EXTRA 330S

EPERFORMANCE SERIES

INSTRUCTION MANUAL

Wingspan: 41 in [1035mm]
Wing Area: 337 in^2 [21.8dm^2]
Weight: 27 – 31 oz [765 – 880g]
Wing Loading: 11.5 – 13.2 oz/ft^2 [35 – 40g/dm^2]
Length: 40 in [1015mm]
Required (not included):
Radio: 4-channel with four micro servos, two 6" [152mm] servo extensions, two 16" [406mm] servo extensions one Y-harness
Motor: RimFire™ 35-30-1250kV brushless out-runner (GPMG4595) or Ammo™ 24-45-3790kV brushless in-runner (GPMG0505) brushless out-runner
Gear-Drive: 24mm gear-drive with 4.5:1 gear ratio
ESC: 35A Brushless
Battery: 3-cell 1250 to 2100mAh LiPo battery & LiPo compatible charger

WARRANTY

Great Planes® Model Manufacturing Co. guarantees this kit to be free from defects in both material and workmanship at the date of purchase. This warranty does not cover any component parts damaged by use or modification. **In no case shall Great Planes' liability exceed the original cost of the purchased kit.** Further, Great Planes reserves the right to change or modify this warranty without notice.

In that Great Planes has no control over the final assembly or material used for final assembly, no liability shall be assumed nor accepted for any damage resulting from the use by the user of the final user-assembled product. By the act of using the user-assembled product, the user accepts all resulting liability.

If the buyer is not prepared to accept the liability associated with the use of this product, the buyer is advised to return this kit immediately in new and unused condition to the place of purchase.

To make a warranty claim send the defective part or item to Hobby Services at the address below:

Hobby Services
3002 N. Apollo Dr., Suite 1
Champaign, IL 61822 USA

Include a letter stating your name, return shipping address, as much contact information as possible (daytime telephone number, fax number, e-mail address), a detailed description of the problem and a photocopy of the purchase receipt. Upon receipt of the package the problem will be evaluated as quickly as possible.

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

Champaign, Illinois
(217) 398-8970, Ext 5
airsupport@greatplanes.com

TABLE OF CONTENTS

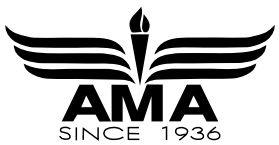
INTRODUCTION

The Extra 330S EP ARF is another great release in a line of electric built-up, all out performance 3D planes. You can fly incredible 3D maneuvers with the Extra 330S EP ARF just like larger scale, expensive gas models. In addition, high capacity LiPo battery packs and a brushless motor will allow you the convenience of electric flying within a reasonable budget.

For the latest technical updates or manual corrections to the Extra 330S EP ARF, visit the Great Planes web site at **www.greatplanes.com**. Open the “Airplanes” link, then select the Extra 330S EP 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

We urge you to join the AMA (Academy of Model Aeronautics) and a local R/C club. The AMA is the governing body of model aviation and membership is required to fly at AMA clubs. Though joining the AMA provides many benefits, one of the primary reasons to join is liability protection. Coverage is not limited to flying at contests or on the club field. It even applies to flying at public demonstrations and air shows. Failure to comply with the Safety Code (excerpts printed in the back of the manual) may endanger insurance coverage. Additionally, training programs and instructors are available at AMA club sites to help you get started the right way. There are over 2,500 AMA chartered clubs across the country. Contact the AMA at the address or toll-free phone number below:



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 Extra 330S EP 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 Extra 330S EP 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 engine and components (fuel tank, wheels, etc.) 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 clevises 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 this 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 use a NiCd/NiMH peak 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 the charger's output volts to match the battery volts.
- ALWAYS charge in a fireproof location.
- NEVER trickle charge.
- NEVER allow the 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 Extra 330S EP 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 model. The servos and receiver shown in the manual are Futaba® S3114 micro servos and the Futaba R114F micro receiver. Two 6" [150mm] servo extensions, two 16" [400mm] servo extensions, and a Y-harness are also required. Order numbers for these items are provided.

- ❏ (4) Futaba S3114 Micro High Torque Servo 7.7g (FUTM0414)
- ❏ Futaba R114F FM Micro Receiver (Low Band – FUTL0442, High Band – FUTL0443)
- ❏ Futaba FM Single Conversion Short Crystal (Low Band – FUTL62**, High Band – FUTL63**)
- ❏ (2) Futaba C-25 Extension Slim Wire 150mm (FUTM4506)
- ❏ (2) Futaba "J" 16" [400mm] Servo Extension (FUTM3955)
- ❏ Futaba "J" 6" Dual Servo Extension (FUTM4130)

Motor Recommendations

The Extra 330S EP ARF comes with two mounting boxes that will accommodate either a brushless in-runner motor with gear drive or a brushless out-runner motor. For all-out 3D performance, we suggest the out-runner motor. For sport flying, either motor choice is acceptable. The motors that have been tested and perform well in this plane are listed below. If using the in-runner motor with gear drive, be sure to install the 11T pinion that is included with the gear drive to achieve a gear ratio of 4.5:1.

- ❏ Great Planes RimFire™ 35-30-1250kV brushless out-runner motor (GPMG4595)
- ❏ Great Planes Ammo™ 24-45-3790kV brushless in-runner motor (GPMG5185)
- ❏ Great Planes Gear Drive 24mm motors (GPMG0505)

Note: Motors from other manufacturers may work with the Extra 330S EP ARF. However, the included firewall pieces are designed to work specifically with the Great Planes motors listed.

Propeller

If using the Ammo brushless in-runner motor with 4.5:1 gearbox or the RimFire brushless out-runner motor, we recommend a 10" x 7" E Slo-Flyer electric propeller (GPMQ4123).

ESC (electronic speed control)

A brushless ESC (electronic speed control) is required for this plane. We recommend using the Great Planes Silver Series 35A Brushless ESC 5V/2A BEC (GPMM1830).

Battery Pack

The Extra 330S EP ARF has been tested with 11.1V LiPo packs ranging from 1250mAh to 2100mAh. Order numbers are provided for packs of this size. The lighter 1250mAh pack is suggested for maximum performance.

- ❏ Great Planes LiPo 1250mAh 11.1V 20C Discharge w/Balance (GPMP0609)
- ❏ Great Planes LiPo 1500mAh 11.1V 20C Discharge w/Balance (GPMP0613)
- ❏ Great Planes LiPo 2100mAh 11.1V 15C w/Balance BP2100 (GPMP0721)

Note: Do not use Great Planes LiPo 1500mAh 11.1V 3S 8C Discharge (GPMP0831). This battery pack is not capable of supporting the current draw of the recommended power systems.

Also, if using a 1250mAh battery pack combined with the brushless out-runner motor, avoid prolonged full throttle flying since the current draw of the motor exceeds the continuous maximum current draw rating of the battery pack. The 1250mAh battery pack is capable of supporting shorter, full throttle maneuvers.

Charger

Note: A cell balancer is required for the LiPo battery packs listed above.

- ❏ Great Planes ElectriFly™ Equinox LiPo 1 to 5 Cell Balancer (GPMM3160)

A suitable charger is also required. The Great Planes PolyCharge4™ is designed for LiPo packs only, but is able to charge four LiPo packs simultaneously. The Great Planes Triton2™ charger will only charge one pack at a time, but is capable of charging NiCd, NiMH, LiPo, and lead acid batteries. Order numbers for both are provided as follows:

- ❏ Great Planes PolyCharge4 DC Only 4 Output LiPo Charger (GPMM3015)

or

- ❏ Great Planes ElectriFly Triton2 DC Comp Peak Charger (GPMM3153)

Required Adhesive & Building Supplies

This is the list of adhesive and building supplies required to finish the Extra 330S EP ARF. Order numbers are provided in parentheses.

- ❏ 1/2 oz. [15g] Thin Pro™ CA (GPMR6001)
- ❏ 1/2 oz. [15g] Medium Pro CA+ (GPMR6007)
- ❏ Pro 30-minute epoxy (GPMR6047)
- ❏ Denatured alcohol
- ❏ Drill bits: 1/8" [3mm]
- ❏ #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)
- ❏ Small spring clamps
- ❏ 220-grit Sandpaper

Optional Supplies & Tools

Here is a list of optional tools mentioned in the manual that will help you build the Extra 330S EP ARF.

- ❏ 21st Century® sealing iron (COVR2700)
- ❏ 21st Century iron cover (COVR2702)
- ❏ 2 oz. [57g] Spray CA activator (GPMR6035)
- ❏ 4 oz. [113g] Aerosol CA activator (GPMR6034)
- ❏ CA debonder (GPMR6039)
- ❏ Epoxy brushes (6, GPMR8060)
- ❏ Mixing sticks (50, GPMR8055)
- ❏ Mixing cups (GPMR8056)
- ❏ Hobbico Duster™ can of compressed air (HCAR5500)
- ❏ Panel Line pen (TOPQ2510)
- ❏ Rotary tool such as Dremel®
- ❏ Hobbico flexible 18" ruler stainless steel (HCAR0460)

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**, and 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.

• Whenever just ***epoxy*** is specified you may use **either** 30-minute (or 45-minute) epoxy **or** 6-minute epoxy. When 30-minute epoxy is specified it is **highly** recommended that you use only 30-minute (or 45-minute) epoxy, because you will need the working time and/or the additional strength.

• ***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 engine 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.

ORDERING REPLACEMENT PARTS

Replacement parts for the Great Planes Extra 330S EP ARF are available using the order numbers in the **Replacement Parts List** that follows. The fastest, most economical service can be provided by your hobby dealer or mail-order company.

To locate a hobby dealer, visit the Hobbico web site at **www.hobbico.com**. Choose "Where to Buy" at the bottom of the menu on the left side of the page. Follow the instructions provided on the page to locate a U.S., Canadian or International dealer.

Parts may also be ordered directly from Hobby Services by calling (217) 398-0007, or via facsimile at (217) 398-7721, but full retail prices and shipping and handling charges will apply. Illinois and Nevada residents will also be charged sales tax. If ordering via fax, include a Visa® or MasterCard® number and expiration date for payment.

Mail parts orders and payments by personal check to:

Hobby Services
3002 N. Apollo Drive, Suite 1
Champaign, IL 61822

Be certain to specify the order number exactly as listed in the **Replacement Parts List**. Payment is by credit card or personal check only; no C.O.D.

If additional assistance is required for any reason contact Product Support by e-mail at **productsupport@greatplanes.com**, or by telephone at (217) 398-8970.

Replacement Parts List

GPMA3040	Wing Set
GPMA3041	Fuse
GPMA3042	Tail Surfaces
GPMA3043	Landing Gear
GPMA3044	Wheel Pants
GPMA3045	Cowl
GPMA3046	Canopy
GPMA3047	Battery Hatch
GPMA3048	Decals
GPMA2981	Spinner
GPMA2982	Hardware Set

COMMON ABBREVIATIONS

Fuse = Fuselage
Stab = Horizontal Stabilizer
Fin = Vertical Fin
LE = Leading Edge
TE = Trailing Edge
LG = Landing Gear
Ply = Plywood
" = Inches
mm = Millimeters
ESC = Electronic Speed Control

METRIC CONVERSIONS

1" = 25.4mm (conversion factor)

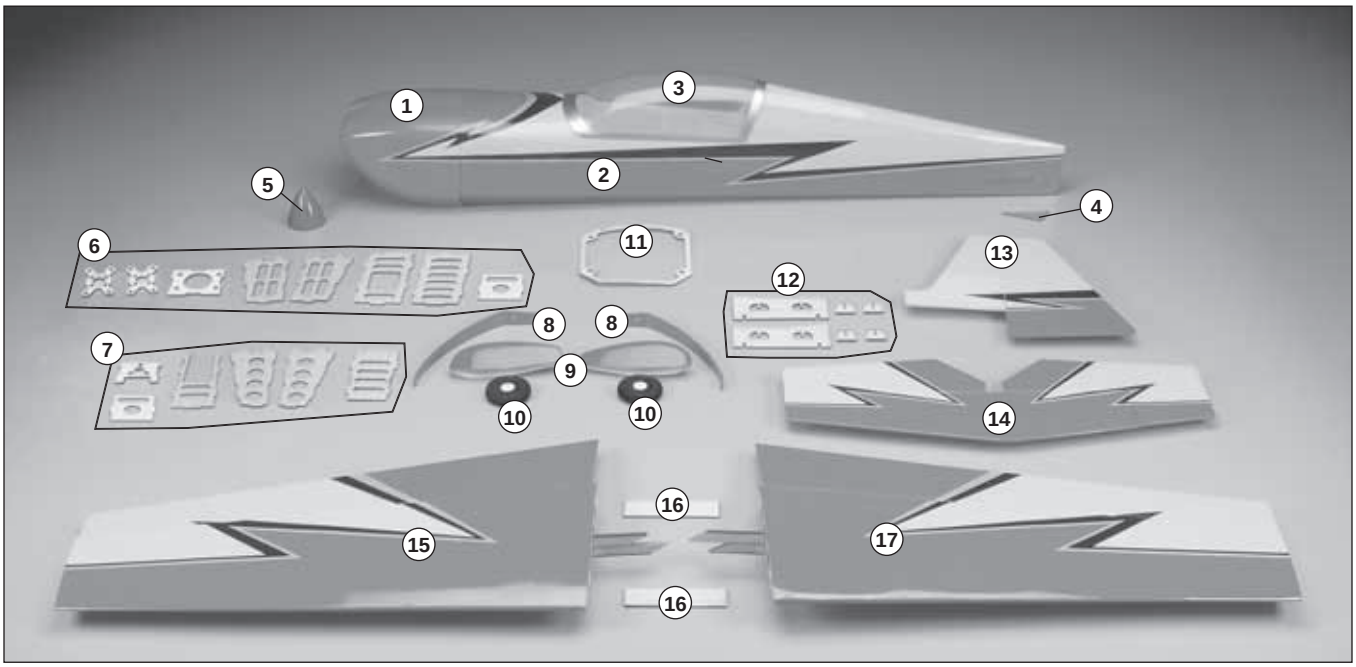
1/64" = .4mm	3/4" = 19.0mm
1/32" = .8mm	1" = 25.4mm
1/16" = 1.6mm	2" = 50.8mm
3/32" = 2.4mm	3" = 76.2mm
1/8" = 3.2mm	6" = 152.4mm
5/32" = 4.0mm	12" = 304.8mm
3/16" = 4.8mm	18" = 457.2mm
1/4" = 6.4mm	21" = 533.4mm
3/8" = 9.5mm	24" = 609.6mm
1/2" = 12.7mm	30" = 762.0mm
5/8" = 15.9mm	36" = 914.4mm

KIT INSPECTION

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 **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

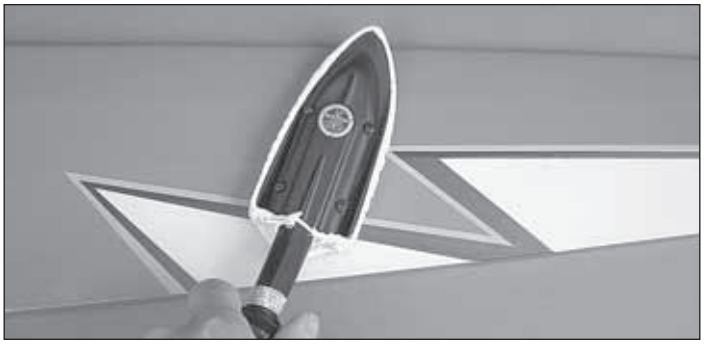


Kit Contents

1	Cowl
2	Fuse
3	Canopy
4	Tail Skid
5	Spinner
6	Out-Runner Motor Mounting Box (8 pcs.)
7	In-Runner Motor Mounting Box (6 pcs.)
8	Landing Gear (2 pcs.)
9	Wheel Pants (L&R)
10	Wheels (2 pcs.)
11	Cowl Ring
12	Wing Alignment Jig (6 pcs.)
13	Vertical Fin & Rudder
14	Horizontal Stabilizer & Elevators
15	Right Wing Panel & Aileron
16	Spar Doublers (2 pcs.)
17	Left Wing Panel & Aileron

PREPARATIONS

❏ 1. If you have not done so already, remove the major parts of the kit from the box and inspect for damage. If any parts are damaged or missing, contact Product Support at the address or telephone number listed in the “Kit Inspection” section on page 6.

