



J-3 ELECTRIC CUB

Electric Sport-Scale ARF

INSTRUCTION MANUAL



Wingspan: 41 in [1040mm]
Wing Area: 269 sq in [17.4 dm²]
Weight: 10 oz [285g]
Wing Loading: 7.5 oz/sq ft [23 g/dm²]
Length: 29.5 in [750mm]
Radio: 3-channel with 2 sub-micro servos
Motor: T-280-size with 3.5:1 gear box
Motor Battery: 9.6V – 650 mAh

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.



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

TABLE OF CONTENTS

INTRODUCTION.....	2
AMA.....	2
SAFETY PRECAUTIONS.....	2
DECISIONS YOU MUST MAKE.....	3
Radio Equipment.....	3
Battery Selection.....	3
Chargers.....	4
ADDITIONAL ITEMS REQUIRED.....	4
Adhesives & Building Supplies.....	4
Optional Supplies & Tools.....	4
IMPORTANT BUILDING NOTES.....	4
COMMON ABBREVIATIONS.....	5
ORDERING REPLACEMENT PARTS.....	5
KIT CONTENTS.....	6
METRIC/INCH RULER.....	6
BUILDING INSTRUCTIONS.....	7
Preparations.....	7
Join the Wing.....	7
Install the Landing Gear.....	7
Install the Tail Skid & Wing Braces.....	8
Assemble the Tail.....	9
Install the Windscreen.....	10
Pushrod Installation.....	10
Mount the Servos.....	10
Mount the Motor.....	11
Install the Cowling.....	11
Optional: Install the Wing Struts.....	11
GET THE MODEL READY TO FLY.....	12
Final Radio Hook Up.....	12
Check the Control Directions.....	13
Set the Control Throws.....	13
Propeller Installation.....	14
Balance the Model (C.G.).....	14
Balance the Model Laterally.....	14
PREFLIGHT.....	15
Identify Your Model.....	15
Charge the Batteries.....	15
Balance the Propellers.....	15
Ground Check.....	15
Range Check.....	15
Mount the Wing.....	15
MOTOR SAFETY PRECAUTIONS.....	16
AMA SAFETY CODE (excerpt).....	16
General.....	16
Radio Control.....	16
CHECK LIST.....	17
FLYING.....	17
Takeoff.....	17
Flight.....	17
Landing.....	18

INTRODUCTION

The **Mini Cub ARF** is a true park flyer, able to fly in small areas (but not intended for indoor settings). It is a great second airplane, with 6+ minutes of flight time on the stock motor package recommended, and climbs with authority to do mild aerobatics such as loops and stall turns.

For the latest technical updates or manual corrections to the Great Planes Mini Cub ARF, visit the Great Planes web site

at www.greatplanes.com. Open the "Airplanes" link, and then select the Great Planes Mini Cub 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 **AMA 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

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**

CAUTION: Be aware that the Mini Cub ARF is operated on the same frequency band as larger, "regular" R/C models. If flying your Mini Cub ARF within 5 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 the 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.**



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 **Mini Cub ARF** is small, lightweight and flies slowly, if it is not assembled and operated correctly, it could possibly cause injury to yourself or spectators and property damage.
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.
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; a correctly sized motor and components (servos, battery, etc...) throughout the building process; and a micro speed control capable of handling 5 Amps.
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.

Note: 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.

DECISIONS YOU MUST MAKE

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

Radio Equipment

The Mini Cub ARF requires a micro receiver and two Nano servos. Futaba® S3107 (FUTM0037) or Hobbico® CS-5 (HCAM0090) micro servos are suitable. A 3-channel radio is also required. The Great Planes C-5 (GPMM2000) hi-frequency speed control is required.

Battery Selection

There are mainly two kinds of battery packs used for electric R/C models; nickel-metal hydride (NiMH) packs and nickel-cadmium (NiCd, pronounced ny-cad) packs. NiMH batteries are recommended for the Mini Cub ARF because they provide nearly twice the capacity of a NiCd for their size. However, it should be noted that nickel-metal hydrides cannot be charged as fast as NiCds.

Each individual cell that makes up a battery is 1.2 volts. Simply stated, a volt is the amount of power a battery pack can deliver (a 6-cell battery pack is 7.2 volts). Batteries are also rated by their capacity in mAh (milli-Amp-hours), or how much energy they store. A 550 mAh battery can supply 1 Ampere for .55 hours (about 30 minutes). A 1200 mAh battery pack is about twice the size of a 550 mAh battery pack.

The battery pack recommended for the Mini Cub ARF:

- GPMP0072 8-cell 9.6V 2/3AA 650 NiMH

Note: Depending on battery choice, you may have to remove the cross brace in the battery compartment to allow the battery pack to fit. This does not adversely affect the performance of the Mini Cub ARF.

Chargers

The best type of charger to use is a peak charger, because it charges the batteries until they are fully charged, then automatically switches to a trickle charge mode. The Great Planes ElectriFly Peak Charger (GPMM3000) is suitable for nickel-metal hydride batteries, NiCds and transmitter battery packs.

If you have another type of charger that is not a peak charger, you will have to calculate the length of time it takes to charge the batteries yourself, then turn the charger off when the batteries are fully charged. Overcharging the batteries can damage them. Before you can calculate the time it takes to charge a battery pack, you first must know the charge rate you are going to use. Nickel-metal hydrides must be charged at a rate of no more than 1/10 of their capacity. For the 650 mAh batteries recommended for the Mini Cub ARF this would be a charge rate of approximately 65 mAh. Divide the capacity of the battery pack by the charge rate to calculate the charge time. A discharged 650 mAh battery pack charged at 0.65 mAh will take 10 hours to charge.

IMPORTANT: Monitor the temperature of the battery frequently. If the battery becomes warm, disconnect it from the charger.

A Great Planes ElectriFly DC Peak 400 Charger (GPMM3001) is also suitable for charging the battery packs used in the Mini Cub ARF.

Note: The period required to charge the battery in the example is for a fully discharged battery. If the battery you are going to charge is not discharged (and you are not using a peak-charger), connect it to the motor on your model. Run the motor until the auto cutoff on the ESC stops the motor.

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 Mini Cub ARF. **Great Planes Pro™ CA and Epoxy glue are recommended.**

- Hobby knife (HCAR0105)
- #11 blades (HCAR0211)

- Small T-pins (HCAR5100)
- Electric drill and 1/16" [1.6mm] drill bit
- Small Phillips and flat blade screwdrivers
- Pliers with wire cutter (HCAR0630)
- 1/2 oz. Thin Pro CA (GPMR6001)
- 6-Minute Epoxy (GPMR6045)
- 30-Minute Epoxy (GPMR6047)
- R/C-56 Canopy glue (JOZR5007)
- Non-elastic monofilament or Kevlar® fishing line (for stab alignment)
- Builder's Triangle Set (HCAR0480) (for fin alignment)
- Thread Locking Compound

Optional Supplies & Tools

Here is a list of optional tools mentioned in the manual that will help you build the Mini Cub ARF.

