FANCAIR ES ARF EP

INSTRUCTION MANUAL

Wingspan: 43 in [1090 mm]
Wing Area: 237 sq in [15.3 dm²]
Weight: 26 – 32 oz [735 – 905 g]
Wing Loading: 15.8 – 19.4 oz/sq ft [48 – 59 g/dm²]
Length: 31 in [785 mm]
Radio: 4-channel with four micro servos and micro receiver

WARRANTY

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

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

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

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

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

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

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

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

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INTRODUCTION

The Great Planes Lancair ES EP ARF is a quick building scale park flyer that has everything you need except radio and servos to get you into the air in about 4 to 6 hours. A 4-channel radio, with four micro servos and a micro receiver, provides aileron control as well as a steerable nose gear. Fiberglass fuselage, wheel pants, cowl, and wing tips recreate the unique contours of the Lancair ES as well as easing the assembly.

Flying the Lancair ES EP ARF is extremely smooth and predictable. Takeoffs are scale-like with graceful flaring of the nose as the model generates air speed. Landings allow a soft touch down on the main wheels first, with the plane slowly settling back down on the nose wheel as it slows to taxi speeds. Even with a short 43 inch [1090 mm] wingspan, the Lancair ES EP ARF demonstrates the steady flight characteristics of larger models and will surely be an attention-getter at the flying field.

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

AMA

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

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

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

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

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

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

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

4. You must use an R/C radio system that is in first-class condition and correctly sized components (servos, wheels, etc.) throughout the building process.

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

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

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

8. **WARNING:** The fuselage, cowl, wheel pants and wing tips included in this kit are made of fiberglass, the fibers of which may cause eye, skin and respiratory tract irritation. Never blow into a part (wheel pant, cowl) to remove fiberglass dust, as the dust will blow back into your eyes. Always wear safety goggles, a particle mask and rubber gloves when grinding, drilling and sanding fiberglass parts. Vacuum the parts and the work area thoroughly after working with fiberglass parts.

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

Radio Equipment

A 4-channel radio system with a micro receiver and four micro servos are the minimum requirements for the Lancair EP ES 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:

- ❏ (4) Futaba S3103 Servo Micro Mini (FUTM0037)
- ❏ Futaba R114F 4-channel FM micro receiver w/o crystal (low band – FUTL0442, high band – FUTL0443)
- ❏ Futaba FM single conversion receiver crystal for R114F (low band – FUTL62**, high band – FUTL63**)

If you plan to purchase a complete radio system, the Futaba 4YF micro system is packaged with the Futaba R114F and two S3108 micro servos. You will need to purchase an additional two micro servos. The order numbers are provided.

- ❏ Futaba 4YF 4-Channel Micro FM/2 S3108 Servos (FUTJ37**)
- ❏ (2) Futaba S3108 Servo Micro 7.6 g (FUTM0042)

Since the Lancair ES EP ARF uses dual aileron servos, a Y-harness will be required to connect the servos together as well as one 9" [230 mm] servo extension. The order numbers are provided below:

- ❏ Futaba 6" Dual Servo Extension J (FUTM4130)
- ❏ Futaba 9" Servo Extension J (FUTM3910)

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. A Deans male ultra plug will also be necessary (soldering is required):

- ❏ Great Planes ElectriFly Peak 400 DC 1-10C Peak Charger (GPMM3001)
- ❏ Deans 2-Pin Ultra Plug (WSDM3001)

For a more advanced computerized charger, we recommend the Great Planes Triton™ charger. 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):

- ❏ Great Planes ElectriFly Triton™ DC Competition Peak Charger (GPMM3150)
- ❏ Deans Male Ultra Pigtail (WSDM2013)
- ❏ Hobbico® Banana Plugs (6) (HCAP0310)

ADDITIONAL ITEMS REQUIRED

Required Hardware & Building Supplies

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

- ❏ #1 Hobby knife (HCAR0105)
- ❏ #11 Blades (5-pack, HCAR0211)
- ❏ Drill bits: 1/16" [1.6 mm], 5/64" [2 mm]
- ❏ 1/2 oz. [15 g] Thin Pro™ CA (GPMR6001)
- ❏ 1/2 oz. [15 g] Medium Pro CA+ (GPMR6007)
- ❏ 220-grit Sandpaper (GPMR6185)
- ❏ Denatured alcohol (for epoxy clean up)
- ❏ Pro™ 30-minute epoxy (GPMR6047)
- ❏ Great Planes Metric Ball Wrench 1.5 mm (GPMR8010)

Optional Supplies & Tools

Here is a list of optional tools that will help you build the Lancair ES EP ARF.

- ❏ 21st Century® sealing iron (COVR2700)
- ❏ 21st Century iron cover (COVR2702)
- ❏ Hobbico® 60 watt soldering iron (HCAR0776)
- ❏ Hayes Large Clamp 4" (HAYR1106)
- ❏ Great Planes Precision Z-bend Pliers (GPMR8025)
- ❏ 4 oz. [113 g] Aerosol CA activator (GPMR634)
- ❏ CA applicator tips (HCAR3780)
- ❏ CA debonder (GPMR6039)
- ❏ Epoxy brushes (6, GPMR8060)
- ❏ Mixing sticks (50, GPMR8055)
- ❏ Mixing cups (GPMR8056)
- ❏ Builder's Triangle Set (HCAR0480)
- ❏ 36" Metal ruler (HCAR0475)
- ❏ Pliers with wire cutter (HCAR0630)
- ❏ Hobbico Duster™ can of compressed air (HCAR5500)
- ❏ Panel Line Pen (TOPQ2510)
- ❏ Rotary tool such as Dremel®
- ❏ Hobby Heat™ Micro Torch II (HCAR0755)
- ❏ CG Machine™ (GPMR2400)
- ❏ Precision Magnetic Prop Balancer™ (TOPQ5700)
- ❏ AccuThrow™ Deflection Gauge (GPMR2405)
- ❏ Top Flite® MonoKote® heat gun (TOPR2000)

IMPORTANT BUILDING NOTES

- There are two types of screws used in this kit:

- **Self-tapping (sheet metal) screws** are designated by a number and a length and are referred to as *self-tapping screws*. For example 2.6 x 8 mm [7/64" x 5/16"].

This is a metric 2.6 mm diameter screw that is 8 mm long.

- **Machine screws** are designated by a number and a length and are referred to as *machine screws*. For example 3 x 12 mm [1/8" x 7/16"].

This is a metric 3 x 12 mm machine screw that is 3 mm in diameter and is 12 mm long.

Note: For accuracy, metric screws will be written with the actual metric dimensions first followed by the SAE equivalent in brackets. All other dimensions provided in the building instructions will be written in English units first followed by the metric equivalent in brackets.

- 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 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.

ORDERING REPLACEMENT PARTS

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

To locate a hobby dealer, visit the Hobbico web site at **www.hobbico.com**. Choose "Where to Buy" at the bottom of the menu on the left side of the page. Follow the instructions provided on the page to locate a U.S., Canadian or International dealer. If a hobby shop is not available, replacement parts may also be ordered from Tower Hobbies® at **www.towerhobbies.com**, or by calling toll free (800) 637-6050.

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

Mail parts orders and payments by personal check to:

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

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

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

Replacement Parts List

Order Number	Description	How to Purchase
	Missing pieces	Contact Product Support
	Instruction manual	Contact Product Support
	Full-size plans	Not available
GPMA2890	Wing Kit	Contact Hobby Supplier
GPMA2891	Fuse Kit	Contact Hobby Supplier
GPMA2892	Tail Set	Contact Hobby Supplier
GPMA2893	Cowl	Contact Hobby Supplier
GPMA2894	Canopy	Contact Hobby Supplier
GPMA2895	Landing Gear	Contact Hobby Supplier
GPMA2896	Wheel Pants	Contact Hobby Supplier
GPMA2897	Spinner	Contact Hobby Supplier
GPMG0325	Motor	Contact Hobby Supplier
GPMG0225	Gearbox	Contact Hobby Supplier

METRIC CONVERSIONS

1" = 25.4 mm (conversion factor)

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

COMMON ABBREVIATIONS

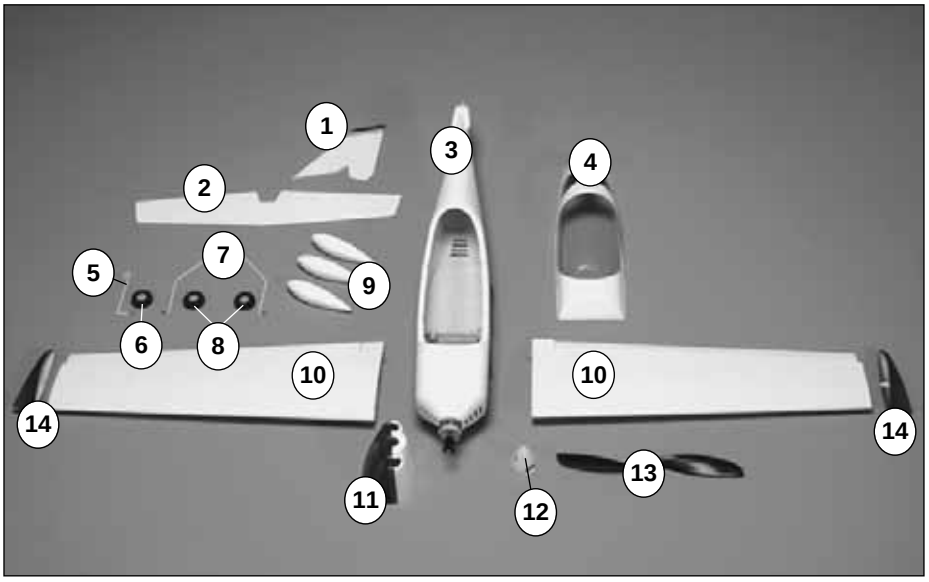
Fuse = Fuselage
Stab = Horizontal Stabilizer
Fin = Vertical Fin
LE = Leading Edge
TE = Trailing Edge
LG = Landing Gear
Ply = Plywood
" = Inches
mm = Millimeters
SHCS = Socket Head Cap Screw