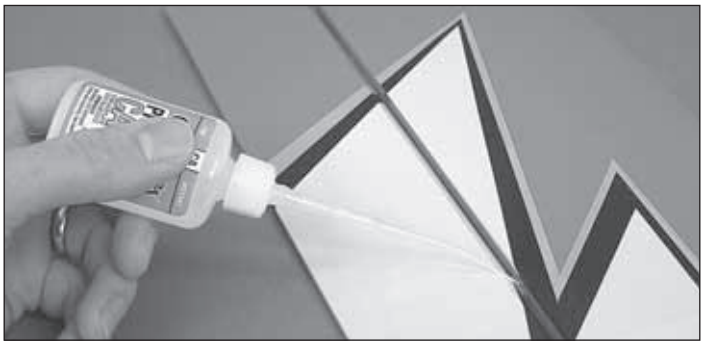


❏ 2. Carefully remove the tape and separate all the control surfaces. Use a covering iron with a covering sock on medium heat to tighten the covering if necessary. Apply pressure over sheeted areas to **thoroughly** bond the covering to the wood.

ASSEMBLE THE WING PANELS

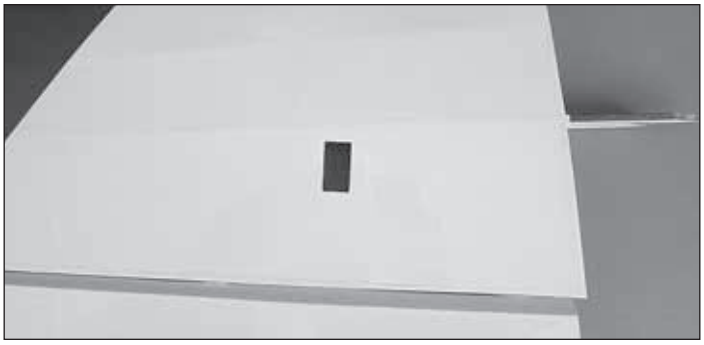
❏ 1. Use a sharp hobby knife to trim open the hinge slots in the **wing panels** and **ailerons**. Test fit the pre-cut CA hinges into the slots. If any are difficult to install, enlarge the slots with your knife.

❏ 2. Insert the CA hinges halfway into the slots in the wing panels. Push small T-pins through the middle of the hinges to keep them centered. Insert the ailerons onto the other ends of the hinges. Align the outer tips of the ailerons flush with the wing tips. Pull the ailerons away from the panels far enough to confirm that the hinges remained perpendicular with the hinge line. If not, use a hobby knife or small screwdriver to nudge them straight.

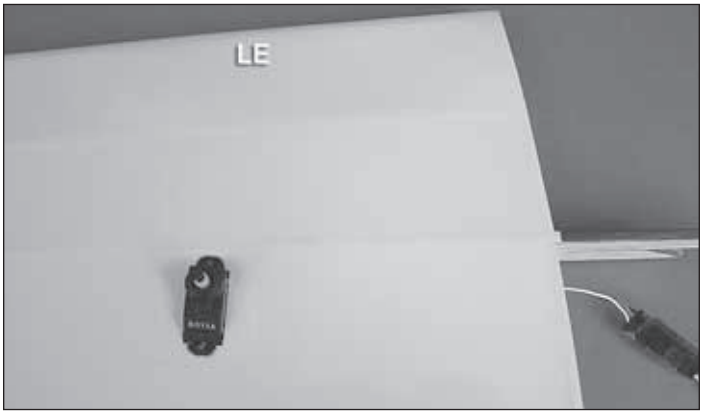


❏ 3. When satisfied, carefully remove the T-pins from the hinges. Adjust the ailerons so there is a small gap between the LE of the aileron and the wing. The gap should be small, just enough to see light through the gap or slip a piece of paper through. Use thin CA glue to secure the ailerons by applying 6 to 7 drops onto both sides of each hinge.

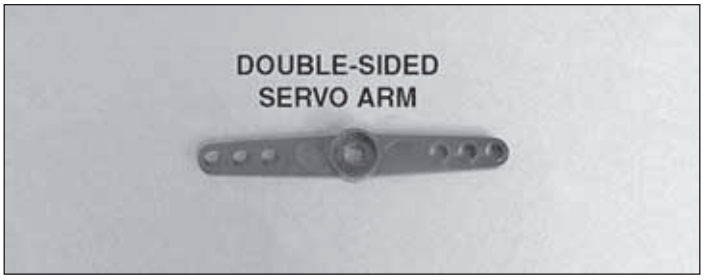
❏ 4. Attach a 6" [152mm] servo extension to each aileron servo and wrap the connection with transparent tape or heat-shrink tubing.

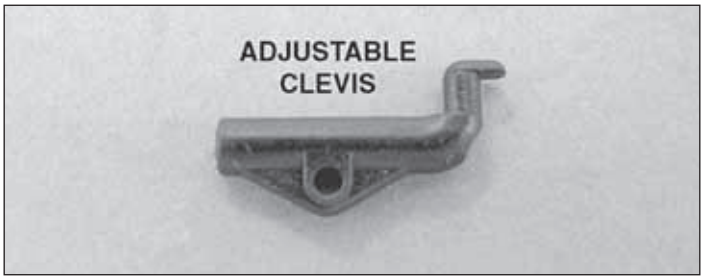


❏ 5. Trim the covering from the aileron servo bays on the undersides of the wing panels.

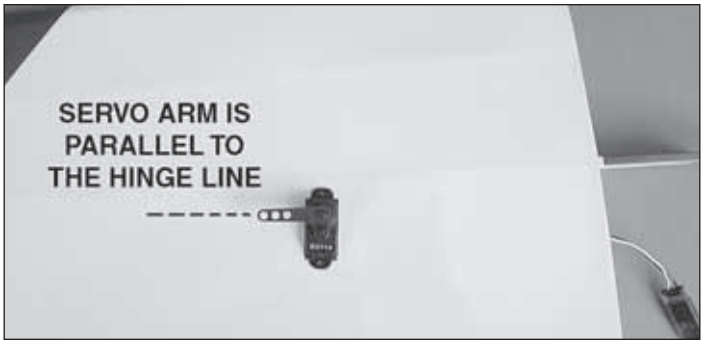


❏ 6. Insert the servo leads into the servo bays and pull them through the wing ribs. The servos can be installed using the hardware included with the servos or they can be glued in place. If gluing the servos in place, slit or puncture the covering just beneath the servo mounting tabs where they will contact the wing. This will ensure that the servo will be glued to the plywood servo bay, not just the covering. Glue the aileron servos into the servo bays using epoxy or CA glue with the servo splines facing the LE of the wings. After the glue has cured, confirm that the servos are properly secured to the wings and reinforce with extra glue if necessary.

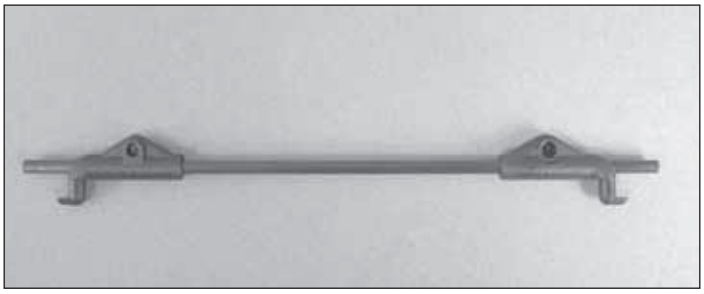


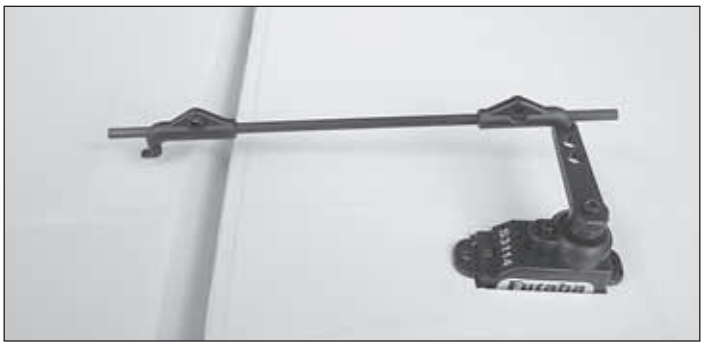


❏ 7. Locate two **double-sided servo arms** that fit the output splines of your aileron servos and four **adjustable clevises**.

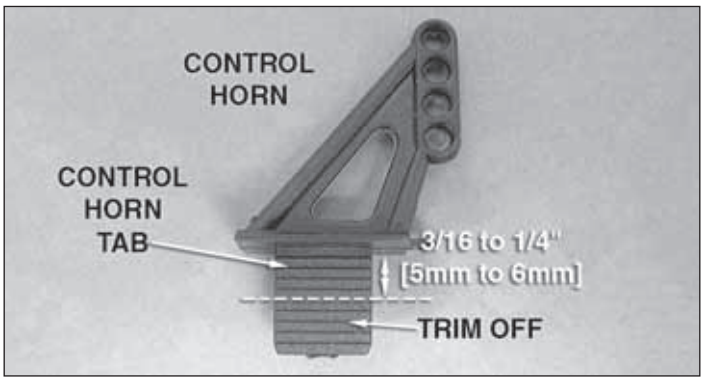


❏ 8. Temporarily connect your aileron servos and battery pack to your radio and center the servos and trim levers on the transmitter. Test fit the double-sided servo arms parallel to the aileron hinge line. If the servo arm does not fit onto the servo spline parallel to the hinge line, remove it from the servo and rotate it 180°. Decide which way fits best (closest to parallel) and cut off the arm that isn't used. Be sure to make a left and right servo arm.



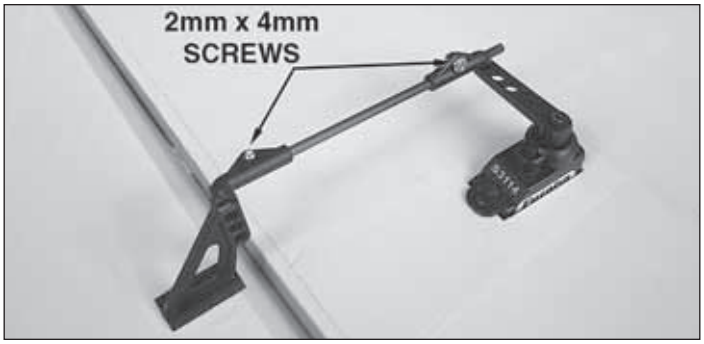


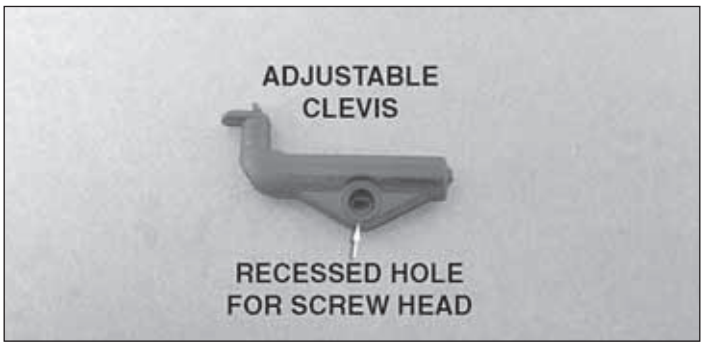
❏ 9. Fit two adjustable clevises onto both 2mm x 90mm **aileron pushrods**. Push one of the clevises from each pushrod into the outer holes of the servo arms.



❏ 10. Locate the aileron double rib that has a rectangular mounting block at the LE. Using the position of the pushrods as a guide, cut a slot 3/8" [9.5mm] long perpendicular to the hinge line just behind the bevel of the LE of aileron for each **control horn** in the center of the mounting block. The slot only needs to be wide enough to accommodate the thickness of the **control horn tab** on the control horn (approximately 1/16" [1.6mm] thick). Do not cut all the way through the ailerons! 3/16" to 1/4" [5mm to 6mm] deep is sufficient. Trim the control horn backplate tabs shorter so that the control horns sit flat in the slots you made.

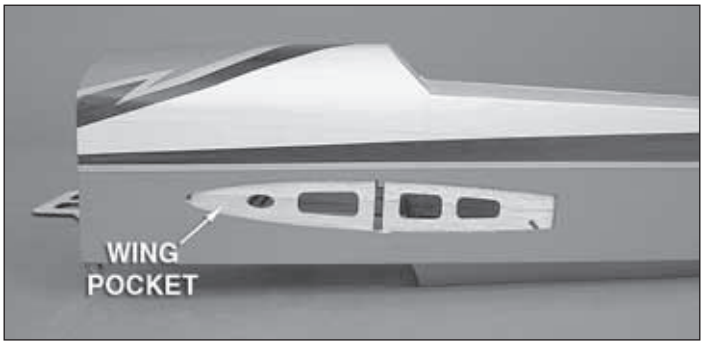
❏ 11. Confirm that the holes in the control horn are centered over the hinge line. When satisfied, coat the backplate tabs with medium CA and press them into the slots.



