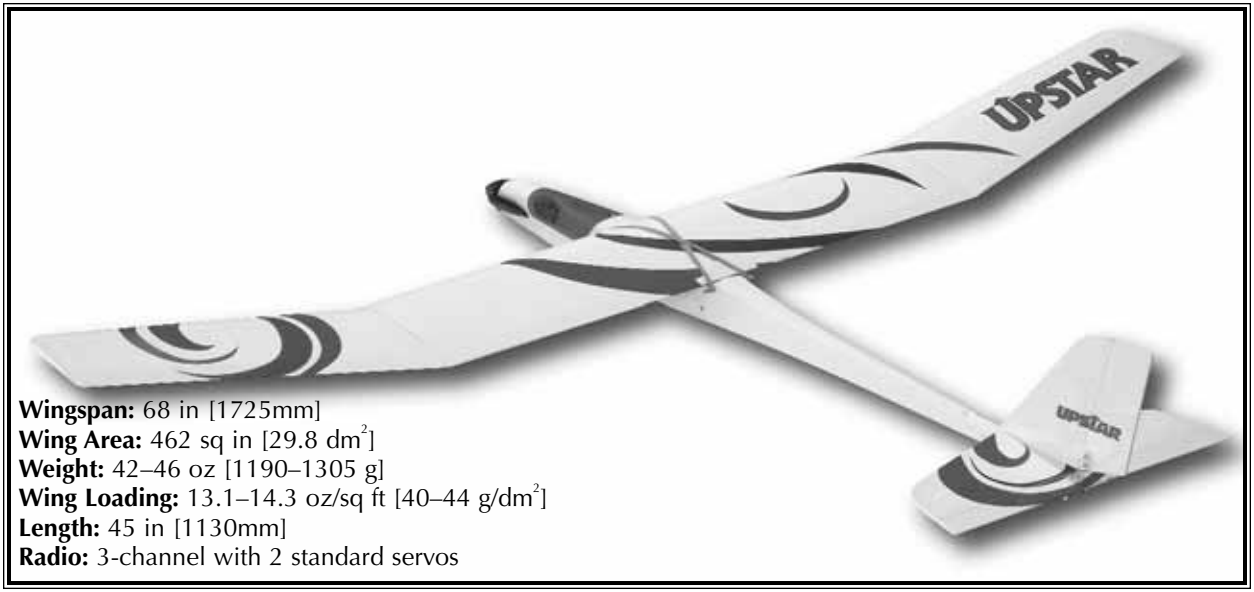
UPSTAR™



Wingspan: 68 in [1725mm]
Wing Area: 462 sq in [29.8 dm^2]
Weight: 42–46 oz [1190–1305 g]
Wing Loading: 13.1–14.3 oz/sq ft [40–44 g/dm^2]
Length: 45 in [1130mm]
Radio: 3-channel with 2 standard servos

WARRANTY

Hobbico®, Inc. 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 Hobbico's liability exceed the original cost of the purchased model. Further, Hobbico reserves the right to change or modify this warranty without notice. In that Hobbico has no control over the 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 buyers are not prepared to accept the liability associated with the use of this product, they are 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, Illinois
(217) 398-8970 ext. 5
airsupport@hobbico.com

TABLE OF CONTENTS

INTRODUCTION

The Upstar ARF is a very predictable and stable aircraft, allowing pilots of different skill levels to enjoy it. It is easy to build, flies great, and is a great selection as your first R/C aircraft.

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

AMA

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

AMA
SINCE 1936

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

IMPORTANT!!!

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

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

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

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

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

4. You must use an R/C radio system that is in first-class condition.

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

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

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

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

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

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

ADDITIONAL ITEMS REQUIRED

RADIO EQUIPMENT

A 3-Channel radio system with a standard receiver and two standard servos are the minimum requirements for the Upstar ARF. The radio components can be purchased as separate items or can be purchased as a package system. If you already have a Futaba or Futaba compatible transmitter you plan to use with this model, part numbers for the servos and receiver are provided below:

(2) Futaba S3003 Standard Servo (FUTM0031)

Futaba R127DF 7-channel FM receiver w/o crystal
(low band – FUTL0702, high band – FUTL0703)

Futaba FM dual conversion receiver crystal for R127DF
(low band – FUTL57**, high band – FUTL58**)

If you plan to purchase a complete radio system, the Futaba 4YF system is packaged with the Futaba R127DF and four S3004 servos. The S3004 servo differs from the S3003 servo mentioned above in that it is equipped with ball bearings. Since only two servos are needed for the glider, the other two that come in the package can be saved for a future project. The order number is provided below:

Futaba 4YF 4-Channel FM/4 S3004 Servos (FUTJ40**)

The asterisks in the part numbers refer to the channel number of the radio system. When placing an order, simply replace the asterisks with the channel number of your choice.

CHARGER

The included battery is a 9.6V 1800mAh NiMH pack. A NiMH compatible charger is required. An economical choice is the Great Planes ElectriFly 400 DC charger. (GPMM3001)

For a more advanced computerized charger, we recommend the Great Planes Triton charger (GPMM3150). Charge leads are not included with this model charger, so order numbers for the correct connector type, wire leads, and banana plugs are listed below (soldering is required):

DuraTrax Battery Connector & Wire (DTXC2280)

Hobbico Banana Plugs (6) (HCAP0310)

ADHESIVES & BUILDING SUPPLIES

This is the list of hardware and accessories required to finish the Upstar ARF. Order numbers are provided in parentheses.

- ❏ Pro 30-minute epoxy (GPMR6047)
- ❏ 1/2 oz. [15g] Thin Pro CA (GPMR6001)
- ❏ 1/2 oz. [15g] Medium Pro CA+ (GPMR6007)
- ❏ Drill bits: 1/16" [1.6mm], 5/64" [2mm], 1/8" [3.2mm]
- ❏ Hobby knife with #11 blade
- ❏ Philips Screwdriver
- ❏ Ruler
- ❏ Threadlocker (GPMR6060)

OPTIONAL SUPPLIES & TOOLS

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

- ❏ Stick-on segmented lead weights (GPMQ4485)
- ❏ 2 oz. [57g] spray CA activator (GPMR6035)
- ❏ CA applicator tips (HCAR3780)
- ❏ CA debonder (GPMR6039)
- ❏ Curved-tip canopy scissors (HCAR0667)
- ❏ Robart Super Stand II (ROBP1402)
- ❏ Denatured alcohol (for epoxy clean up)
- ❏ Small clamps
- ❏ Felt tip pen

IMPORTANT BUILDING NOTES

• There are two types of screws used in this kit:
Sheet metal screws are designated by a number and a length.

For example #6 x 3/4" [19mm]

This is a number six screw that is 3/4" [19mm] long.

Machine screws are designated by a number, **threads per inch**, and a length.

For example 4-40 x 3/4" [19mm]

This is a number four screw that is 3/4" [19mm] long with forty threads per inch.

• 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.

