❏ 13. Extend your receiver antenna.
❏ 14. Check the C.G. according to the measurements provided in the manual.
❏ 15. Place your name, address, AMA number and telephone number on or inside your model.
❏ 16. Fully charge your transmitter battery and check the battery voltage after it is charged.
❏ 17. Range-check your radio when you get to the flying field.
❏ 18. Confirm that all controls operate in the correct direction and the throws are set up according to the manual.
❏ 19. If you wish to photograph your model, do so before your first flight.

FLYING

The Pluma 3D ARF is an airplane suitable for both indoor and outdoor flying. If you plan on flying outdoors, make sure that you choose days with very light to calm winds (gusting to less than 5 mph). If this is your first experience with an indoor-style foamie, seek help from experienced modelers. Join a local flying club or ask your local hobby dealer where the nearest approved flying sites are in your area.

CAUTION (THIS APPLIES TO ALL R/C AIRPLANES): If, while flying, you notice an alarming or unusual sound such as a low-pitched "buzz," this may indicate control surface *flutter*. Flutter occurs when a control surface (such as an aileron or elevator) or a flying surface (such as a wing or stab) rapidly vibrates up and down (thus causing the noise). In extreme cases, if not detected immediately, flutter can actually cause the control surface to detach or the flying surface to fail, thus causing loss of control followed by an impending crash. The best thing to do when flutter is detected is to slow the model **immediately** by reducing power, then land as soon as safely possible. Identify which surface fluttered (so the problem may be resolved) by checking all the servo grommets for deterioration or signs of vibration. Make certain all pushrod linkages are secure and free of play. If it fluttered once, under similar circumstances it will probably flutter again unless the problem is fixed. Some things which can cause flutter are; Excessive hinge gap; Not mounting control horns solidly; Poor fit of clevis pin in horn; Side-play of wire pushrods caused by large bends; Excessive free play in servo gears; Insecure servo mounting; and one of the most prevalent causes of flutter; Flying an over-powered model at excessive speeds.

Takeoff

The Pluma 3D ARF can take off from the ground (ROG) or can be hand launched. Rise-off-ground (ROG) takeoffs should be reserved for indoor flying and should be performed with the model rolling away from you and others. For your first flight it's probably a good idea to have an assistant hand-launch the plane for you. You should be ready to correct (or fly through) any trim errors. First, set your transmitter for **LOW RATES**. Launch your plane directly into the wind (and away from others). After your assistant launches the plane, have him come back and adjust the trim on your transmitter. If you want to perform an ROG takeoff, make sure the surface you're using is completely smooth and free from "potholes" that can flip the plane or break the landing gear.

Flight

When you're airborne and your plane is trimmed out, throttle back and fly the pattern. Get used to the way the model handles with standard control inputs. When you're comfortable, try switching to HIGH rates to see how you like the plane (save 3D rates for later flights). Based on your preference, you may want to adjust your rates or exponential settings in your radio. If your assistant is still available, have him take notes for you so you can make adjustments when you land. Fly around for a bit and try a few simple maneuvers like: slow flight, gentle rolls, loops, stalls, and hammerhead stalls. Practice a few landing approaches.

Landing

Before you land, throttle down completely (with a safe amount of altitude). You'll notice that when you power off, the airplane will lose speed very quickly but will not pitch down. To keep your speed up you'll have to pitch down rather steeply and this can be less than ideal for most landings. Set up for landing by throttling down to an "idle" instead. If you find it difficult to get the right setting, power-off completely and try blipping the throttle. For a short approach, power-off completely while at altitude and pitch down. At the flare, be ready to blip the throttle for a gentle 3-point landing.

One final note about flying your model: Have a goal or flight plan in mind for **every** flight. This can be learning a new maneuver(s), improving a maneuver(s) you already know, or learning how the model behaves in certain conditions (such as on high or low rates). This is not necessarily to improve your skills *(though it is never a bad idea!)*, but more importantly so you do not surprise yourself by impulsively attempting a maneuver and suddenly finding that you've run out of time, altitude or airspeed. Every maneuver should be deliberate, not impulsive. A flight plan greatly reduces the chances of crashing your model just because of poor planning and impulsive moves. ***Remember to think.***
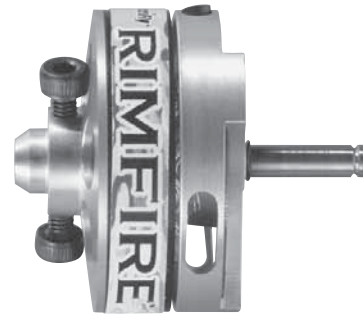
Have a ball! But always stay in control and fly in a safe manner.

GOOD LUCK AND GREAT FLYING!

