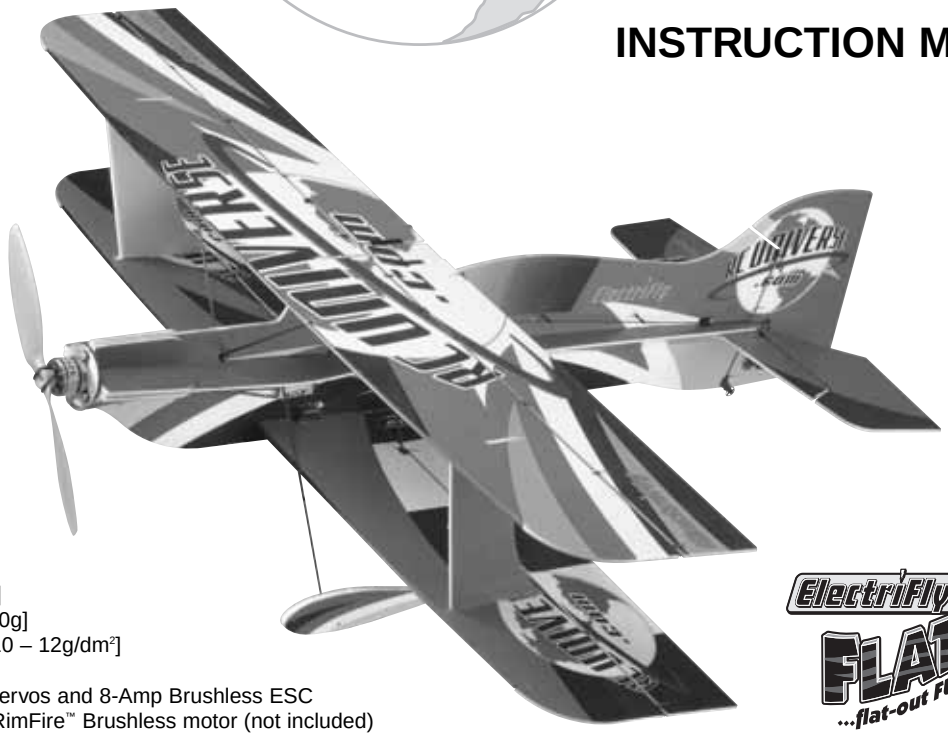
RC UNIVERSE .com ARF

INSTRUCTION MANUAL



Wingspan: 31 in [780 mm]
Wing Area: 420 sq in [27dm²]
Weight: 10 – 12 oz [285 – 340g]
Wing Loading: 3.9 oz/sq ft [10 – 12g/dm²]
Length: 34 in [850 mm]
Radio: 4-channel w/3 micro servos and 8-Amp Brushless ESC
Power System: Direct-drive RimFire™ Brushless motor (not included)

ElectriFly™ By Great Planes®
FLATOUTS
...flat-out FUN electrics!

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 WARNINGS AND INSTRUCTIONS CONCERNING THE ASSEMBLY AND USE OF THIS MODEL.

GREAT PLANES® MODEL MANUFACTURING COMPANY
Champaign, Illinois
(217) 398-8970, Ext 5
airsupport@greatplanes.com

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INTRODUCTION

The ElectriFly™ by Great Planes FlatOuts R/C Universe Bipe is an excellent way to enjoy 3D aerobatics without the cost and headaches of giant-scale gasoline-powered models. Four to six hours on the workbench, and your R/C Universe Bipe will be ready to tackle torque rolls, walls, harriers, high-alpha rolling circles and more! An excellent indoor or calm-day outdoor performer, this airplane is a virtually unlimited 3D aerobat, but flying it involves only connecting the battery, throttling up, and letting go!

Take care to build straight and true. Misaligned parts will hurt the airplane's ability to perform the extreme aerobatics it is designed for.

For the latest technical updates or manual corrections to the FlatOuts R/C Universe Bipe, visit the Great Planes web site at www.greatplanes.com. Open the "Airplanes" link, and then select the FlatOuts R/C Universe Bipe 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.

CAUTION: Be aware that the FlatOuts R/C Universe Bipe is operated on the same frequency band as larger, "regular" R/C models. If flying your R/C Universe Bipe within five miles of an R/C site, there is a real possibility that you could be operating your model on the same frequency (channel) as another R/C pilot. If this happens a crash will result–with the person flying the more expensive model suffering the greater loss (and having greater potential for property damage or injury). The best thing to do is to join an R/C club and fly at the site where frequency control measures will be in effect. If you insist on flying elsewhere, **always be aware of your proximity to R/C flying sites**.

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

Attention: The product you have purchased is powered by a rechargeable battery. At the end of its useful life, under various state and local laws, it may be illegal to dispose of this battery into the municipal waste system. Check with your local solid waste officials for details in your area for recycling options or proper disposal.

This product contains a chemical known to the state of California to cause cancer and birth defects or other reproductive harm.

1. Even though the FlatOuts R/C Universe Bipe is small, lightweight and flies slowly, if it is not assembled and operated correctly it could possibly cause injury to yourself or spectators and damage property.

2. Build the plane **according to the instructions**. Do not alter or modify the model, as doing so may result in an unsafe or unflyable model.

3. Use an R/C radio system and components that are in first-class condition. The FlatOuts R/C Universe Bipe requires specialized radio gear. Refer to ***"DECISIONS YOU MUST MAKE"*** to get an accurate description of the specialized gear required.

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

5. You must test 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 connectors often and replace them if they show signs of wear or fatigue.

Note: We, as the kit manufacturer, provide you with a top quality kit and great 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 directions to end up with a well-built model that is straight and true.

If you're not already an **AMA** (Academy of Model Aeronautics) member, we highly recommend that you join. In addition to providing liability protection while operating under the AMA Safety Code, the AMA is the governing body of model aeronautics in the United States and fights for your rights as member of the modeling community. You must also be an AMA member to fly at R/C clubs chartered by the AMA–most of which are. Contact the AMA at the address or toll-free phone number below.

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

LITHIUM BATTERY HANDLING & USAGE

WARNING!! 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 charger's output volts to match battery volts.
- ALWAYS charge in a fireproof location.
- NEVER trickle charge.
- NEVER allow the battery temperature to exceed 50°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

In the hands of a capable pilot, the FlatOuts R/C Universe Bipe is an impressive 3D performer. But for the R/C Universe Bipe to perform to its full potential, it must be properly equipped with all the right gear (servos, batteries, receiver, speed control). There may be more than one type and brand of radio equipment that can be used, but based on extensive testing, following is the equipment we recommend so you can get the most performance out of your R/C Universe Bipe and assemble it as shown in this instruction manual.

Motor

The FlatOuts R/C Universe Bipe performs extremely well with the Great Planes RimFire™ 22M-1000 Brushless Motor (GPMG4500) and it is the recommended motor for this airplane. This manual covers the installation of the RimFire motor and the plywood firewall included is designed specifically for use with the RimFire. Other motors can be used, however modification may be required for installation.

Transmitter

With a standard, four-channel radio, the FlatOuts R/C Universe Bipe is capable of all the basic 3D maneuvers. However, some advanced pilots who are already familiar with handling "flat foamies" may prefer to fly this FlatOuts with a computer radio capable of endpoint adjustments (for fine-tuning control throws), exponentials (for "softening" the throws near the center of the travel), and various mixing functions (such as rudder-to-elevator mixing for extended knife-edge flight).

Servos

The FlatOuts R/C Universe Bipe requires three *micro* servos with a maximum weight of 9g [.3 oz] each and a minimum torque rating of 15 oz-in. Futaba® S3108 servos

(FUTM0042) are ideal because they meet the torque and weight requirements. Although there may be other servos that will physically fit in the model, those outside the recommended weight and torque specifications will adversely affect flight performance and are not recommended. **Note:** During assembly when it's time to mount the servos, you will be instructed to glue them in. Do not be alarmed as this is a common practice with this type of lightweight, high-performance model. Should servo removal ever be necessary for repair, replacement or transfer to another model, this can be done by prying them out with a hobby knife or a small screwdriver.

Receiver

A light, four-channel receiver is recommended and must be compatible with whatever servos will be used (not all servos are compatible with all receivers–even servos and receivers within the same brand). The Futaba R-114F *Micro* receiver is recommended and is compatible with the S3108 servos recommended. **Note:** Futaba receivers are sold on high and low bands and come without crystals. Following are the order numbers for the R-114F receiver and compatible crystals:

	Low Band (Channels 11-35)	**High Band (Channels 36-60)**
R124F Receiver	FUTL0438	FUTL0439
Crystal	FUTL62**	FUTL63**

Replace the "" in the order number for the crystals with the preferred channel number. For example, if you want to fly on channel 33, order a low band receiver and crystal number FUTL6233.

Battery

The FlatOuts R/C Universe Bipe requires a 3-cell (11.1V), 350–700mAh lithium-polymer (LiPo) battery capable of providing 7A continuous discharge current. The ElectriFly 3-cell, *3-Series* 640mAh battery pack is recommended (GPMP0805). **Note:** The ElectriFly 720mAh battery is not recommended for this model as it is not capable of delivering the current required by this system. For optimum performance, battery weight should not exceed 54g [2 oz.].

Speed Control

An electronic speed control capable of handling a minimum of 8A continuous current is required. Additionally, the speed control should be as light as possible. The ElectriFly BL-8 Micro Brushless ESC w/BEC (GPMM2070) or the Electrifly Silver Series 8A Brushless ESC w/BEC (GPMM1800) are suitable. **NEVER use speed controllers intended for brushed motors on brushless motors.**

Charger

A charger capable of charging 3-cell (11.1V) LiPo batteries such as the ElectriFly PolyCharge 1 to 3-cell LiPo charger (GPMM3010) must be used. If using another charger, it **must** be a LiPo charger or have a LiPo charge mode. Never charge LiPo batteries with chargers not intended for LiPo batteries or chargers on NiMH or NiCd settings. Overcharging or explosion may result. In addition to the PolyCharge, the ElectriFly Triton™ (GPMM3150) or Accu-Cycle Elite™ (HCAP0280) are also suitable chargers.

Battery Charging Leads

Many chargers (including the Triton and Accu-Cycle Elite listed above) do not include charging leads, but rather have banana jacks to plug the leads into. If this is the case with your charger, you will need to purchase a charge lead to match your battery. For the recommended 640mAh pack, the correct lead is GPMM3105.

Propeller Selection

The Great Planes 9x3.5S (GPMQ6625) propeller offers very good performance with the Great Planes RimFire motor system. A Great Planes 10x3.5 (GPMQ6655) propeller will also offer good performance.

Glue

Though there may be a few different types of adhesives that the FlatOuts R/C Universe Bipe could be assembled with, we have had the best success with and exclusively recommend, foam-safe CA such as Great Planes 1 oz. thick, foam-safe CA (GPMR6072). Thin, foam-safe CA such as Hot Stuff UFO thin CA (HOTR1040) is also used in the construction of this model. Regular CA is not recommended as it will aggressively attack the foam used in this model. In addition to being foam-compatible, foam-safe CA is also suitable for gluing together all of the rest of the materials (balsa, carbon) included in this kit. No other adhesive is required to build the FlatOuts R/C Universe Bipe.