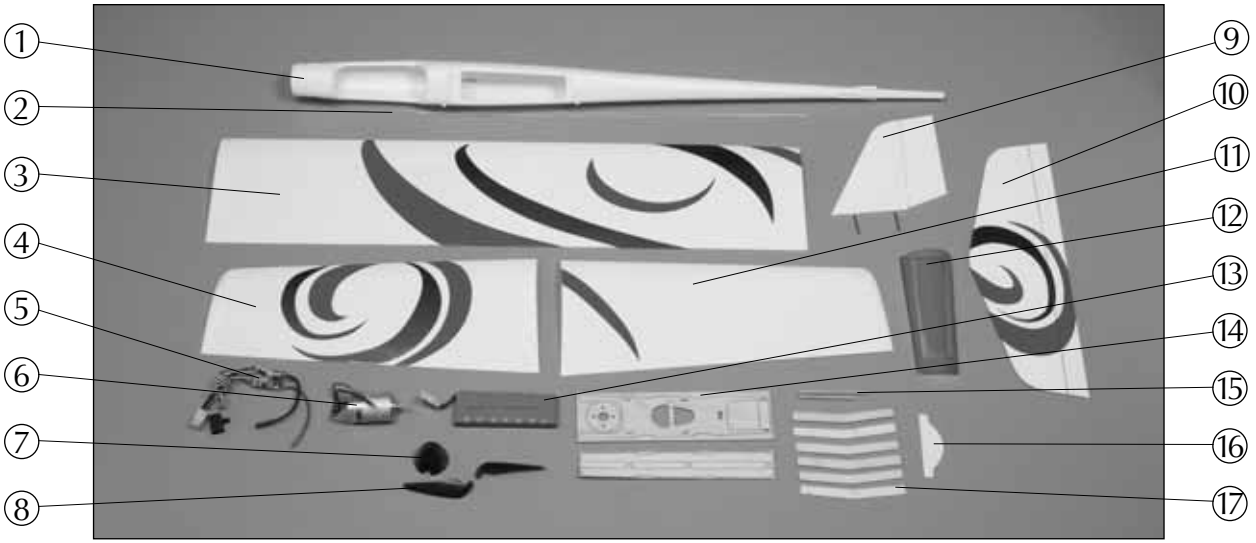
• The stabilizer and wing incidences and engine thrust angles have been factory-built into this model. However, some technically-minded modelers may wish to check these measurements anyway. To view this information visit the web site at **www.hobbico.com** and click on "Technical Data." Due to manufacturing 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.

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.

Hobbico Product Support:
3002 N Apollo Drive, Suite 1
Champaign, IL 61822
Telephone: (217) 398-8970, ext. 5
Fax: (217) 398-7721
E-mail: *airsupport@hobbico.com*

KIT CONTENTS



Kit Contents (Photographed)

1 Fuselage
2 Pushrods
3 Center wing section
4 Left wing section
5 ESC
6 Motor
7 Spinner
8 Folding prop
9 Vertical fin
10 Horizontal stabilizer
11 Right wing section
12 Canopy
13 Battery pack 9.6V
14 Radio tray
15 Wood dowels
16 Rubber band reinforcement plate
17 Plywood wing joiners

Kit Contents (Not Photographed)

(4) 2mm Nuts
(2) 2mm Flat washers
(4) 2 x 12mm Machine screws
(2) Control horns with backplates
(2) Hook and loop material
(8) 2.6 x 6mm Screws
(2) Nylon clevises
(2) Silicone clevis retainers
(2) Nylon fasLinks
(2) 3 x 8mm Machine screws
(2) 3mm Flat washers
(2) 2 x 10mm Prop pins
(4) #2 x ½" Screws
(1) 3 x 3mm Set screw

ORDERING REPLACEMENT PARTS

Replacement parts for the Hobbico Upstar 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.

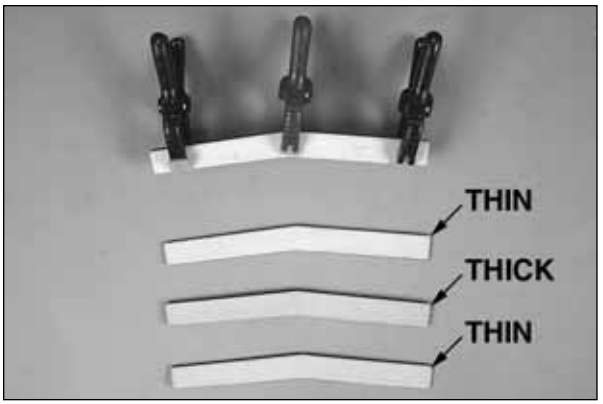
If additional assistance is required for any reason contact Product Support by e-mail at **productsupport@hobbico.com**, or by telephone at (217) 398-8970.

REPLACEMENT PARTS LIST

ORDER NUMBER	DESCRIPTION	HOW TO PURCHASE
HCAA3760	WING SET UPSTAR EP GLIDER	Hobby Supplier
HCAA3761	FUSELAGE SET UPSTAR EP GLIDER	Hobby Supplier
HCAA3762	TAIL SET UPSTAR EP GLIDER	Hobby Supplier
HCAA3763	CANOPY UPSTAR EP GLIDER	Hobby Supplier
HCAA3764	FOLDING PROP UPSTAR EP GLIDER	Hobby Supplier
HCAA3765	MOTOR UPSTAR EP GLIDER	Hobby Supplier
HCAA3766	ESC UPSTAR EP GLIDER	Hobby Supplier
HCAA3767	BATTERY PACK UPSTAR EP GLIDER	Hobby Supplier
	Missing pieces	Contact Product Support
	Instruction manual	Contact Product Support
	Full-size plans	Not available

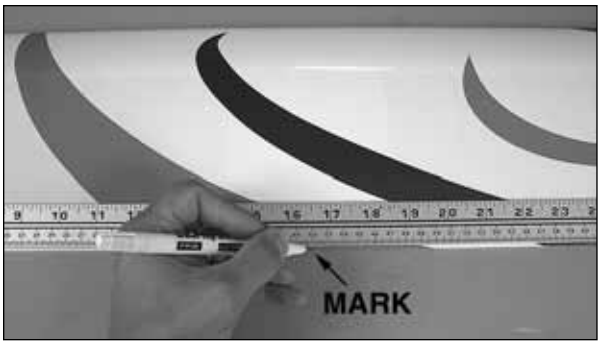
ASSEMBLE THE WING

MAKE THE JOINERS



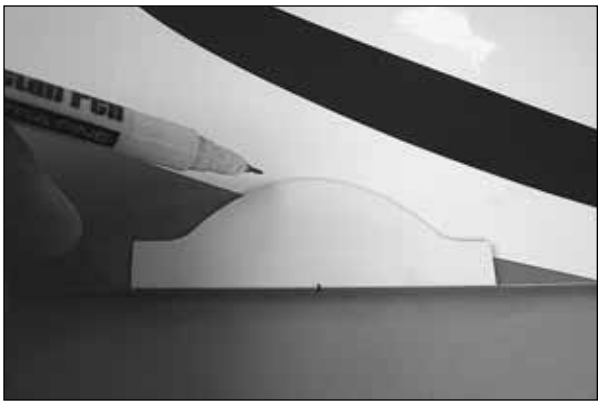
❏ 1. Locate the two thick and four thin **plywood wing joiner pieces**. Make two wing joiners by laminating one thick piece between two thin pieces with 30-minute epoxy. Clamp the pieces together while the epoxy cures and use denatured alcohol to wipe away any excess squeeze out. Make sure the edges of the three joiner pieces are flush.