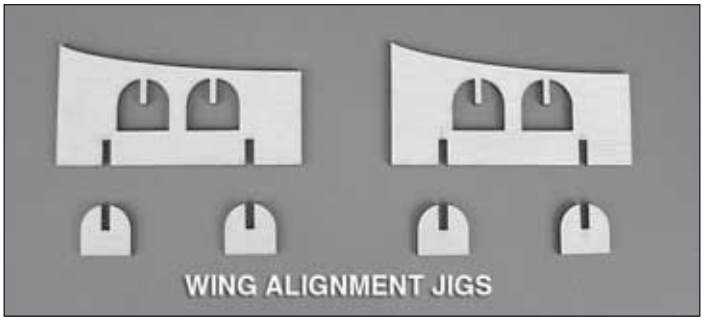


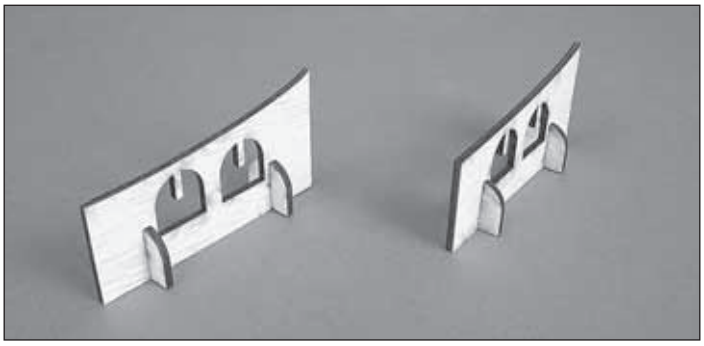
❏ 12. Use the position of the control horn to adjust the length of the pushrods as needed. Remove the servo arms from the aileron servos. Connect the other adjustable clevises on the aileron pushrods to the control horns and reattach the servo arms. Fine tune the length of the pushrods inside the clevises so that the ailerons are in the neutral position. Lock the clevises onto the pushrods by threading a 2mm x 4mm screw into each clevis screw hole. The screw head should fit into the recessed hole in the adjustable clevises as shown (installing the screws in the wrong direction may not properly tighten the clevises onto the pushrods). The excess rod ends can be cut away.

INSTALL THE WING PANELS



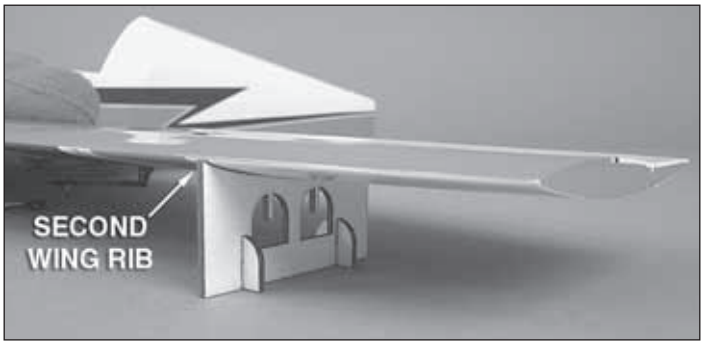
❏ 1. Trim the covering from the wing pockets in the **fuse**. For the best results, work slowly and use a new hobby knife blade for this step. Be careful not to cut into the fuse sides. On the wing panels, trim the covering that overlaps onto the wing panel root ribs.



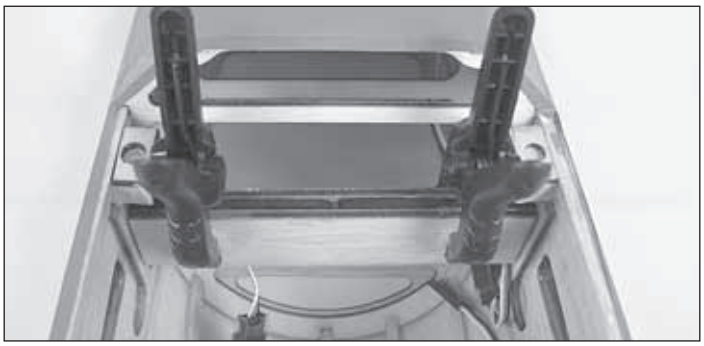


❏ 2. Locate the parts for the **wing alignment jigs**. Glue the parts together as shown.

❏ 3. Before gluing, test fit both wing panels into the fuse to confirm a proper fit. The center spar extends into the fuse and interlocks with the spar of the other wing panel. If both wing panels cannot seat flat into the wing pockets, lightly sand the tips of the interlocking spars until they do.

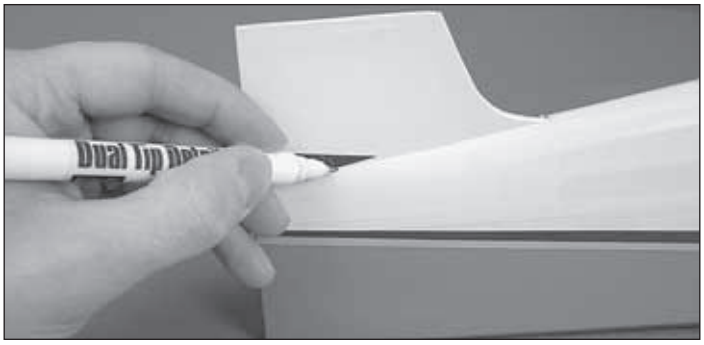


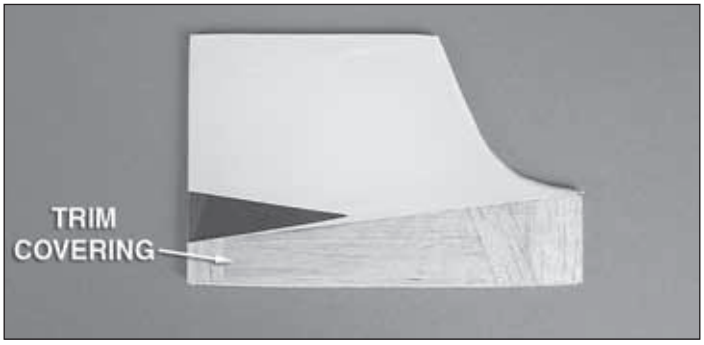
❏ 4. ***Note: This step must be performed on a clean, flat work surface.*** Thoroughly coat the root ribs of the wing panels and the wing pockets in the fuse with 30-minute epoxy and slide them into place. **Do not** put epoxy on the interlocking spars at this time. Being sure that the wing panels are fully seated into the wing pockets, position the wing alignment jigs underneath the second from the outside wing ribs. The fuse must lay flat on its bottom side as shown. These jigs will ensure that the wings are glued straight in the fuse. Use a weight to hold the fuse down against your work surface as well as the wings against the alignment jigs (we used a sock filled with sand). Clean up any excess epoxy on the outside of the wings where they meet the fuse, with a paper towel dampened with denatured alcohol and allow the epoxy to cure undisturbed.



❏ 5. Test fit the plywood **spar doublers** to the front and back of the wing spars. The aft spar doubler will need to be lightly sanded or cut to fit between the fuse sides. When satisfied with the fit, coat one side of each spar doubler as well as the front and back of the spars with epoxy. Fit the spars into position and use clamps to hold the doubler in place while the epoxy cures. The bottom edges of the doublers should be flush with the bottom of the wing spars.

ASSEMBLE THE TAIL SECTION



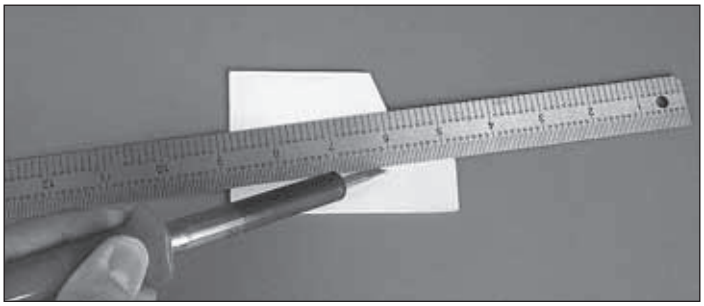


❏ 1. Fit the **vertical fin** into place and use a felt-tip pen to trace around the fin where it meets the fuse. Remove the fin from the fuse and trim the covering away 1/16" [1.6mm] below the line that you made (do not trim the covering from the TE of the vertical fin). Be careful not to cut through the wood as this will weaken it. See the following ***Expert Tip*** for removing the covering.

EXPERT TIP

HOW TO CUT COVERING FROM BALSA

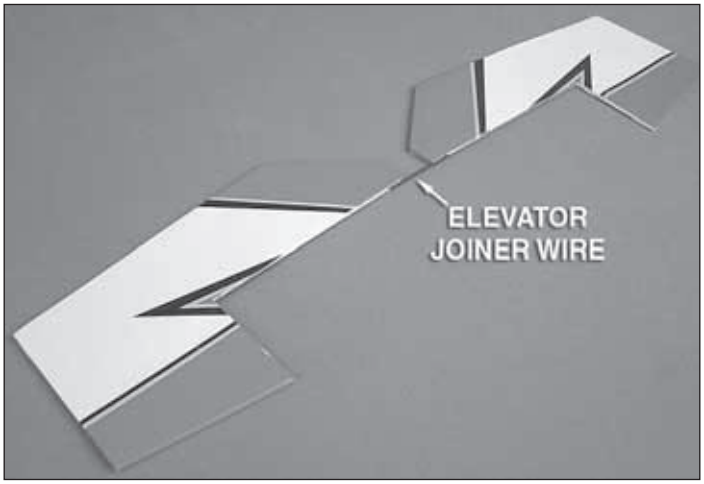
Use a soldering iron to cut the covering from the fin. The tip of the soldering iron doesn't have to be sharp, but a fine tip does work best. Allow the iron to heat fully.



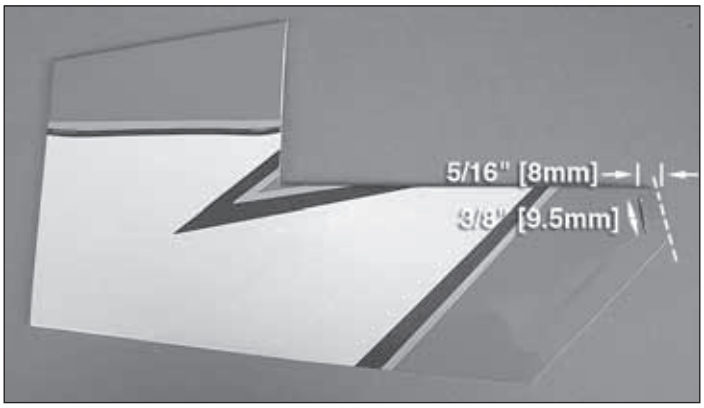
Use a straightedge to guide the soldering iron at a rate that will just melt the covering and not burn into the wood. The hotter the soldering iron, the faster it must travel to melt a fine cut. Peel off the covering.

❏ 2. Wipe away the lines you drew and glue the fin into place.

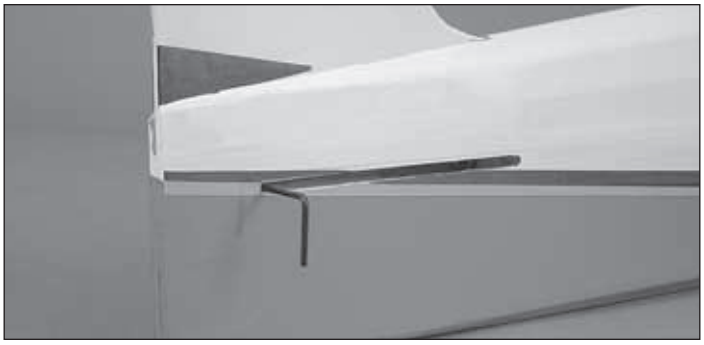
❏ 3. Trim the covering from the LE of each **elevator half** between the holes for the **elevator joiner wire** and the inner sides as shown.



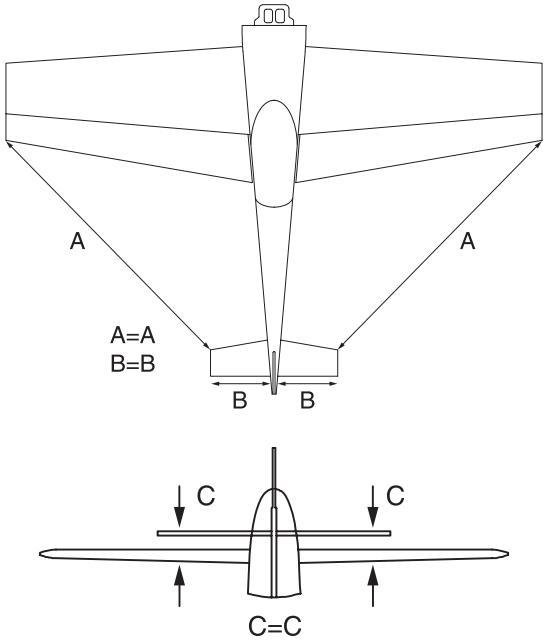
❏ 4. Test fit the elevator joiner into the elevator halves. Lay the elevators on your work surface and confirm that they both lay flat. If not, "tweak" or bend the elevator joiner wire slightly until they do. Do not attempt to bend the joiner wire while it is installed in the elevators. **Do not glue the joiner wire in place at this time.**



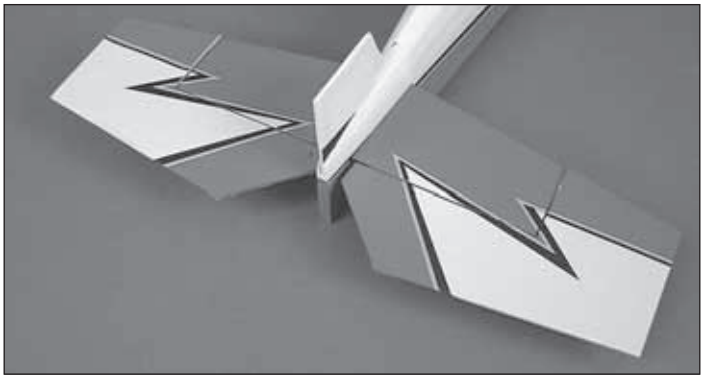
❏ 5. Carefully cut a slot for the elevator control horn in the left elevator half. The slot should be 5/16" [8mm] from the inside edge, 3/8" [9.5mm] long, and parallel with the elevator inside edge as shown. The slot should be cut completely through the elevator. Test fit the control horn into the slot, being sure that the control horn holes are positioned over the hinge line.