KIT INSPECTION

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

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

KIT CONTENTS



Kit Contents

1. Vertical Stabilizer & Rudder
2. Horizontal Stabilizer & Elevators
3. Fuselage
4. Canopy
5. Nose Gear
6. Nose Wheel
7. Main Landing Gear (L&R)
8. Main Wheels (2)
9. Wheels Pants (3)
10. Wing Panels w/Ailerons (L&R)
11. Cowl
12. Spinner
13. 9x6 Propeller
14. Wing Tips (L&R)

Kit Contents (not photographed)

Hook & Loop Material
(3) Nose Wire Brackets
3 x 20 mm [1/8" x 1/8"] Machine Screw
3 mm [1/8"] Wheel Collar
2-56 x 1/8" [25 mm] Threaded Rod
3/32" [2.4 mm] Wheel Collars
(2) Anti-Rotation Pins
(14) 2.6 x 8 mm [7/64" x 5/16"] Self-Tapping Screws
(4) 2.6 x 10 mm [7/64" x 3/8"] Self-Tapping Screws
(5) Screw-Lock Pushrod Connectors

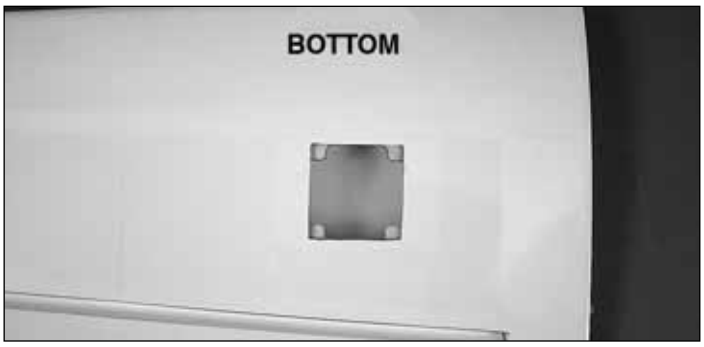
(2) 2.6 x 8mm [7/64" x 5/16"] Spinner Screws
(3) 4-40 x 1/4" [6 mm] Socket Head Cap Screws
(2) Landing Gear Straps
(4 pcs) Heat-Shrink Tubing
(4) Main Wheel Retainers
(2) Nose Wheel Retainers
(3) 8-7/8" [225 mm] Pushrod Wires
(2) 1/4" x 1/4" x 12" [6 x 6 x 305 mm] Balsa Sticks
1800mAh 9.6V NiMH Battery pack

Electronic Speed Control (ESC)
(4) Control Horns w/Backplates
(2) 2-7/8" [73 mm] Aileron Pushrods
1/4" x 9-3/4" [6 x 247 mm] Carbon Wing Joiner Tube
Radio Tray Brace
Radio Tray
Vertical Radio Tray Support
(2) Main Wheel Pant Straps
Nose Wheel Pant Strap

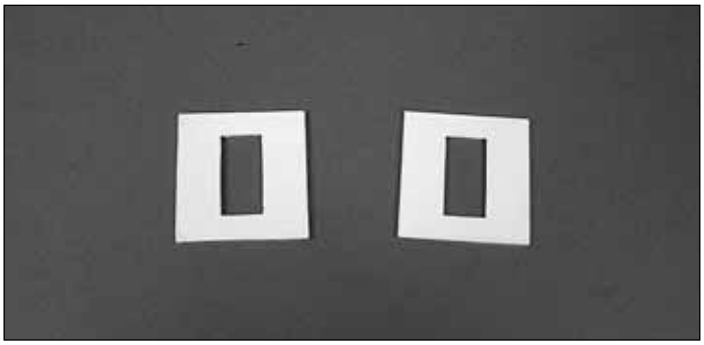
BEFORE YOU BEGIN

Before you begin assembly, take a moment to inspect the covering on the wing panels and tail section. Use a heat gun or covering iron to tighten any wrinkled or loose covering. Be careful when applying heat around the clear hinge tape holding the ailerons, elevator, and rudder in place. Excess heat in these areas could cause the tape to lift.

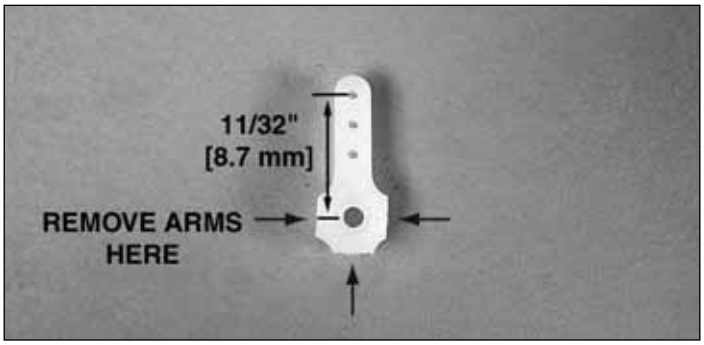
ASSEMBLE THE WING

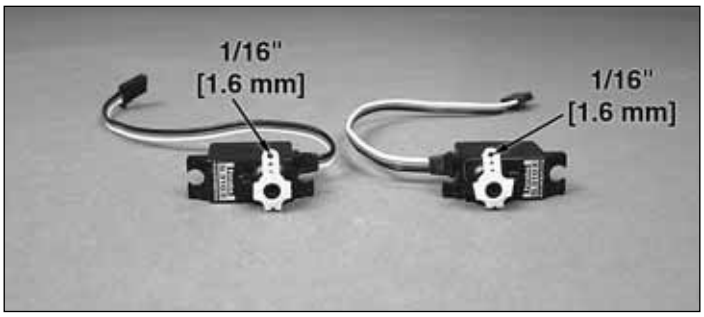


❏ 1. Locate the aileron servo bays by holding the **wing panels** up to a light source or gently pressing against the covering looking for the edges of these cutouts. Use a sharp hobby knife to trim the covering away from the servo bays.

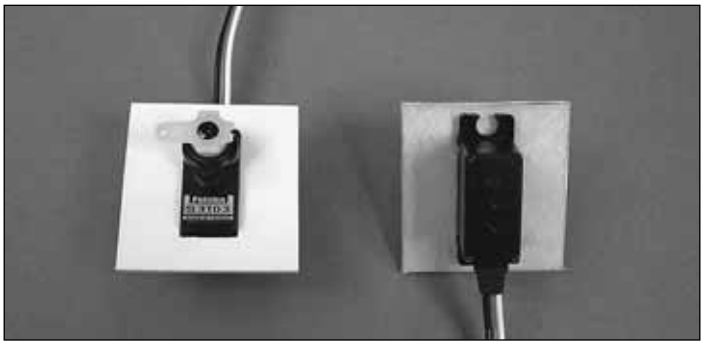


❏ 2. Trim the covering away from the slots in the **servo bay covers**.

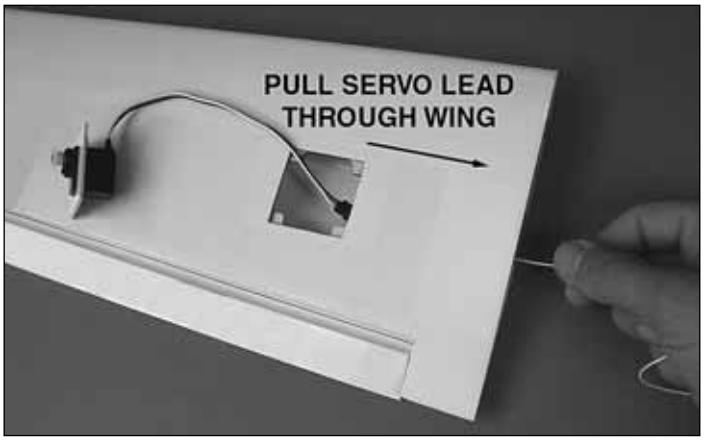




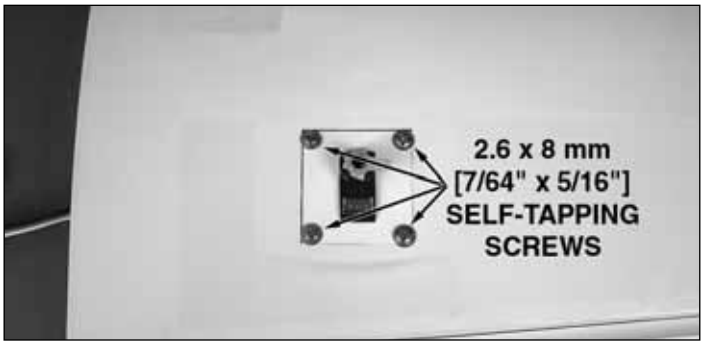
❏ 3. Cut off three arms from two four-arm servo horns leaving one of the long arms intact as shown. Attach the servo horns at a right angle to the servos using the screws included with the servos. Enlarge the outer holes of the servo horns with a 1/16" [1.6 mm] drill bit.



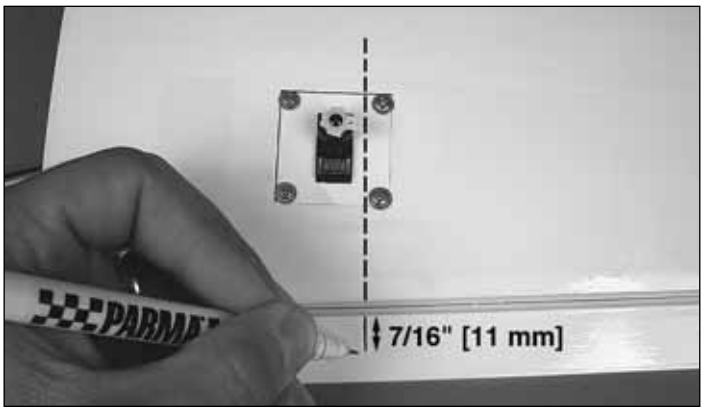
❏ 4. We recommend gluing the aileron servos to the servo bay covers with medium CA glue. Insert the servos through the underside of the covers and apply epoxy around each servo mounting tab to secure them. If you do not wish to glue the servos in place, you can insert the servos through the top of the covers and screw them in place using the hardware included with the servos. You will need to glue mounting blocks made from scrap hardwood to the underside of the covers for the servo screws.