ADDITIONAL ITEMS REQUIRED

Adhesives & Building Supplies

In addition to common household tools and hobby tools, this is the "short list" of the most important items required to build the FlatOuts R/C Universe Bipe:

- ❏ Great Planes Aerosol Activator (GPMR6034)
- ❏ Hobbico® CA Applicator tips (HCAR3780)
- ❏ Hobby knife with #11 blade (HCAR0100)

- ❏ #11 blades (5-pack – HCAR0211)
- ❏ 1-meter metric ruler (for identifying tubes and rods)
- ❏ 5-1/2" [140 mm] Easy-Touch™ bar sander (GPMR6169) with 220-grit sandpaper (GPMR6185)
- ❏ Drill bits: 1/16" [1.5 mm], 3/32" [2.5 mm]
- ❏ Double-sided foam tape (GPMQ4400)
- ❏ Stick-on weight (GPMQ4485)
- ❏ Great Planes Plan Protector™ (GPMR6167) or wax paper

ORDERING REPLACEMENT PARTS

Replacement parts for the Great Planes FlatOuts R/C Universe Bipe 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. If a hobby shop is not available, replacement parts may also be ordered from Tower Hobbies® at **www.towerhobbies.com**, or by calling toll free (800) 637-6050.

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 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

Order Number	Description	How to Purchase
	Missing pieces	Contact Product Support
	Instruction manual	Contact Product Support
	Full-size plans	Not available
GPMQ6625	9x3.5S Propeller	Contact Hobby Supplier
GPMQ4618	Prop Saver O-ring	Contact Hobby Supplier
GPMQ4620	Prop Saver	Contact Hobby Supplier

COMMON ABBREVIATIONS

Fuse = Fuselage
Stab = Horizontal Stabilizer
Fin = Vertical Fin
LE = Leading Edge
TE = Trailing Edge
LG = Landing Gear
Ply = Plywood
" = Inches
mm = Millimeters
SHCS = Socket Head Cap Screw

METRIC CONVERSIONS

1" = 25.4 mm (conversion factor)

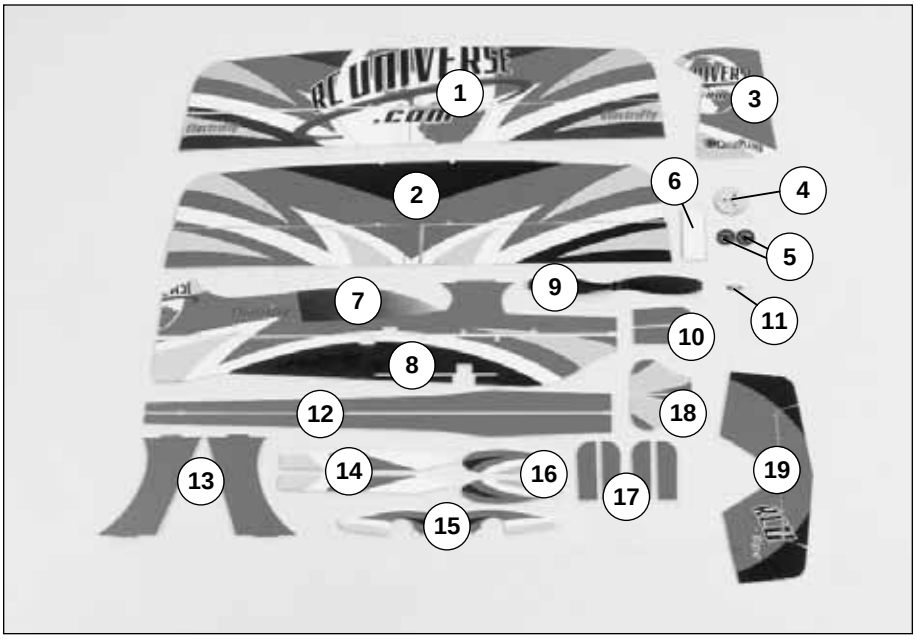
1/64"	=	.4 mm	3/4"	=	19.0 mm
1/32"	=	.8 mm	1"	=	25.4 mm
1/16"	=	1.6 mm	2"	=	50.8 mm
3/32"	=	2.4 mm	3"	=	76.2 mm
1/8"	=	3.2 mm	6"	=	152.4 mm
5/32"	=	4.0 mm	12"	=	304.8 mm
3/16"	=	4.8 mm	18"	=	457.2 mm
1/4"	=	6.4 mm	21"	=	533.4 mm
3/8"	=	9.5 mm	24"	=	609.6 mm
1/2"	=	12.7 mm	30"	=	762.0 mm
5/8"	=	15.9 mm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

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. Top Wing & Ailerons
2. Bottom Wing & Ailerons
3. Rudder
4. Plywood Firewall
5. Main Wheels
6. Hook and Loop Material
7. Upper Vertical Fuselage Half
8. Lower Vertical Fuselage Half
9. Propeller
10. Small Vertical Nose Doublers (2)
11. Prop Saver
12. Horizontal Fuselage Halves (L&R)
13. Interplane Struts (L&R)
14. Fuselage Braces (L&R)
15. Inner Wheel Pants (L&R)
16. Outer Wheel Pants (L&R)
17. Horizontal Nose Doublers (4)
18. Large Vertical Nose Doublers (2)
19. Horizontal Stabilizer w/Elevators

Kit Contents (Not Photographed)

Plastic Tree Parts
A1 Z-Bend Clevis (10)
A2 Offset Z-Bend Clevis (4)
B1 Stand-Alone Control Horn (5)
B2 Stand-Alone Control Horn Retainer (5)
C1 Clip Hinge Control Horn (5)
C2 Clip Hinge (26)
C3 Hinge Retainer Ring (10)
C4 Aileron Link Horn (4)
D1 Axle Support (2)
D2 Rod Support (12)
D4 Tailwheel Bracket (1)
D5 Tailwheel (1)
D6 Wheel Collar (2)
E1 Control Surface Brace (4)
E2 Fuselage Joiner (3)
E3 Pushrod Support (4)

F1 Wire Clip (4)
F2 Aileron Servo Mounting Tray (1)
F3 Fuselage Servo Mount (2)
F4 Fuselage Aileron Servo Mount (1)
G1 Double-Sided Offset Arm, Size B (2)
G2 Double-Sided Arm, Size B (2)
G3 Single-Sided Arm, Size B (4)
G4 Double-Sided Arm, Size A (2)
G5 Double-Sided Offset Arm, Size A (2)
G6 Single-Sided Arm, Size A (4)
G7 Double-Sided Arm, Size C (2)
G8 Double-Sided Offset Arm, Size C (2)
G9 Single-Aided Arm, Size C (4)

Carbon Rods & Tubes
Fuselage Doubler Tube 5.5 x 295 mm
Elevator Joiner Tube 3 x 216 mm
Rudder Post Tube 3 x 145 mm
Fuselage Main Tube 3 x 684 mm
Leading Edge Tube 3 x 650 mm (2)
Trailing Edge Tube 3 x 370 mm (4)
Landing Gear Rods 2 x 190 mm (2)
Wheel Axles 2 x 17 mm (2)
Rudder Pushrod 1 x 340 mm
Elevator Pushrod 1 x 370 mm
Aileron Pushrod 1 x 80 mm (2)
Aileron Link Pushrod 1 x 165 mm (2)

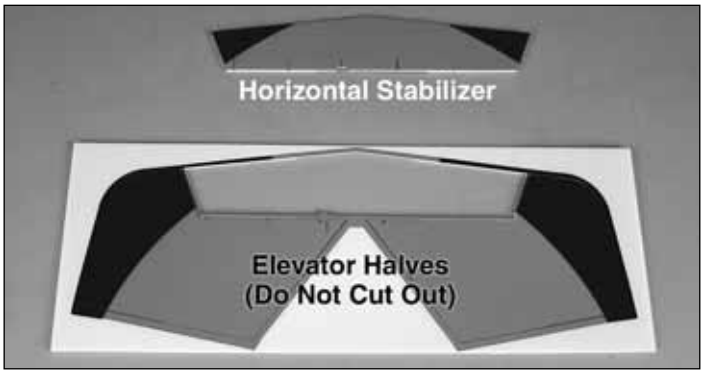
Other Parts
Firewall
O-rings
Top Wing Braces 2 x 115 mm (4)
Bottom Wing Braces 2 x 85 mm (2)

BUILDING INSTRUCTIONS

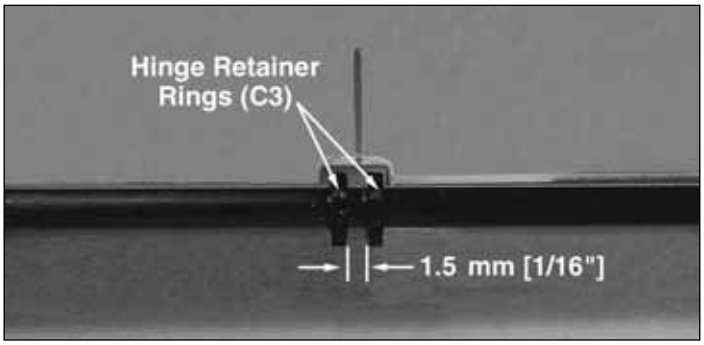
Please note that all of the plastic parts used when building the FlatOuts R/C Universe Bipe are identified by name and part number, for example: ***Z-bend clevis (A1)****. The part numbers are molded next to each part on the parts trees for easy identification.*

The carbon tube diameters referenced throughout this manual may be difficult to measure without calipers. The dimensions provided consist of 1 mm, 2 mm, 3 mm, and 5.5 mm. These four sizes can be identified by comparing all the tubes next to each other. Once the diameters are determined, it is advisable to group the tubes together by size for quick reference.

Assemble the Horizontal Tail



❏ 1. Cut the **horizontal stabilizer** free from the foam sheet using a hobby knife with a sharp #11 blade. **DO NOT** cut the **elevator halves** free at this time.



❏ 2. Without removing the elevator halves from the foam sheet, slide two hinge retainer rings (C3) onto the elevator joiner tube. Align the rings with the cutout in the left elevator half. The ring on the right should be in line with the edge of the cutout and there should be a 1.5 mm [1/16"] gap between the two rings. Secure both rings to the tube with a drop of glue on the outside of the gap.

❏ 3. Using the ***Expert Tip*** that follows, permanently join the elevator halves by gluing in the 3 x 216 mm [1/8" x 8-1/2"] elevator joiner tube.

EXPERT TIP

HOW TO GLUE THE TUBES TO THE CONTROL SURFACES

Note: *You may want to protect your work surface from excess glue. We recommend the use of Great Planes Plan Protector™ (GPMR6167) for this purpose.*

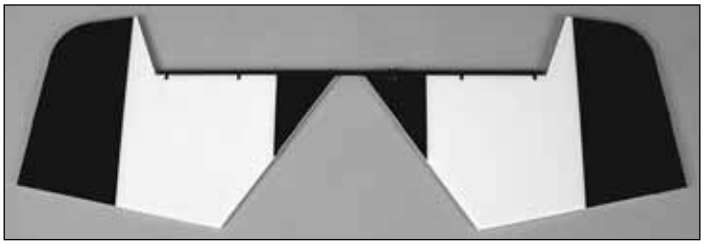
A. *Cut several 40 mm [1-1/2"] pieces of cellophane tape. Fold the last 5 mm [1/4"] over to make a tab for easy removal.*

B. *Lightly coat the leading edges of the elevators with foam-safe CA–do not use an excessive amount.* ***Hint:*** *A CA applicator tip is recommended to accurately control the bead of glue.*

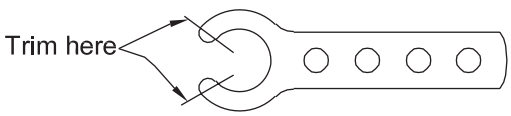
C. *Tape the tube to the leading edge of the elevators. Weight the assembly down on a* ***flat*** *surface to prevent warping and allow the glue to harden without accelerator.*

D. *Once the glue has hardened, remove the tape.*

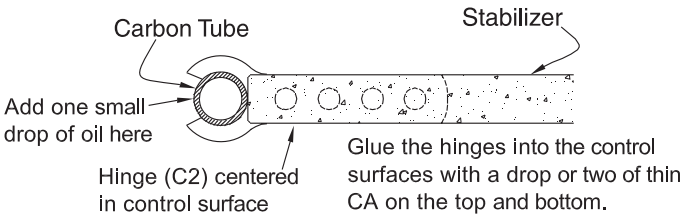
E. *Add a fillet of glue to the bottom of the joiner tube and elevators.*

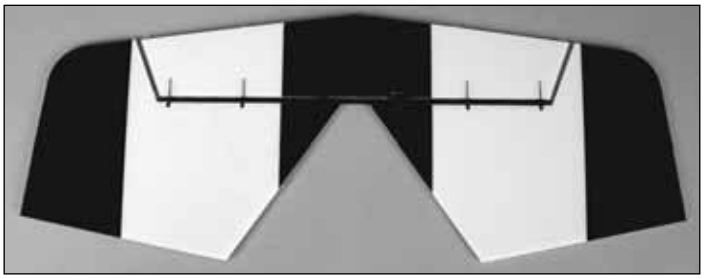


❏ 4. Now the elevator halves may be cut from the sheet.