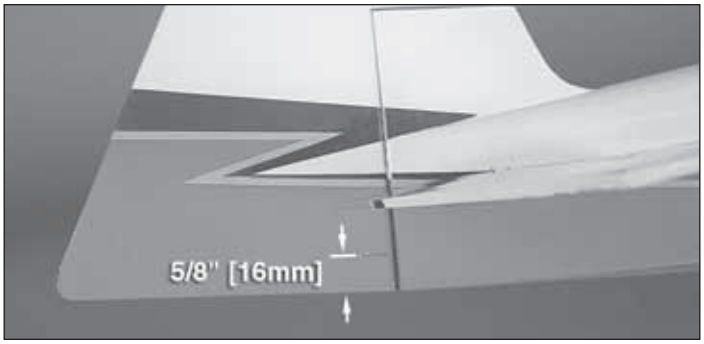
❏ 6. Trim the covering from the tail of the fuse for the **horizontal stabilizer**. Insert the elevator joiner wire into the back of the stab slot.



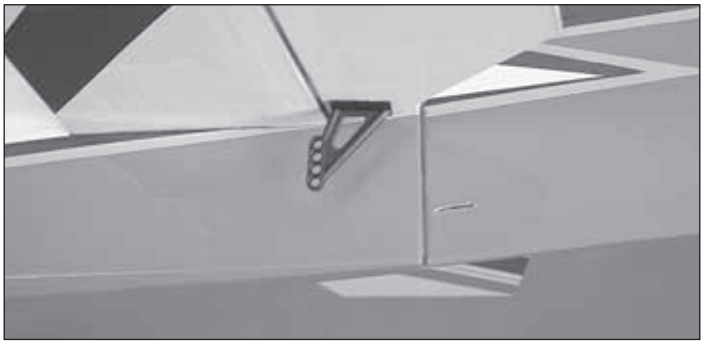
❏ 7. Position the stab into the stab saddle, centering it left and right and making it square to the wings. Mark the outline where the stab meets the fuse as you did with the vertical fin and remove the covering inside your marks. Reposition the stab into the fuse, stand back several feet behind the model and view it from the rear. Confirm that the stab is parallel with the wing panels. If not, use tape or a weight to straighten it. CA glue or epoxy can be used to glue the stab in place.



❏ 8. If necessary, use a hobby knife to cut open the hinge slots in the elevators and stab. Before gluing, roughen the elevator joiner wire with sandpaper and clean it off with alcohol. Prepare the elevators by inserting a CA hinge into each hinge slot. Use T-pins to keep the hinges centered. Put a light coating of epoxy onto the ends of the elevator joiner wire. Install the elevators onto the joiner wire while fitting the CA hinges into their mating slots in the stab. As you did with the ailerons, use thin CA to glue the hinges.



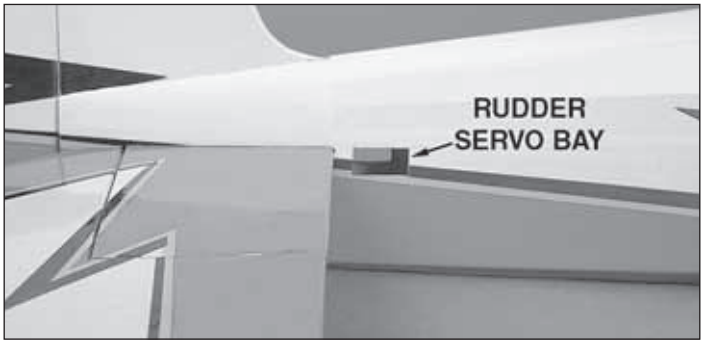
❏ 9. Cut a slot for the rudder control horn 5/8" [16mm] from the bottom of the rudder. Test fit a control horn into the slot, being sure that the control horn holes are positioned over the hinge line. Attach the rudder to fuse using three CA hinges.



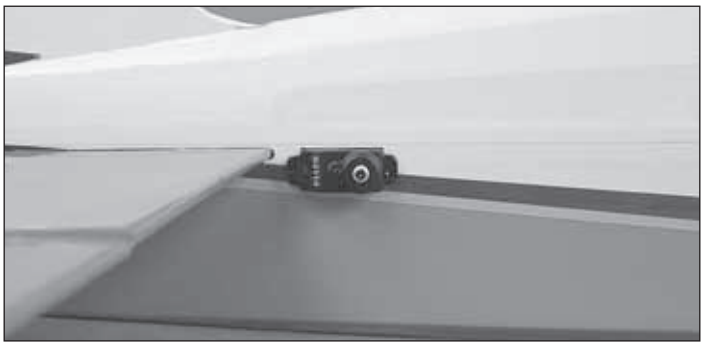
❏ 10. Insert a control horn into the slot on the underside of the left elevator. Press a control horn backplate onto the control horn tab on top of the elevator. Apply a few drops of CA glue to the control horn and backplate to secure them in place. The control horn tab can be trimmed flush with the backplate.

❏ 11. Attach a control horn to the right side of the rudder perpendicular to the hinge line in the same manner.

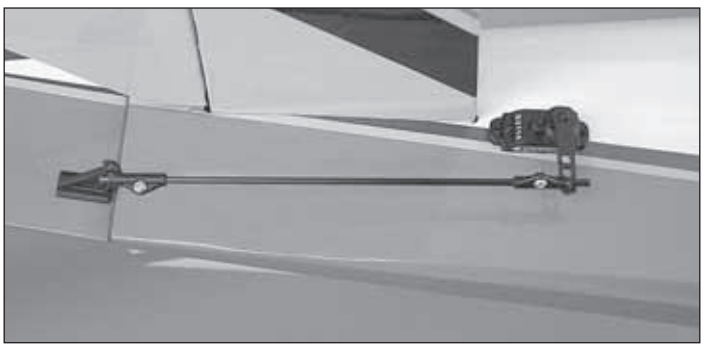
INSTALL THE TAIL SERVOS & PUSHRODS



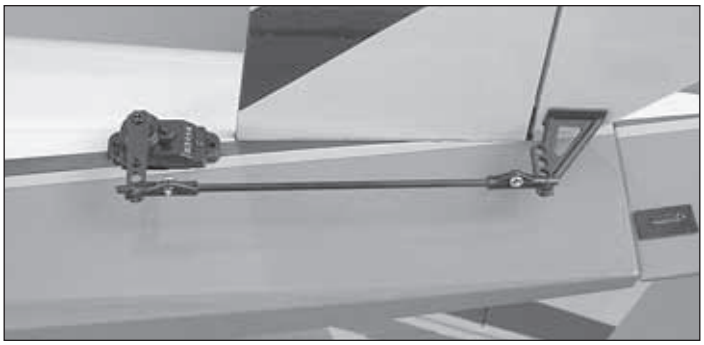
❏ 1. Trim the covering from the elevator and rudder servo bays just in front of the stab on both sides of the fuse.



❏ 2. Attach a 16" [400mm] servo extension to the elevator and rudder servos. Secure the servos in the servo bays with the splines facing forward. Use your radio system to center the servos.

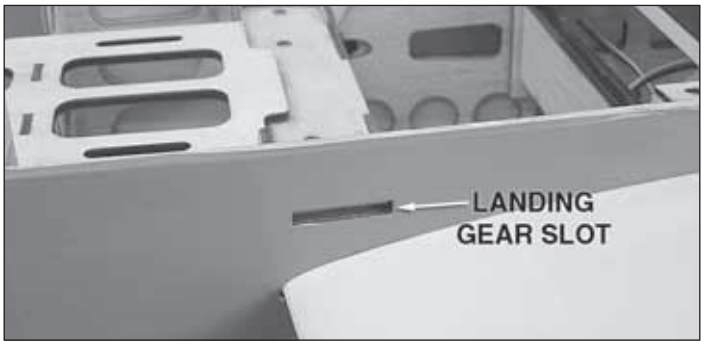


❏ 3. As you did with the ailerons, test fit the double-sided servo arms perpendicular to the rudder servo case. If the servo arm does not fit onto the servo spline perpendicular to the servo case, remove it from the servo and rotate it 180°. Decide which way fits best (closest to perpendicular) and cut off the arm that isn't used. Attach an adjustable clevis to the outer holes of the arm and to the rudder control horn. Attach the arm to the servo with the servo arm screw. Install a 6-3/4" [170mm] pushrod into the clevis, center the control surface, and use a 2mm x 4mm self-tapping screw to secure the clevis to the pushrod. The excess pushrod length can be cut off.

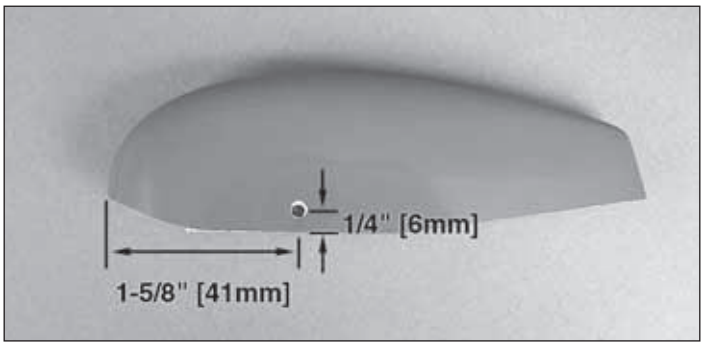


❏ 4. Install the elevator pushrod in the same manner.

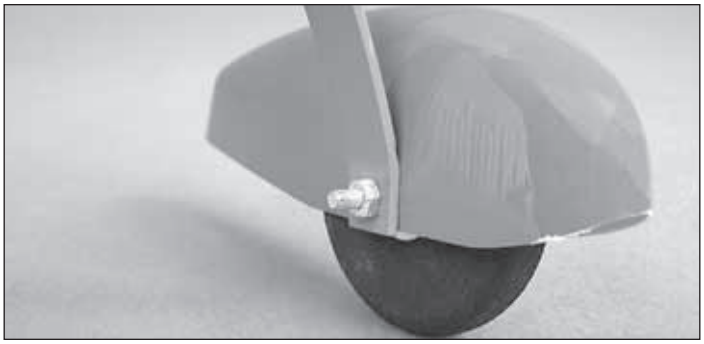
INSTALL THE LANDING GEAR

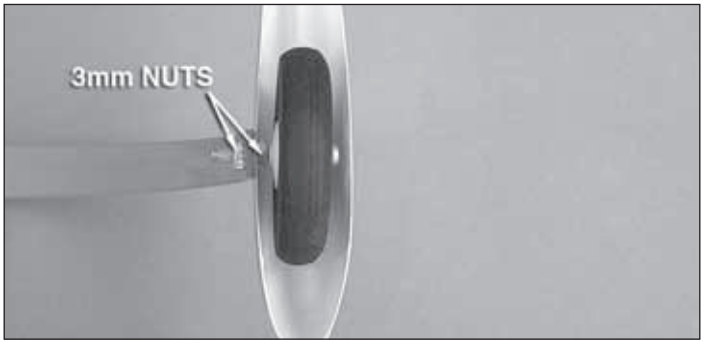


❏ 1. Trim the covering from the **landing gear slots** in the fuse.

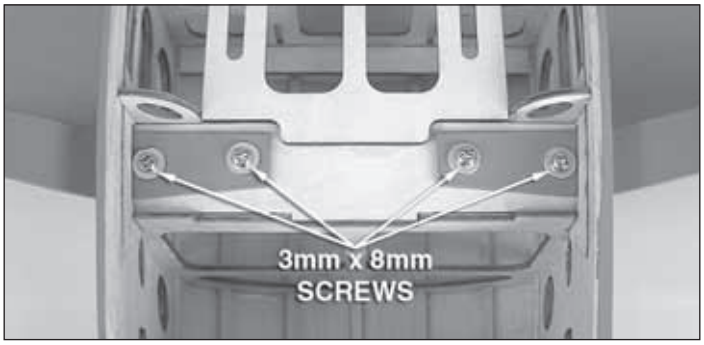


❏ 2. Measure and mark 1-5/8" [41mm] from the front and 1/4" [6mm] from the bottom of the **wheel pants**. Drill a 1/8" [3mm] hole at your marks (or use a reamer) on the **inside** of each wheel pant. Accuracy during this step will ensure that your wheels are positioned straight inside the pants. When drilling the hole, make a pilot hole with a smaller bit first, then enlarge the hole to the correct diameter. **Be sure to make a left and right wheel pant!**

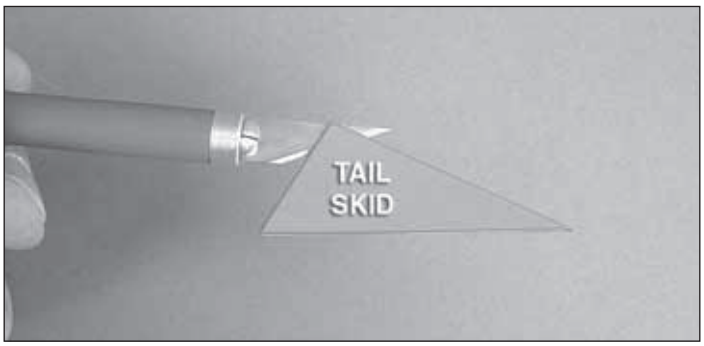




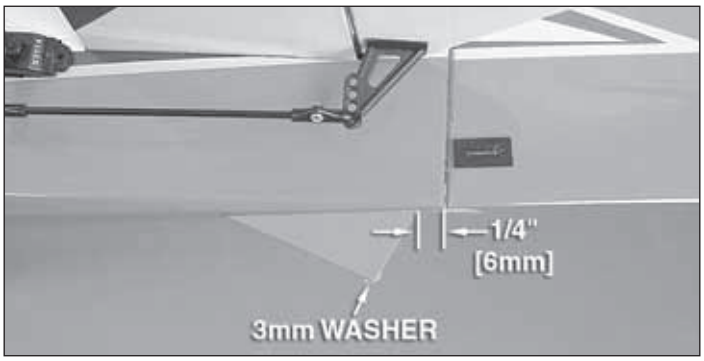
❏ 3. Fit the 3mm x 25mm machine screw (axle) through the axle hole in the wheel and secure the wheel to the axle using a 3mm nut and thread-locking compound. Be sure the nut is loose enough to allow the wheel to rotate freely on the axle. Fit the wheel and axle inside the wheel pant with the end of the axle screw exiting the hole you drilled in the wheel pant. Fit the end of the screw through the landing gear leg (the tapered sides of the landing gear legs face the rear of the plane) and install another 3mm nut tightly against the landing gear leg, securing the wheel pant in place. The addition of silicone adhesive between the wheel pant and landing gear leg will help prevent the wheel pant from rotating on the axle. Apply thread-locking compound onto the screw and nut to secure the wheel assembly. Repeat this step for the other wheel.