- Great Planes CG Machine™ (GPMR2400)
- Straightedge with scale (HCAR0475)
- Top Flite® MonoKote® sealing iron (TOPR2100)
- Top Flite MonoKote trim seal iron (TOPR2200)
- Masking tape (TOPR8018)
- CA accelerator (GPMR6034)
- Mixing sticks (GPMR8055)
- Denatured alcohol (for epoxy clean up)
- Curved-tip canopy scissors (HCAR0667)
- Clear packing tape

IMPORTANT BUILDING NOTES

- When you see the term **test fit** in the instructions, it means that you should first position the part on the assembly **without using any glue**, then slightly modify or *custom fit* the part as necessary for the best fit.
- Whenever the term **glue** is written you should rely upon your experience to decide what type of glue to use. When a specific type of adhesive works best for that step, the instructions will make a recommendation.
- 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 Mini Cub ARF is factory-covered with **Top Flite MonoKote** film. Should repairs ever be required, MonoKote film can be patched with additional MonoKote film purchased separately. MonoKote film is packaged in six-foot rolls, but

some hobby shops also sell it by the foot. If only a small piece of MonoKote film is needed for a minor patch, perhaps a fellow modeler would give you some. MonoKote film is applied with a model airplane covering iron, but in an emergency a regular clothing iron could be used. A roll of MonoKote film includes full instructions for application. Following is the color used on this model and the order number for a six foot roll.

Cub Yellow – TOPQ0220

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

effect on the way your model will fly, please expect slight deviations between your model and the published values.

COMMON ABBREVIATIONS

- Fuse = Fuselage
- Stab = Horizontal Stabilizer
- Fin = Vertical Fin
- LE = Leading Edge
- TE = Trailing Edge
- LG = Landing Gear
- " = Inches
- mm = millimeters

ORDERING REPLACEMENT PARTS

Replacement parts for the Great Planes Mini Cub 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. Parts may also be ordered directly from Hobby Services, but full retail prices and shipping and handling charges will apply. Illinois and Nevada residents will also be charged sales tax.

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, or from Hobby Services by calling (217) 398-0007, or via facsimile at (217) 398-7721. If ordering via fax, include a Visa or MasterCard number and expiration date for payment.

Mail parts orders and payments by personal check or money order 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.

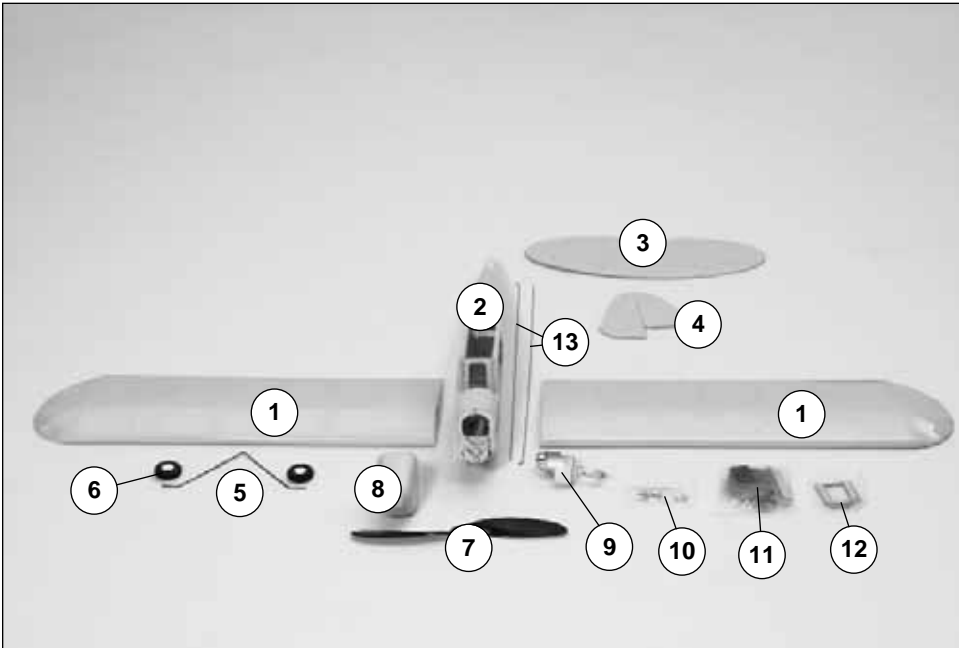
Replacement Parts List

<u>Order Number</u>	<u>Description</u>	<u>How to Purchase</u>
	Missing pieces	Contact Product Support
	Instruction manual	Contact Product Support
	Full-size plans.....	Not available
GPMA2640	Wing Set	} Contact Your Hobby Supplier to Purchase These Items
GPMA2641	Fuselage	
GPMA2642	Tail Set	
GPMA2643	Cowl	
GPMA2644	Windscreen	
GPMA2645	Landing Gear	
GPMA2646	Gear Drive	
GPMA2647	Speed Control	
GPMA2648	Motor	
GPMA2649	Propeller	

KIT CONTENTS

Before starting to build, take an inventory of this kit to make sure it is complete, and inspect the parts to make sure they are of acceptable quality. If any parts are missing or are not of acceptable quality, or if you need assistance with assembly, contact **Great Planes Product Support**. When reporting defective or missing parts, use the part names exactly as they are written in the Kit Contents list on this page.

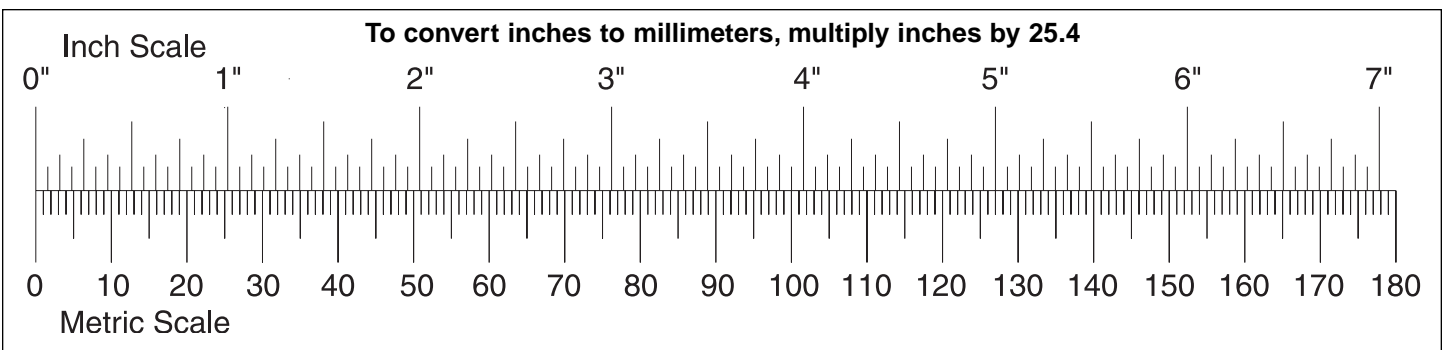
Great Planes Product Support:
Telephone: (217) 398-8970, ext. 5
Fax: (217) 398-7721
E-mail: airsupport@greatplanes.com



- Kit Contents**
1. L and R Wing Panels
 2. Fuselage
 3. Stab and Elevator
 4. Fin and Rudder
 5. Landing Gear
 6. Wheels (2)
 7. Propeller
 8. Cowl
 9. Motor
 10. Hardware Bag
 11. Parts Bag
 12. Servo Tray
 13. Pushrods (2)

Kit Contents (not photographed)

- | | |
|--|---|
| <ul style="list-style-type: none"> (1) Tail Skid (2) Wing Dowel Rods (2) Nylon Control Horns with Back Plates (4) 2 x 10mm Machine Screws (1) Wooden Landing Gear Brace (4) 2 x 5mm Washer Head Self-Tapping Screws (1) 2 x 8mm Washer Head Self-Tapping Screw (1) Battery Cover Latch (2) 2 x 6mm Round Head Self-Tapping Screws (2) Knurled Nuts | <ul style="list-style-type: none"> (2) Quick Connect Posts (2) 2.8 x 5mm Machine Screws (1) Electronic Speed Control (2) Nylon Tie Straps |
|--|---|



BUILDING INSTRUCTIONS

Preparations

1. If you have not done so already, remove the major parts of the kit from the box (wing halves, fuselage, tail parts, etc...) and inspect them for damage. If any parts are damaged or missing, contact Product Support at the address or telephone number listed on page 6.