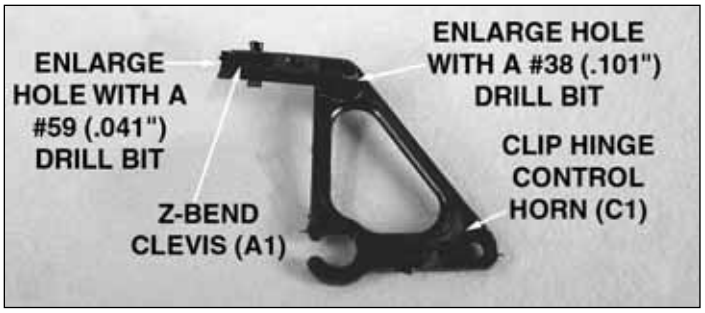


❏ 5. To avoid broken clip hinges (C2) and control horns (C1) during assembly, trim them as shown **before** installing onto the 3mm carbon tubes.





❏ 6. Snap all the clip hinges to the carbon tube already glued to the elevators. Push the hinges into the slots in the stabilizer. Make sure the hinges are centered in the stabilizer. Add a drop of oil to each hinge. Glue the hinges into the stabilizer with a drop or two of foam-safe thin CA (Hot Stuff UFO Thin Foam-Safe 1 oz, HOTR1040) where shown.

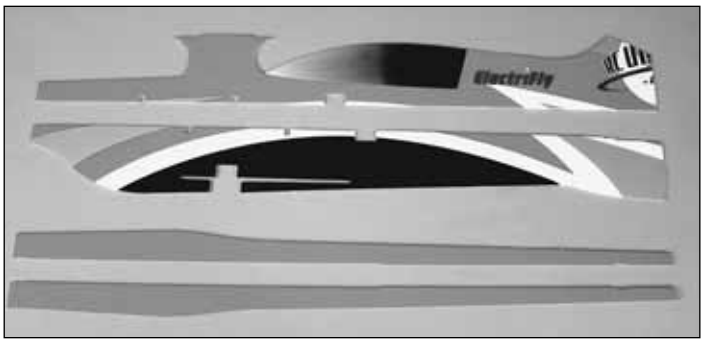


❏ 7. Enlarge the hole in the Z-bend clevis (A1) with a #59 (.041") drill bit. Enlarge the hole in a clip-hinge control horn (C1) with a #38 (.101") drill bit. Insert the Z-bend clevis (A1) into the clip-hinge control horn (C1) as shown.

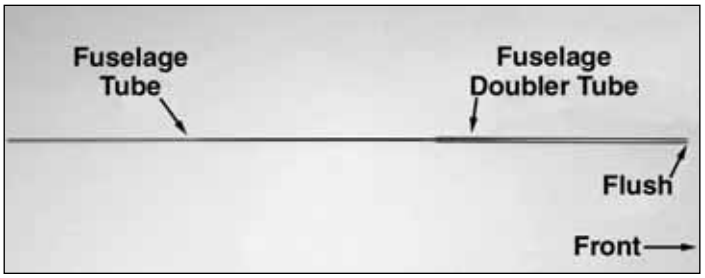
❏ 8. Clip the control horn onto the joiner tube aligned with the precut slot. The control horn must extend above the top of the elevator.

❏ 9. Coat the gluing area on the control horn with thick, foam-safe CA glue and rotate it down into the precut slot.

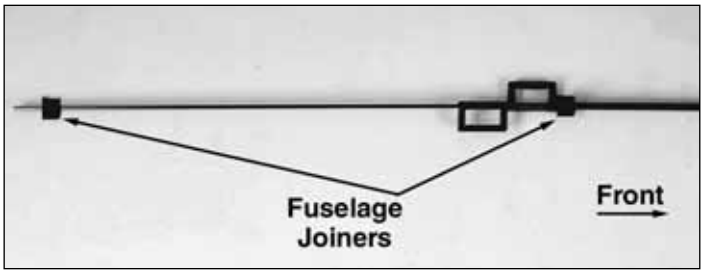
Assemble the Fuselage

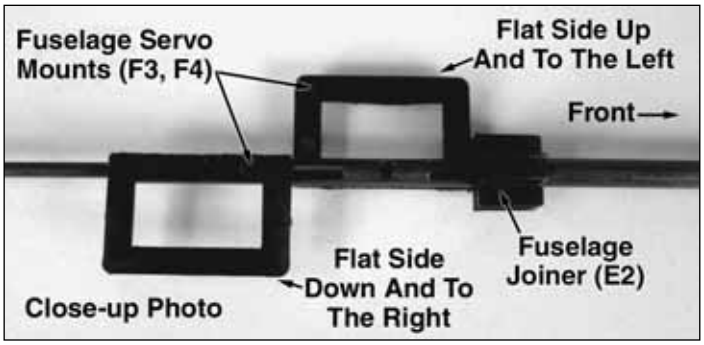


❏ 1. Cut the **upper** and **lower vertical fuselage halves** and the **left** and **right horizontal fuselage halves** free from their foam sheets.



❏ 2. Glue the 3 x 684 mm [1/8" x 26-15/16"] **fuselage tube** into the 5.5 x 295 mm [7/32" x 11-5/8"] **fuselage tube doubler**. One end should be flush. From now on, this assembly will be referred to as the **fuselage tube**.

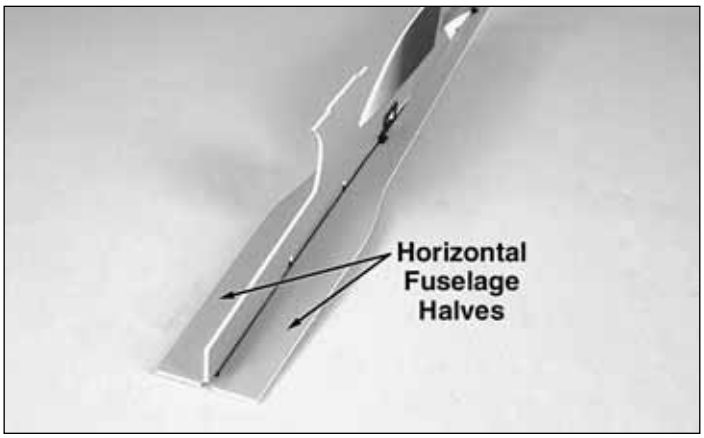




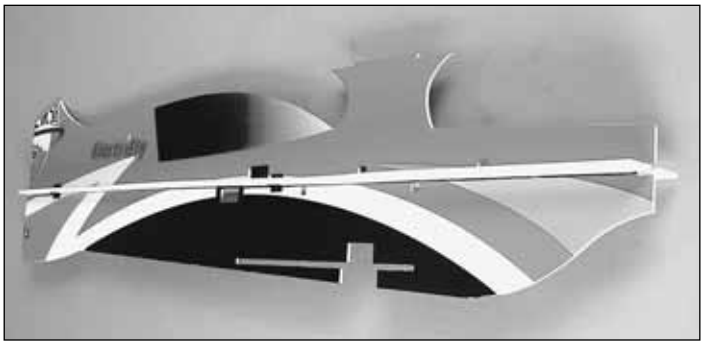
❏ 3. Slide a **fuselage joiner (E2)**, two **fuselage servo mounts (F3, F4)**, (F3 and F4 are the same and are interchangeable), and another fuselage joiner onto the fuselage tube. With the tube doubler forward, the front servo mount should point up with its flat surface on the left, and the rear servo mount should point down with its flat surface on the right.

❏ 4. Position the servo mounts and fuselage joiners so that they align with the precut slots in the upper vertical fuselage half.

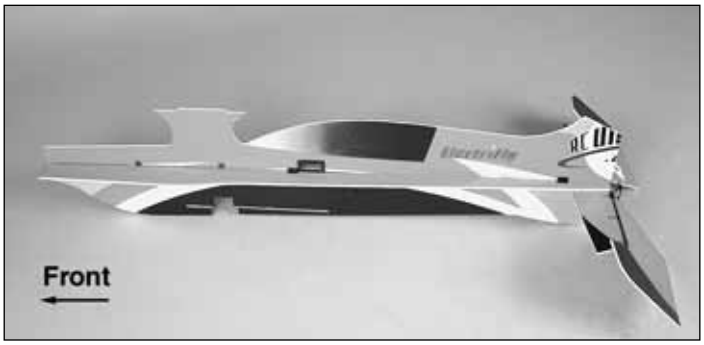
❏ 5. Glue the fuselage tube to the upper vertical fuselage half.



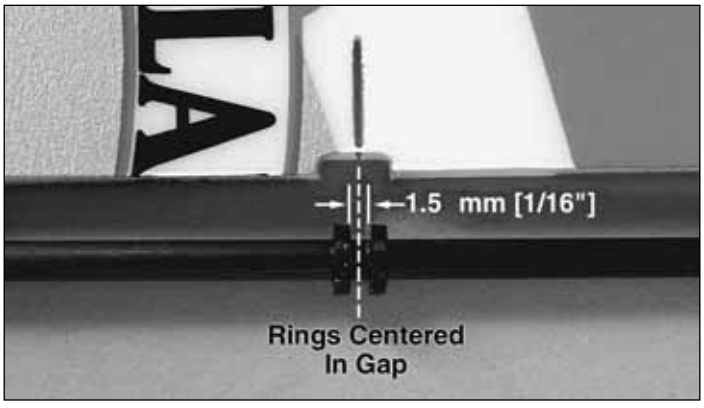
❏ 6. Glue the left and right horizontal fuselage halves to the fuselage tube. Make sure they are perpendicular to the upper vertical fuselage.



❏ 7. Glue the lower vertical fuselage half to the fuselage tube. Make sure to keep it parallel with the upper half and perpendicular to the horizontal fuselage.



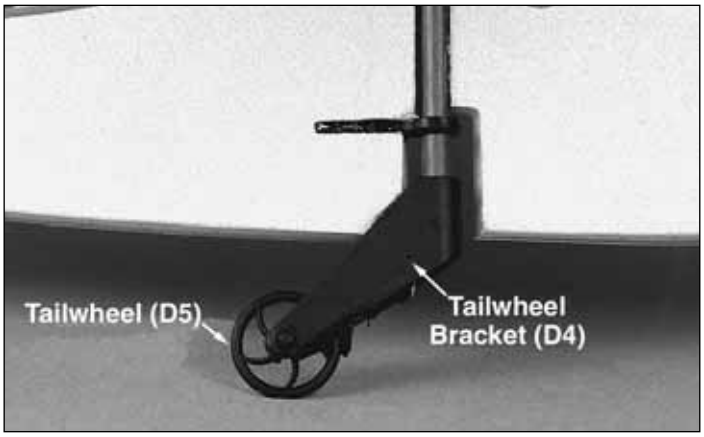
❏ 8. Glue the stabilizer into position as far forward in the stabilizer slot as it will go. Be sure that the stab is centered left to right and is perpendicular to the fuselage.