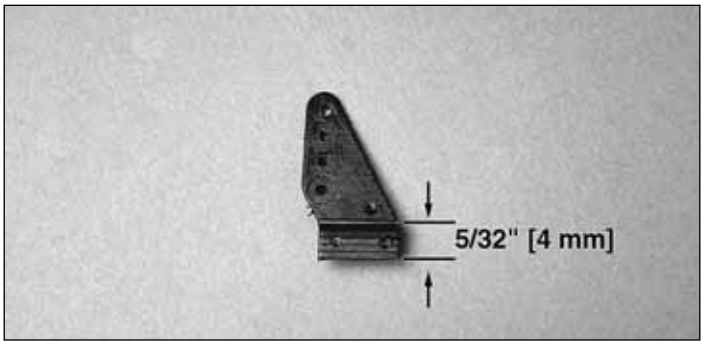
❏ 5. Remove the tape holding the end of the servo wire draw-strings inside the servo bays. Tie these ends to the servo connectors and use the string to pull the servo leads through the wing ribs.



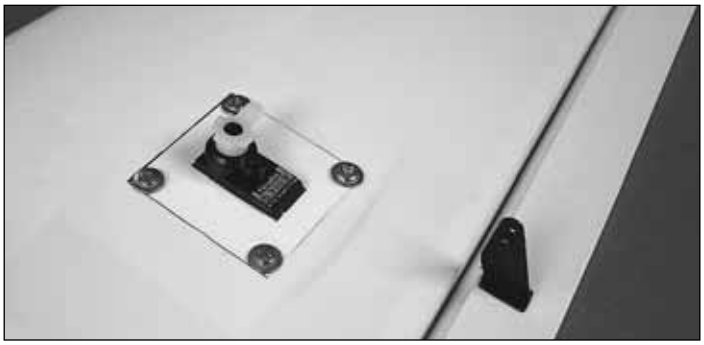
❏ 6. You can either glue the servo bay covers in place or use eight 2.6 x 8 mm [7/64" x 5/16"] self-tapping screws. It is recommended to glue the covers in place for a cleaner look. However, the servos will be more difficult to replace should it be necessary in the future. If you use screws, position the covers onto the wing panels and drill 5/64" [2 mm] holes in each of the four corners of the covers. Thread a 2.6 x 8 mm [7/64" x 5/16"] screw into each hole and back it out. Apply a drop of thin CA glue to the holes and allow it to fully harden. Secure the covers to the wings with the screws.



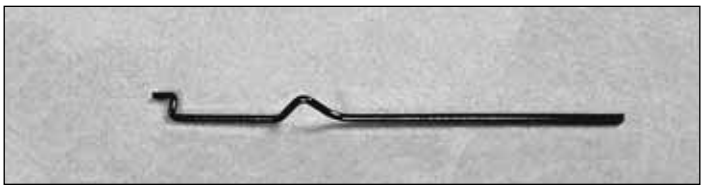
❏ 7. Make a mark 7/16" [11 mm] long on each **aileron** perpendicular to the aileron hinge and in line with the outer hole of the servo horn.

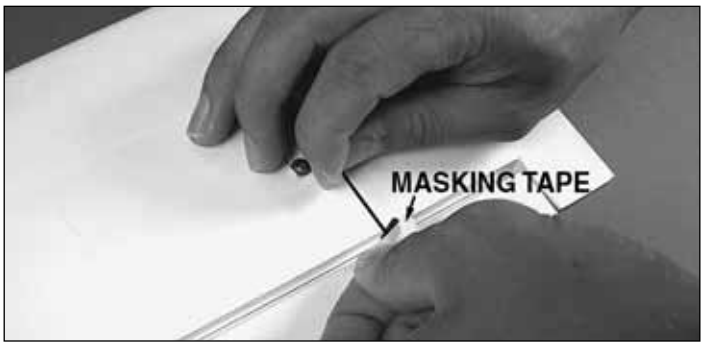


❏ 8. Trim the bottom tabs of two control horns so that only 5/32" [4 mm] remains.

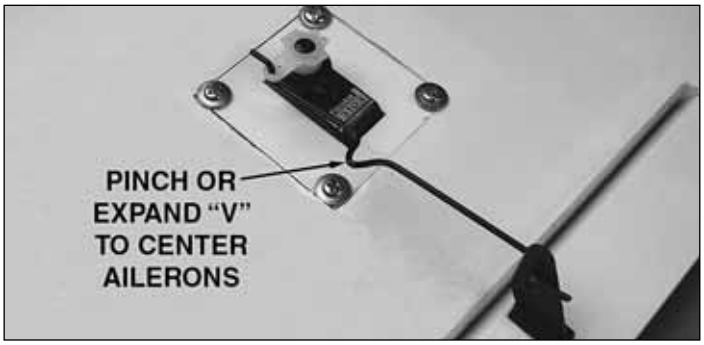


❏ 9. Use a hobby knife along the marks you made to remove enough material to accommodate the control horn tabs. Do not cut all the way through the ailerons. Test fit the control horns into the slots, being sure the horns fully seat onto the ailerons. When satisfied with their fit, coat the control horn tabs with medium CA glue and press them into place.

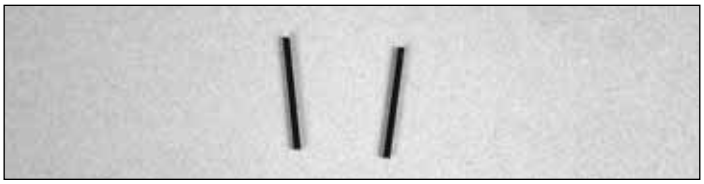


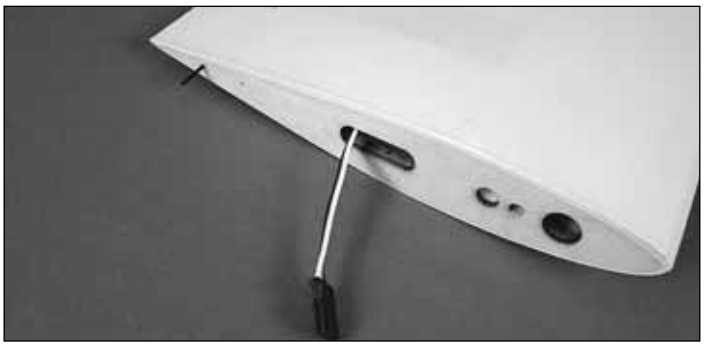


❏ 10. Double check that the servo horns are perpendicular to the servos. Fit the Z-bend in the 2-7/8" [73 mm] **aileron pushrod** into the outer hole of the servo horn. While holding the aileron in the neutral position, stick a piece of masking tape onto the pushrod where it crosses the holes in the control horn.



❏ 11. Remove the servo horns from the servos. Make a Z-bend at the masking tape of each pushrod. Fit the Z-bends you just made into the third holes on the control horns and reattach the servo horns to the servos. Small adjustments can be made on the pushrods to bring the ailerons to the neutral position by pinching or expanding the "V"-shaped bend with pliers.

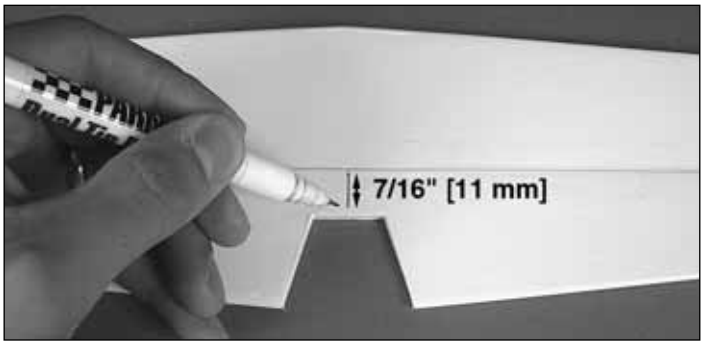




❏ 12. Glue the **anti-rotation pins** into the aft holes of the wing root ribs.

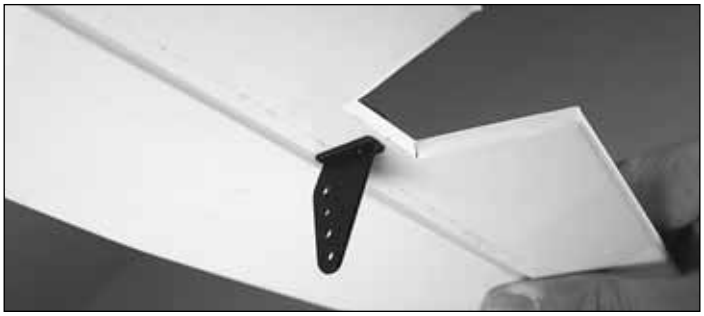
ASSEMBLE THE TAIL SECTION

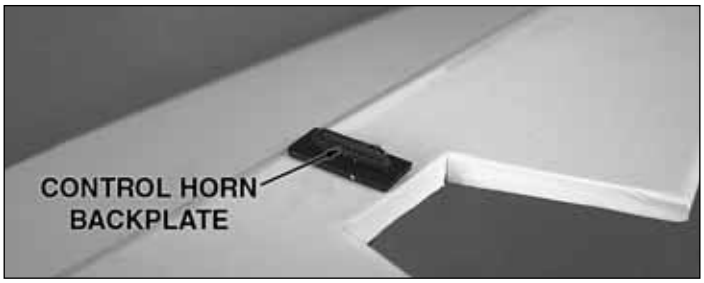
Install the Stabilizer



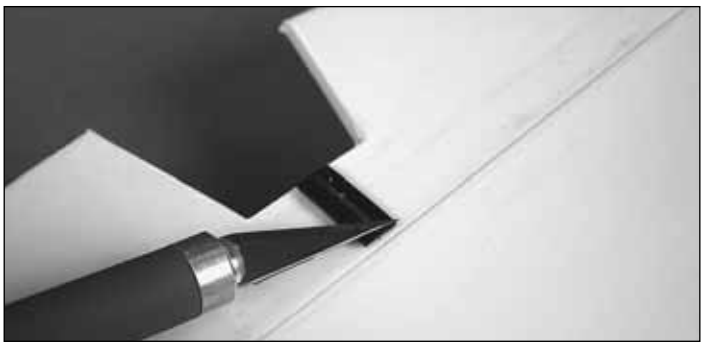
❏ 1. Draw a line 7/16" [11 mm] long just aft of the leading edge centered on the top of the **elevator** (the beveled leading edge of the elevator is the bottom).