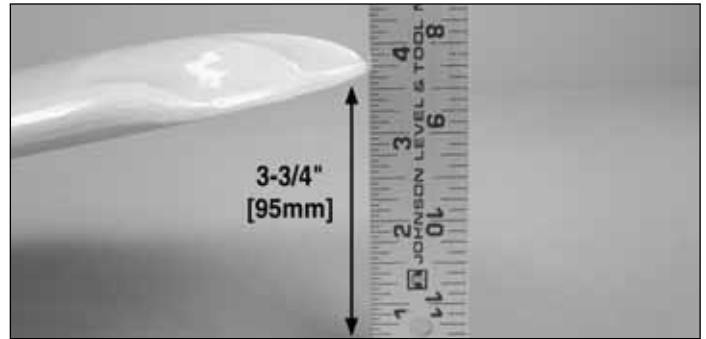
2. With a covering sock on your covering iron, set the temperature to medium and tighten the covering. If necessary, apply pressure to the sheeted areas to thoroughly bond the covering to the wood. **Hint:** Poke three or four pin holes in the covering between the ribs in the tail surfaces; this will allow the hot air to escape when tightening the covering.

Join the Wing



1. Glue the wing joiners together using 6-minute epoxy and allow them to harden. Test fit the wing joiner into the slots in the wing halves. Sand the joiner as required to get a tight, secure fit that allows the wing panels to mate as nicely as possible. **Note:** If the root ribs' angles aren't exactly the same, that's OK. The difference can be filled with epoxy when the wings are joined.

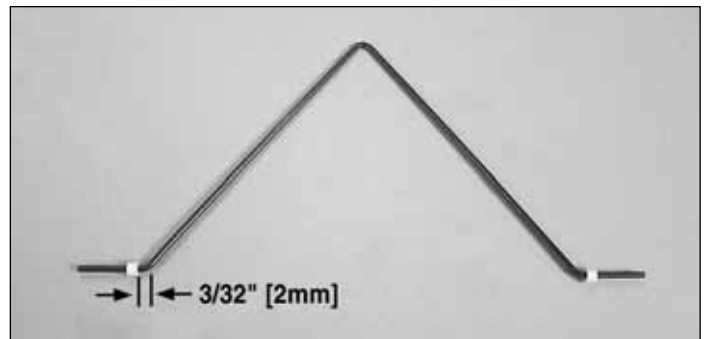
2. Cover your workbench with wax paper.



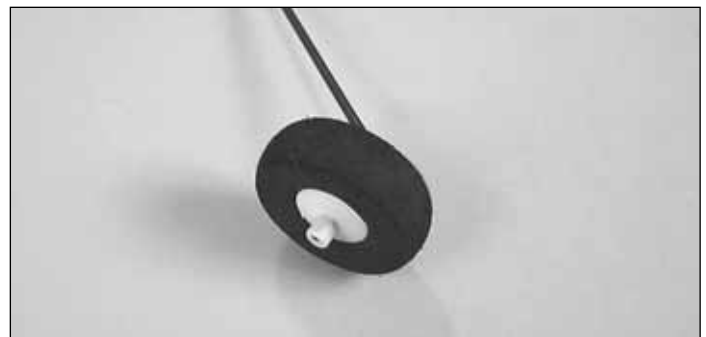
3. With the left wing flat on your workbench and the center joint on the wax paper, raise the right wing tip 3-3/4" [95mm] to properly set the dihedral. Block the raised right wing at the desired height and make a mental note of the position needed for it to maintain that dihedral. Slide the left wing and joiner off the right wing.

4. Remove the joiner from the left wing. Cover the joiner, left and right wing root ribs and pockets in the wing panels with a moderate, but not excessive, amount of 30-minute epoxy. Join the wing halves together. Ensure that the left wing remains flat and the right wing tip is 3-3/4" [95mm] from your workbench and can remain that way undisturbed until the epoxy hardens. **Hint:** Use masking tape to hold the wing together while the epoxy cures. Remove any excess epoxy prior to hardening with a paper towel dampened with denatured alcohol, being careful not to disturb the joint.

Install the Landing Gear

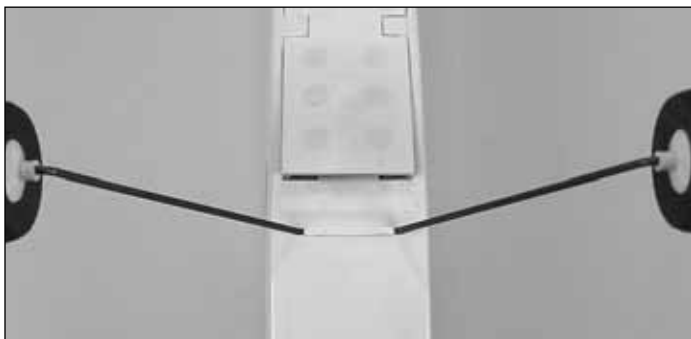


1. Push one plastic wheel collar on each axle, leaving approximately 3/32" [2mm] between the wheel collar and the bend.

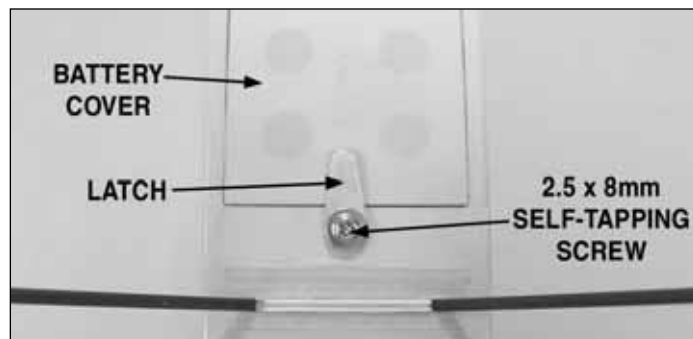
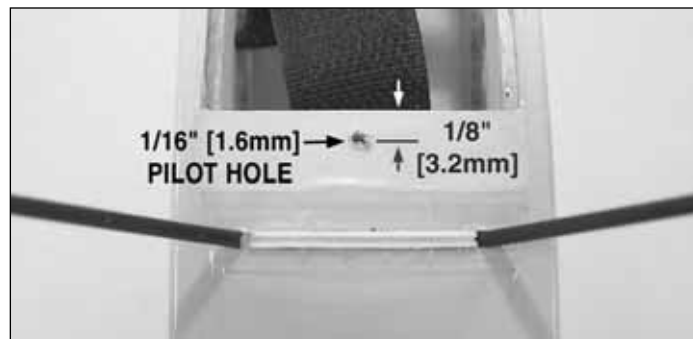


2. Slide the wheels onto the axles and hold them in place with the two remaining wheel collars. Make sure the wheels spin freely.

❑ 3. Remove the covering from the landing gear slot in the bottom of the fuselage located just in front of the battery hatch.