❏ 9. Slide two **hinge retainer rings (C3)** onto the rudder post tube. Test fit the tube onto the fuselage and center the rings in the gap shown, leaving 1.5 mm [1/16"] between them. When satisfied with the fit, glue the rings to the tube and glue the tube to the fuselage.

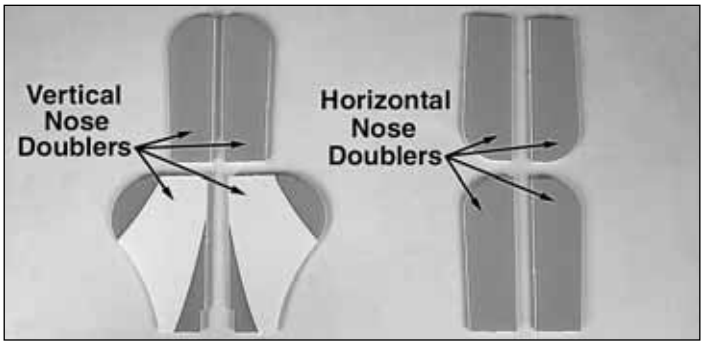
❏ 10. Using the same technique as you did with the horizontal stabilizer, attach four clip hinges into the **rudder** centering them properly at the locations shown in the picture.

❏ 11. Install a Z-bend clevis (A1) into a clip hinge control horn (C1). Clip the control horn on the right side of the rudder between the retainer rings. Snap the rudder onto the rudder tube and glue the control horn and hinges into position. Be sure that the rudder moves freely.

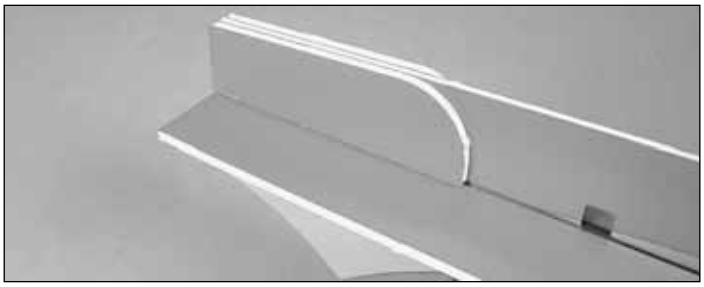


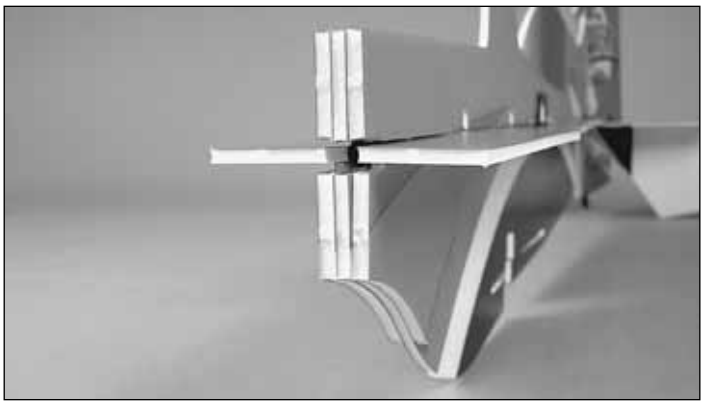
❏ 12. Snap the **tailwheel (D5)** into the **tailwheel bracket (D4)** and slide the tailwheel bracket onto the rudder post tube. Glue this assembly to the rudder. Do not glue the tailwheel bracket to the tube.

Finish the Fuselage

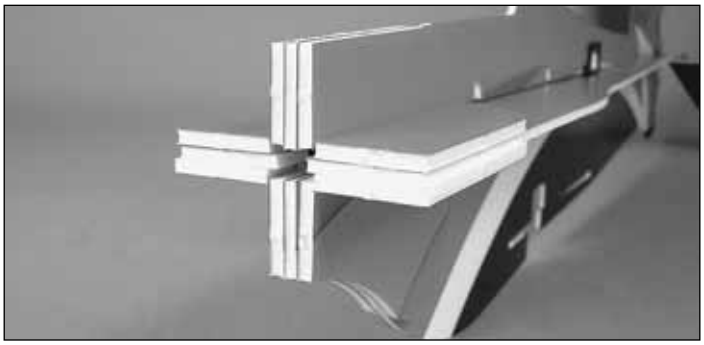


❏ 1. Locate the **horizontal** and **vertical nose doublers** and cut them from the foam sheets. Notice that the smaller vertical nose doublers look the same as the horizontal doublers but have notches in the front.



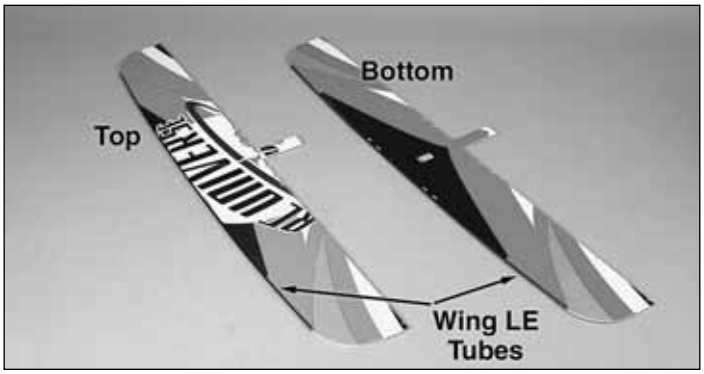


❏ 2. Align the vertical doublers flush with the top and bottom of the fuselage and glue them into position.

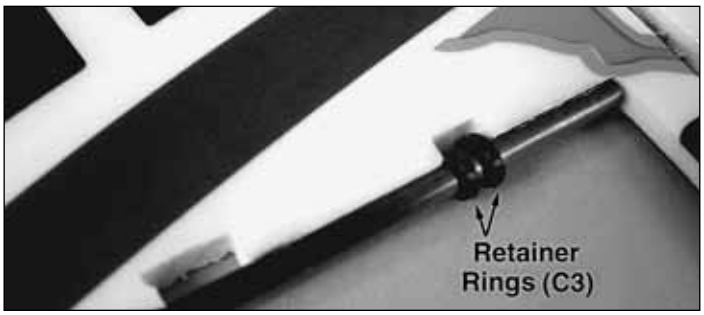


❏ 3. Glue the horizontal doublers to the fuselage as you did with the vertical doublers.

Assemble the Wing

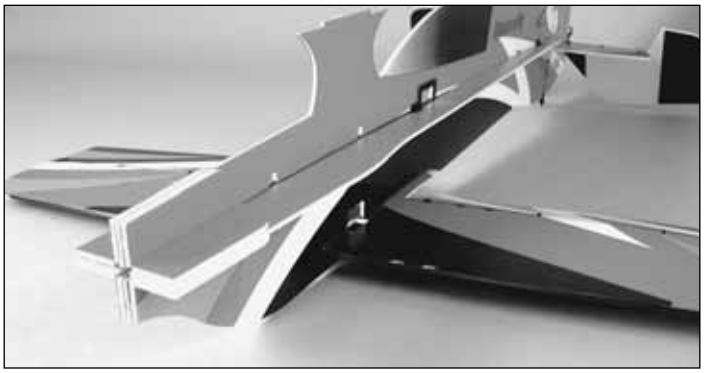


❏ 1. Cut the **wings** and all four **ailerons** free from the foam sheet. Identify the top and bottom wings. The bottom wing has the aileron servo bay. Locate the 3 x 650 mm [1/8" x 25-9/16"] **wing leading edge tubes**. Glue these tubes to both the top and bottom wings.

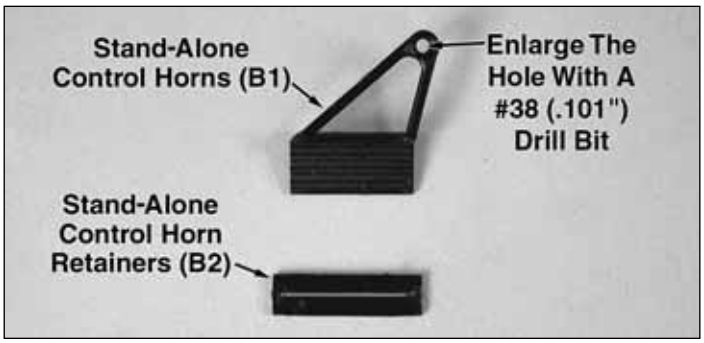


❏ 2. As you did with the rudder and elevators, slide two **hinge retainer rings (C3)** onto each of the four wing trailing edge tubes to be centered in the notches in the wing. Glue the rings to the tubes and glue the tubes to the wings.

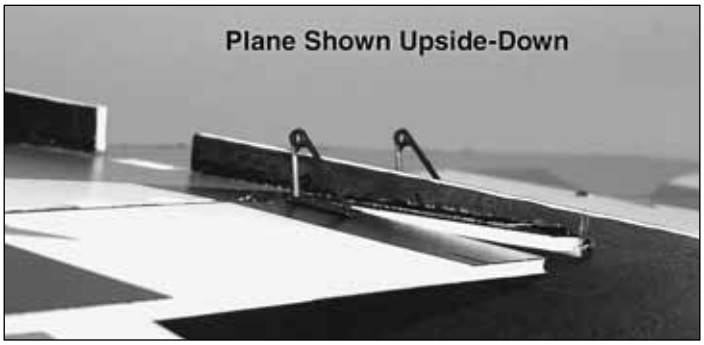
❏ 3. Clip the upper and lower ailerons to the trailing edge tubes with clip hinges (C2) and glue the hinges into place.

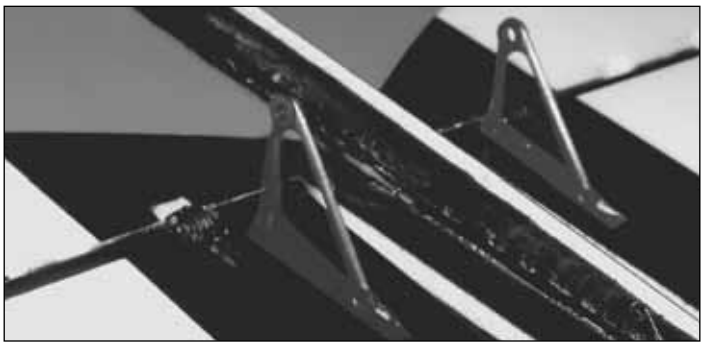


❏ 4. Slide the bottom wing into the cutout in the fuselage and center it laterally and perpendicular to the fuselage. When satisfied with the fit, glue the lower wing to the fuselage by running a bead of glue down each corner where the wing and fuse meet.

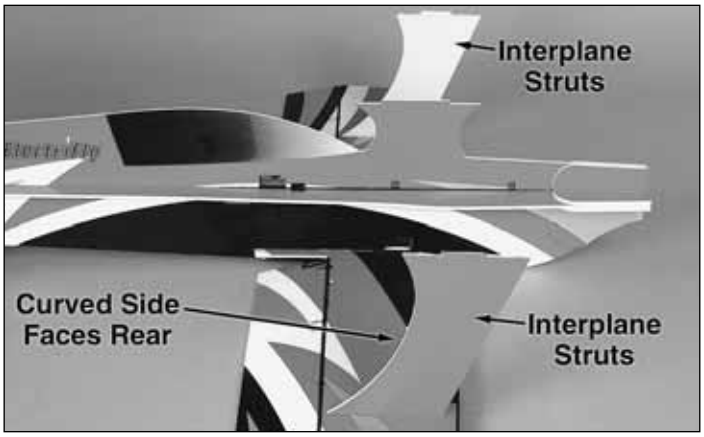


❏ 5. Cut two **stand-alone control horns (B1)** and two **stand-alone control horn retainers (B2)** from the parts tree. Enlarge the holes with a #38 (.101") drill bit.