❏ 2. Use a hobby knife to cut away the material at the line for the elevator control horn. Unlike the ailerons, the elevator control horn will pass all the way through the elevator.

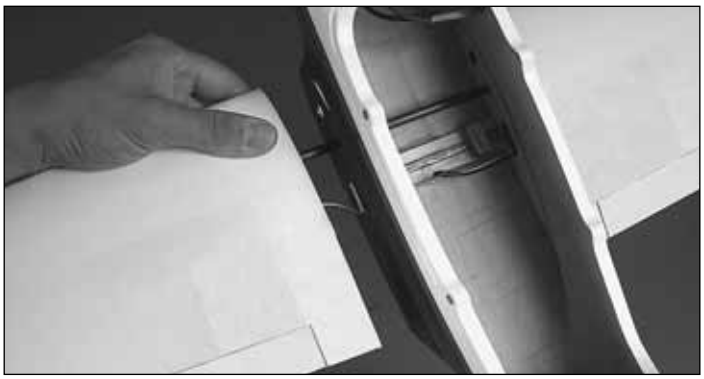




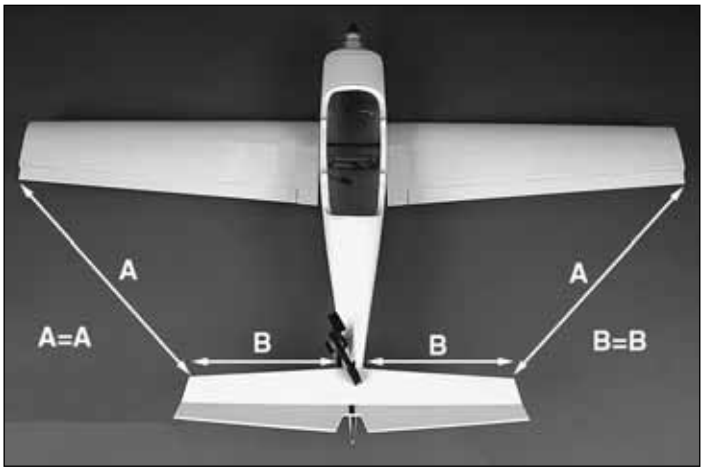
❏ 3. Test fit the control horn into the slot by pushing it up through the bottom of the elevator until it is fully seated. Press a control horn backplate onto the tab from the top. This step is just to confirm fit. Do not add any glue until instructed to do so.

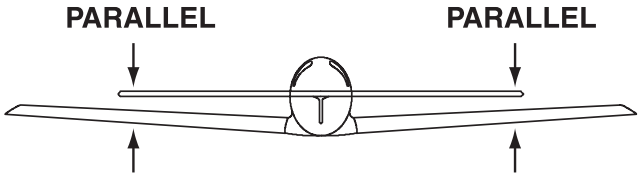


❏ 4. Trim off the portion of the control horn tab that protrudes beyond the backplate.



❏ 5. Temporarily install the wing panels onto the **fuselage** by inserting the 1/4" x 9-3/4" [6 x 247 mm] carbon **wing joiner tube** into the fuselage and sliding the wing panels onto the tube. The anti-rotation pins will fit into mating holes in the fuselage.





❏ 6. Align the **horizontal stabilizer** onto the fuselage by measuring the distances between the trailing edge wing tips and making them equal on both sides. Also, center the stabilizer left and right onto the fuselage and be sure the stab is positioned as far forward as it will go. Stand back several feet and look at the model from behind. Confirm that the wing and stab are parallel. Adjust the area where the stab sits on the fuse as necessary until they are parallel. The elevator control horn will fit into the slot at the aft end of the fuselage. A clamp is extremely useful in this step to hold the position of the stab onto the fuse.

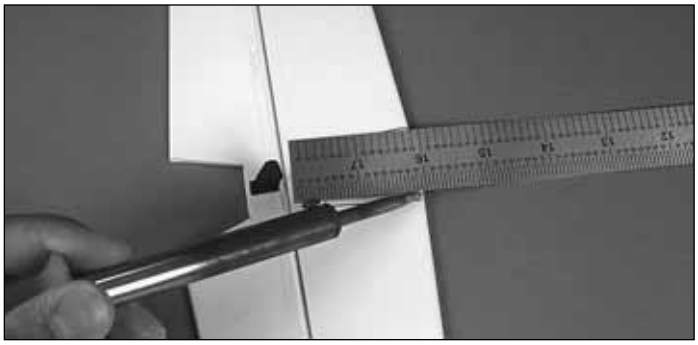
❏ 7. Trace around the fuselage onto the underside of the stabilizer with a felt-tip or panel line pen.

❏ 8. Remove the stabilizer from the fuselage. Cut away the covering just inside your lines on the underside of the fuselage. If you use a hobby knife to cut the covering, be careful not to cut the balsa wood underneath which could result in compromising the strength of the stabilizer.

EXPERT TIP

HOW TO CUT COVERING FROM BALSA

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

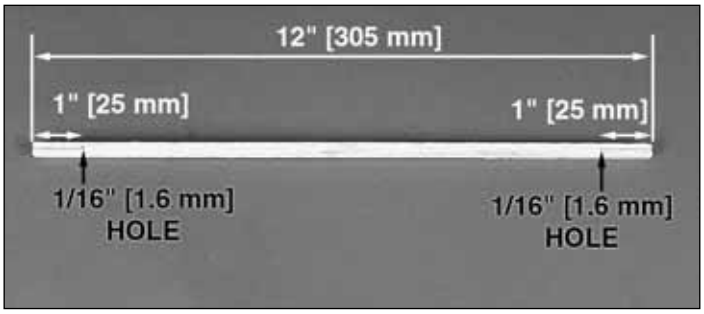


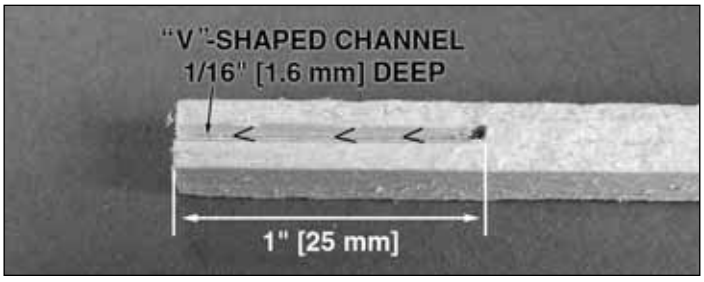
Use a straightedge to guide the soldering iron at a rate that will just melt the covering and not burn into the wood. The hotter the soldering iron, the faster it must travel to melt a fine cut. Peel off the covering.Use a straightedge to guide the soldering iron at a rate that will just melt the covering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

❏ 9. Roughen up the portion of the fuselage with sandpaper where the stabilizer will be installed. Clean the area with

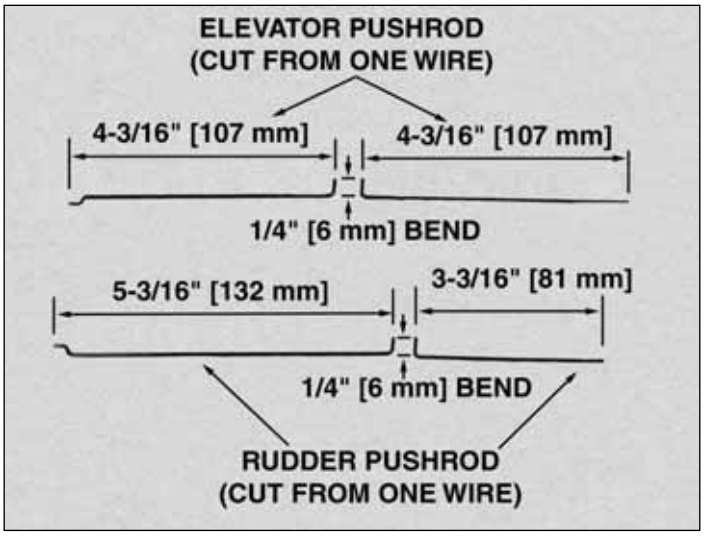
denatured alcohol. Mix up a small batch of 30-minute epoxy and glue the stabilizer into position using the lines you drew in step 7. Wipe away any excess epoxy with denatured alcohol. Clamp the stab in place and allow the epoxy to cure undisturbed.

Build the Pushrods

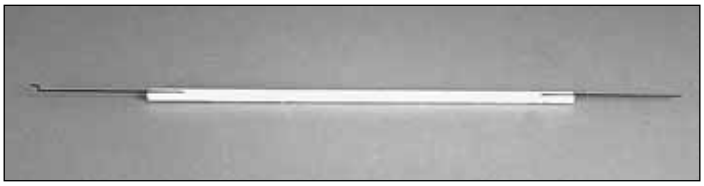




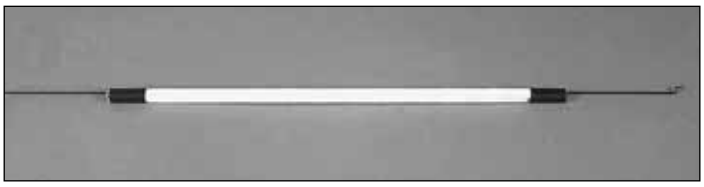
❏ 1. Locate the two 1/4" x 1/4" x 12" [6 x 6 x 305 mm] balsa sticks. Make a mark 1" [25 mm] from each end on the center of both sticks. Drill a 1/16" [1.6 mm] hole at all four marks. Use a hobby knife to carve a "V"-shaped channel 1/16" [1.6 mm] deep from the holes to the ends of the sticks. Put a drop of thin CA glue into each hole and three drops into each "V" channel.



❏ 2. Cut the 8-7/8" [225 mm] **elevator** and **rudder pushrods** into the lengths shown in the picture above. Make a 1/4" [6 mm] long 90° bend at each end of the cuts. One 8-7/8" [225 mm] pushrod wire will remain uncut for the steerable nose gear.