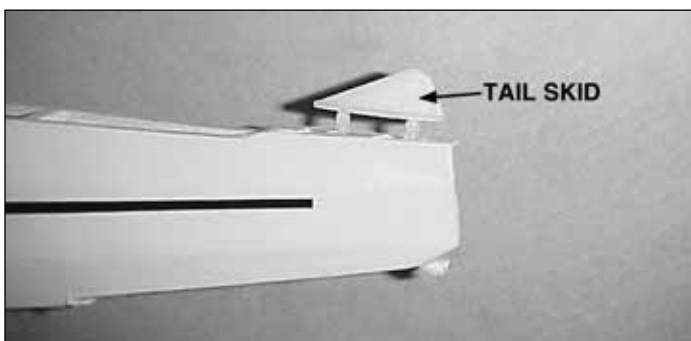


❑ 4. Fit the landing gear into the fuselage and test fit the plywood triangle block. Lock the gear in place by gluing the plywood triangle in the landing gear slot with CA.

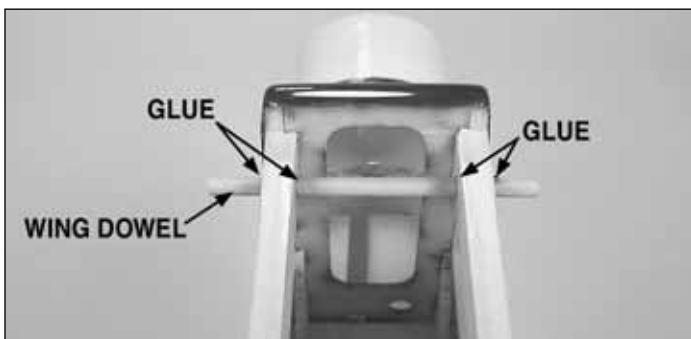


❑ 3. Temporarily install the battery cover. Drill a 1/16" [1.6mm] hole approximately 1/8" [3mm] in front of the battery compartment, closest to the landing gear. Attach the battery cover latch to the fuselage, using the supplied 2.5 x 8mm self-tapping screw. Do not overtighten; the latch must be able to move, but not freely.

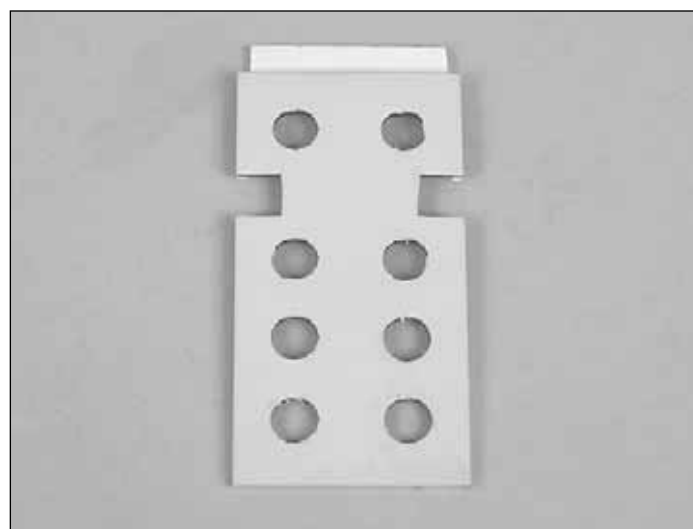
Install the Tail Skid & Wing Braces



❑ 1. Place the fuselage upside-down on the workbench and cut the covering away from the two holes for installing the tail skid. Remove a small strip of covering from between the two holes and securely glue the tail skid in place.

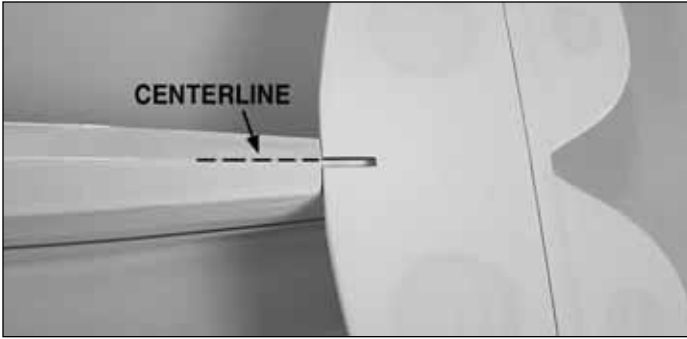


❑ 2. Locate and cut out the four holes to the front and rear of the wing saddle for the dowel rods. Insert the wing dowels in the holes and center. When centered, securely glue them in place using a few drops of thin CA.

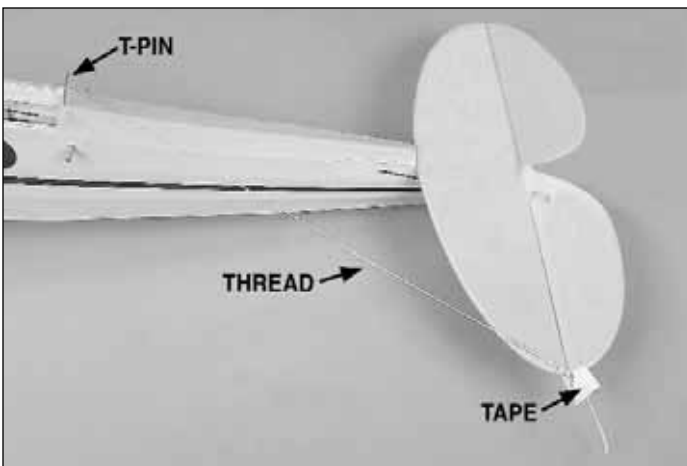


❑ 4. Carefully remove the covering from the battery cooling holes on the battery cover with a sharp hobby knife.

Assemble the Tail

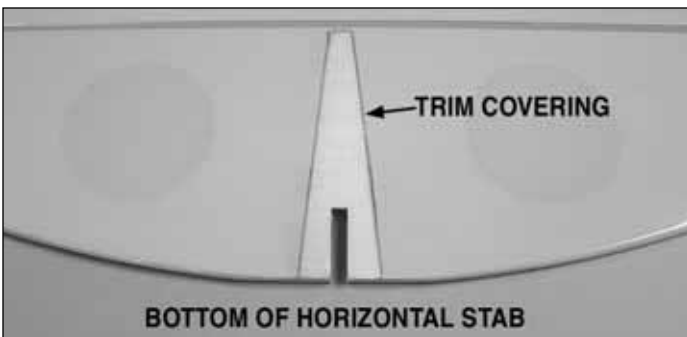


- ❑ 1. Center and align the LE of the horizontal stab with the centerline of the fuse. Pin the front center of the stab to the centerline of the fuse.

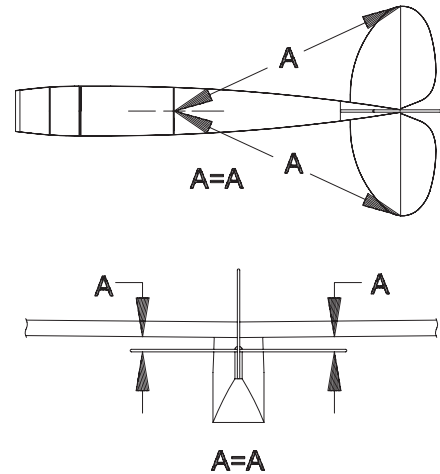


- ❑ 2. Locate the center stringer running the length of the fuse on the top. This is the centerline of the fuse. Attach one end of a piece of string to the centerline using a T-pin or piece of masking tape, just behind the wing saddle, and extend the string to the left outer edge of the stabilizer. Mark the string at that location on a piece of tape. Move the end of the string to the other side of the stab. Rotate the stab until both lengths are the same. Pin the TE of the stab to the fuse.