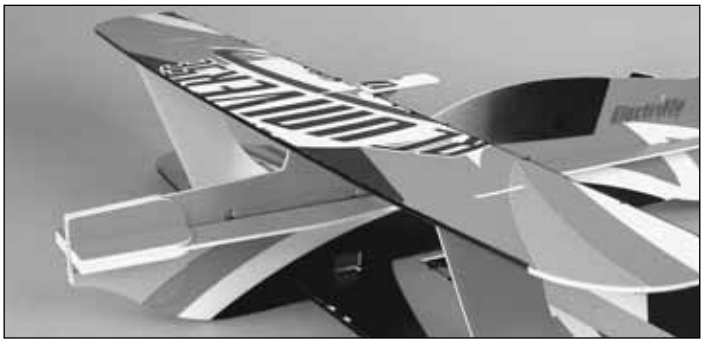




❏ 6. Insert the control horns into the slots in the lower ailerons with the hole in the horn pointing down and positioned over the hinge line. Press the control horn retainers onto the control horns and secure them with a few drops of glue.



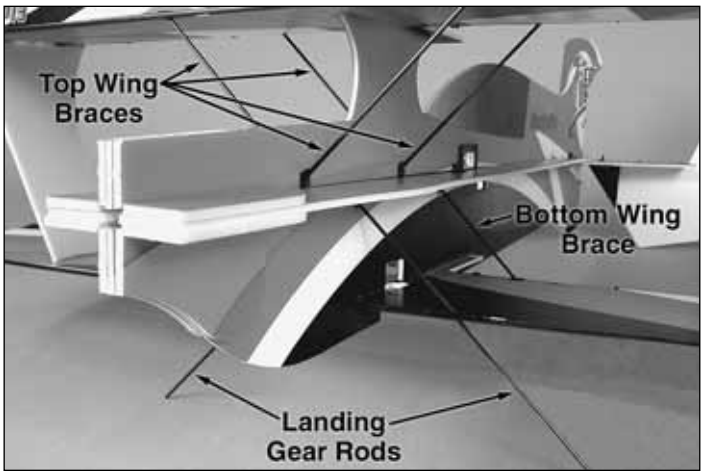
❏ 7. Glue the **interplane struts** into the lower wing. The red sides of the struts points outward. Try to glue the struts so they are 90 degrees to the wing. However, the top wing will align the struts straight when completed.



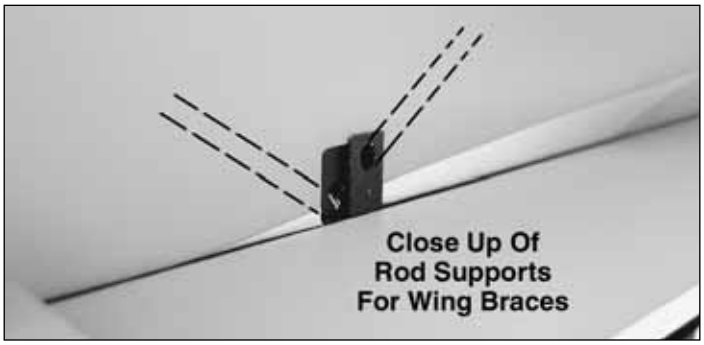
❏ 8. Glue the top wing to the fuselage and wing struts.

Connect the Rod Struts

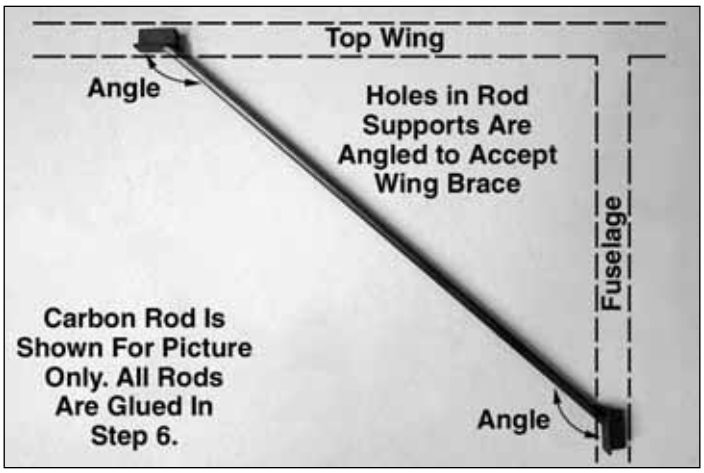
Before gluing any parts in the following steps, it is a good idea to dry fit the supports and braces to be sure they are being installed in the correct orientation. Rather than provide excessive text describing the installation of each brace, simply refer to the picture of the completed wing braces below for their locations on the plane.



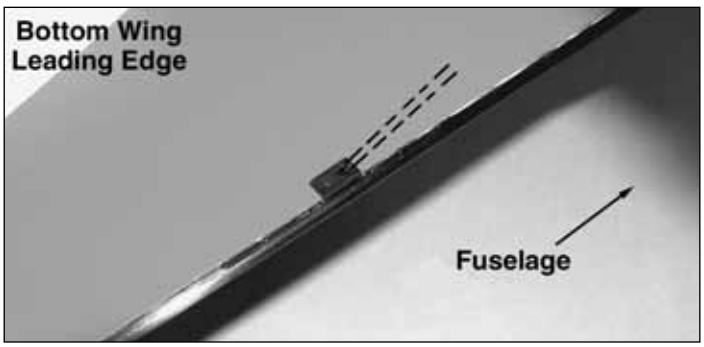
❏ 1. Locate sixteen **rod supports (D2)**, four 2 x 115 mm [5/64" x 4-1/2"] **top wing braces**, two 2 x 85 mm [5/64" x 3-11/32"] **bottom wing braces**, and two 2 x 190 mm [5/64" x 7-1/2"] **landing gear rods**.



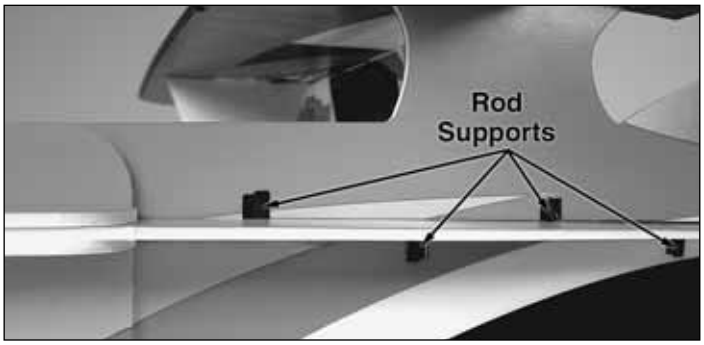
❏ 2. There are four square cutouts in the center of the fuselage between the wings. Each cutout receives two rod supports glued side-by-side and facing opposite directions. It does not matter which rod support is in the forward position.



❏ 3. Make note how the holes in the rod supports are angled. The rod supports must be installed so that these holes are aligned to accept the carbon rods.



❏ 4. The rectangular cutouts at the leading and trailing edges of the wings will only receive one rod support per cutout. Install them into the cutouts.

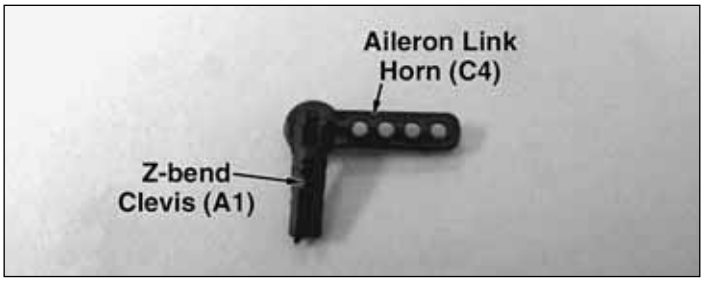


❏ 5. Correctly position the rod supports into the wings and fuselage (test fitting the braces into the supports as needed) and gluing them permanently when satisfied.

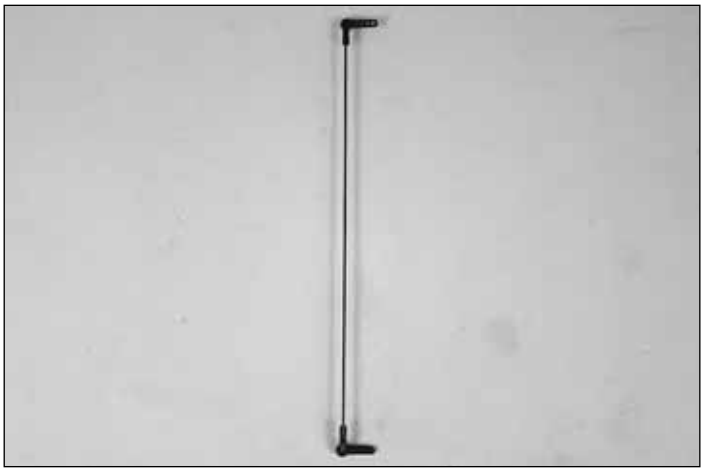
❏ 6. Slide the braces into their respective rod supports based on the completed picture above and center their positions. Glue the braces one end at a time to the rod supports. “Skew” the wing assembly if necessary during this process so that all the rods evenly align and the top and bottom wings are square to the fuselage.

Finish the Wings

❏ 1. Locate four **Z-bend clevises (A1)** and four **aileron link horns (C4)** and cut them from the parts tree.

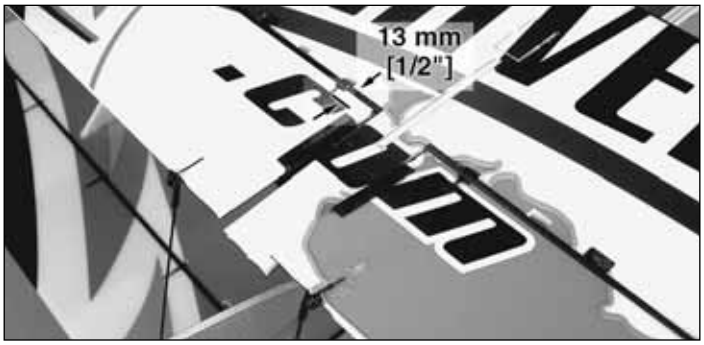


❏ 2. Press the clevises into the aileron link horns (C4) as done in prior steps.

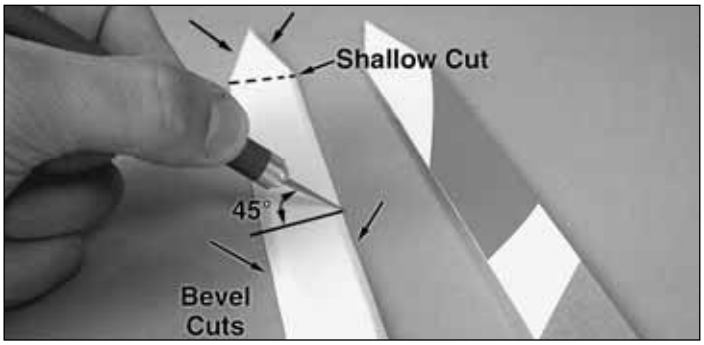


❏ 3. Insert the two 1 x 165 mm [1/32" x 6-1/2"] **aileron joiner pushrods** into the Z-bend clevises connecting the top and bottom ailerons (sanding the ends of the pushrods to a dull point will allow them to slide into the clevises easier). Be sure that the Z-bend clevises are on the same side of the link horns for each set of ailerons.

❏ 4. Position the link horns into the slots at the trailing edges of all four ailerons as shown and glue them into place. Adjust the pushrods in the clevises so that the ailerons are parallel. Add a couple drops of glue to each clevis at the pushrod to secure them into place. Be careful not to glue the clevises to the link horns.