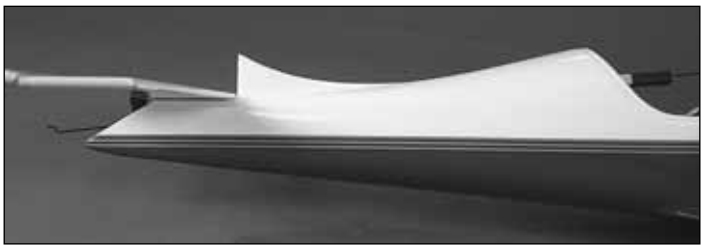


❏ 3. Fit the ends of the pushrod wires that you bent into the holes in the balsa sticks, allowing the wire to rest in the "V" channel as shown.

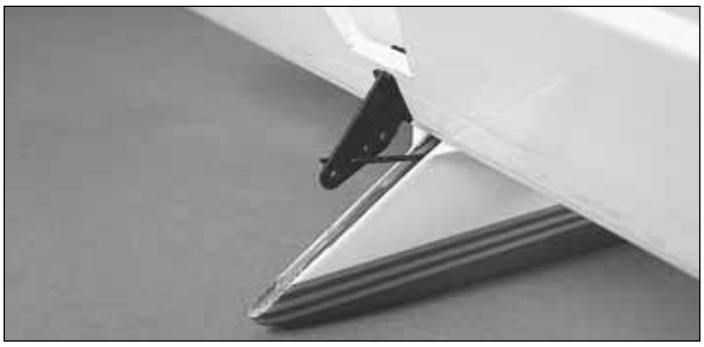


❏ 4. Slide a 1" [25 mm] piece of **heat-shrink tubing** onto each end of the balsa sticks, overlapping the portion of the pushrod wires resting in the "V" channel. Use a heat gun to shrink the tubing tight over the sticks. These completed assemblies will now be referred to as the elevator and rudder pushrods throughout the rest of the manual.

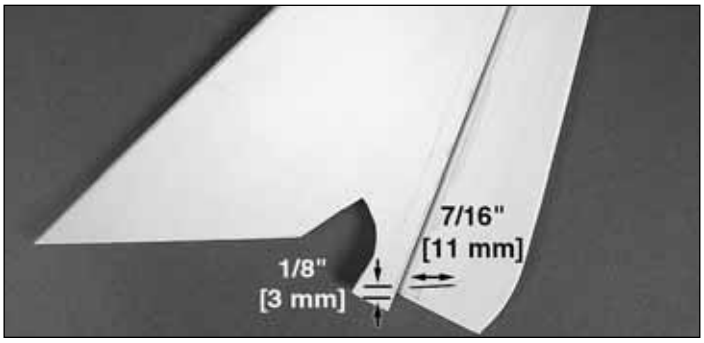
Finish the Tail Section



❏ 1. Insert a pushrod into the fuselage through the canopy opening with the Z-bend exiting the slot at the back of the fuselage below the elevator.

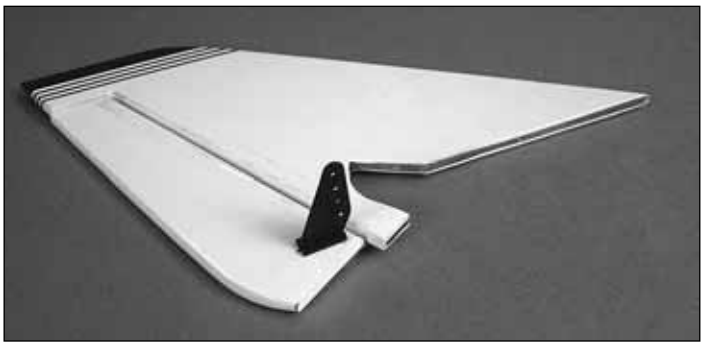


❏ 2. Pull out the control horn from the elevator. Connect the Z-bend in the pushrod to the third hole in the control horn. Apply a bit of medium CA glue to the base of the control horn tab and reinsert it into the elevator. Replace the control horn backplate and add a drop or two of CA to secure it in place.

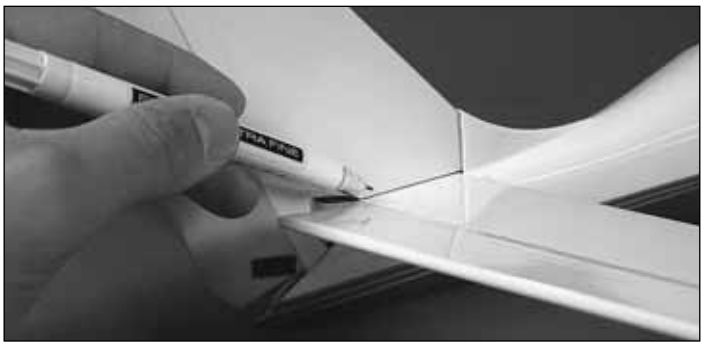


❏ 3. Make a 7/16" [11 mm] long mark 1/8" [3 mm] above the bottom of the hinge line on the left side of the **rudder**. The mark should be just behind the bevel on the leading edge of the rudder.

❏ 4. As you did with the elevator, use a hobby knife to cut out balsa from the line equal to the thickness of a control horn tab.



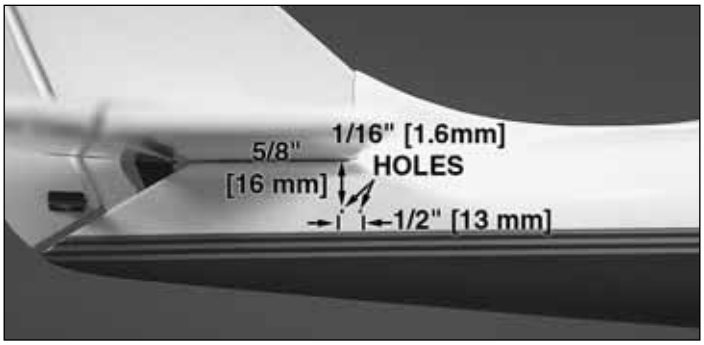
❏ 5. Test fit a control horn in the slot and press a backplate onto the tab. Trim off the excess tab protruding beyond the backplate. If the backplate interferes with the fin when the rudder is deflected, mark the backplate where it needs to be trimmed. Do not glue the control horn to the rudder until instructed to do do.



❏ 6. Fit the rudder and **fin** into place by sliding it into the slot in the fuselage above the stabilizer. The aft end of the fin fits into the fuselage just behind the elevator control horn. Use a pen to mark lines where the fin fits into the fuselage as well as where it sits on top of the stabilizer.

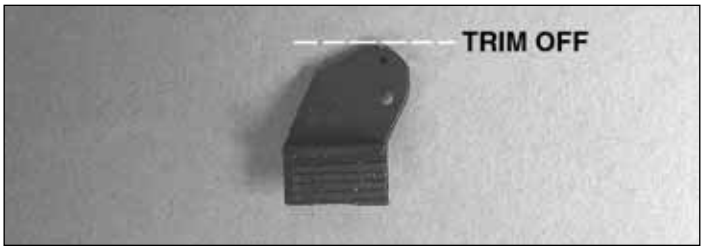
❏ 7. Trim the covering just inside the lines you drew on the vertical fin and horizontal stabilizer. Use alcohol to wipe away the lines from the fin and the top of the stab.

❏ 8. Mix up a batch of 30-minute epoxy. Coat the areas of wood where you trimmed the covering from the fin as well as the underside of the fin where it sits on top of the stab. Press the rudder into place and use clamps to secure it. Wipe away excess epoxy with denatured alcohol.



❏ 9. Drill two 1/16" [1.6 mm] holes spaced 1/2" [13 mm] apart on the right side of the fuselage for the rudder pushrod

slot. The forward hole should be inline with the leading edge of the stab and 5/8" [16 mm] below it as shown in the picture. Use a hobby knife to carve out the material between the holes to finish the pushrod exit slot. Test fit the rudder pushrod through the fuselage exiting out of the slot and make any adjustments to the slot as necessary to prevent the pushrod from rubbing.



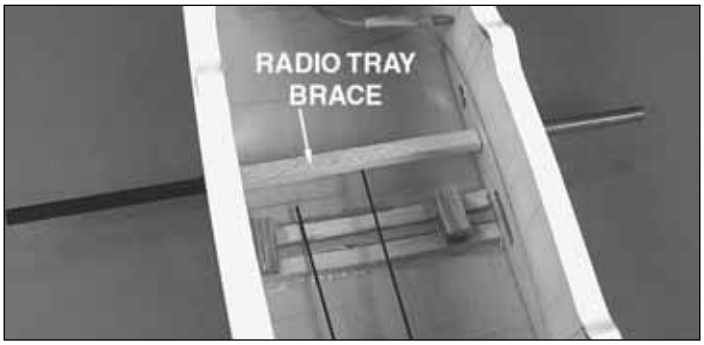
❏ 10. Remove the control horn from the rudder. Trim off the outer two holes so that the control horn will clear the elevator. If you made a mark on the backplate to trim it, do so now.

❏ 11. Slide the rudder pushrod through the fuselage with the Z-bend exiting out of the slot. Connect the Z-bend in the pushrod to the outer hole on the control horn. Reinsert the control horn into the rudder adding a bit of medium CA to the base of the control horn tab. Press on the control horn backplate and add a drop of CA to secure it in place.

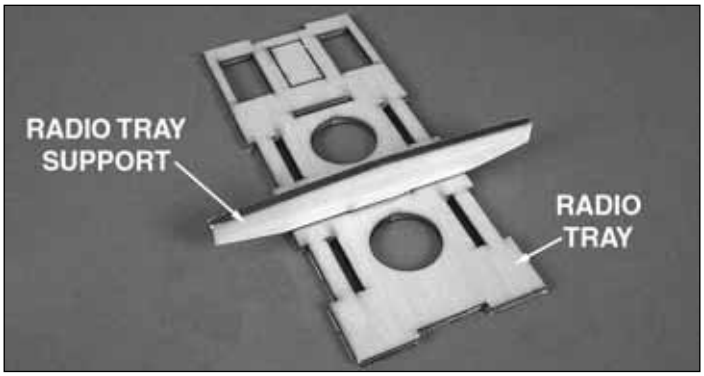
ASSEMBLE THE FUSELAGE

Install the Radio Tray & Wing Joiner Tube

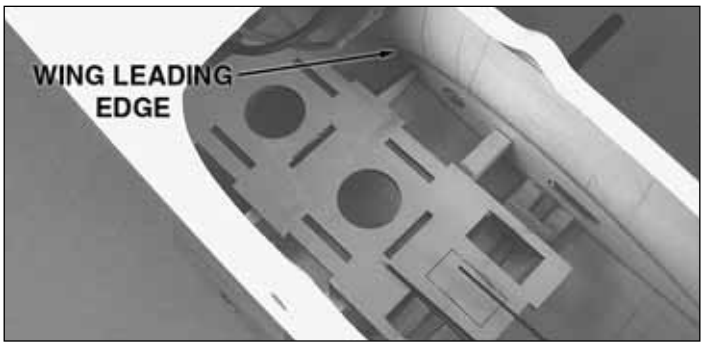
❏ 1. Glue the carbon **wing joiner tube** evenly spaced into the fuselage. Test fit the wings onto the tube before gluing it to be sure the tube is centered.