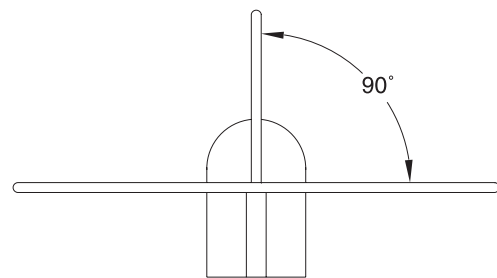
- ❑ 3. Using a fine point felt-tip pen, mark the covering on the bottom of the stab where it contacts the fuse.



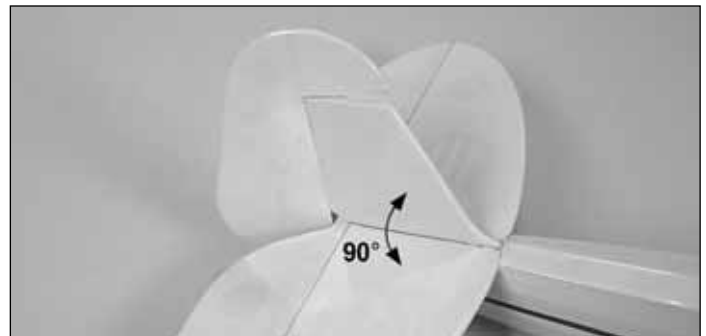
- ❑ 4. Remove the stab. Cut the covering from the marked area of the stab and from the gap on the front of the stab. **Note:** Be careful not to cut into the balsa stab when removing the covering.



- ❑ 5. Mount the wing to the fuse with two of the rubber bands included with this kit. Pin the stab to the fuse; check from behind the aircraft to make sure the stab is parallel with the wing. Lift the stab off, and coat the stab where the covering was removed and the fuselage with 30-min epoxy. Reinstall the stab with the pin for guidance.

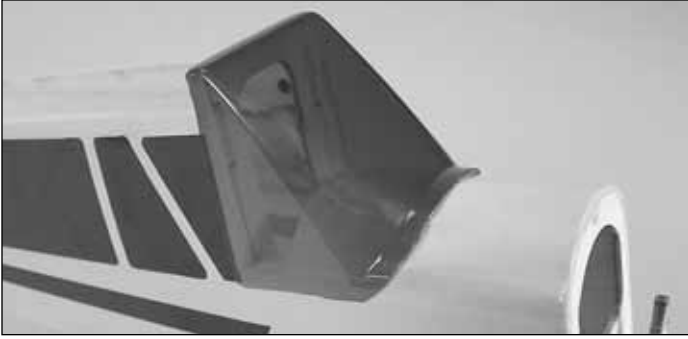


- ❑ 6. Center the fin on the stab and align it with the center of the fuse. The front of the fin will slide into a notch in the front of the horizontal stab. Mark the stab on both sides of the base of the fin. Remove the covering from the marked area of the top of the stab and the bottom of the fin. **Note:** Be careful not to cut into the balsa stab when removing the covering.



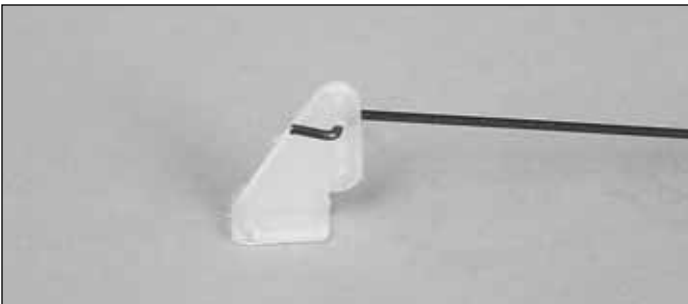
- ❑ 7. Using 30-min epoxy, glue the fin to the stab, making sure to keep it aligned with the centerline of the fuse and perpendicular to the stab until the glue is fully cured.

Install the Windscreen



1. Locate the trim line on the windscreen; it will be a small recessed area showing where to cut for the proper shape. Cut the windscreen a little at a time on this line with sharp scissors, or canopy scissors. Test fit the windscreen often and trim it as necessary. When you are happy with the fit, glue it in place using canopy glue. Clear tape may be used as well, as desired. **Note:** Do not use CA, it will fog the plastic.

Pushrod Installation

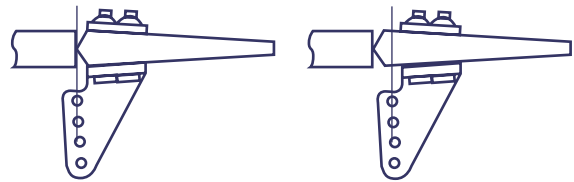


1. Connect the wire pushrod to the second-from-the-outer hole in a nylon control horn. You may have to enlarge the hole in the horn using a sharp hobby knife.

2. Locate the pushrod exit tubes at the tail end of the fuselage. They are located just forward of the horizontal stab. If you cannot see them, feel for the slight indentation through the covering or insert the pushrod into the pushrod tubes inside the fuselage, and push the pushrods against the covering. Cut the covering away from the pushrod exit with a sharp hobby knife.



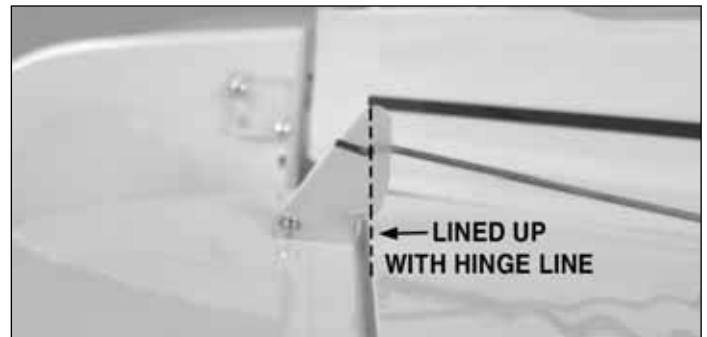
3. Slide the straight end of the pushrods into the fuselage from the tail.



Correct

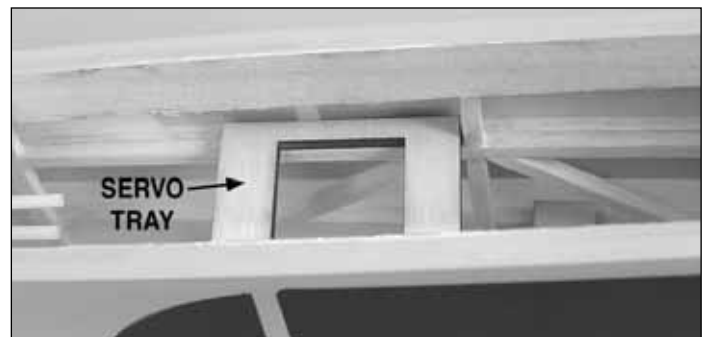
Incorrect

4. Position the control horn so that the pushrod mounting holes are aligned with the hinge line. Mark the location of the control horns' mounting holes on to the elevator and rudder control surface. Drill two 1/16" [1.6mm] holes where you marked them.