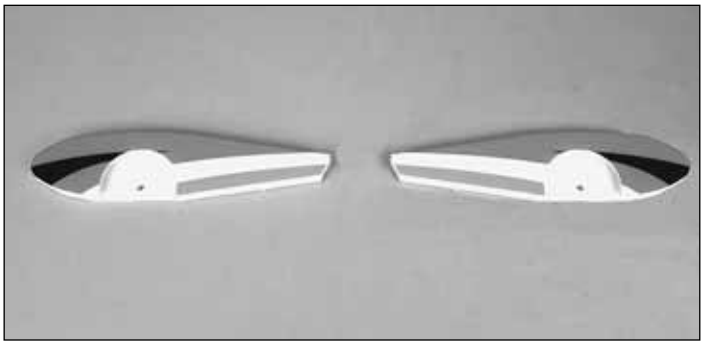
❏ 5. Glue four **control surface braces (E1)** onto the inside of each aileron 13 mm [1/2"] back from the aileron leading edges.



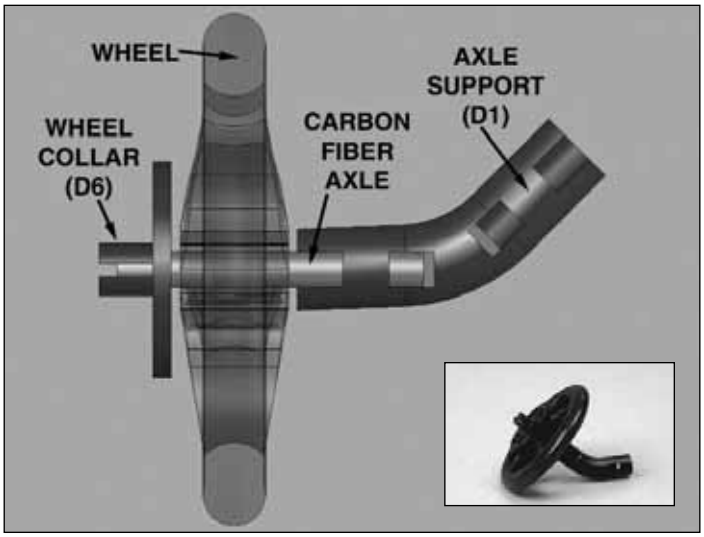
❏ 6. Cut a 45° beveled edge on the sides and tips of the **fuselage braces** with a sharp hobby knife. Make a shallow cut along the line shown in the picture. Do not cut all the way through the foam for this cut.

❏ 7. Align the colored pattern on the fuselage braces with the colors on the fuselage and glue them into position. These braces mount at a 45° angle to the fuselage, matching the bevel cuts you made in the prior step. Bend the triangle shaped tips of the braces inward to glue against the fuselage.

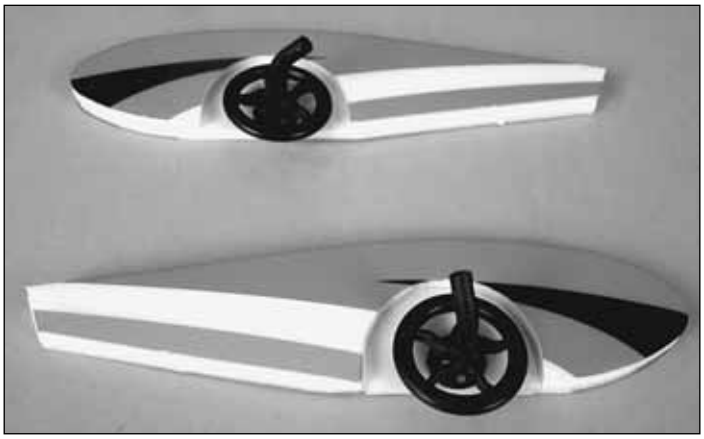
Assemble the Landing Gear



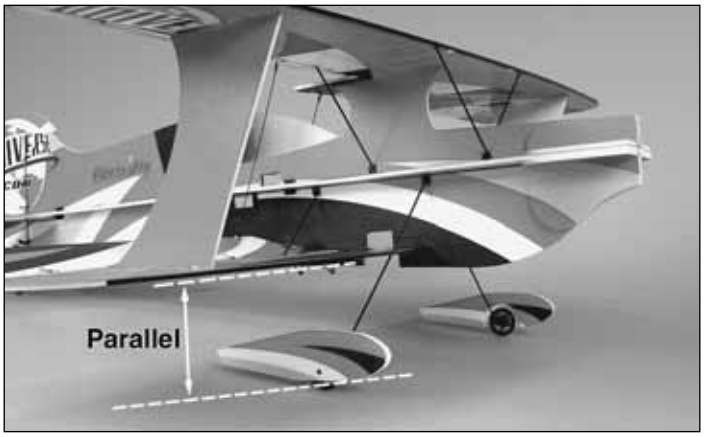
❏ 1. Glue the **inner wheel pants** to the **outer wheel pants**. Be sure to make one left and one right wheel pant.



❏ 2. Assemble the **axle supports (D1)**, axles, wheels, and **wheel collars (D6)** to make two landing gear assemblies. Secure the wheel collar to the axle with a drop of glue, but do not glue the axle to the axle support until later. Be sure that the wheels rotate freely.



❏ 3. Glue the wheel pants to the wheel collars. You do not need to align the position of the axle supports at this time.



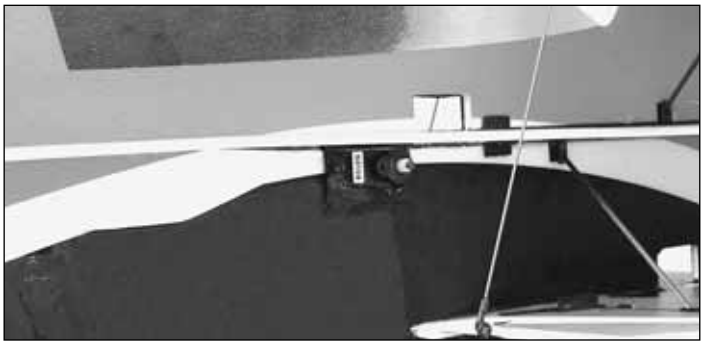
❏ 4. Slide the wheel assemblies onto the 2 x 190 mm [5/64" x 7-1/2"] landing gear rods. Rotate the assemblies so that the wheel pant bottoms are parallel with the wings and the wheels are pointed straight ahead. When satisfied with their fit, apply a few drops of glue to the axle supports at the axles and at the landing gear rods.

Install the Servos

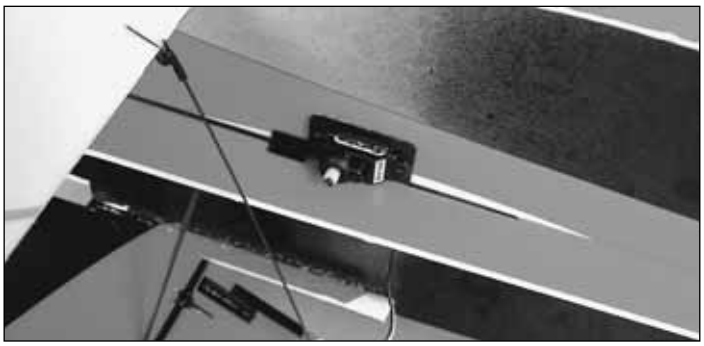
❏ 1. Remove the stock servo arms from all three of the servos.

❏ 2. Refer to the ***Kit Contents*** section on page 5 and select the correct spline size for the servos you will be using. There are three sizes to choose from:

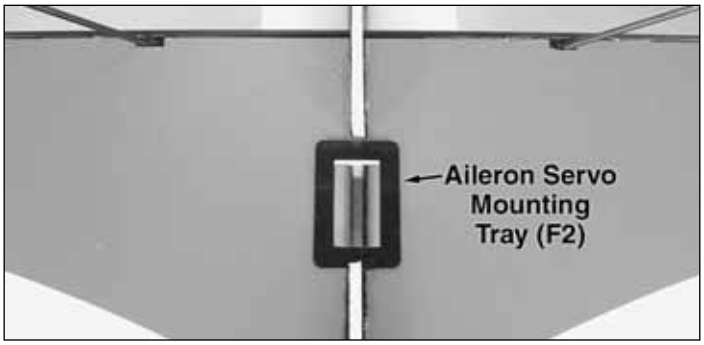
(G1 - G3)	Futaba S3103, Airtronics 94091
(G4 - G6)	Hitec HS-55, Hitec HS-50, Futaba 3108M
(G7 - G9)	JR 241



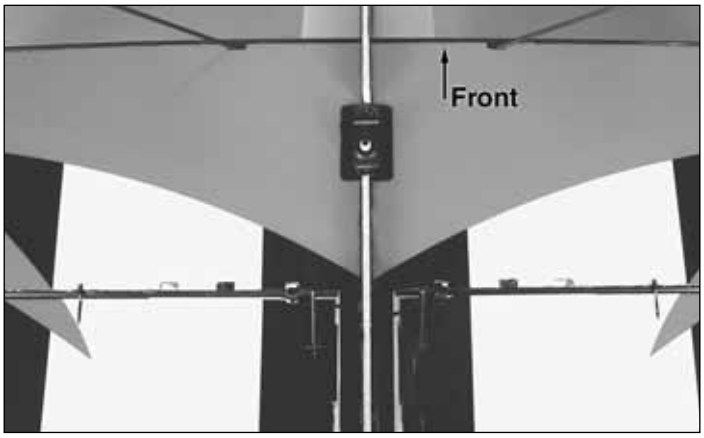
❏ 3. Glue the rudder servo into the rear servo mount in the right side of the fuselage. The output shaft should be forward.



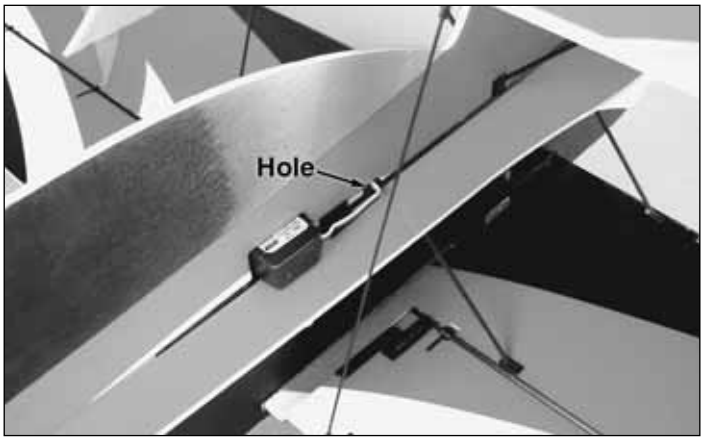
❏ 4. Glue the elevator servo into the front servo mount in the left side of the fuselage. The output shaft should be forward.

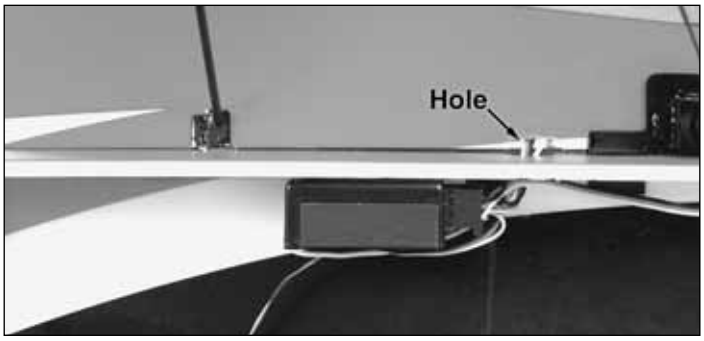


❏ 5. Glue the **aileron servo mounting tray (F2)** over the cutout in the underside of the wing.