❏ 4. Attach the landing gear to the fuse using four 3mm x 8mm machine screws, four 3mm washers, and thread-locking compound.



❏ 5. Use a hobby knife to cut open the covering from the slot in the bottom tip of the **tail skid**. Glue the included 3mm washer into the slot. The washer will prevent the tail skid from being worn down when flying from a paved runway.

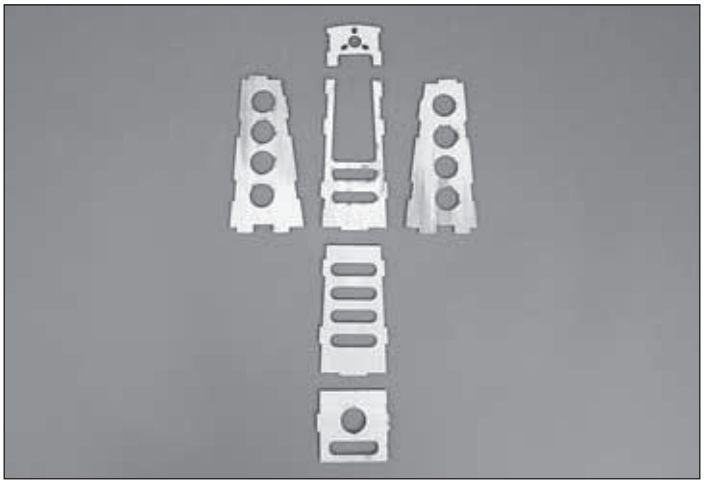


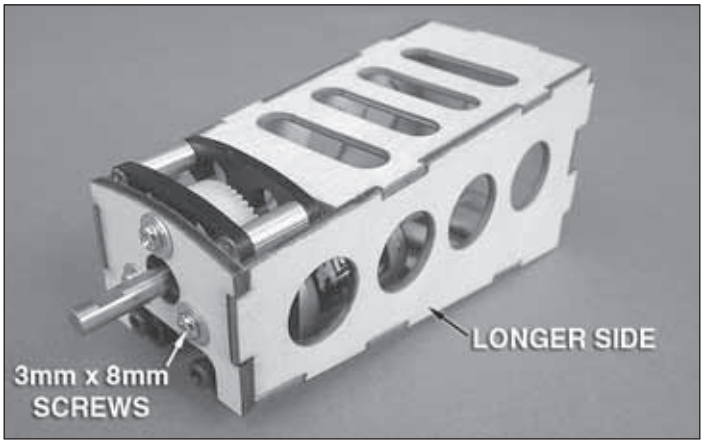
❏ 6. Glue the tail skid to the underside of the fuse 1/4" [6mm] from the aft end using medium CA or epoxy. The longest side of the skid goes against the fuse. Be sure to remove the covering from the top of the skid and the fuse where the skid will be glued before you attach it.

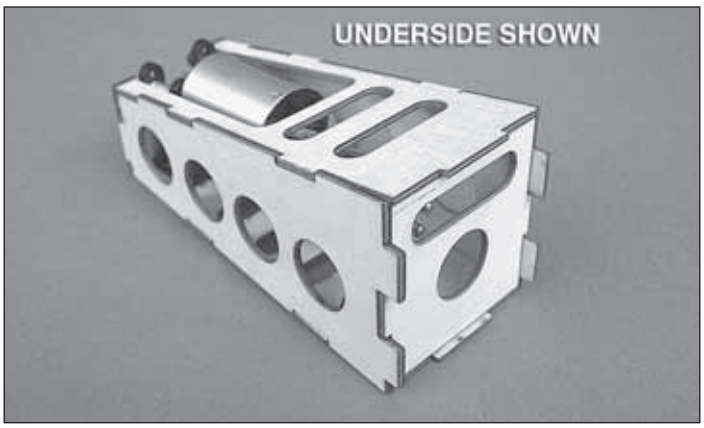
MOUNT THE MOTOR

The Extra includes motor mounting parts for both the Great Planes brushless 35-30-1250kV RimFire out-runner motor and the brushless 24-45-3790kV Ammo in-runner motor equipped with the Great Planes 24mm gear drive. Other motors may be able to be installed. However, modification to one of the motor mounting boxes would be necessary to suit the size and mount pattern of your equipment.

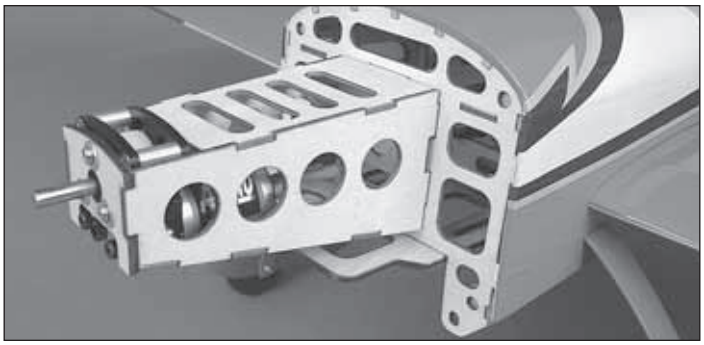
In-runner Brushless Motor with 24mm Gear Drive





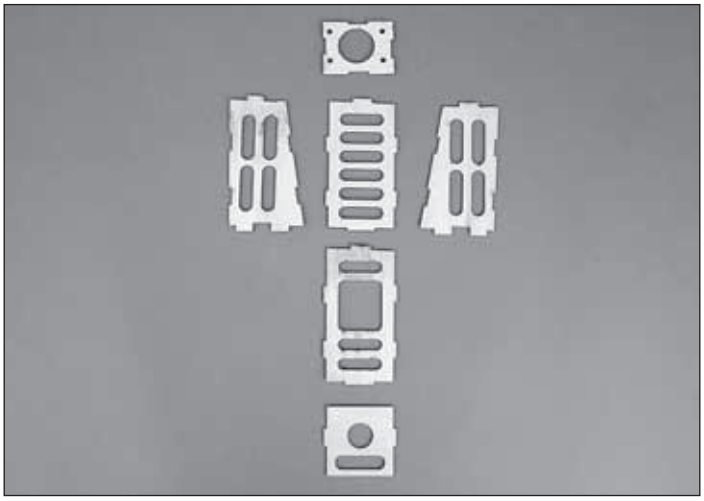


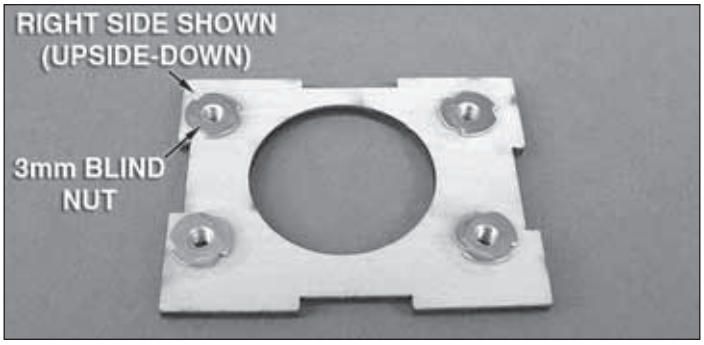
❏ 1. Locate the six pieces that make up the **in-runner motor mounting box**. Attach the **motor** to the **gearbox** using the screws included with the gearbox (be sure to read the instructions included with the gearbox). Remove the brass collar on the gearbox shaft and attach the motor mounting box front piece to the gearbox using three 3mm x 8mm machine screws, three 3mm washers, and thread-locking compound. Assemble the box as shown with medium CA glue (the longer side piece being on the left of the box). When the motor mounting box is fully assembled, all sides should be flush with each other as shown, and can only assemble one way.

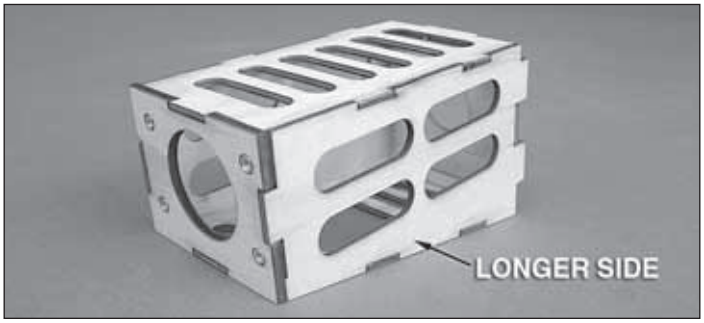


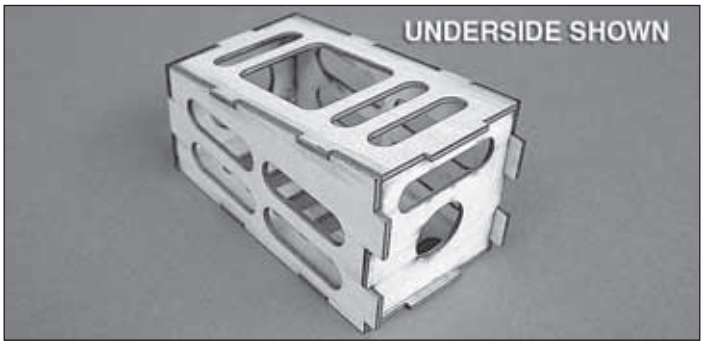
❏ 2. Use medium CA or epoxy to thoroughly glue the motor mounting box assembly to the fuse, being sure that the box is flat against the firewall. The tabs on the back of the motor mounting box will fit into the slots in the firewall.

Out-runner Brushless Motor

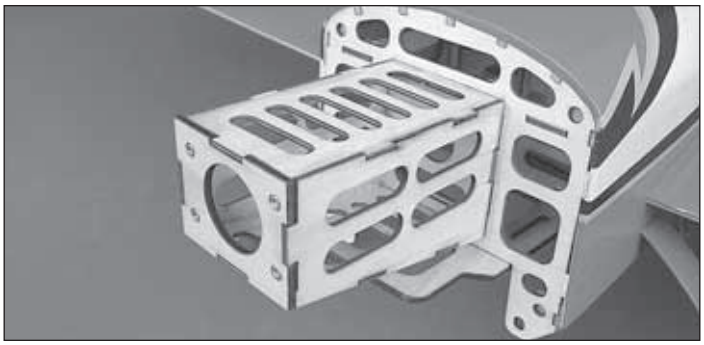




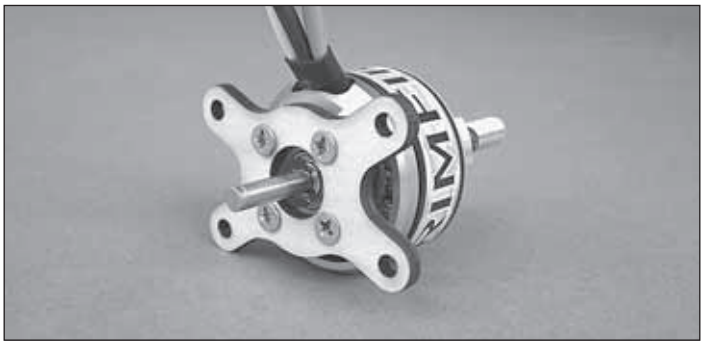




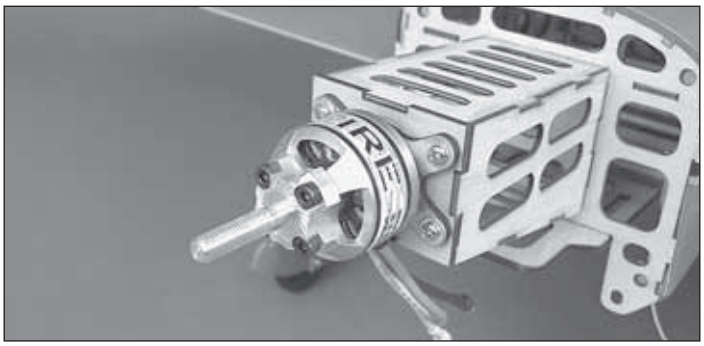
❏ 1. Locate the six pieces that make up the **out-runner motor mounting box** and four 3mm blind nuts. Press the blind nuts into the backside of the motor mounting box front piece and apply some medium or thick CA around the edges of the blind nuts to glue them in place (be careful not to get glue in the threads). The holes in the front piece are slightly off-center to accommodate the motor right thrust. **Be sure that the blind nuts are installed on the correct side as shown.** Assemble the box as shown with medium CA glue (the longer side piece being on the left of the box).



❏ 2. Use medium CA or epoxy to thoroughly glue the motor mounting box assembly to the fuse, being sure that the box is flat against the firewall. The tabs on the back of the motor mounting box will fit into the slots in the firewall.

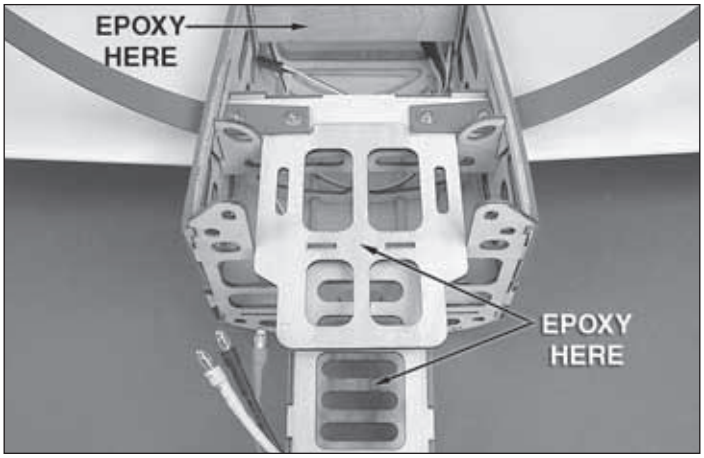


❏ 3. Use the flat head screws included with the motor and thread-locking compound to attach the plywood **motor adapter** to the back of the out-runner motor case.