ATTACH THE REINFORCEMENT PLATE

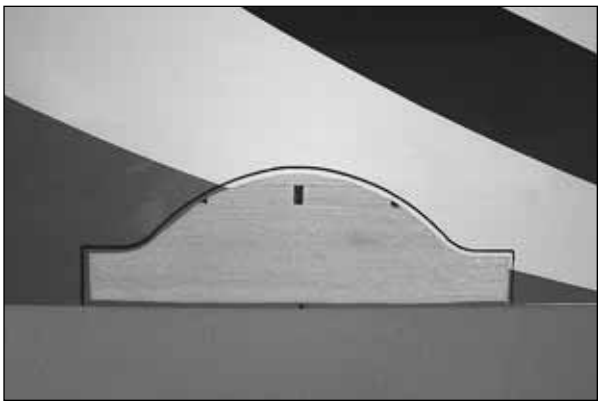


❏ 2. While waiting for the wing joiner epoxy to cure, find the exact center of the **center wing section** and make a mark with a felt tip pen on the trailing edge.

❏ 3. Do the same on the **rubber band reinforcement plate**.



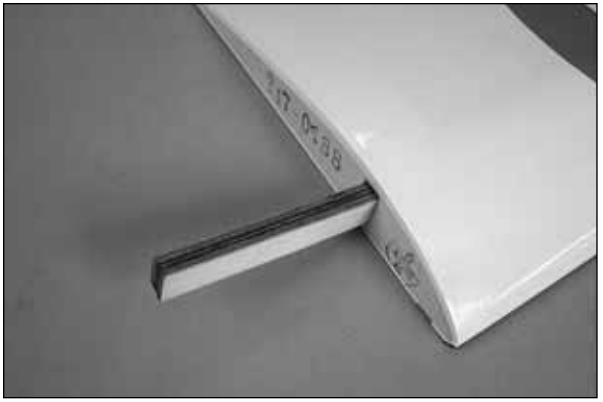
❏ 4. Place the reinforcement plate on the top of the center wing section and line up the trailing edges and the two marks that you made. Trace around the reinforcement plate.



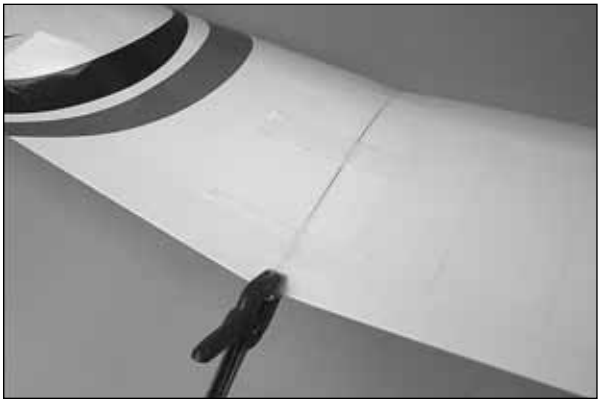
❏ 5. With a new blade in your hobby knife, carefully cut the covering just inside your line being sure not to cut into the wood beneath. Pull the covering away and use alcohol to wipe away the line you drew. Leave the two marks you made on the trailing edges until after you have glued the part.

❏ 6. Realign the plate on the center wing section and glue it in place.

JOIN THE WING



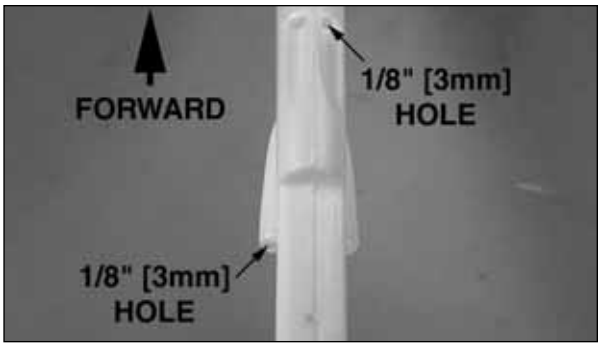
❏ 1. Test fit the wing together using the wing joiners. Be sure that the joiners fit into each joiner pocket properly. Trim or sand the joiners lightly as necessary so that the joiners can slide halfway into their mating pockets.



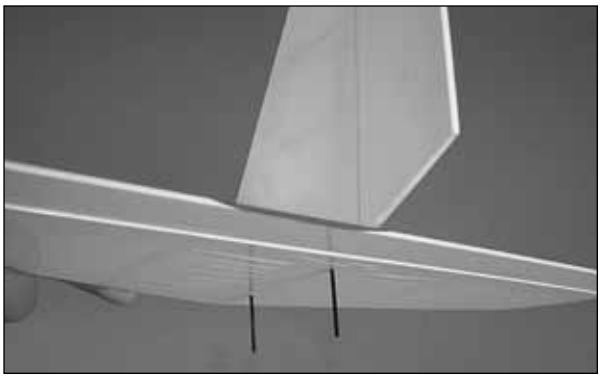
❏ 2. When satisfied with their fit, use 30-minute epoxy to glue the three wing pieces together. Coat one half of each wing joiner on all sides and insert them into the wing center section. Cover the mating wing ribs with epoxy and the other ends of the wing joiners. Slide the wing pieces together snugly. Wipe away any excess epoxy with alcohol and use masking tape to secure them together while the epoxy cures. If necessary, use small clamps to align the trailing edges. We suggest gluing only one wing section at a time.

ASSEMBLE THE FUSELAGE

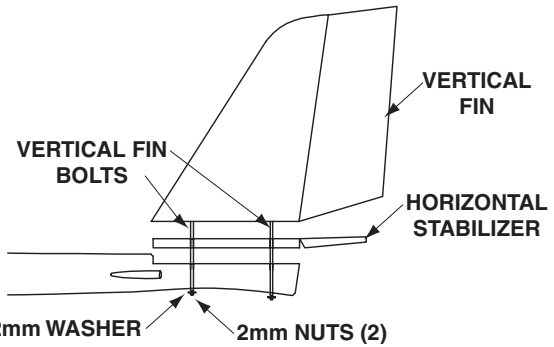
INSTALL THE TAIL SECTION



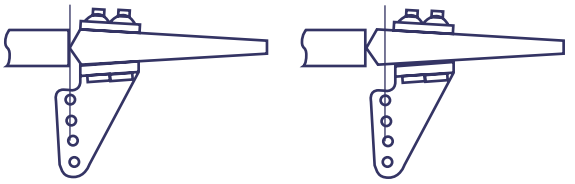
❏ 1. Use a hobby knife or drill to open the upper right and lower left pushrod exit holes on the **fuselage** to approximately 1/8" [3.2mm].