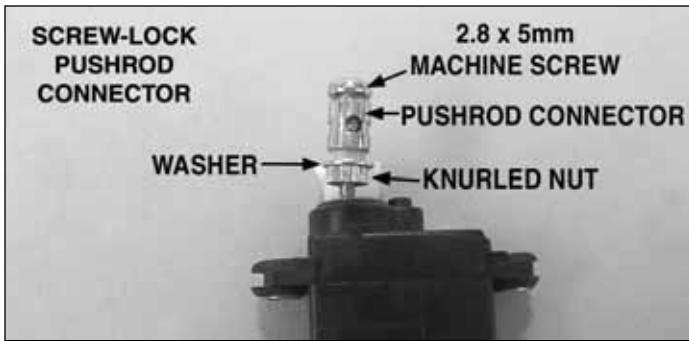


5. Using the 2 x 10mm machine screws provided, attach the nylon control horn and tighten with the nylon back plate. Be careful not to crush the wood when tightening.

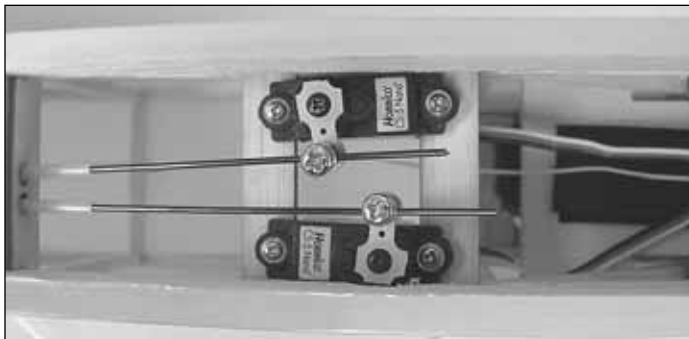
Mount the Servos



1. Test fit the servo tray as shown in the photo, but do not glue it in place. This will allow you to move the tray forward or aft to assist with the balancing of the model.



2. Attach a screw-lock pushrod connector on the servo arm that came with the servo. Insert the threaded portion down through the top of the arm, slide a washer on the bottom of the threaded portion and tighten to the horn using the small knurled nut. Be sure to apply a small drop of thread locking compound to the threaded portion to prevent the nut from working loose and falling off. Do not overtighten as the connector must be able to rotate freely. Do this for both servos.



3. Fit the two servos in the servo tray as shown. Plug the servos and ESC into your receiver. Turn on the transmitter and receiver to center the servos. Slide the pushrods through the screw-lock pushrod connectors, but do not tighten. Drill 1/16" [1.6mm] pilot holes in the tray where the servo mounting holes line up. Making sure not to preload the pushrods, mount the servos to the servo tray with the hardware provided with your radio. Turn the transmitter and receiver off. Don't cut the pushrods yet. This will allow you to adjust the position of the servo tray for balancing.

Mount the Motor

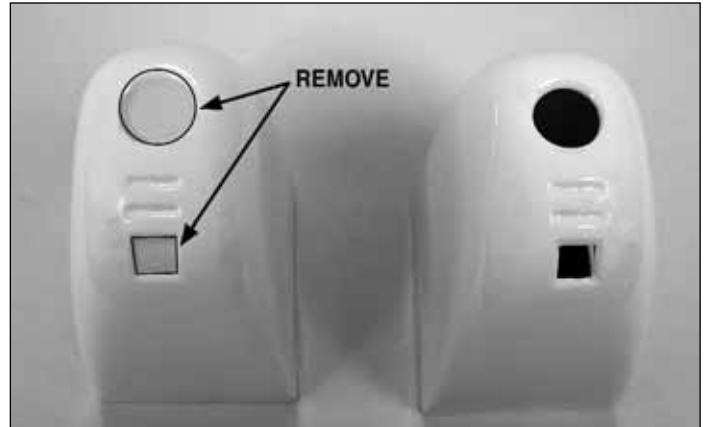
1. Following the motor manufacturer's instructions, assemble your motor and gear box. Refer to the "Motor" section on page 3.



2. Test fit the motor in the motor mount. The motor should be as far back as possible, without contacting the firewall.

When satisfied with the fit, secure the motor with the supplied zip-tie straps.

Install the Cowl



1. Cut the 1/2" [13mm] circle from the front of the cowl and the small square below it as shown using a sharp hobby knife.



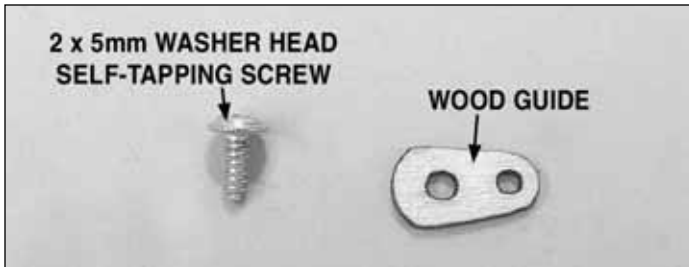
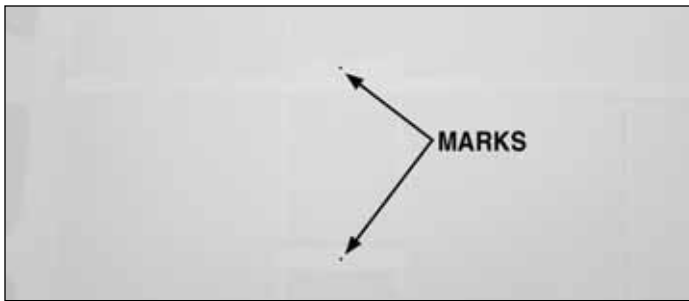
2. Test fit the cowl and trim as necessary.

3. Attach the cowling to the fuselage with clear tape. We used clear packing tape to secure the cowling to the fuse.

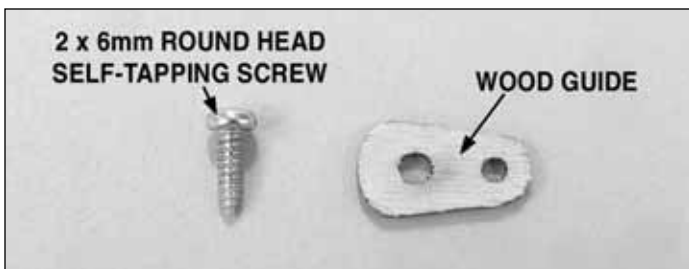
Optional: Install the Wing Struts

Note: Two pieces of yellow string are provided to simulate wing struts. They enhance the appearance of the plane, but are not necessary. The plane can be flown without the struts.

1. Through the covering on the bottom of the wing you should be able to see four small black dots, two on each side, between the second and third ribs from the wing tips.



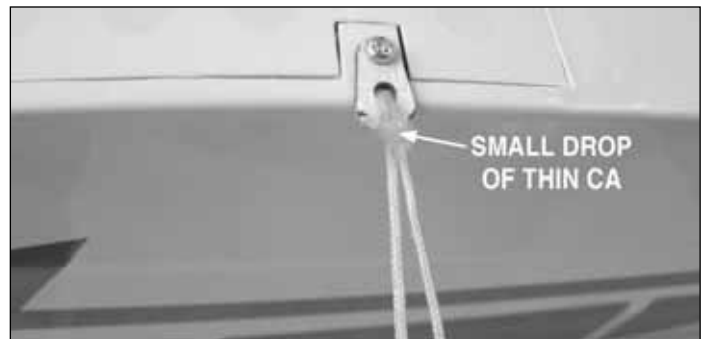
2. Drill a 1/16" [1.6mm] hole on each mark and attach the plywood guides using two 2 x 5mm washer head self-tapping screws shown in the photo. Do this for both sides.