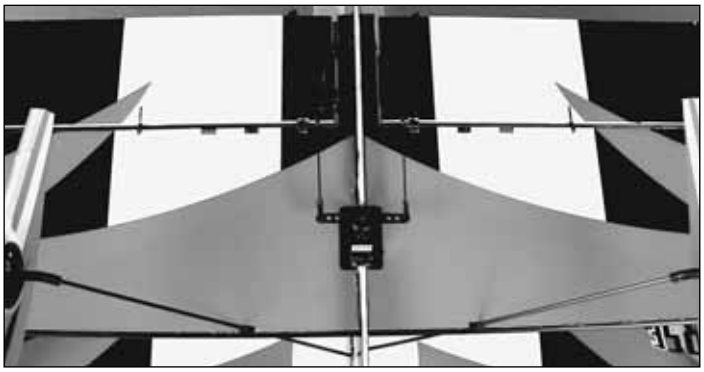


❏ 6. Glue the aileron servo into the tray with the output shaft facing toward the back of the airplane.

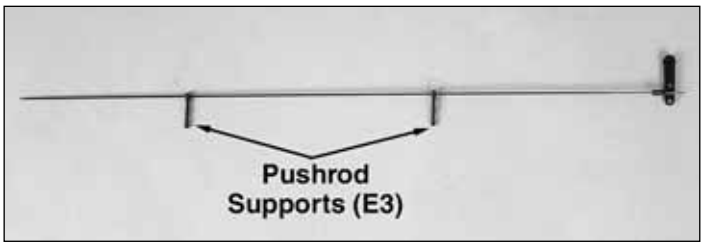




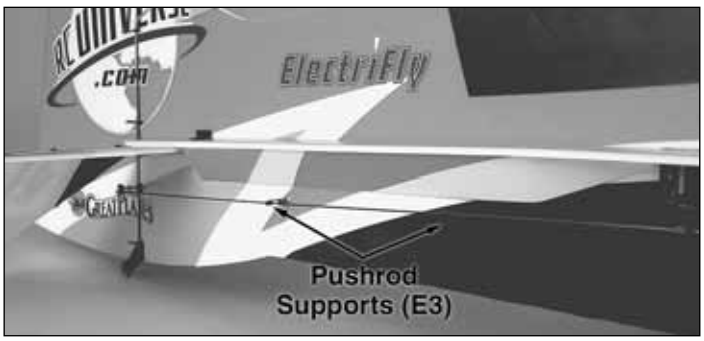
❏ 7. Cut two small holes in the fuselage for the elevator servo wire to pass through to the left lower quadrant. Use double-sided servo tape (not included) to secure the receiver to the underside of the horizontal fuselage section on the left side. Be sure to position the receiver so that all the servo wires can reach it without the use of servo extensions. Connect the servos to the receiver and power up the radio system to center all three servos.



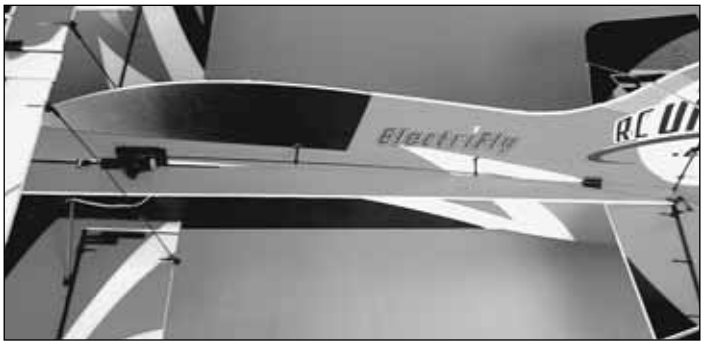
❏ 8. Insert two Z-bend clevises (A1) into the outer holes of a double-sided servo arm that fits your servo and two Z-bend clevises into the aileron control horns. Push the 1 x 80 mm [1/32" x 3-1/8"] **aileron pushrods** into the clevises on the control horns. Now attach the clevises in the servo arm onto the other ends of the pushrods. Screw the arm onto the aileron servo and adjust the depth of the pushrods in the clevises so that the ailerons are in the neutral position when the servo arm is parallel to the wing leading edge. When satisfied with their fit, a few drops of glue on the pushrods will secure them in place.



❏ 9. Fit a Z-bend clevis into the **middle hole** of a single-sided servo arm that fits your servo. Slide the 1 x 340 mm [1/32" x 13-1/2"] **rudder pushrod** into the clevis in the servo arm and slide two **pushrod supports (E3)** onto the other end of the rod.



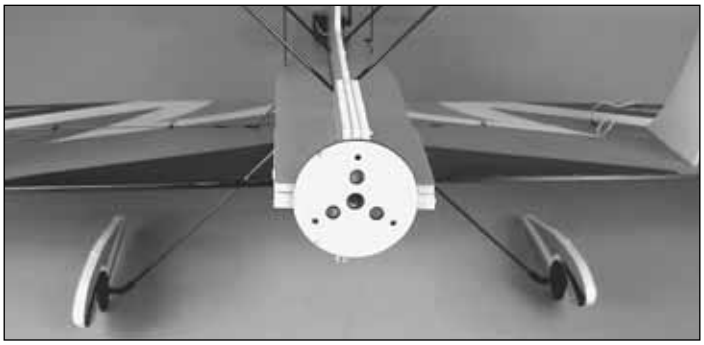
❏ 10. Attach the other end of the rudder pushrod to the clevis in the control horn and secure the arm to the servo. Adjust the pushrod as you did with the ailerons so that the rudder is neutral with the servo arm pointing straight down. Glue the pushrod to the clevises and attach the supports to the fuselage an equal distance apart (pre-drilling a hole for the supports with a 2.4 mm [3/32"] bit is recommended). Do not push the supports all the way through the fuselage. Glue the supports in place.



❏ 11. Repeat the same procedure with the elevator servo using the 1 x 370 mm [1/32" x 14-5/8"] elevator pushrod. Connect the clevis to the **outer hole** on the servo arm.

Install the Motor System

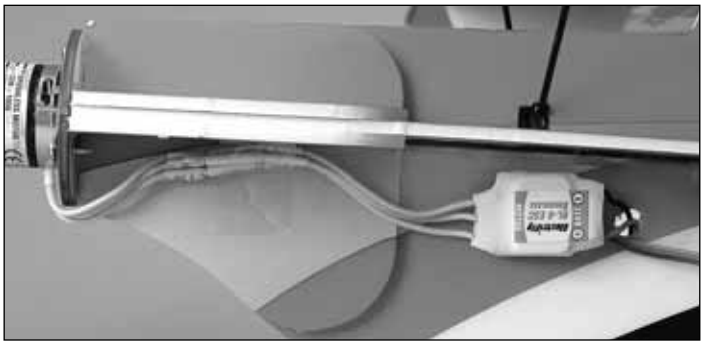
❏ 1. If necessary, use a bar sander with 220-grit sandpaper to lightly sand the front of the fuselage even. Be careful not to change the built-in thrust angles.



❏ 2. If installing an ElectriFly RimFire™ motor, glue the included 3 mm [1/8"] plywood firewall to the nose so that the center hole is centered on the fuselage tube. **Note:** If installing another brand of outrunner motor, you will need to cut your own or modify the included firewall to match its mount pattern. The motor and firewall should be mounted so that the thrust line is centered on the fuselage tube.

❏ 3. Mount the motor using the hardware and instructions that came with your motor. Back the mounting screws out and use thin foam-safe CA glue to reinforce the holes in the firewall. Allow the glue to dry completely before reattaching motor.

❏ 4. If using the RimFire motor, mount the prop saver adapter that came with the motor. Install the propeller using the O-ring provided with the motor.



❏ 5. Connect your speed control to the motor and receiver. Mount the speed control to the bottom of the left horizontal fuselage with double-sided foam tape. Cut a small hole for the ESC's battery wire to cross to the bottom right side of the fuselage.

❏ 6. Install the "hook" side of the included hook-and-loop material to the right side of the fuselage where shown. This is where you will mount the battery.

❏ 7. Attach the "loop" side of the hook-and-loop material to the battery. Mount the battery to the fuselage.

❏ 8. Drill two 1.5 mm [1/16"] holes through the fuselage where shown. "Stitch" the receiver antenna through these holes.

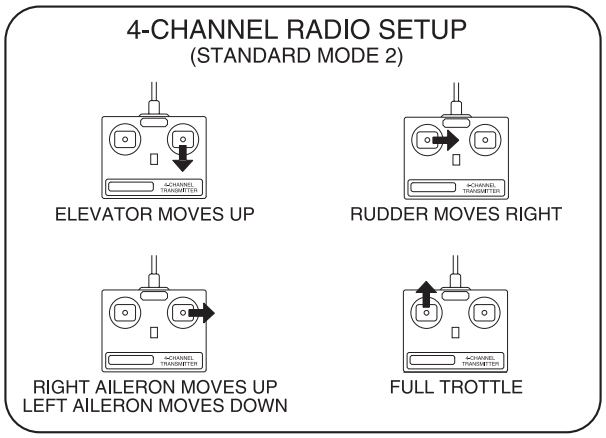
GET THE MODEL READY TO FLY

Check the Control Directions

For safety, remove the propeller while performing bench setup. Once you have finished setting up your airplane, you can reinstall it.

❏ 1. Lower the throttle stick all the way and turn on the transmitter. Connect your battery to the ESC. If the ESC has a BEC switch, turn it on.

❏ 2. Check all the control surfaces to see if they are centered. Since you set the center points as you set up the linkages, they should already be very close. Use the trims on the transmitter to center the controls.



❏ 3. Make certain that the control surfaces and the motor respond in the correct direction as shown in the diagram. To operate the motor, you may have to "arm" your ESC. Follow the instructions that came with your ESC to do this. If any of the controls responds 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

To simplify setup, the high-rate (3D) control throws for this model are automatically set by the geometry of the included hardware. We do recommend, however, that you perform a quick check as described below to make sure the throws are set up correctly.

Note: If your radio has the capability, low-rates will make it easier to perform precision aerobatics. We recommend 40% endpoints for all low-rate throws. If your radio does not have low-rates, set up the plane using only the high-rate throws.

Additionally, you may want to use the exponential function to soften the control response around center. This is largely a matter of personal taste, but helps many pilots balance the extreme throws needed for 3D flying with the need to make small corrections when in normal flight.

We recommend setting up your airplane according to the following table as a starting point. Use the Angle Templates included with the plane to verify that you are in the ballpark. However, setting up models of this type is largely a matter of personal taste. We encourage you to tune the throws to your taste as you get more familiar with the aircraft. Many expert 3D fliers choose to increase their high-rate travel by using higher endpoints.

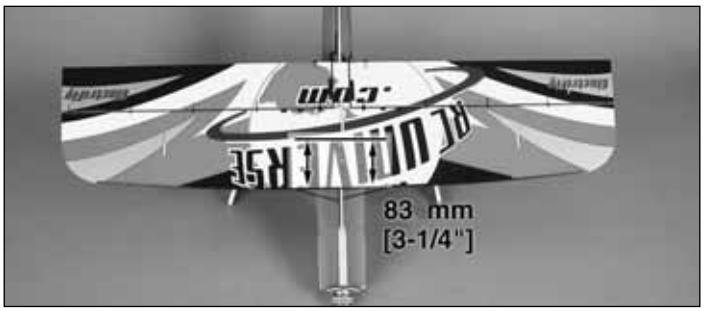
Function	High-Rate Endpoints	High-Rate Travel	High-Rate Exponential
Aileron	+/– 100%	+/– 35˚	40%
Elevator	+/– 100%	+/– 50˚	40%
Rudder	+/– 100%	+/– 35˚	40%
Function	**Low-Rate Endpoints**	**Low-Rate Travel**	**Low-Rate Exponential**
Aileron	+/– 40%	+/– 15-25˚	0%
Elevator	+/– 40%	+/– 15-25˚	0%
Rudder	+/– 40%	+/– 15-25˚	0%

If you are not able to achieve these control throws, double-check your pushrod hookup and make sure any control surfaces in question are operating smoothly. If you have a computer radio, also make sure your endpoint adjustments are properly set.