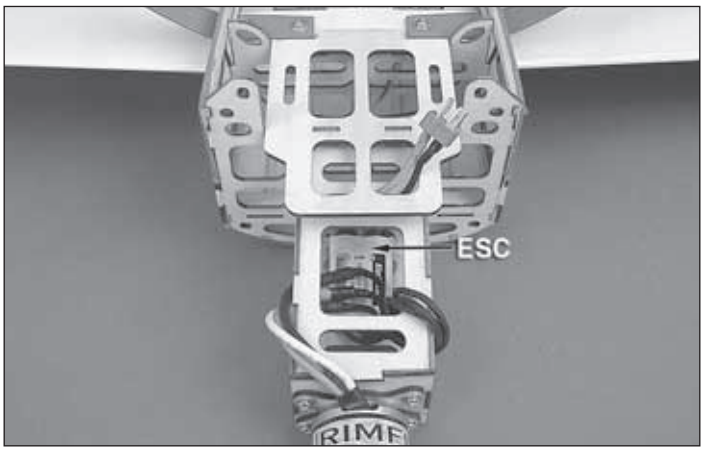


❏ 4. Attach the motor to the motor mounting box using four 3mm x 8mm machine screws, four 3mm flat washers, and thread-locking compound.

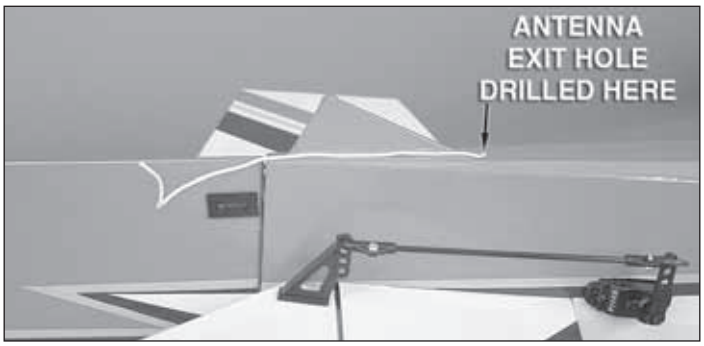
INSTALL THE RADIO & ESC



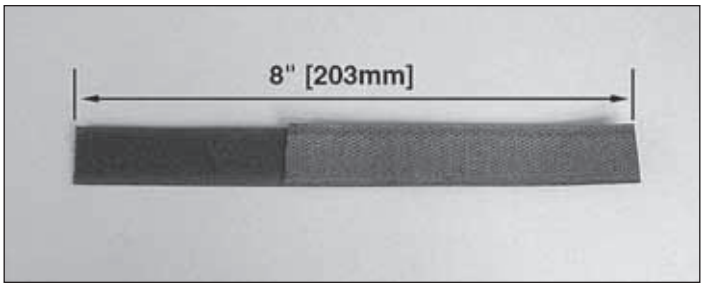
❏ 1. The **ESC** and **receiver** will be secured inside the plane with double-sided servo tape. For better adhesion of the tape, brush on a light coating of epoxy where the components will be installed. As shown in the picture, we will install the ESC to the underside of the top piece of the motor mounting box and the receiver to the front of the wing spar. The ESC can also be installed on the side of the motor mounting box. Also, apply a coat of epoxy to the **battery tray**.

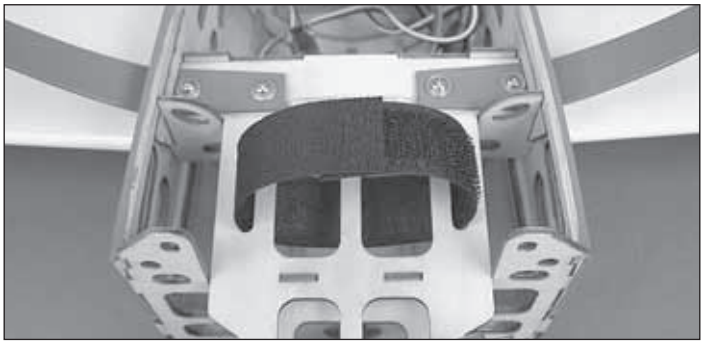


❏ 2. Connect the servo leads to the receiver. If you are using a 4-channel receiver, you will also need a dual servo extension or Y-harness for the aileron servos. Cut pieces of double-sided servo tape to secure the ESC and receiver where you applied epoxy in step #1. Connect the ESC to the motor leads and receiver.

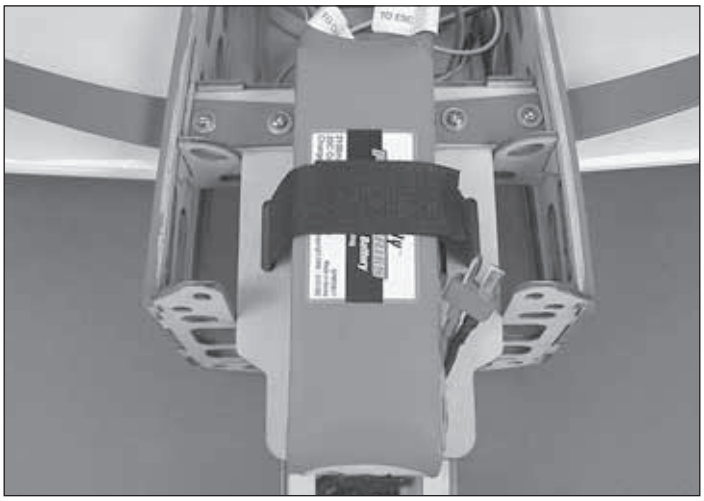


❏ 3. Route the receiver antenna out of the **battery hatch** and down the underside of the fuse. Use clear tape to hold the antenna in place. For a cleaner look, run the receiver antenna through the inside of the fuse to the tail. The antenna exits from a small hole drilled in the location shown. We used a piece of leftover pushrod that we had in the shop and inserted it through the hole in the tail of the plane and fished it through the formers to the front. Tape the antenna to the pushrod and draw it back through the fuse and out the hole.

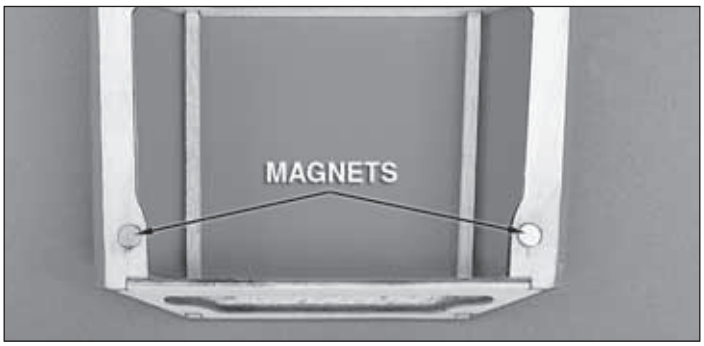




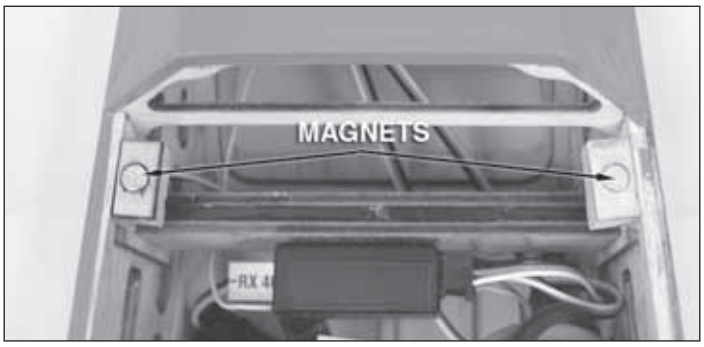
❏ 4. Make a hook and loop strap 8" [203mm] long by overlapping two pieces and cutting it to length. Feed it through the battery tray in the location shown. The strap can be glued to the battery tray with medium CA to keep it in place.



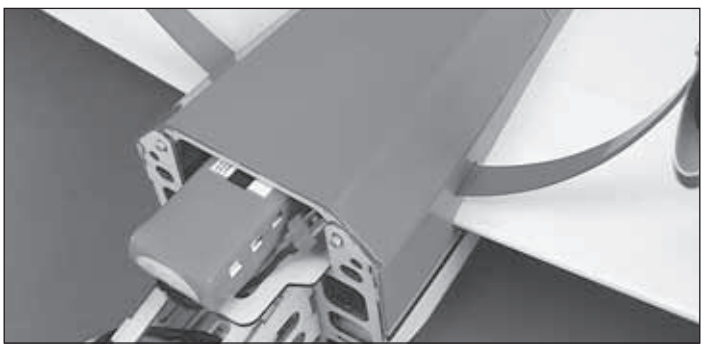
❏ 5. Test fit your battery into place and adjust the length of the strap as necessary. When you balance the model, the exact position of the battery pack will be determined. When you know where the pack will need to be to balance, mark its position onto the battery tray and put a piece of adhesive-backed hook and loop material onto the pack and battery tray to hold it in place during flight.



❏ 6. Glue the two **hatch dowels** halfway into the holes in the front of the battery hatch. Glue two magnets into the battery hatch with medium CA as shown. Do not use too much CA because it may prevent the magnets from sitting flush inside the holes. If the magnets do not sit flush with the hatch bottom, use long nose pliers to carefully press them in place. A light skin coating of thin CA over the magnets that overlaps onto the wood frame of the hatch will help secure the magnets in place. Let the CA glue harden without accelerator.



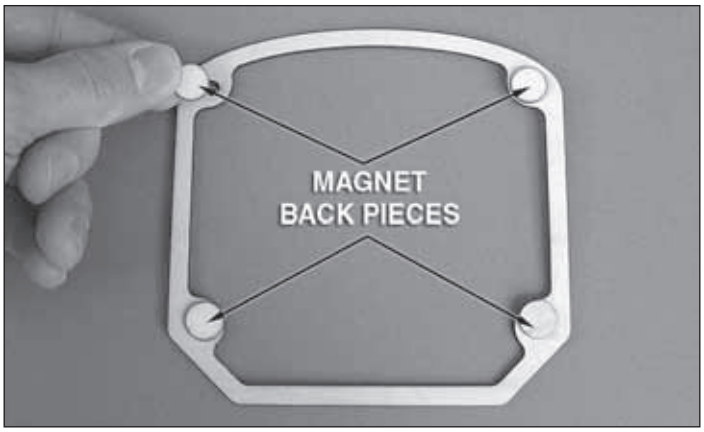
❏ 7. Glue two magnets into the fuse for the battery hatch. **Be sure that the magnets are glued with the correct polarity facing out!** The magnets in the fuse must be attracted to the magnets in the battery hatch.

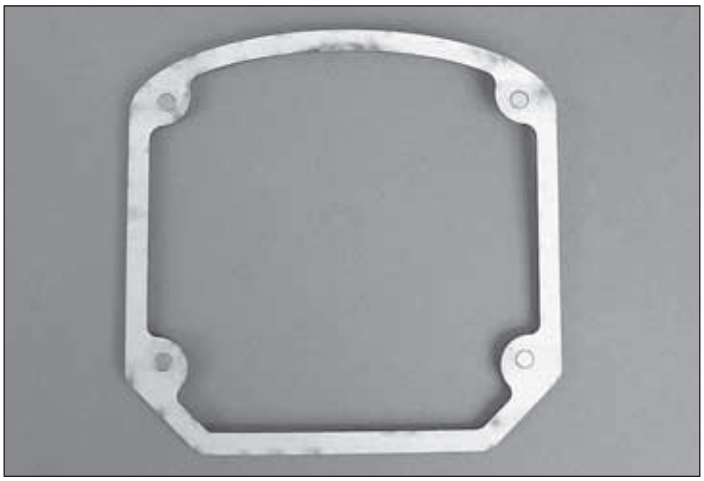


❏ 8. Test fit the battery hatch onto the fuse.

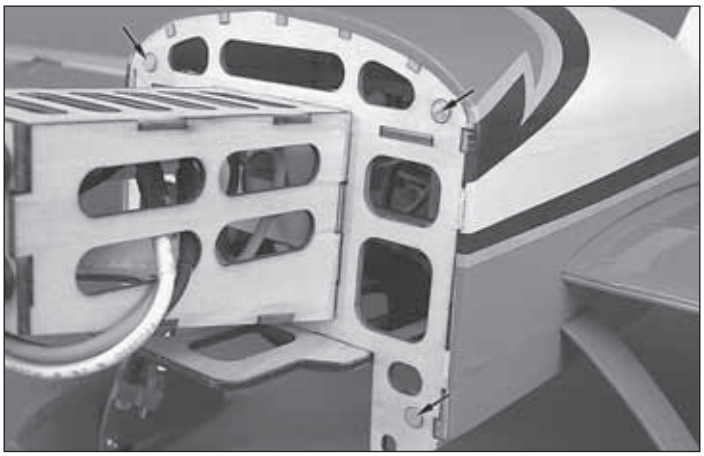
INSTALL THE COWL, CANOPY & SPINNER

❏ 1. Prepare the inside of the **cowl** by lightly scuffing it with 220-grit sandpaper. When satisfied, clean the inside with alcohol.



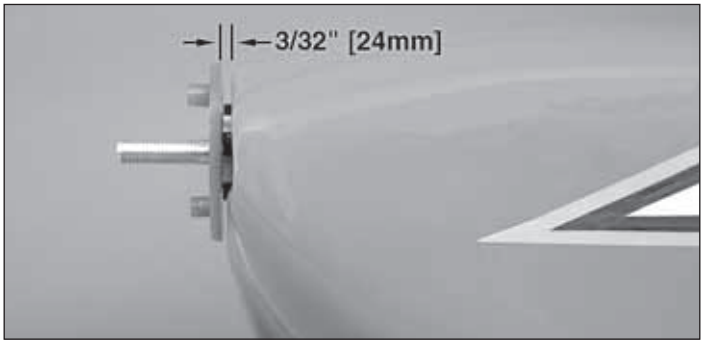


❏ 2. Glue the four plywood **magnet back pieces** to the **cowl ring**. Glue a magnet into each of the four holes in the cowl ring by coating the insides of the holes with medium CA. A light skin coating of thin CA over the magnets that overlaps onto the cowl ring will help secure the magnets in place. Let the CA glue cure without accelerator.