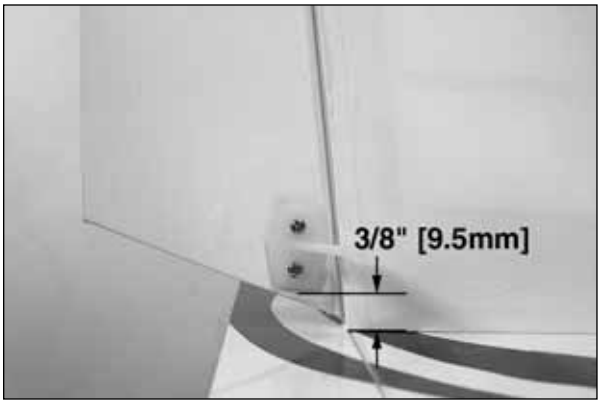
❏ 2. Slide the pre-installed **vertical fin bolts** through the holes in the **horizontal stabilizer**.



❏ 3. Attach the tail to the fuselage by pushing the bolts through the pre-drilled holes. Secure each bolt with a 2mm flat washer and two 2mm nuts. Tighten the second nut on each bolt firmly against the first, to lock it in place.



Correct Incorrect

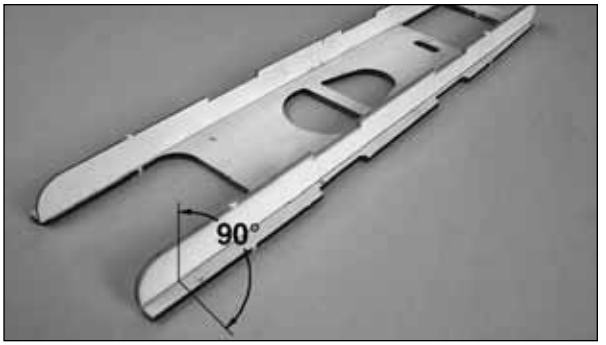


❑ 4. Position the rudder control horn on the right side of the **rudder** so that it is 3/8" [9.5mm] from the bottom of the **vertical fin** and at a slight angle downward. Mark the mounting holes and drill them out with a 5/64" [2mm] drill bit. Attach the control horn using (2) 2-56 x 1/2" [13mm] screws and a control horn backing plate.

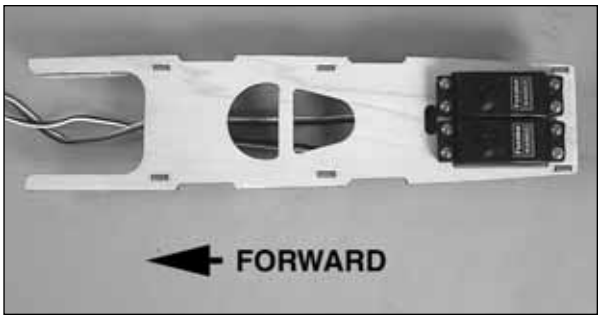
❑ 5. Attach the elevator control horn on the left underside of the **elevator** 3/8" [9.5mm] from the fuselage.

INSTALL THE SERVOS

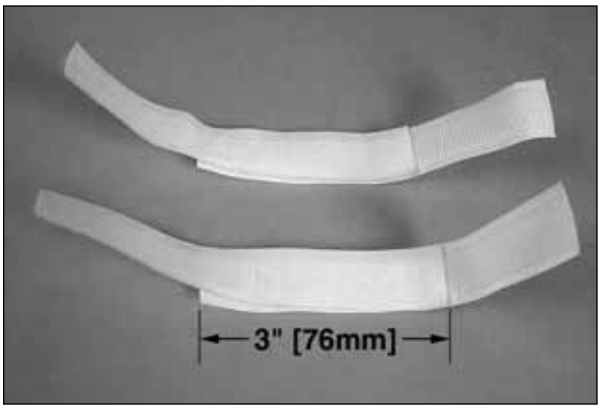
❑ 1. Cut the **servo tray** and **servo tray supports** from the 1/8" [3mm] plywood sheet.



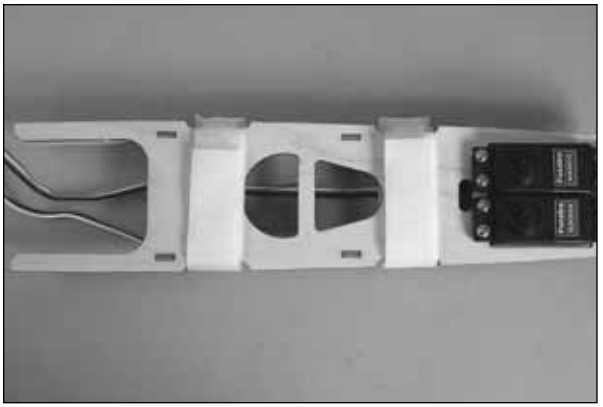
❑ 2. Fit the servo tray supports to the servo tray and glue them on using medium CA glue.



❑ 3. Place your rudder and elevator servos into the cutout on the servo tray. Mark and drill 1/16" [1.6mm] holes for the servo mounting screws. Reinforce the holes with a couple drops of thin CA glue. Install the servos with the output splines facing forward using the hardware provided with the servos.



❏ 4. Overlap two sets of **hook and loop material** by approximately 3" [76mm].

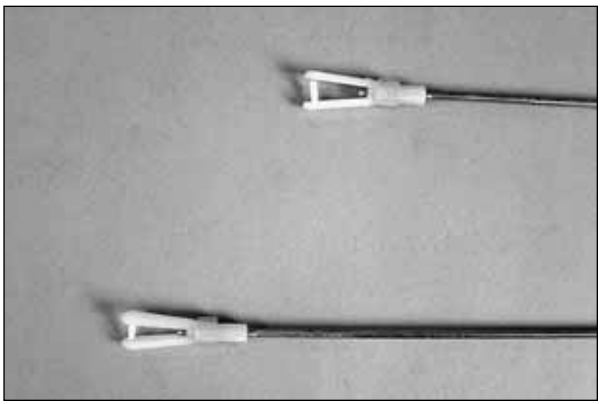


❏ 5. Wrap the hook and loop material around the notches in the radio tray.

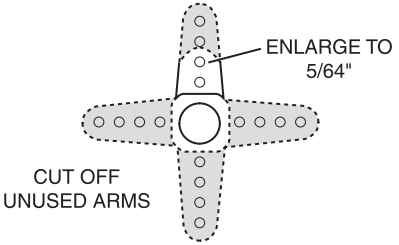
❏ 6. Maneuver the radio tray assembly into the fuselage. Squeezing or skewing the fuselage slightly while sliding the tray back will allow it to fit into place.