3. On each side of the battery compartment, center and drill a 1/16" [1.6mm] hole and attach the remaining two

guides using the two remaining 2 x 6mm round-head self-tapping screws.

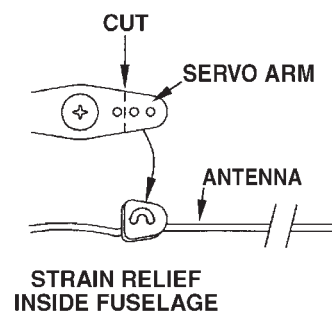
4. Attach the wing to the fuse using rubber bands.



5. Use the included yellow thread to make the wing struts. Take one length of thread and run it through both guides on one side of the wing. Then tie the ends to the guide installed on the fuse. Add a small drop of CA to the knot to secure it. Do this for both sides. Removal of the wing can be accomplished by unscrewing the two guides from the bottom of the fuse.

GET THE MODEL READY TO FLY

Final Radio Hook Up



1. Complete the radio installation by connecting the ESC and servos to the receiver. The receiver antenna should be run out of and taped to the bottom of the fuselage. Do not cut off the excess antenna; let it hang from the aft end of the fuselage. Be sure to provide a strain relief for the receiver antenna as shown.

❑ 2. Turn on the transmitter and receiver. Double-check that the elevator trim on your transmitter is centered, the servo arm on the servo is centered and that the elevator is centered to the stab.

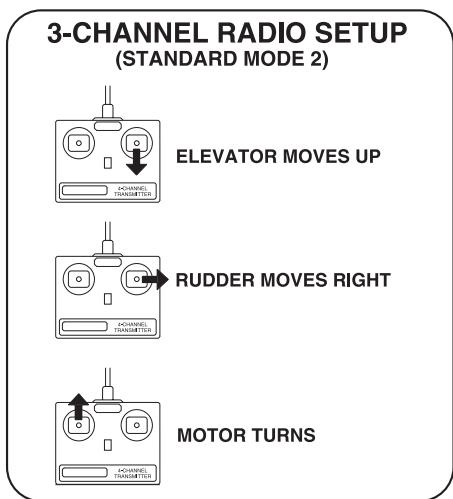
❑ 3. Double-check that the rudder trim is centered on your transmitter, the servo arm on the servo is centered and that the rudder is centered on the fin.

❑ 4. Insert and tighten 2.8 x 5mm machine screws on the screw-lock pushrod connectors to clamp down on the pushrods and trim off excess pushrod with wire cutters. Leave approximately 1/2" [13mm] beyond the screw-lock pushrod connector.

Check the Control Directions

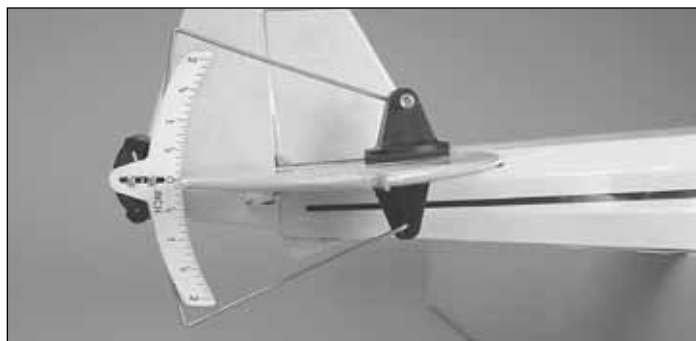
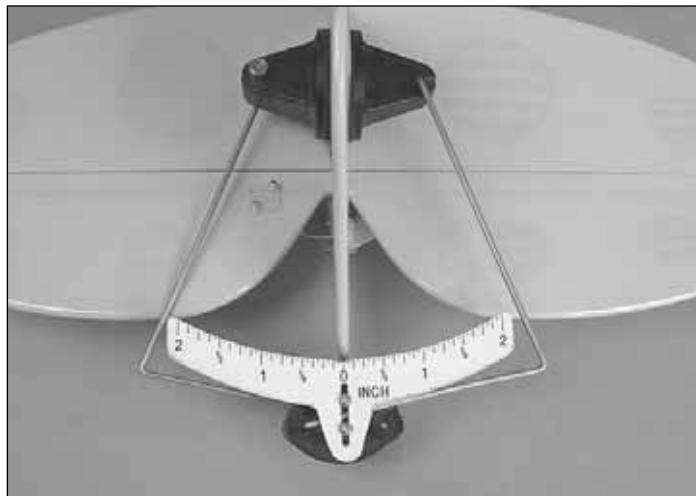
❑ 1. Turn on the transmitter and receiver and center the trims. If necessary, remove the servo arms from the servos and reposition them so they are centered. Reinstall the screws that hold on the servo arms.

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



❑ 3. Make certain that the control surfaces 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 at the low rate setting.

Note: The throws are measured at the widest part of the elevator and rudder.

These are the recommended control surface throws:

	High Rate	Low Rate
ELEVATOR:	5/8" [16mm] up 5/8" [16mm] down	1/2" [13mm] up 1/2" [13mm] down
RUDDER:	5/8" [16mm] right 5/8" [16mm] left	3/8" [10mm] right 3/8" [10mm] left

IMPORTANT: The Mini Cub 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 Mini Cub ARF 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."

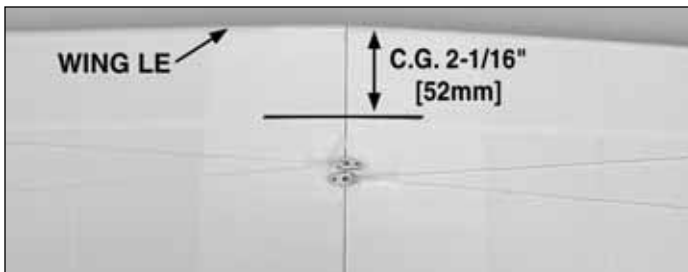
Propeller Installation

Prior to balancing the model install the propeller.

Balance the Model (C.G.)

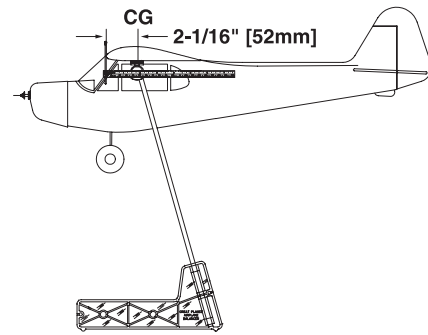
More than any other factor, the **C.G.** (balance point) can have the **greatest** effect on how a model flies, and may determine whether or not your first flight will be successful. If you value this model and wish to enjoy it for many flights, **DO NOT OVERLOOK THIS IMPORTANT PROCEDURE.** A model that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

The servo tray and receiver location are used to adjust the center of gravity (C.G.). For now, temporarily position the battery in the battery compartment and receiver in the radio compartment, but do not secure them in place. When setting the C.G. (below), adjust the position of the receiver and servo tray as needed. Remember to also reposition the Velcro® and rubber band mounting to properly hold them in place. **Note:** Once the Mini Cub ARF is balanced, you may secure the receiver and glue the servo tray in place.