❏ 2. Use sandpaper to roughen up the portion of the wing joiner rod that is inside of the fuse. Use alcohol to clean the rod. Glue the **radio tray brace** to the top of the wing joiner tube as shown.

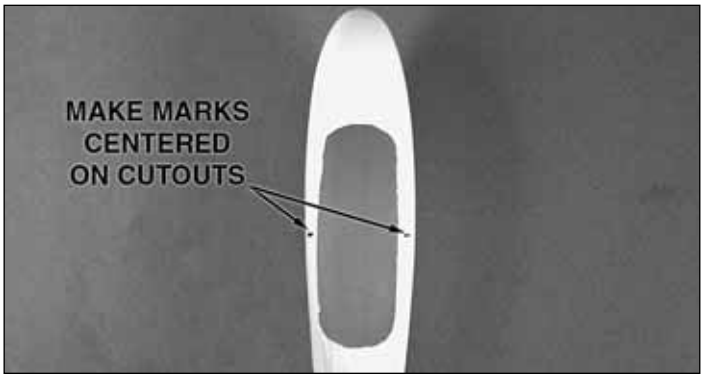


❏ 3. Press the tab on the **vertical radio tray support** into the slot between the circle cutouts in the **radio tray** and glue it into place.

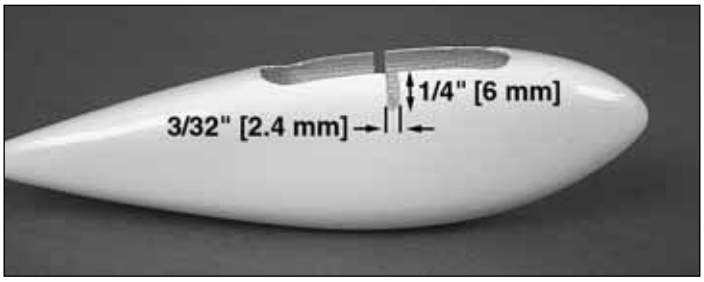


❏ 4. As you did with the wing joiner rod, sand the inside of the fuselage where the radio tray is going to be installed. Use alcohol to thoroughly clean the area. Epoxy the radio tray assembly into the fuselage. The vertical radio tray support should be positioned just behind the wing leading edge.

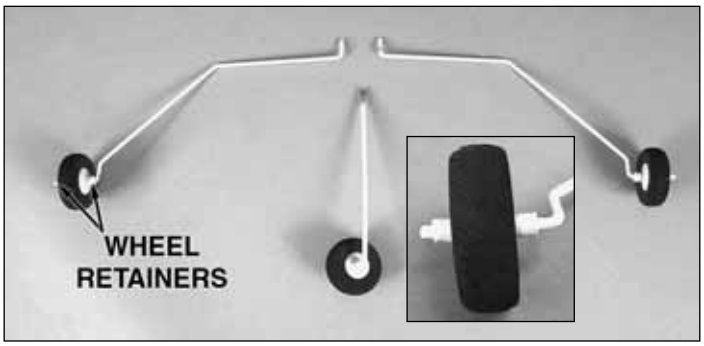
Assemble the Landing Gear



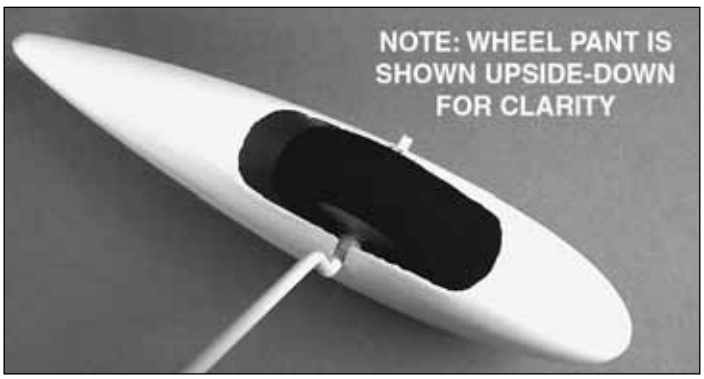
❏ 1. Make a center mark on both sides of the wheel cutouts on all three **wheel pants**.



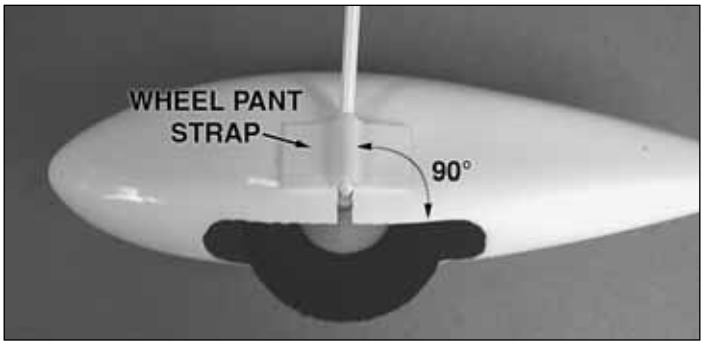
❏ 2. Cut slots at these marks 3/32" [2.4 mm]-wide and 1/4" [6 mm] deep.

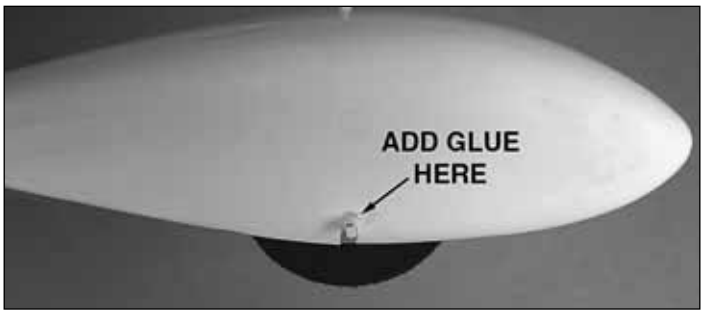


❏ 3. Attach the **wheels** to the **landing gear wires** by sliding on a plastic **wheel retainer**, wheel, and another wheel retainer onto each wire.

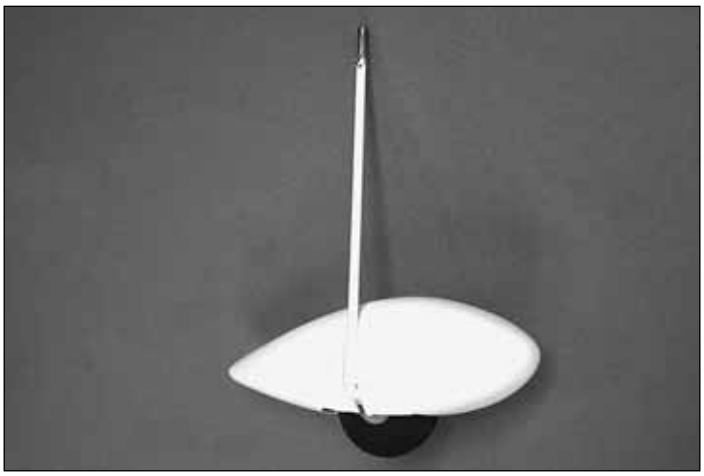


❏ 4. Insert the landing gear wires into the slots you cut in the wheel pants as shown.



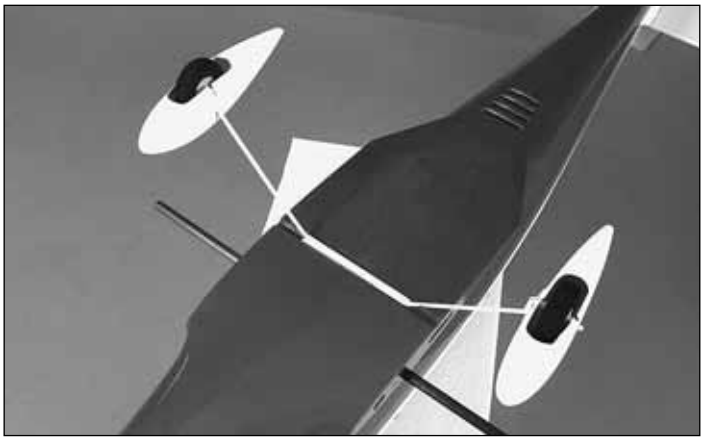


❏ 5. Use fine sandpaper to roughen up the area around the bend in the landing gear wire on the wheel pants as well as the **wheel pant straps**. Clean those areas with denatured alcohol and use medium CA to glue the straps over the landing gear wires onto the wheel pants. Be sure the landing gear wires are secured perpendicular to the bottom of the pants. Add a drop or two of medium or thick CA to the other end of the landing gear wires where it contacts the pants. **Be sure to make a left and right landing gear.**

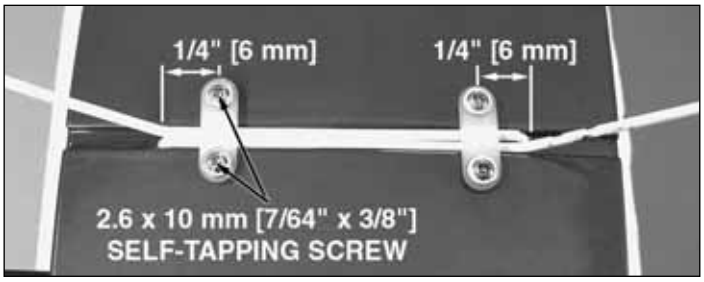


❏ 6. The nose gear wheel pant is installed the same way, and should be glued to the **left side** of the nose gear wire.