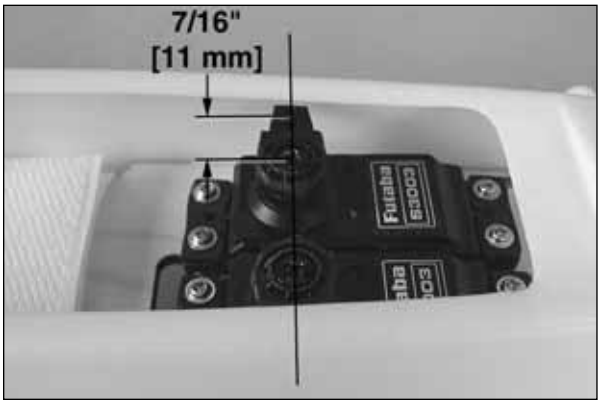
❏ 7. Position the tray so that the front tips of the tray are 3/8" [9.5mm] forward of the front mounting holes. Using a 1/16" [1.6mm] bit, drill out the six mounting holes and secure the radio tray with (6) #2 x 1/4" [6mm] screws. There are two indented mounting screw holes on each side of the fuselage and two toward the front of the radio tray.

CONNECT THE CONTROL LINKAGES

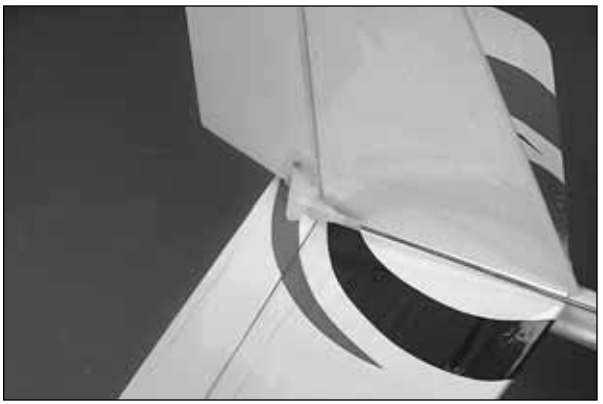


❏ 1. Thread two nylon clevises along with two silicone clevis retainers onto the two 24" [610mm] pushrods. Be sure that each clevis is threaded on approximately 14 complete rotations.



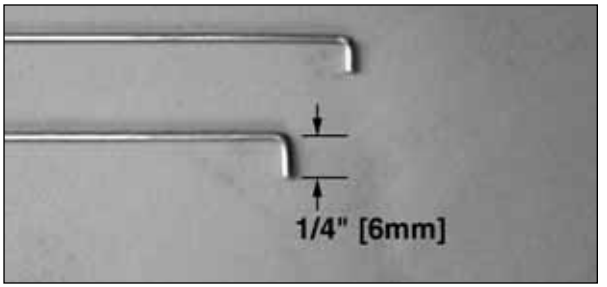


❑ 2. Center the servos by temporarily turning on your radio system. Cut off unused arms leaving only one arm on each horn. Cut off the two outer-most holes from each remaining servo arm. Enlarge the holes in the horns that are 7/16" [11 mm] from the center to accommodate the diameter of the pushrod wires. Attach servo horns opposite each other to the rudder and elevator servos.

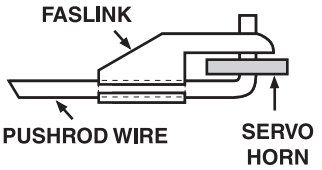


❑ 3. Slide the pushrods into the fuselage through the pushrod exit slots and temporarily connect the rudder clevis to the middle hole in the rudder control horn and the elevator clevis to the fourth outer hole in the elevator control horn.

❑ 4. Adjust the rudder and elevator so they are in the neutral position. Mark the location on each pushrod where they cross the enlarged holes in the servo horns.



❑ 5. Remove the pushrods from the fuselage and make a 90 degree bend at each mark. Cut off the excess wire leaving only ¼" [6mm] remaining after the bend.



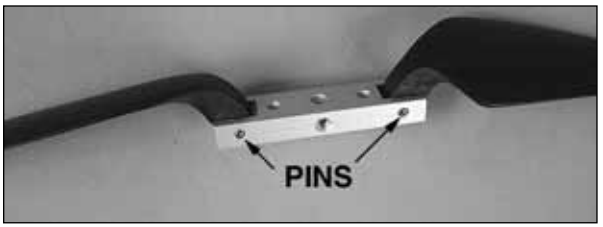
❑ 6. Reinstall the pushrods into the fuselage and connect them to the servo horns using the included Faslinks. Hook up the clevises to the control horns and secure them with the silicone clevis retainers.

INSTALL THE MOTOR & RADIO SYSTEM

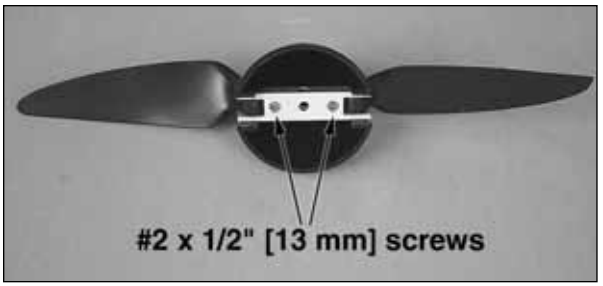
INSTALL THE MOTOR

❑ 1. Using two 3 x 8mm machine screws and two #4 flat washers, secure the **motor** to the fuselage with the plywood reinforcement plate by sliding the motor into the opening in the front of the fuselage. Align the screw holes in the motor with the hole in the firewall and reinforcement plate. Use a drop of thread-locker on each screw.

ASSEMBLE THE PROPELLER



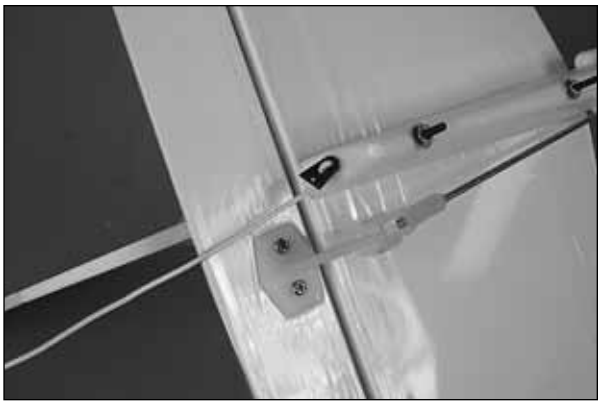
❑ 1. Attach the **folding propeller blades** to the **hub** by pressing the two 2 x 10 mm pins through the holes.



❑ 2. The **spinner** is held to the hub with two #2 x 1/2" [13 mm] screws. Use the 3 x 3mm set screw to attach the propeller assembly to the motor shaft. Be sure that the set screw is tightened against the flat cutout on the motor shaft.