This model belongs to:

Name

Address

City, State Zip

Phone number

AMA number

Make a copy of this identification tag and put it on or inside your model.

OTHER ITEMS AVAILABLE FROM GREAT PLANES

ElectriFly™ RimFire™ 28-22-1380kV Out-Runner Brushless Motor
Designed for explosive acceleration and maximum torque, RimFire out-runner brushless motors are dependable and virtually maintenance-free – there are not comms or brushes to worry about, and the bearings are double-shielded. The lightened aluminum can houses high-torque, "rare earth" Neodymium magnet. Improved cooling means 50% more power than other out-runners of similar size. **GPMA4505**
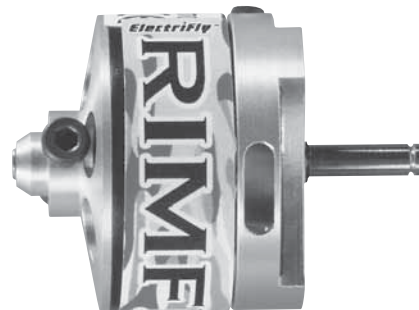
ElectriFly RimFire 28-26-1000kV Out-runner Brushless Motor
Powered by rare-earth Neodymium magnets, RimFire out-runner motors produce strong acceleration in planes ranging from park flyers to 1.60-size giants! Their high-torque design

eliminates the need for a gearbox, making them the simpler, lighter and less expensive alternative to a brushed motor and gearbox. Plus, their innovative housing optimizes cooling, allowing RimFire motors to produce 50% more performance power than out-runners of similar size. Motor mount and hardware are included. **GPMA4525**

ElectriFly Silver Series 8A Micro Brushless ESC

If you're into electric flight, take it easy: get a Silver Series ESC. It's easy to find a compatible battery – you can use NiCd, NiMH or LiPo. Hook-up takes just seconds, and there's NO set-up. Silver Series ESCs detect the battery type, read the voltage and set the voltage cut-off. Brake turns on (or off) at your option. The BECs are hefty and realistically rated. The SS-8 delivers 1.5A, for right-now response and extended flight times. **GPMM1800**

ElectriFly Silver Series 12A Electronic Speed Control

With Silver Series brushless ESCs, the only way their performance would be any easier to enjoy is if they came already installed. As it is, hookup takes only seconds – and set-up takes no time at all. Silver Series brushless ESCs set up automatically on hook-up and offer the option to use brake (or not) with a flick of the throttle stick. The 12A ESC is great for small flat foamies and built-up 3D airplanes, perfect for out-runner brushless motors, and delivers 12A of continuous current. It's compatible with LiPo, NiCd and NiMH batteries and features leads and Deans® battery connector, gold-plated bullet plugs for motor and universal radio connectors already attached. **GPMM1810**

ElectriFly Power Series™ 11.1V LiPo Batteries

When the voltages of all cells in a pack are closely matched, each one can accept maximum power during a charge…and deliver maximum power in use. What's more, balanced packs tend to last longer than unbalanced packs – and that means maximum value for your battery dollar! ElectriFly offers Power Series balanced LiPo packs in *300mAh* **(GPMP0595)** and *640mAh* **(GPMP0601)** capacities. Both feature a 24 AWG charge lead with balance connector and 18AWG discharge lead with Deans® micro plug.

ElectriFly Equinox™ LiPo Cell Balancer

By regulating the voltage levels from 2 to 5 LiPo cells to within a very tight tolerance of each other, the Equinox ensures the fullest possible safe voltage during charging – which means more power and longer lasting packs! It can handle a maximum current of 3 amps during charge or discharge (up to 6 amps with custom connectors), and includes adapters for 2S and 3S (7.4V & 11.1V) batteries and gold-plated banana plugs. Plus, it automatically checks for poor quality cells, and provides a safe platform for charging*. Choose from two modes for using Equinox: connected directly to the cell in "Quick Balance" mode, or in conjunction with a LiPo-compatible charger/discharge in "Interface" mode. **GPMM3160**

*Equinox cannot be used with LiPo batteries which have built-in charge protection circuits.

ElectriFly PolyCharge4™

For convenience with multiple LiPo packs, there's the DC PolyCharge4. Each of its four independent outputs can charge a one-to-four cell Lithium-Polymer pack. It's ideal if you don't have the time for one-at-a-time charging – and don't want the expense and hassle of multiple chargers. Each output can handle packs from 300 to 3000mAh. Set the capacity, and PolyCharge4 will automatically set the charge rate to get you started – and use light and sound cues to tell you when your pack is done. **GPMM3015**

Low Rates
Ail 27°
Rudd 19°
Elev 17°

High Rates
Ail 43°
Rudd 36°
Elev 26°

3D Rates
Ail 43°
Rudd 36°
Elev 26°

90°