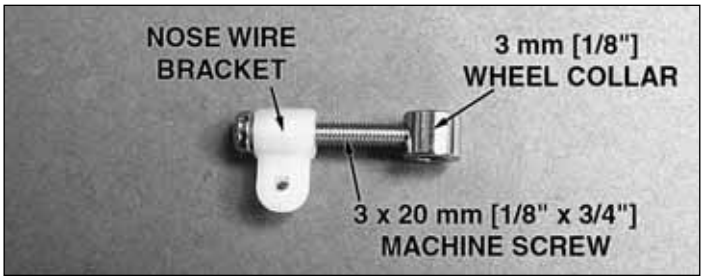
Install the Landing Gear



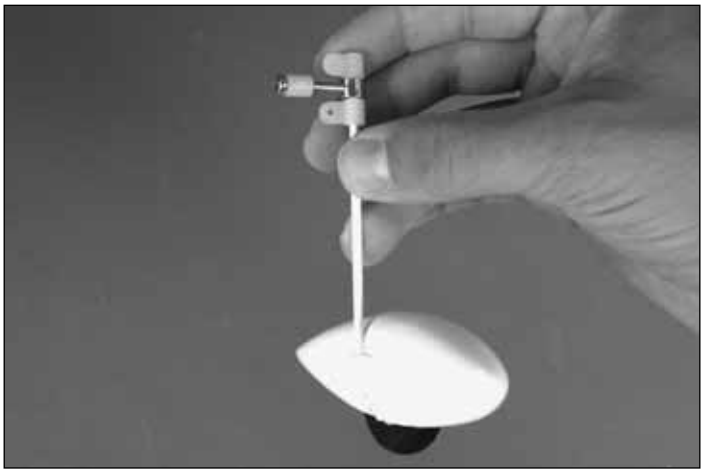
❏ 1. Fit the main landing gear into the holes on the underside of the fuselage. The landing gear wires will fit side-by-side into the molded channel.



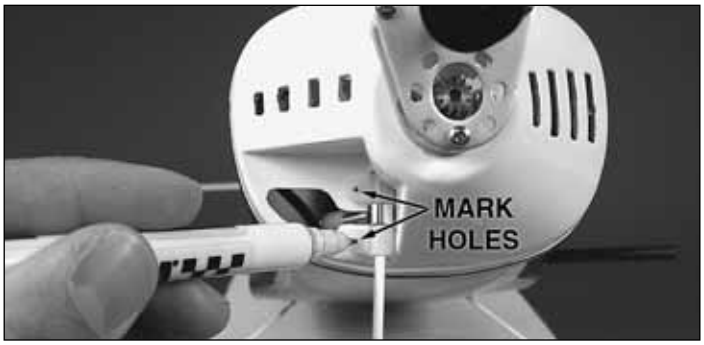
❏ 2. Line up the landing gear straps 1/4" [6 mm] from the bend in the gear wires and mark the holes. Drill the holes with a 5/64" [2 mm] drill bit. Thread a 2.6 x 10 mm [7/64" x 3/8"] self-tapping screw into each hole and back it out. Apply thin CA to each hole and allow it to fully harden. Secure the straps to the fuselage using four 2.6 x 10 mm [7/64" x 3/8"] screws.



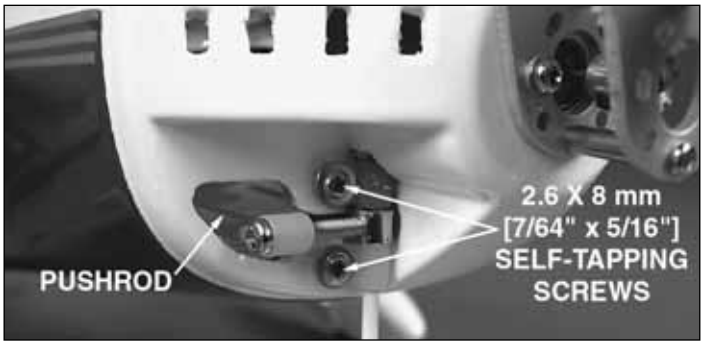
❏ 3. Thread a **nose wire bracket** onto a 3 x 20 mm [1/8" x 3/4"] machine screw. Loosely insert the screw into the 3 mm [1/8"] wheel collar.



❏ 4. Slide a nose wire bracket, wheel collar with screw and bracket, followed by another nose wire bracket, onto the nose gear wire. Tighten the screw in the wheel collar tightly against the flat spot cut into the nose gear wire.



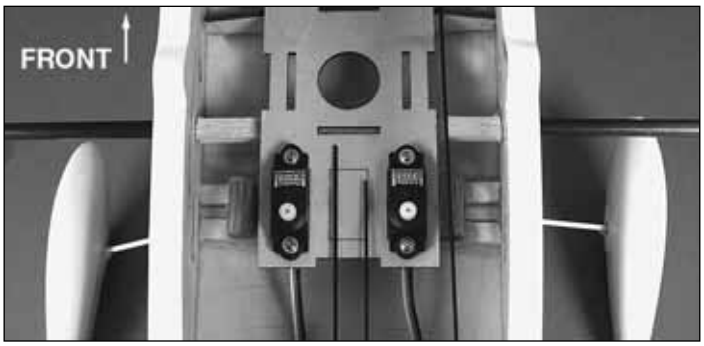
❏ 5. Line the nose gear assembly up to the firewall as shown. The screw extending out of the wheel collar should pass freely through the slot cut in the firewall when the nose gear is rotated. Slide the assembly as close to the center of the firewall as possible while still leaving a small amount of clearance between the wheel collar and the side of the firewall. Hold the brackets against the firewall face and mark the hole locations.



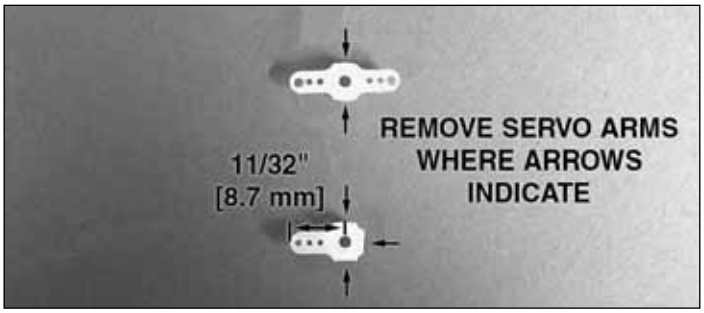
❏ 6. Drill the marks with a 5/64" [2 mm] drill bit. Thread a 2.6 x 8 mm [7/64" x 5/16"] self-tapping screw into each hole and back it out. Add a few drops of thin CA to each hole and allow it to harden. Hook the Z-bend of the remaining pushrod wire into the wire bracket attached to the screw in the wheel collar. Insert the pushrod through the steering hole in the firewall and secure the nose gear assembly with two 2.6 x 8 mm [7/64" x 5/16"] screws.

❏ 7. Confirm that the nose gear turns smoothly within the wire brackets. Make any adjustments to the slots in the firewall or the position of the wheel collar on the gear wire until it does.

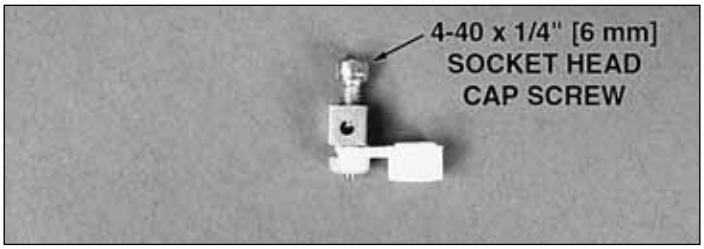
Install the Radio System & Battery



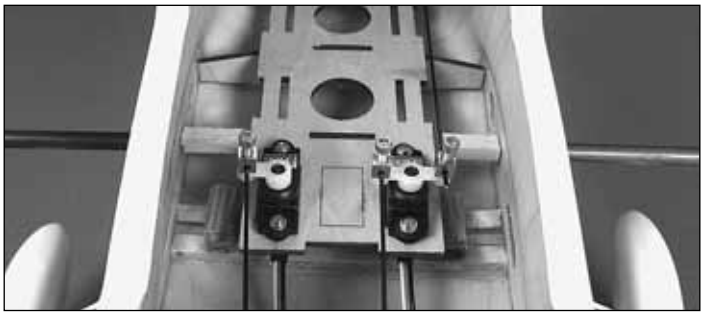
❏ 1. Using the hardware provided with the servos, install the rudder and elevator servos into the precut openings. Apply a couple drops of thin CA glue to each mounting hole before installing the servos. The outline for a third servo bay is provided but not used on this model.



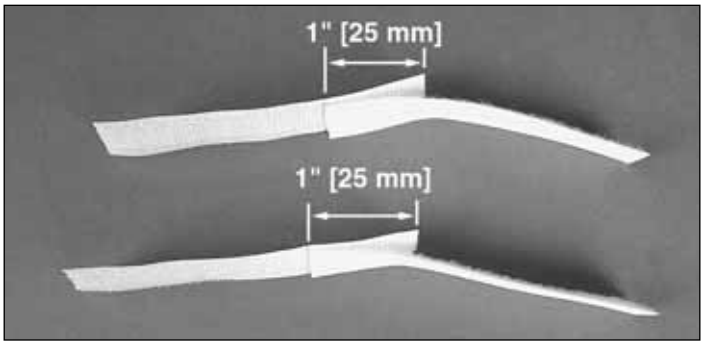
❏ 2. Trim two arms from one servo horn and three from the other as shown. Drill the outer holes in the horns with a 5/64" [2 mm] drill bit.



❏ 3. Install three screw-lock pushrod connectors into the outer holes of the servo horns. Loosely thread a 4-40 x 1/4" [6 mm] socket head cap screw into each connector.

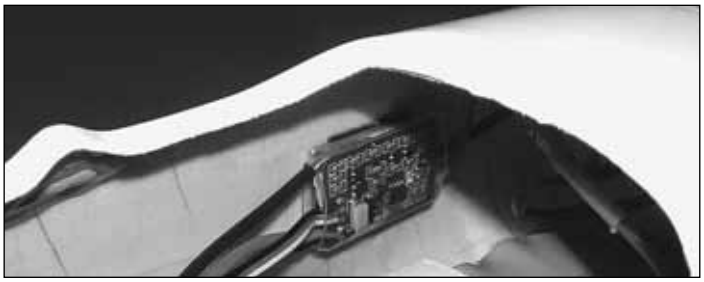


❏ 4. Slide the nose gear pushrod, elevator pushrod, and rudder pushrod through the screw-lock pushrod connectors. Install the servo horns onto the rudder and elevator servos as shown. Secure the horns with the servo horn screws. Center the elevator, rudder, and nose gear and tighten the 4-40 x 1/4" [6 mm] socket head cap screws in the connectors.