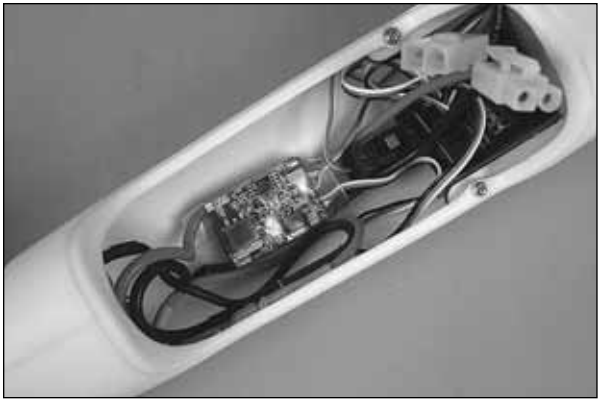
INSTALL THE ELECTRONICS

❑ 1. Loosen the hook and loop straps you installed earlier and slide the battery pack into position. Small pieces of the included self-adhesive hook and loop material attached to the underside of the pack will prevent it from sliding back and forth during flight and allow you to alter its position for balancing the model. With the self-adhesive hook and loop material attached to the front end of the battery pack, you will be able to remove and replace it without taking off the wing.

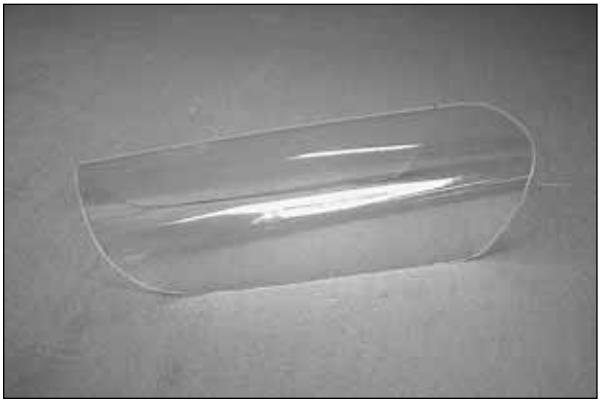


❑ 2. Install the receiver with hook and loop material in the open area in front of the battery pack. Run the antenna down the inside and out the back of the fuselage. In the example shown above, we drilled a small hole at the aft end of the fuse and used some flexible wire to fish the antenna through the hole. A strain relief made from a leftover servo arm was then installed to prevent the antenna from pulling back into the fuselage.

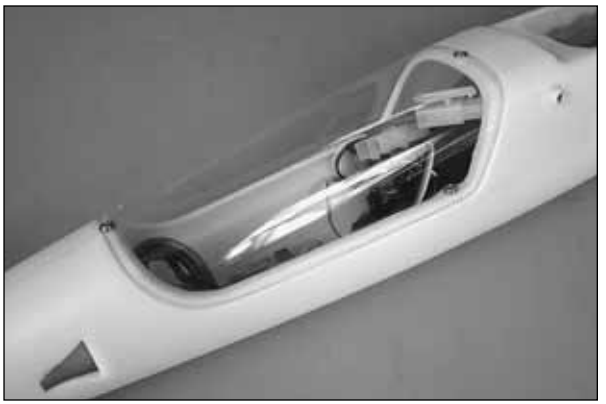
INSTALL THE CANOPY



❏ 1. Connect the included **electronic speed controller** to the motor leads and to the receiver. Using a piece of self-adhesive hook and loop material, secure the ESC to the fuselage. You can also affix the ESC switch in a convenient location. Hook the servos up to the appropriate channels on the receiver.



❏ 2. Trim the canopy along the molded-in cut lines. Test fit the canopy on the fuselage and sand as necessary until it fits well.



❏ 3. When satisfied with the fit, position it onto the fuselage and drill two 1/16" [1.6mm] holes at the front and back and secure it to the fuselage using (2) #2 x 1/4" [6mm] screws.

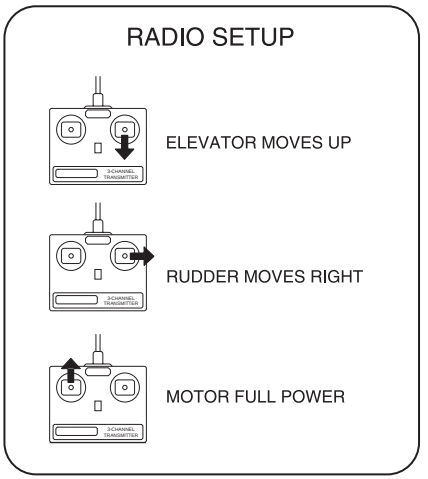
❏ 4. Slide the two wooden dowels into the dowel holes in the fuselage. The longer dowel installs in front. Center the wing onto the fuse and secure it with the included rubber bands.

GET THE MODEL READY TO FLY

CHECK THE CONTROL DIRECTIONS

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

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



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

SET THE CONTROL THROWS

Use a ruler 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. This can be accomplished by moving the clevises further outward on the control horns.

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	3/8" [10mm] up 3/8" [10mm] down	1/4" [6mm] up 1/4" [6mm] down
RUDDER	7/8" [22mm] right 7/8" [22mm] left	9/16" [14mm] right 9/16" [14mm] left

IMPORTANT: The Upstar 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 Upstar 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."

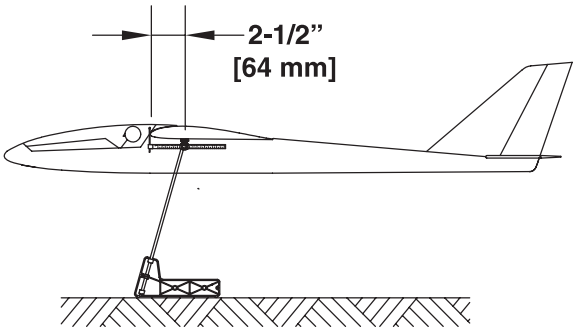
BALANCE THE MODEL (C.G.)

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 battery pack and the radio system.

❑ 1. Use a felt-tip pen or 1/8" [3mm]-wide tape to accurately mark the C.G. on the bottom of the wing on both sides of the fuselage. The C.G. is located 2-1/2" [64 mm] 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 3/8" [10mm] forward or 3/8" [10mm] 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, all parts of the model installed (ready to fly), place the model on a Great Planes CG 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. If additional weight is required, it may be easily added by using Great Planes (GPMQ4485) "stick-on" lead. Begin by placing incrementally increasing amounts of weight on the bottom of the fuse 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, have an assistant help you lift the model by the engine propeller shaft and the bottom of the fuse under the TE of the fin. Do this several times.

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

PREFLIGHT

IDENTIFY YOUR MODEL

No matter if you fly at an AMA sanctioned R/C club site or if you fly somewhere on your own, you should always have your name, address, telephone number and AMA number on or inside your model. It is **required** at all AMA R/C club flying sites and AMA sanctioned flying events.