1. Use a felt-tip pen or 1/8" [3mm] wide tape to accurately mark the C.G. on the bottom of the wing on both sides close to the fuselage. The recommended C.G. is located 2-1/16" [52mm] back from the leading edge of the wing.

This is where your model should balance for the first flights. Later, you may wish to experiment by shifting the C.G. up to 1/4" [6.4mm] forward or 1/4" [6.4mm] 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 the wing attached to the fuselage and all parts of the model installed (ready-to-fly), place the model 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 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 and receiver to minimize or eliminate any additional ballast required. Use Great Planes (GPMQ4485) "stick-on" lead if necessary to add weight. A good place to add stick-on nose weight is to the firewall (don't attach weight to the cowl—it is not intended to support weight). Begin by placing incrementally increasing amounts of weight on the bottom of the fuse over the firewall until the model balances. Once you have determined the amount of weight required, it can be permanently attached. If required, tail weight may be added under the stabilizer.

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.



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

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 18 of this manual and place it on or inside your model.

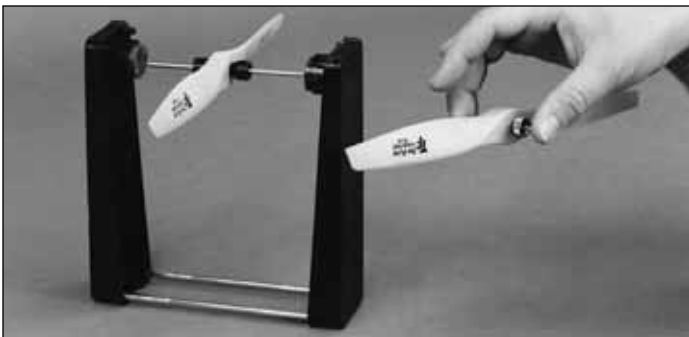
Charge the Batteries

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

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

Note: All battery packs, whether it's a trusty pack you've just taken out of another model, or a new battery pack you just purchased, should be cycled, noting the discharge capacity. Oftentimes, a weak battery pack can be identified (and a valuable model saved!) by comparing its actual capacity to its rated capacity. Refer to the instructions and recommendations that come with your cyclor. If you don't own a battery cyclor, perhaps you can have a friend cycle your pack and note the capacity for you.

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. For electric motors, proper balance is even more critical than glow motors. Not only will pushrod connector screws loosen, possibly with disastrous effect, but vibration may also damage your radio receiver and speed control.

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

Ground Check

If the motor is new, follow the manufacturer's instructions to break-in the motor. After you run the motor on the model, inspect the model closely to make sure all screws remained tight, the hinges are secure, the prop is secure and all pushrods and connectors are secure.

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' 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.

Mount the Wing

Mount the wing to the fuselage with rubber bands included with the Mini Cub ARF. Install them from front to back, crisscrossing the last two. Never use torn or cracked rubber bands. After removing the rubber bands from your model, store them in a container with talcum powder or clay-type kitty litter to keep them fresh for the next flying session. Use eight (8) #32 Great Planes, Hobbico or similar rubber bands as replacements.

If the rubber bands you will be using are different from those recommended, consult an experienced modeler to make certain they are strong enough, and that you have used enough of them. If uncertain, force the front of the wing off of the wing saddle. There should be considerable resistance! If the wing can be forced from the fuselage without having to strain your hands, then there are probably not enough rubber bands.

IMPORTANT! Flying a model with too few rubber bands can be dangerous. If the wing momentarily lifts from the fuselage and acts as though a large amount of “up” elevator has suddenly been applied because there are not enough rubber bands or they are too weak, internal structural damage may result. Even worse, the wing could actually detach from the fuselage resulting in a crash. If the model exhibits any tendencies that indicate there are not enough rubber bands, immediately reduce power, land and closely inspect the model for damage. If no damage is found, add more rubber bands.

The Mini Cub ARF is a great-flying model that flies smoothly and predictably. The Mini Cub ARF 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.

MOTOR SAFETY PRECAUTIONS

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

1. Do not run the motor in an area of loose gravel or sand; the propeller may throw such material in your face or eyes.
2. Keep your face and body as well as all spectators away from the plane of rotation of the propeller at all times that the motor is armed.

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

4. The motor gets hot! So does the battery pack and the ESC. Do not touch it during or right after operation.

5. **REMEMBER!** This is an electric motor. Unlike a glow engine, it can start at any time without any movement of the prop by the user. **ALWAYS** take extreme care around your electric motor.

6. Do not use hands, fingers, or any other body part to try and stop the motor. Do not throw anything into the propeller of a running motor.

AMA SAFETY CODE (excerpt)

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 to 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 model 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** (see 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 (that's why it's called a *check list!*).

- 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 antenna and make sure it has a strain relief inside the fuselage to keep tension off the solder joint inside the receiver.
- 4. Balance your model *laterally* as explained in the instructions.
- 5. Use thread locking compound to secure critical fasteners such as the set screws that hold the screw-lock pushrod connectors, etc.
- 6. Add a drop of oil to the axles so the wheels will turn freely.
- 7. Make sure all hinges are **securely** glued in place.
- 8. Confirm that all controls operate in the correct direction and the throws are set up according to the manual.
- 9. Make sure that all servo arms are secured to the servos with the screws included with your radio.
- 10. Make sure any servo extension cords you may have used do not interfere with other systems (servo arms, pushrods, etc.).
- 11. Balance your propeller (and spare propellers).
- 12. Tighten the propeller nut.
- 13. Place your name, address, AMA number and telephone number on or inside your model.

- 14. Cycle your plane's battery pack (if necessary) and make sure it is fully charged.
- 15. If you wish to photograph your model, do so before your first flight.
- 16. Range check your radio when you get to the flying field.

FLYING

Takeoff

Before you get ready to take off, see how the model handles on the ground by doing a few practice runs at **low speeds** on the runway. Hold "up" elevator to keep the tail skid on the ground. If you need to calm your nerves before the maiden flight, turn off the motor and bring the model back into the pits.

Remember to take off into the wind. When you're ready, point the model straight down the runway, then gradually advance the throttle. As the model gains speed decrease up elevator allowing the tail to come off the ground. One of the most important things to remember with a tail dragger is to always be ready to apply **right** rudder to counteract motor torque. Gain as much speed as your runway and flying site will practically allow before gently applying up elevator, lifting the model into the air. At this moment it is likely that you will need to apply more right rudder to counteract motor torque. Be smooth on the elevator stick, allowing the model to establish a **gentle** climb to a safe altitude before turning into the traffic pattern. The Mini Cub ARF may also be hand launched if your site does not have a runway or you prefer hand launching.

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 Mini Cub 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, 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. Use this first flight to become familiar with your model but keep it relatively short so you have plenty of battery power to take a few practice passes at 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.

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

OTHER ITEMS AVAILABLE FROM GREAT PLANES



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**



Futaba® 3FR 3-Channel FM Radio

This version of Futaba's 3FR 3-channel FM radio features super-light on-board components that are ideal for park flyers and other weight-sensitive aircraft: the compact R114F single-conversion receiver and two S3108 micro servos. Single-stick simplicity makes the 3FR very user-friendly, and the case is ergonomically designed for comfort and easy access to controls. Performance perks include V-tail mixing, a proportional 3rd channel, trims, servo reversing and more. Plus, 600mAh NiCd transmitter batteries with Sanyo® cells and a 50A overnight AC charger are included. **FUTJ53****