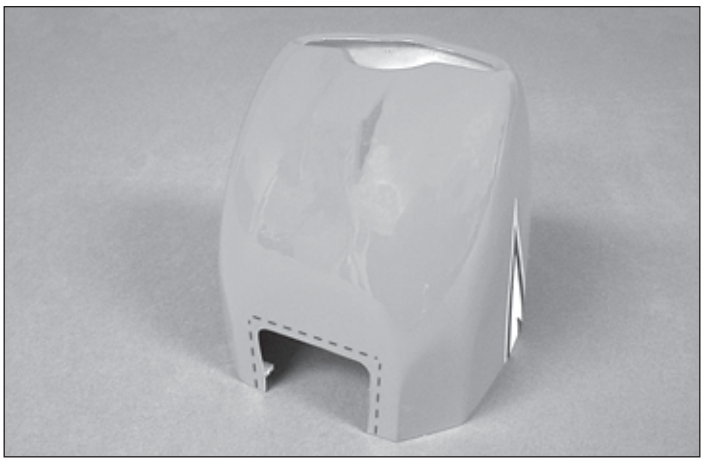
❏ 3. Glue four magnets into the holes in the fuse as shown. **Be sure that the magnets are glued with the correct polarity facing out!** The magnets in the fuse must be attracted to the

magnets in the cowl ring. As you did with the cowl ring, apply a light skin coating of thin CA over the magnets after they have been glued into the fuse. Let the CA cure without accelerator.

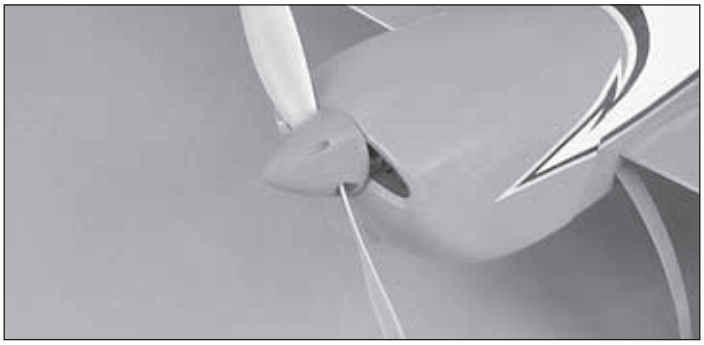


❏ 4. Connect the cowl ring onto the fuse. Slide the cowl over the cowl ring and onto the fuse. Confirm that the spinner backplate properly fits your motor shaft. If not, ream or drill it to the correct diameter. Temporarily install the spinner backplate onto the prop shaft. Adjust the position of the cowl on the fuse so that the colors line up with the covering on the fuse. The spinner backplate should be centered over the front cowl opening, and the backplate should be approximately 3/32" [2.4mm] beyond the front of the cowl. When satisfied, tack glue the cowl to the cowl ring in three or four spots by reaching through the front opening in the cowl. A CA applicator tip is very useful in this step. If you do not have an applicator tip long enough, use a stick to apply a dot of epoxy to each of the four cowl ring corners.

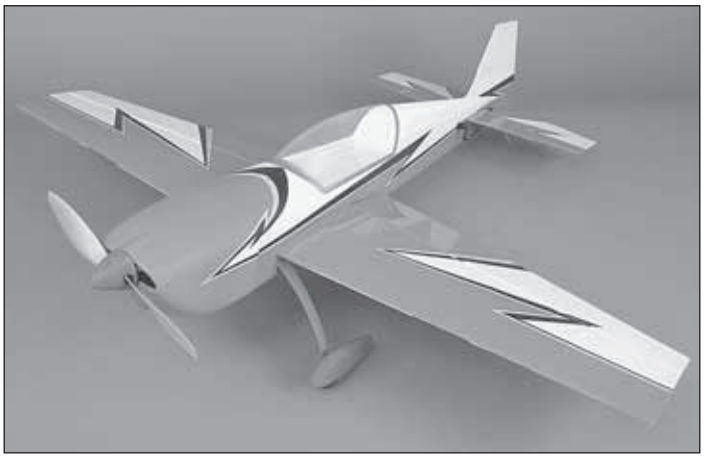
❏ 5. Carefully remove the cowl (and cowl ring) from the fuse and apply a fillet of medium or thick CA glue along the **front** of the cowl ring where it touches the cowl.



❏ 6. Cut a cooling hole out of the underside of the cowl as shown.



❏ 7. Reattach the cowl to the fuse. Install the propeller, prop washer, and prop nut onto the prop shaft. Install the spinner cone using the included spinner screws.



❏ 8. If you plan to install the instrument panel decal, do so now. Finish up the assembly by taping the canopy in position. Clear tape works well for this.

APPLY THE DECALS

1. Use scissors or a sharp hobby knife to cut the decals from the sheet.

2. Be certain the model is clean and free from oily fingerprints and dust. Prepare a dishpan or small bucket with a mixture of liquid dish soap and warm water–about one teaspoon of soap per gallon of water. Submerse the decal in the soap and water and peel off the paper backing. **Note:** Even though the decals have a "sticky-back" and are not the water transfer type, submersing them in soap & water allows accurate positioning and reduces air bubbles underneath.

3. Position decal on the model where desired. Holding the decal down, use a paper towel to wipe most of the water away.

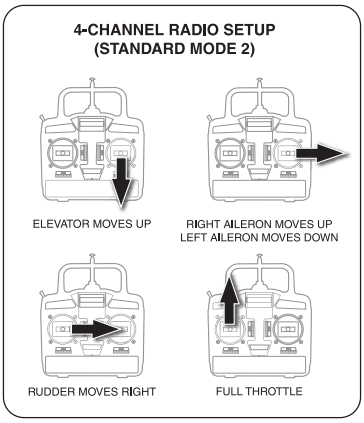
4. Use a piece of soft balsa or something similar to squeegee remaining water from under the decal. Apply the rest of the decals the same way.

GET THE MODEL READY TO FLY

Check the Control Directions

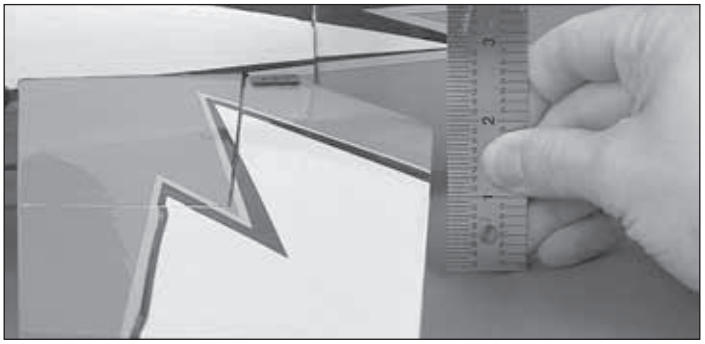
❏ 1. Turn on the transmitter and receiver and center the trims. If necessary, remove the servo arms from the servos and reposition them so they are centered. Reinstall the screws that hold on the servo arms.

❏ 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.



❏ 3. Make certain that the control surfaces and the throttle 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 Great Planes AccuThrow (or a ruler) 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 for your first few flights at the **low rate** setting.

Note: The throws are measured at the **widest part** of the elevators, rudder and ailerons.

These are the recommended control surface throws:

	High Rate	**Low Rate**
ELEVATOR:	5/8" [16mm] up 5/8" [16mm] down	5/16" [8mm] up 5/16" [8mm] down
RUDDER:	2-1/2" [64mm] right 2-1/2" [64mm] left	1-1/4" [32mm] right 1-1/4" [32mm] left
AILERONS:	3/4" [19mm] up 3/4" [19mm] down	7/16" [11mm] up 7/16" [11mm] down
	3D Rates	
ELEVATOR:	1-1/4" [32mm] up 1-1/4" [32mm] down	
RUDDER:	3" [76mm] right 3" [76mm] left	
AILERONS:	1-1/4" [32mm] up 1-1/4" [32mm] down	

IMPORTANT: The Extra 330S EP ARF has been **extensively** flown and tested to arrive at the throws at which it flies best. Flying your model at these throws will provide you with the greatest chance for successful first flights. If, after you have become accustomed to the way the Extra flies, you would like to change the throws to suit your taste, that is fine. However, too much control throw could make the model difficult to control, so remember, "more is not always better."

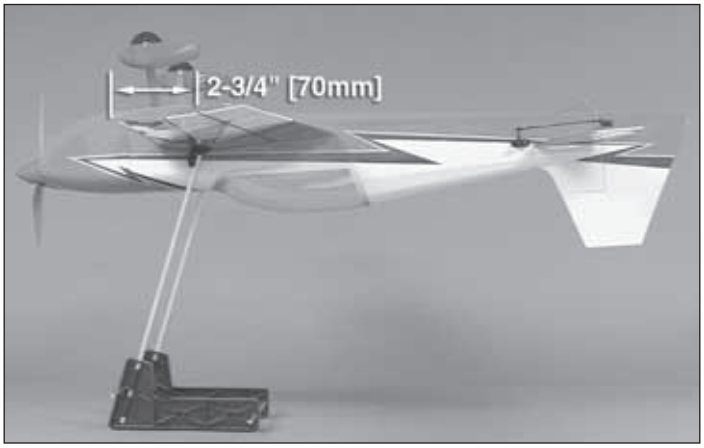
Balance the Model (C.G.)

More than any other factor, the **C.G.** (balance point) can have the **greatest** effect on how a model flies, and may determine whether or not your first flight will be successful. If you value this model and wish to enjoy it for many flights, **DO NOT OVERLOOK THIS IMPORTANT PROCEDURE.** A model that is not properly balanced will be unstable and possibly unflyable.

At this stage the model should be in ready-to-fly condition with all of the systems in place including the motor, landing gear, battery pack, and the radio system.

❏ 1. Use a felt-tip pen or 1/8" [3mm]-wide tape to accurately mark the C.G. on the top of the wing on both sides of the fuse. The C.G. is located 2-3/4" [70mm] back from the LE of the wing at the fuse.

This is where your model should balance for the first flights. Later, you may wish to experiment by shifting the C.G. up to 1/2" [13mm] forward or 3/8" [9.5mm] back to change the flying characteristics. Moving the C.G. forward may improve the smoothness and stability, but the model may then require more speed for takeoff and make it more difficult to slow for landing. Moving the C.G. aft makes the model more maneuverable, but could also cause it to become too difficult to control. In any case, **start at the recommended balance point** and do not at any time balance the model outside the specified range.



❏ 2. With all parts of the model installed (ready to fly) and the battery pack installed, place the model upside-down on a Great Planes C.G. Machine, or lift it at the balance point you marked.

❏ 3. If the tail drops, the model is "tail heavy" and the battery pack and/or receiver must be shifted to balance. If the nose drops, the model is "nose heavy" and the battery pack and/or receiver must be shifted aft to balance. If possible, move the battery pack and receiver to minimize or eliminate any additional ballast required. An additional aft battery tray is included to help balance the model when nose heavy by moving the battery pack further aft. Epoxy the tray in place as shown if necessary.

❏ 4. **IMPORTANT:** If you found it necessary to move the battery pack or receiver for the Extra to balance, recheck the C.G. after this has been done.

Balance the Model Laterally

❏ 1. With the wing level, have an assistant help you lift the model by the engine propeller shaft and the bottom of the fuse 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.**

PREFLIGHT

Identify Your Model

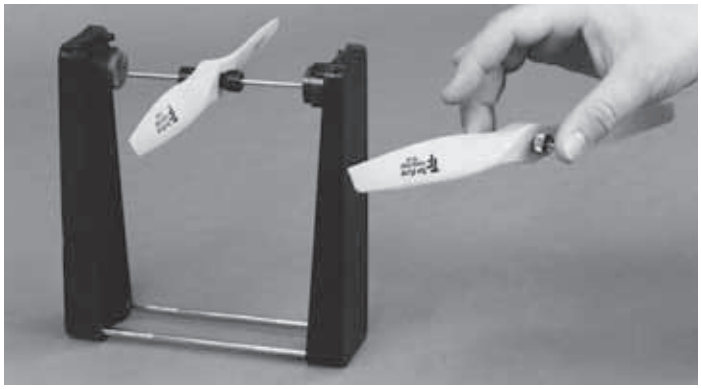
No matter if you fly at an AMA sanctioned R/C club site or if you fly somewhere on your own, you should always have your name, address, telephone number and AMA number on or inside your model. It is **required** at all AMA R/C club flying sites and AMA sanctioned flying events. Fill out the identification tag on page 24 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 transmitter battery 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 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 the 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 only will engine mounting screws and bolts loosen, possibly with disastrous effect, but vibration may also damage your radio receiver and battery. Vibration can also cause your fuel to foam, which will, in turn, cause your engine to run hot or quit.

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.

Range Check

Ground check the operational range of your radio before the first flight of the day. With the transmitter antenna collapsed and the receiver and transmitter on, you should be able to walk at least 100 feet away from the model and still have control. Have an assistant stand by your model and, while you work the controls, tell you what the control surfaces are doing. Repeat this test **with the motor running** at various speeds with an assistant holding the model, using hand signals to show you what is happening. 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 operate 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.

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 C.G. according to the measurements provided in the manual.
❏ 2. Be certain the battery and receiver are securely mounted in the fuse. Simply stuffing them into place with foam rubber is not sufficient.
❏ 3. Extend your receiver.
❏ 4. Balance your model laterally as explained in the instructions.
❏ 5. Add a drop of oil to the axles so the wheels will turn freely.
❏ 6. Make sure all hinges are **securely** glued in place.
❏ 7. Confirm that all controls operate in the correct direction and the throws are set up according to the manual.
❏ 8. Make sure that all servo arms are secured to the servos with the screws included with your radio.
❏ 9. Secure connections between servo wires and Y-connectors or servo extensions, and the connection between your battery pack and the on/off switch with vinyl tape, heat-shrink tubing or special clips suitable for that purpose.
❏ 10. Balance your propeller (and spare propellers).
❏ 11. Tighten the propeller nut and spinner.
❏ 12. Place your name, address, AMA number and telephone number on or inside your model.
❏ 13. If you wish to photograph your model, do so before your first flight.
❏ 14. Range check your radio when you get to the flying field.

FLYING

The Extra 330S EP ARF is a great-flying model that flies smoothly and predictably. The Extra does not, however, possess the self-recovery characteristics of a primary R/C trainer and should be flown only by experienced R/C pilots.

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

If you have access to a smooth, paved runway, we suggest using it to takeoff, especially for the first few flights. Position the Extra 330S EP ARF onto the runway pointed into the wind. Slowly advance the throttle stick to half throttle, leaving the elevator in the neutral position. As the tail rises off the ground, slowly increase throttle and apply a bit of up elevator to lift the model into the air. As you become accustomed to the takeoff characteristics of the Extra 330S EP ARF, they can be performed quickly only requiring ten to twenty feet of runway until the model is airborne.