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 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.

The included 1800mAh NiMH battery pack should be charged by a NiMH-compatible charger at no more than 1.5A. Compatible chargers available are listed on page 4 of this manual. At the 1.5A charge rate, the battery pack should take a little more than one hour to charge when fully depleted. Rates less than 1.5A will take longer to completely charge the pack. The fully charged battery pack voltage should not exceed 12V. Always monitor the battery pack during a charge. The pack may get warm during charging but should not get hotter than 125°F. If the pack gets too hot, disconnect it from the charger and allow it to cool.

RANGE CHECK

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

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

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

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 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 the model *laterally* as explained in the instructions.

❑ 5. Reinforce holes for wood screws with thin CA where appropriate (servo mounting screws, etc.).
❑ 6. Confirm that all controls operate in the correct direction and the throws are set up according to the manual.
❑ 7. Make sure there are silicone retainers on all the clevises and that all servo arms are secured to the servos with the screws included with your radio.
❑ 8. Place your name, address, AMA number and telephone number on or inside 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 field.

FLYING

MOUNT THE WING

Mount the wing to the fuselage with 6 of the included rubber bands or #64 Great Planes, Hobbico or similar rubber bands. Install them from front to back, crisscrossing the last two. Never use torn, cracked or oily rubber bands. After removing the rubber bands from your model, store them in a container with talcum powder or clay-type kitty litter to absorb oil and keep them fresh for the next flying session.

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

TRIM FLIGHTS

It is a good idea to do a couple of trim flights, without the motor running, before each flying session to make sure the plane is still in trim and the radio is working properly. The model will survive a hard landing from 5 feet much better than it will one from several hundred feet. The first few trim flights should be done over a grass field. The longer the grass the better (more cushion).

Turn on the transmitter first and then the receiver. Hold the Upstar ARF under the wing with the nose pointed slightly down and directly into the wind. Do not run the motor for these test flights. It is very important that you launch the model with the wings level and the nose pointing at a spot on the ground about 50 feet in front of you. Have a friend stand off to the side of you and tell you whether the nose is pointing up or down. Show your friend the picture above so

he will know what to look for. If the Upstar ARF is launched with the nose up or launched too hard it will climb a few feet, stall and fall nose first straight down. With the nose pointed down slightly the sailplane will accelerate down until it picks up enough flying speed then level off and glide forward. The plane should be launched with a gentle push forward. With a little practice you will be able to launch it at just the right speed so it soars straight ahead in a long and impressive glide path. Adjust the trims on your transmitter to get the plane to fly straight ahead in a smooth glide path.

Once you get the hang of launching it you can try turning the plane during the trim flights by gently applying a "touch" of right or left rudder. You can also try "flaring" the landings by slowly applying a touch of up elevator (pull the stick back) as the plane nears the ground. The Upstar ARF will continue to fly just a few inches off the ground for a surprisingly long distance. It is important you don't "over-control" the model. Make any control inputs slowly and smoothly rather than moving the transmitter sticks abruptly.

FIRST FLIGHTS

Find a BIG, OPEN field for your first flights. The bigger the better as you won't have to worry about where you need to land. Ground based objects (trees, poles, buildings, etc.) seem to attract model airplanes like a magnet. **Again, we would like to recommend that you find an experienced pilot to help you with these first flights. Note**: You need to remember that your radio control responds as if you were sitting in the cockpit. When you push the transmitter stick to the right, the rudder moves to the plane's right! This means that when the plane is flying towards you it may seem like the rudder controls are reversed (when you give "right" rudder the plane turns to your left–which is the plane's "right"). It is sometimes easier to learn to fly the plane if you always face your body in the direction the plane is flying and look over your shoulder to watch the model.

Turn on your transmitter and then your receiver and hold the model as you did for the hand launched test flights. Hold it firmly and move the throttle stick up to test the motor operation. When satisfied that everything is responding as it should, launch the model straight into the wind just as you did without the motor running. It is important that you do not throw the airplane up or it may stall an hit the ground. If you launch it level or slightly down the airplane will accelerate and start climbing on its own.

Don't worry about accomplishing very much on your first flights. Use these flights to get the "feel" of the controls and the Upstar ARF's flying characteristics. For the first few seconds of the flight allow the airplane to gently climb straight ahead. Try to keep the plane upwind and just perform some gentle "S-turns" (always turning into the wind) until it is time to set up for landing. Have a helper adjust the trims on your transmitter (a little at a time) until it has reached a comfortable soaring altitude (200' - 300'). Turn the motor off and allow the Upstar ARF to soar around, keeping the airplane upwind of yourself. When you feel its getting too low, turn the motor back on and climb back to altitude. It can be very hard for a beginner to fly a plane straight towards him as he would have to do if the plane were downwind. While the Upstar ARF is gliding have a helper to adjust the trims on your transmitter (a little at a time) until the plane will fly straight and level with the transmitter sticks in their neutral position.

When you can hear the motor starting to die off and/or the plane does not want to climb anymore it is time to shut off the motor for the last time (especially if you have BEC.) It is important to remember that you no longer have enough power to climb out again, so you only get one chance at landing. When it is time to land, just continue performing the gentle "S-turns" upwind and let the plane glide onto the ground. Don't worry about where the plane lands–just miss any trees, etc. If you need to "stretch" a landing you can switch the motor back on but do not expect it to be able to carry you very far. When NiCd Batteries start going dead, they really go dead in a hurry. An alternative to allowing the battery to become weak before shutting the motor off for good is to time the motor runs so you can leave enough "juice" in the battery for a couple of "go arounds" if needed.

Note: BEC is a system offered by most modern speed controls that allow you to get rid of the radio battery and use the motor battery as the means for supplying power to the radio. The BEC will cut power to the motor when the motor battery is low on charge but it will still give the modeler enough power to use the radio normally for a short time until landing. Keep in mind that while there is still enough charge to use the radio the motor battery is low, so you should land within 10 to 15 minutes of motor cut out time.

Practice flying directly into the wind (upwind of yourself) without letting the plane get off course, and then turn and come downwind until the plane is even with you and try it again. When you are comfortable with flying directly into the wind, start letting the plane go behind you (downwind) a little before you start back upwind. Continue this until you can fly directly towards you from downwind without getting disoriented. At this point you can start to establish a "landing pattern" and bring the sailplane in for a landing from downwind. **Always land into the wind.** This enables the plane to be flown as slowly (ground speed) as possible for accurate and damage free landings.

It is probably not a good idea to try and fly around at a low altitude with the motor on during your first flights. This will cause the airplane's speed to increase and make the controls more responsive which is just what a beginner does not need.

The Upstar ARF will climb to altitude several times on a single charge allowing you to have flights well over ten minutes without finding any "lift". You should be able to get two full climbs above 500' on a single charge although there are many factors that figure into this.