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, the propeller, the battery, and the radio system.



❏ 1. Use a felt-tip pen or 3 mm [1/8"]-wide tape to accurately mark the C.G. on the underside of the top wing on both sides of the fuselage. The C.G. is located 83 mm [3-1/4"] back from the leading edge of the wing at the fuselage.

This is where your model should balance for the first flights. Later, you may wish to experiment by shifting the C.G. up to 13 mm [1/2"] forward or 13 mm [1/2"] 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 or 3D aerobatics. 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**. As with the throws, though, we encourage you to experiment with the CG until the model flies to your taste.

❏ 2. With all parts of the model installed, including the battery and propeller (ready to fly), lift it on your fingertips 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 forward or weight must be added to the nose to balance. If the nose drops, the model is “nose heavy” and the battery pack and/or receiver must be shifted aft or weight must be added to the tail to balance. If possible, relocate the battery pack on the hook-and-loop strip to minimize or eliminate any

additional ballast required. If additional weight is required, begin by placing incrementally increasing amounts of weight on the bottom of the horizontal fuselage until the model balances. Once you have determined the amount of weight required, it can be permanently attached.

❏ 4. **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 wing level, lift the model by the motor 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 your model. It is **required** at all AMA R/C club flying sites and AMA sanctioned flying events. Write this information on the bottom of the wing with a fine felt-tip pen.

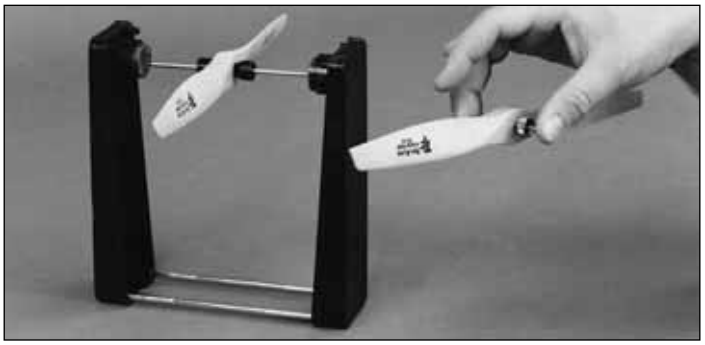
Charge the Batteries

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

Charge the flight battery using a charger designed for Lithium Polymer batteries. Charging with any other type of charger is very dangerous, and may cause the batteries to combust violently.

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 motor mounting screws and bolts loosen, possibly with disastrous effect, but vibration may also damage your radio receiver and battery. When balancing the propeller that came with your Fun Force ARF, add tape to the light side of the propeller. Do not shave material away as is done with traditional propellers.

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 50 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.

Keep your face and body as well as all spectators away from the plane of rotation of the propeller whenever the battery is connected.

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.

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 on the fuse.
- ❏ 3. Extend your receiver antenna and make sure it cannot get tangled in the prop.
- ❏ 4. Balance your model *laterally* as explained in the instructions.
- ❏ 5. Make sure all hinges are **securely** glued in place.
- ❏ 6. Confirm that all controls operate in the correct direction and the throws are set up according to the manual.
- ❏ 7. Make sure any servo wiring does not interfere with other systems (servo arms, pushrods, etc.).
- ❏ 8. Place your name, address, AMA number and telephone number on your model.
- ❏ 9. If you wish to photograph your model, do so before your first flight.
- ❏ 10. Range check your radio when you get to the flying site.

FLYING

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

Hand Launch

For the first flight, it is a good idea to have an assistant launch the airplane for you. This allows you to keep your hands on the controls and immediately correct any trim problems that are present.

Have your friend hold the FlatOuts R/C Universe Bipe by the canopy. Throttle up to full power, and give the plane a gentle, underhanded toss at about a 30° angle upward. Since the R/C Universe Bipe has a very high thrust-to-weight ratio, the plane will accelerate to flying speed almost instantly. Climb to a comfortable height and throttle back to a lower power setting. This plane flies great at about half-throttle when in standard forward flight.

Rise-Off-Ground (ROG) Takeoffs

Once you have the model trimmed out, the FlatOuts R/C Universe Bipe is very capable of ROG (rise-off-ground) takeoffs from a smooth surface (parking lot, runway, gym floor, etc.). To take off, start by advancing the throttle to about two-thirds, making sure to correct any torque reactions with rudder. The plane will build flying speed almost instantly due to its high thrust-to-weight ratio. Once the tail comes up, gently apply up elevator to break ground and climb out. Full throttle takeoffs are necessary only for extremely short runways.

Flight

When flying a 3D aerobat like the R/C Universe Bipe, there are several things you should always keep in mind. First is throttle management–this airplane has enough power to climb straight up at full throttle, so level flight is more comfortably achieved at about half-throttle. Avoid extremely high-speed flight with the FlatOuts R/C Universe Bipe–it is designed for slow 3D aerobatics, and extended full-throttle dives can result in wing flutter. While flutter won't destroy the airplane, it's best to avoid it. Second, take it easy on the control sticks–with 3D throws, even a small stick deflection can result in a big response, so be gentle (unless of course you're performing an aggressive maneuver).

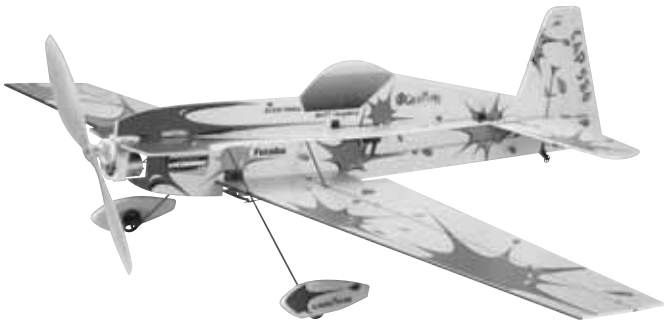
Landing

Because this model is extremely lightweight, it slows rapidly without power, and performing standard gliding landings can be difficult. Instead, land the model under power, with a rolling 3-point landing as the goal. To achieve this, perform your landing approach with the model in the 3-point attitude (nose up at such an angle that all three wheels are level). Modulate your descent with the throttle, and use a quick "blip" of power just before touchdown to slow the descent for a gentle landing.

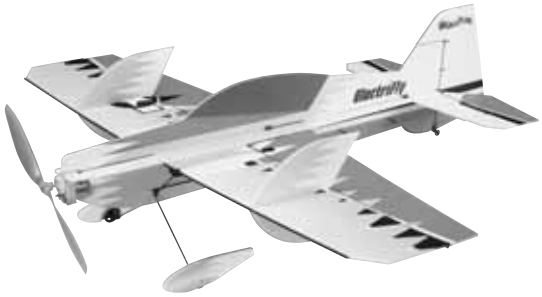
Have a ball! But always stay in control and fly in a safe manner.

GOOD LUCK AND GREAT FLYING!

OTHER ITEMS AVAILABLE FROM GREAT PLANES



ElectriFly FlatOuts Matt Chapman CAP 580
Based on the full-scale airshow favorite flown by Matt Chapman, this "flat foamie" is made the Great Planes way – straight, strong, easy on the eyes, and outrageous in 3D action. A powerful T-370 brushed motor and gearbox are included and ready for installation. Also supplied are a slow fly propeller and prop saver that enables it to deflect at landing. Using foam-safe CA and the supplied custom hardware, you'll easily assemble the pre-printed foam panels and carbon rods into a sturdy, great-looking 3D model that excels at the low speeds and tight turns needed for flying indoors. **GPMA1112**



ElectriFly FlatOuts Turmoil™
Accept no limitations! The Turmoil was specifically designed by Jason Noll for a mix of precision aerobatics and 3D maneuvers. Its unique Side Force Generators let you fly knife-edge almost hands-off. They also provide enough side lift to perform loops, figure eights, and more, using nothing but rudder. Flight-ready in only 2-3 hours, the Turmoil includes a T-370 brushed motor with gearbox and slow-fly prop. Using the supplied custom hardware and foam-safe CA, you'll easily assemble its colorful foam panels and carbon rods into a strong, eye-catching model with proven contest-winning performance. **GPMA1115**

ElectriFly FlatOuts Reflection™
Go end-over-end with ease! If you're looking for tumbling fun, the FlatOuts Reflection is your plane. Waterfalls, tumbles, and rolls are amazingly easy. With its short wingspan and large ailerons, the roll rate is incredible. Flight-ready in only 2-3 hours, the Reflection includes a T-370 brushed motor with gearbox and slow-fly prop (and is also available in a version without them, GPMA1140). Using the supplied custom hardware and foam-safe CA, you'll easily assemble its colorful foam panels and carbon rods into a strong, eye-catching model that offers big returns in performance for very little time and money. **GPMA1116**

Hobbico® Pro Series™ Accu-Cycle™ Elite
Accu-Cycle Elite is an AC/DC charger, discharger and cycler in one. It makes full, deep charges virtually effortless. Enter the cell chemistry, voltage and capacity from your battery label, and its Auto Smart Set will automatically set the safety-time-out period, charge current and discharge voltage cut-off for Li-Ion/LiPo packs – and all three plus the trickle rate for NiCds and NiMHs. You can also program custom battery routines and store them in 10-battery memory. It can handle a single cell or a pack; one of each simultaneously; or two cells or packs at once – even if they're of different chemistries. The large, 2-line, 16-character LCD make progress easy to see! **HCAP0280**

ElectriFly™ by Great Planes Triton Peak Charger
Imagine a charger so versatile it can be used with lithium-ion and lead-acid batteries as effectively as NiCd and NiMH cells. A unit that can peak charge tiny park flyer packs and 24V car batteries alike. A charger that can discharge as well as charge, cycle packs from 1 to 10 times automatically, memorize peak and average battery voltages for each cycle – and constantly display battery capacity, voltage, current and time as each cycle progresses. Then, imagine that the charger, which can do all this, is about the size of a thick paperback book, and weighs just over a pound. The advanced computer technology in the Triton Peak Charger makes it possible to accomplish all this and more, through controls and menus so simple that programming is a breeze. For more information, log on at ***www.electrifly.com*** – and be amazed. 1-year warranty. **GPMM3150**

Hobbico Pro Series Quick Field Charger MkII
The MkII is two completely independent chargers in a single case! Current on both sides adjusts from 0.2-2A, to fast charge 1-3 cell Li-Ion or LiPo park flyer batteries or peak charge 1-8 cell NiCd or NiMH radio packs. Auto-trickle for NiCds and NiMH packs is automatically set, based on the fast-charge rate. Hook up the pack, press the start button – and twin LEDs signal the cell type and charge method to be used by color: red for NiCd, yellow for NiMH and green for Li-Ion or LiPo cells. Jacks make it easy to hook up your pack – and a voltmeter – to either side. **HCAP0290**

Hobbico 12V Power Supply
The 12V Power Supply transforms 110V AC current into constant 13.8V 11.5A DC power for peak chargers, motor break-in and more. It includes fuse protection, 5V tap, a lighted on/off switch and one-year warranty protection. **HCAP0250**

BUILDING NOTES	
Kit Purchased Date: _____	Date Construction Finished: _____
Where Purchased:_____	Finished Weight: _____
Date Construction Started: _____	Date of First Flight: _____

FLIGHT LOG	

ANGLE TEMPLATES