If you do not have access to a smooth runway, the Extra 330S EP ARF can be hand launched. For the first flight, it

is a good idea to have someone launch the airplane for you. This allows you to keep your hands on the radio sticks and correct any trim problems that are present.

Have the person launching the Extra 330S EP ARF hold the plane by the fuse just in front of the canopy. Throttle up to full power, and have your helper give the plane a gentle underhanded toss at about 30° angle upward into the wind. The high thrust to weight ratio will allow the plane to accelerate to flying speed almost instantly. Climb to a comfortable altitude and throttle back to a lower power setting.

Flight

For reassurance and to keep an eye on other traffic, it is a good idea to have an assistant on the flight line with you. Tell him to remind you to throttle back once the plane gets to a comfortable altitude. While full throttle is usually desirable for takeoff, most models fly more smoothly at reduced speeds.

Take it easy with the Extra 330S EP ARF for the first few flights, gradually getting acquainted with it as you gain confidence. Adjust the trims to maintain straight and level flight. After flying around for a while, and while still at a safe altitude with plenty of battery charge, practice slow flight and execute practice landing approaches by reducing the throttle to see how the model handles at slower speeds. Add power to see how she climbs as well. Continue to fly around, executing various maneuvers and making mental notes (or having your assistant write them down) of what trim or C.G. changes may be required to fine tune the model so it flies the way you like. Mind your fuel level, but use this first flight to become familiar with your model before landing.

Landing

To initiate a landing approach, lower the throttle while on the downwind leg. Allow the nose of the model to pitch downward to gradually bleed off altitude. Continue to lose altitude, but maintain airspeed by keeping the nose down as you turn onto the crosswind leg. Make your final turn toward the runway (into the wind) keeping the nose down to maintain airspeed and control. Level the attitude when the model reaches the runway threshold, modulating the throttle as necessary to maintain your glide path and airspeed. If you are going to overshoot, smoothly advance the throttle (always ready on the right rudder to counteract torque) and climb out to make another attempt. When you're ready to make your landing flare and the model is a foot or so off the deck, smoothly increase up elevator until it gently touches down. Once the model is on the runway and has lost flying speed, hold up elevator to place the tail on the ground, regaining tail wheel control.

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. For example, if you're going to do a loop, check your altitude, mind the wind direction (anticipating rudder corrections that will be required to maintain heading), remember to throttle back at the top, and make certain you are on the desired rates (high/low rates). 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

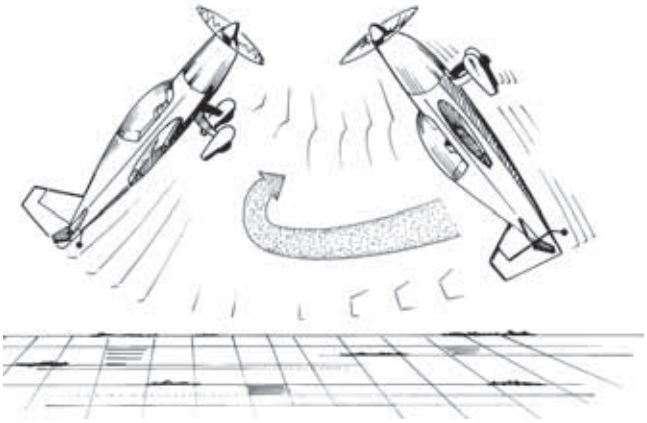
Make a copy of this identification tag and put it on or inside your model.

3D FLYING

Because of the power-to-weight ratio on 3D planes, straight and level flight should be at a reduced throttle and **full power should only be used when the airplane is "loaded" during a maneuver**. Avoid extended full throttle downlines. Learn to manage the throttle and experiment while in the maneuver. The power needed will depend on the maneuver being performed. C.G. also plays a large role in the 3D capability of models as well. Experiment, but keep in mind that being tail heavy is not always the best way to go.

Another thing to remember is maximum control throw is not necessary for all 3D maneuvers. Occasionally, too much throw can place the model too far into a stall, causing it to become uncontrollable. Practice your maneuvers at a higher altitude while you become accustomed to your particular plane's stall characteristics.

WATERFALLS



With the model pointing straight up (almost in a hover), push full down elevator and full throttle. As the model rotates and begins to point downwards, reduce the throttle (to keep the model from being pulled downwards). As the model flattens out, add power back in to pull the model around. Most models will require rudder correction (usually right rudder) during this maneuver. Some planes will require aileron correction to keep the wings level.

UPRIGHT FLAT SPINS

Pull the nose up slightly and slowly decrease power. As the model slows down to a few mph, slowly add in full left rudder and power. Next, start adding in up elevator as needed to keep the model flat in the spin. Most airplanes will require some aileron as well to keep the wings level. This is one of the maneuvers to experiment on; try different C.G. positions and different amounts of throw and power to see how flat the spin will go. It is possible to maintain altitude in the flat spin and in some cases it is also possible to climb during the spin.

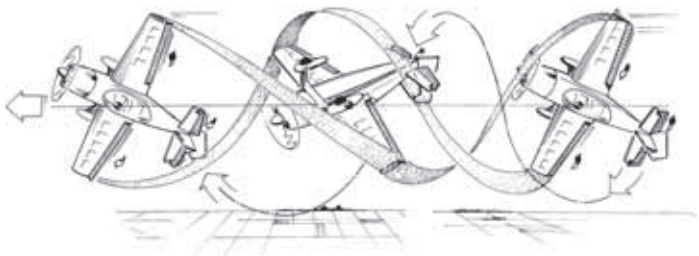
INVERTED FLAT SPINS

This is the same as the up-right flat spin except most planes like to spin in the opposite direction, for example: right rudder and down elevator.

THE WALL

Fly straight across the field at a moderate speed and simply pull full up until vertical. Adjust the power as necessary to maintain a hover.

KNIFE EDGE TUMBLE



This is an impressive looking maneuver that really isn't as difficult as it looks. (Before learning this maneuver you must be able to confidently Snap and Tumble your plane and stop the aircraft exactly, without over rotating.) Fly the model Knife Edge from the right at a moderate airspeed, using just enough rudder to maintain Knife Edge, not climbing or diving. Perform one full right negative Tumble by maintaining your rudder setting while applying full throttle, full down elevator, and full right aileron, releasing in time to end again flying Knife Edge to the right. Note that you may need to use some positive elevator and/or left aileron to stop the Tumble at exactly Knife Edge. This maneuver is easier to the right because torque helps stop the Tumble and it can be done at varied airspeeds with proper throttle and rudder modulation.

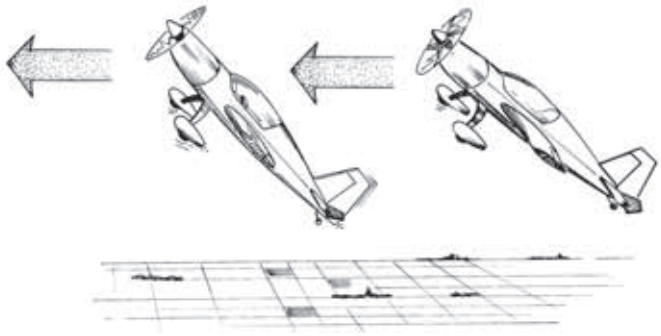
VERTICAL HOVER

Fly a straight pass across the field at 75ft high and 100ft out and pull the model vertical. Roll the model until the top of it is facing you and slowly begin to reduce power. As the model begins to slow down to 10mph or so, slowly add a little bit of power back in. You will have to adjust the throttle as needed, but make your adjustments smooth. Some right aileron may be needed to keep the model from torque rolling. Use the rudder and elevator to keep the nose pointing straight up. Be patient as this maneuver will take a while to learn.

TORQUE ROLL

This is the same as the vertical hover but without the use of right aileron to keep the model from rolling. If needed, you can use a little left aileron to speed the roll up. As the model rotates around, the controls will appear to be reversed to you but only the orientation of the model has changed.

HARRIER



The harrier is nothing more than a high angle of attack flying stall. Check the stall characteristics of your plane before proceeding with this maneuver. Bring your plane across the field at 75ft high and 100ft out away from yourself. Slowly pull back on the elevator while reducing throttle. The nose of the plane should come up. Depending on the plane/setup, you may have to make constant aileron (wing walking) and rudder corrections for this maneuver. As the nose of the plane comes up, start adding in a little bit of power to help maintain airspeed. The rudder is now used to turn the model. This maneuver will take some practice as there are a lot of small corrections made to keep most planes in the maneuver.

This is one maneuver where less control is needed. Too much elevator and the model goes into an uncontrollable stall. The C.G. of the plane will have a large effect on the stability of the model during this maneuver. Some planes

perform better with more elevator deflection and a farther forward C.G. while other planes prefer a further aft C.G. and less elevator deflection. Elevator to flap mixing can be used on airplanes with marginal wing area, and some planes won't stall so elevator to spolieron mixing will be needed.

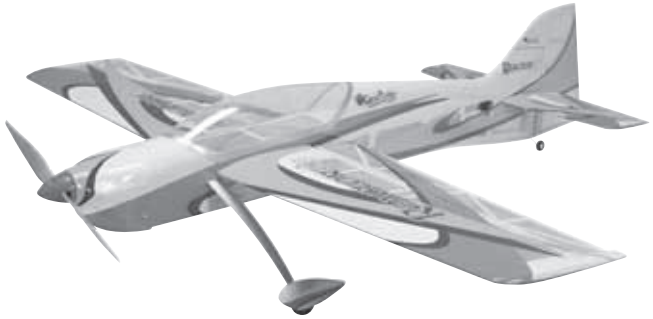
ROLLING HARRIER

Once you get comfortable with the up-right harrier, it's time to work rolls into the mix. From an up-right harrier, add in left aileron and change from up elevator to down elevator when inverted. If you are comfortable with four point rolls and slow rolls, inputting rudder on the knife edges can improve the maneuver considerably. To turn the model, simply input the elevator or rudder a little sooner or later in the rotation. It's all a matter of timing.

PINWHEEL

Climb vertically and bring the model to a vertical hover, but do not stop long enough to let the torque pull the model around (climbing or sliding slightly will not be noticeable to spectators but will keep air flowing over the ailerons and provide you roll authority to stop the torque). When the model is hanging, rock the plane left with rudder, then apply full throttle and full right rudder and hold both, completing 3/4 of a VERY tight Knife Edge Loop and flying out Knife Edge. When done correctly, the plane pivots around the wing tip in a very small area. This maneuver can be done either direction.

OTHER ITEMS AVAILABLE FROM GREAT PLANES



Great Planes Reactor™ 3D GP/EP ARF
Precision pattern plane – or all-out 3D aerobat? You decide. Glow power – or electric power? Your choice – and the performance is outstanding whichever you choose. Pure, no-compromise sport design is one reason; a mid-wing design and a thin, 9% airfoil are two more. Plus, the light, strong wood airframe that resists 3D stresses is already built and factory-covered, which cuts assembly time to just 5 to 6 hours. **GPMA1021**

ElectriFly Yak 55 EP 3D ARF by Great Planes
- High alpha flight, Parachutes, Blenders, even Walls – there's virtually no limit to the Yak's aerobatic capabilities!
- Sized to fly in a park, sports field – almost anywhere!

You don't need expensive brushless motor systems for 3D electric aerobatics. The Yak's enormous control surfaces and full flying stabilizer offer impressive maneuverability and hovering potential with the powerful, included 280-size brushed motor and 5:1 gearbox. Its low parts count and easy final assembly will have this aerobat flight-ready in just 2 to 3 hours. The durable, lightweight EPS foam airframe features a high-vis, preapplied trim scheme. An included "prop saver" allows the prop to deflect back upon landing, and is compatible with APC or GWS prop hubs. **GPMA1190**

ElectriFly Reactor 3D EP ARF by Great Planes
With its generous wingspan, the Reactor 3D electric ARF is easy to handle and track indoors or out. The wing's ultra-thin airfoil allows radical attitude changes and gentle handling on approach. Oversized ailerons, adjustable pushrods and short, direct linkages combine for crisp, powerful response. The structure is factory-built from interlocking, laser-cut balsa parts, with covering already applied, and the fiberglass cowl and plastic wheel pants are painted to match. Magnetic "latches" on the cowl and battery hatch eliminate the need for screw fasteners and offer clean looks and improved aerodynamics. Unlike most electrics, the Reactor 3D ARF was designed for in-runner or out-runner motors and includes mounts for both. **GPMA1540**

Futaba® S3114 High Torque Micro Servo
Ideal for electric planes and small electric helis, the affordable, analog S3114 delivers plenty of power and performance in a compact package. **FUTM0414**

Great Planes ElectriFly RimFire™ 35-30-1250kV Out-Runner Brushless Motor
For explosive acceleration and maximum torque, nothing is hotter than a RimFire! A lightened aluminum can houses high-torque, "rare-earth" Neodymium magnets, and RimFire motors feature better cooling – which means 50% more power than similar-sized out-runners. Bearings are double-shielded, and because they are no comms or brushes to worry about, RimFire motors are super-dependable and virtually maintenance-free! Motor comes with prop adapter, mount, hardware and preinstalled, gold-plated bullet connectors compatible with all ElectriFly ESCs. **GPMG4595**

Great Planes ElectriFly Ammo™ 24-45-3790kV In-Runner Brushless Motor
Powered by "rare-earth" Neodymium magnets, Ammo motors boast exceptionally high torque and unmatched heat resistance. Up to 89% efficient and virtually maintenance-free, they feature double-shielded bearings, with no brushes to wear out. Gold-plated connectors are preinstalled for simple plug-and-play operation; in fact, not even soldering is required when used with compatible ElectriFly Silver Series brushless ESCs. **GPMG5185**

Great Planes ElectriFly BP 11.1V 2100mAh 15C Balanced LiPo Battery
Enjoy exceptional performance for less money with this balanced LiPo pack! Quality Deans® Ultra™ connectors make this a real value for Sunday fliers. Plus, you get all the benefits of balancing, such as knowing that all cells are fully charged for maximum power, they're conditioned better to last longer, and they're safe to handle*. **GPMP0721**

*Packs must be balanced using a dedicated cell balancer such as the ElectriFly Equinox™ (GPMM3160) or a properly equipped charger.

GREAT PLANES®
MODEL MANUFACTURING COMPANY

BUILDING NOTES

Kit Purchased Date: ______________________________

Where Purchased: ______________________________

Date Construction Started: ______________________________

Date Construction Finished: ______________________________

Finished Weight: ______________________________

Date of First Flight: ______________________________

FLIGHT LOG