THERMAL FLYING

Thermal soaring is one of the most intriguing of all aspects of flying and the Upstar ARF was designed to excel at thermal soaring even in the hands of a novice. It can be hard for the average person to understand how a plane can fly for a long time and gain altitude **without a motor!**

FACTS ABOUT THERMALS

Thermals are a natural phenomenon that happen outside, by the millions, every single day of the year. Thermals are responsible for many things including forming several types of clouds, creating breezes, and distributing plant seeds and pollen. If you have ever seen a dust devil (which is nothing more than a thermal that has picked up some dust), you have seen a thermal in action. Their swirling action is very similar to that of a tornado but of course much gentler. Most thermals have updrafts rising in the 200 – 700 feet per minute range but they have been known to produce updrafts of over 5,000 feet per minute (that's over 50 miles/hour straight up!) These strong thermals can rip a plane apart or carry the plane out of sight before the pilot can get out of the updraft.

Thermals are formed by the uneven heating of the earth and buildings, etc. by the sun. The darker colored surfaces absorb heat faster than the lighter colors which reflect a great deal of the sun's energy back into space. These darker areas (plowed fields, asphalt parking lots, tar roofs, etc.) get warmer than the lighter areas (lakes, grassy fields, forests, etc.). This causes the air above the darker areas to be warmer than the air over the lighter areas and the more buoyant warm air rises as the cooler, denser air forces its way underneath the warmer air. As this warm air is forced upward it contacts the cooler air of the higher altitudes and this larger temperature difference makes the thermal rise quicker. The thermal is gradually cooled by the surrounding cooler air and its strength diminishes. Eventually the thermal stops rising and any moisture contained in the once warm air condenses and forms a puffy cumulus cloud. These clouds, which mark the tops of thermals, are usually between 2000 and 5000 feet high.

THERMAL SOARING

It takes a lot of concentration to thermal soar effectively. An electric sailplane can fly along the edge of a thermal and unless the pilot is carefully watching the model he may not realize the opportunity to gain some altitude. Because most thermals are relatively small (a couple hundred feet in diameter or less at 400' altitude) compared to the rest of the sky, the sailplanes will rarely fly directly into the thermal and start rising. Generally, the electric sailplane will fly into the edge or near a thermal and the effects the thermal has on the plane may be almost unnoticeable. As the electric sailplane approaches a thermal, the wing tip that reaches the rising air first will be lifted before the opposite wing tip. This causes the plane to "bank" and turn away from where we would like the plane to go.

When you are thermal soaring, try to fly as smoothly and straight as possible. Trim the plane to fly in a straight line and only touch the controls when you have to. Watch the electric sailplane carefully and it will tell you what it is encountering. When the electric sailplane flies directly into a thermal it will either start rising or stop sinking. Either case is reason enough to start circling (especially in a contest where every second counts). Fly straight ahead until you feel like you are in the strongest lift, fly a couple of seconds farther (so your circle will be centered in the strongest lift) and then start circling in a fairly tight but smooth turn. When the electric sailplane is low the turns have to be tighter to stay in the strongest lift. As the plane gains altitude, the turns can be larger and flatter. The flatter the turn, the more efficient the plane is flying, but don't be afraid to really "crank" it into a steep bank when

you are low. If you see the plane falling off on one side of the turn, move your circle over into the stronger lift. Thermals move along with the wind so as you circle you will be swept along with it. Be careful when thermaling, that you don't get so far downwind you can't make it back to the field to land.

If the electric sailplane is flying along straight and all of a sudden turns, let the plane continue to bank (you may have to give it some rudder to keep it banking) until it has turned 270-degrees (3/4 of a full circle). Straighten out the bank and fly into whatever turned the plane. If you encounter lift, and you won't every time, start circling just as you did when flying directly into a thermal.

Thermals are generated all day long, but the strongest thermals are produced when the sun is directly overhead. 10:00 am – 2:00 pm seems to be the best time to get those "killer" thermals. Some of these thermals can be very large and you may find it hard to get out of them. If you find yourself getting too high, don't dive the plane to get out of the lift. Sailplanes are very efficient aircraft and they will build up a lot of speed and could "blow up" in the rough air of a thermal. The easiest way to lose altitude is to apply full rudder and full up elevator. This will put the plane into a tight spin that will not over stress the airframe but it will enable it to lose altitude very quickly. This is especially helpful if the sailplane gets sucked into a cloud or it gets too high to see. The twirling action will give the sun a better chance of flashing off of the wing and catching your attention. When you are high enough and want to leave the thermal, add a little down trim to pick up some speed and fly 90 degrees to the direction of the wind. If you are not real high and want to find another thermal, you may want to look upwind of the last thermal. The same source that generated this thermal is probably producing another. Just watch out for "sink" which is often found behind and between thermals.

As you might expect, with all this air rising, there is also air sinking. This air is the electric sailplane pilot's nightmare that can really make soaring challenging. "Sink" is usually not as strong as the thermals in the same area, but it can be very strong. Down drafts of many hundreds of feet per minute are common on a good soaring day. These down drafts can make a sailplane look like it is falling out of the air. Because of this, it is important that you do not let the sailplane get too far downwind.

When encountering sink, immediately turn and fly 90 degrees to the direction of the wind (towards you if possible). Apply a little "down elevator" and pick up some speed to get out of the sink as fast as possible. Every second you stay in the sink is precious altitude lost.

POINTERS FOR CONTEST SOARING

Pay Attention! – Pay close attention to the electric sailplanes flying before you, watch them and try to establish where and when the thermals are being formed. Thermals are often formed in cycles and can be fairly regular, so if you keep track of the time intervals you will have a pretty good idea of when and where a thermal may be generated.

Watch The Birds! – Thermals suck up small insects that many birds love to eat. A bunch of swallows flying around in one area may indicate a thermal. Soaring birds (hawks, vultures, eagles etc.) are the best thermal indicators. They not only show you where the thermal is but they also show you where the center is. These "Masters of the Sky" will often fly right along with electric sailplanes.

Practice Those Landings! – Most thermal contests are won or lost during the landing. Establish a particular landing pattern and try to stick to it for all landings. Learn to shift your pattern to account for the wind and the particular flying field characteristics.

Concentrate – Keep your eye on your electric sailplane during your contest flights. Have a helper or your counter watch the other planes in the air. Sometimes your electric sailplane will wiggle so quickly or gently that you may miss it if you are not paying close attention. If you find a productive thermal, don't leave it because your helper tells you that someone else has found a different one.

Know Your Electric Sailplane! – Learn what your electric sailplane will and won't do and fly within this envelope. This will allow you to ride thermals downwind while knowing when you have to head back to make your landing safely.

Learn From The Wind! – Keep track of which way the wind is blowing. If the wind suddenly shifts, there is some thermal action fairly close to you. The air is probably being either sucked up into a thermal or falling out of some sink. In either case it is often a good idea to fly in the direction the wind is blowing if your sailplane is in the general area. This will take you towards a thermal if there is one or away from the sink, both of which are desirable.

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