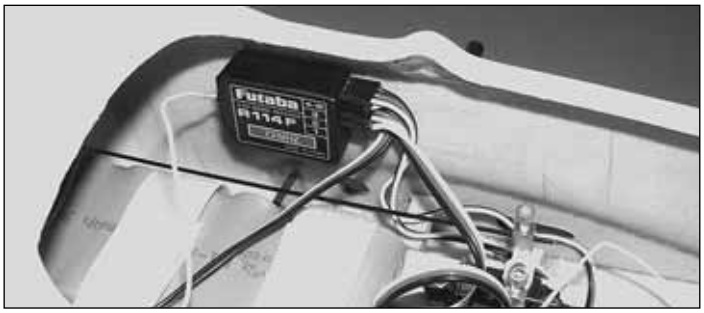


❏ 5. Cut the included **hook and loop material** into two equal lengths. Make battery straps by overlapping the ends of the pieces by 1" [25 mm].

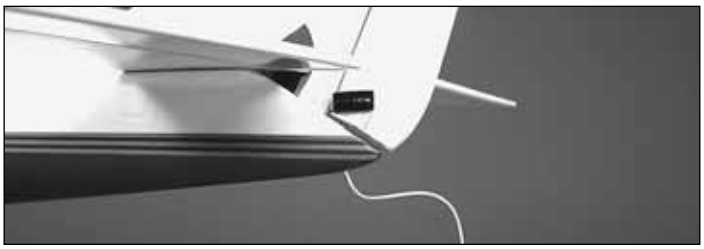
❏ 6. Insert the **battery pack** in the forward position on the radio tray. Use the battery straps to secure the battery pack to the tray by looping straps underneath the tray and pressing the ends together as shown. Glue the straps to the underside of the tray with CA glue.



❏ 7. Sand the left side of the fuselage above the battery pack. Clean that area with denatured alcohol. Brush a light coat of epoxy onto the sanded area. This will provide a smooth surface for the **electronic speed control (ESC)** to adhere to. Connect the motor leads to the red and black female bullet ends on the ESC. Use a piece of double-sided tape to secure the ESC on/off switch to the inside of the fuselage. Be sure that the switch or switch leads do not interfere with the servos or pushrods.



❏ 8. Repeat this procedure on the other side of the fuselage for the receiver. Connect the ESC, rudder and elevator servos, and a dual servo extension for the ailerons to the receiver and secure it inside the fuselage.

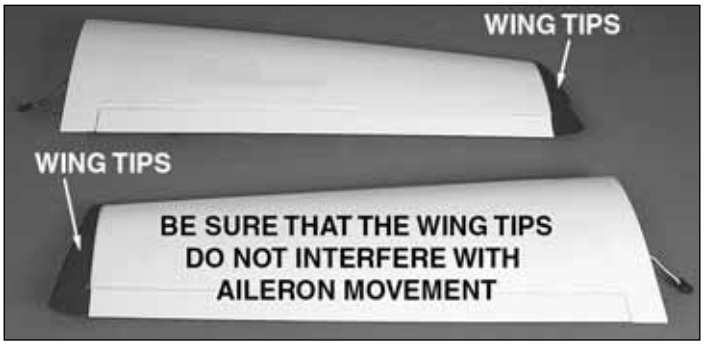


❏ 9. Route the antenna out of the way from the pushrods. It can be secured on the outside of model. However, for a clean look, we drilled a hole in the bottom of the fuselage at the back and ran the antenna out the hole.

FINISH THE MODEL

Attach the Wing Panels

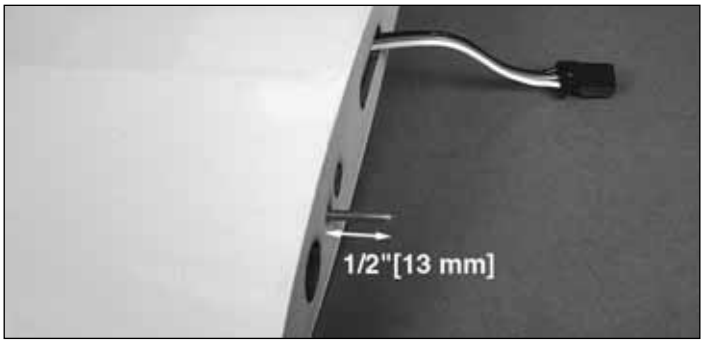
❏ 1. Prepare the **wing tips** by sanding the inside edges of the tips as well as scuffing up the covering at the ends of the wing panels. Clean these surfaces with denatured alcohol.



❏ 2. Mix up some 30-minute epoxy and coat a 1/4" [6 mm]-wide strip around the inside edges of the wing tips. Fit the wing tips to the ends of the wings with the curves pointing up and tape them into position while the epoxy cures. Be sure that the tips do not interfere with the movements of the ailerons. Excess epoxy can be wiped away with alcohol.

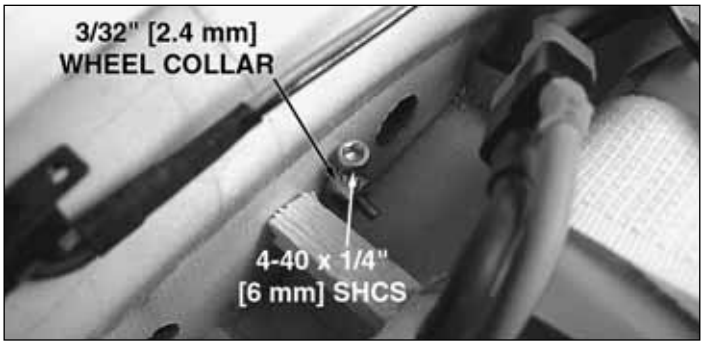
❏ 3. The preferred method of attaching the wings to the fuselage is to glue them permanently with epoxy. The wings have also been designed to be removable for ease of transport if necessary. If you epoxy the wing panels to the fuselage, thoroughly coat the carbon wing joiner tube as well as the root ribs on the panels with epoxy, and roughen the mating area on the fuselage with sandpaper and clean it with alcohol. Slide the panels in place and tape them to the fuselage while the epoxy cures.

Note: *If you have glued the wing panels to the fuselage, skip steps #4 and #5.*



❏ 4. To bolt the wings to the fuselage, locate the two 2-56 x 1" [25 mm] threaded rods and lightly coat one half of each rod with epoxy. Before the epoxy cures, thread the rods into the blind nuts in the wing panels in the location shown. Leave 1/2" [13 mm] of each rod protruding out of the wings.

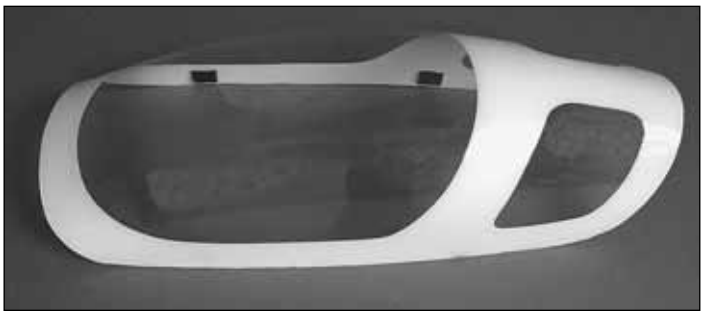
❏ 5. Connect an additional servo extension to one of the aileron servo leads and secure the connection with heat-shrink tubing or tape. The servo extension is necessary if you are using the Futaba 6" [150 mm] dual servo extension. Since most micro servo models have shorter 5" [128 mm] servo leads, they are not long enough to reach the dual servo slots. If you purchased a standard Y-harness from another manufacturer, you may not need an additional servo extension.



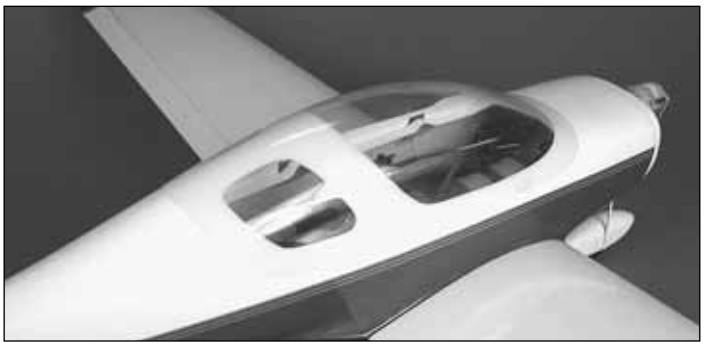
❏ 6. Slide the wing panels onto the wing joiner tube and push them firmly into place. Loosely thread a 4-40 x 1/4" [6 mm] SHCS into two 3/32" [2.4 mm] wheel collars. Tighten the wheel collars onto the threaded rods in the wings against the fuselage side.

❏ 7. Connect the aileron servo leads to the Y-harness or dual servo extension.

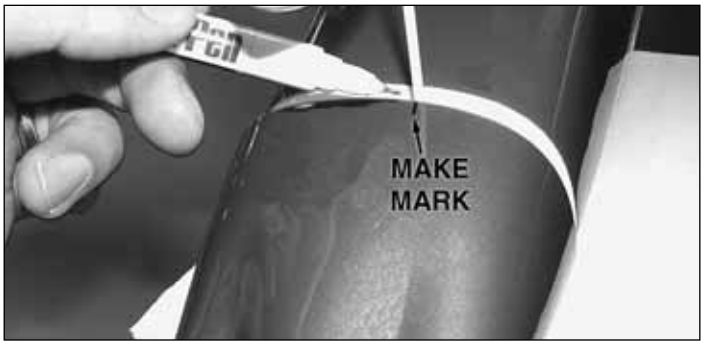
Attach the Canopy & Cowl



❏ 1. Trim the **canopy** along the molded cut lines. Use sandpaper to smooth the cut edges.

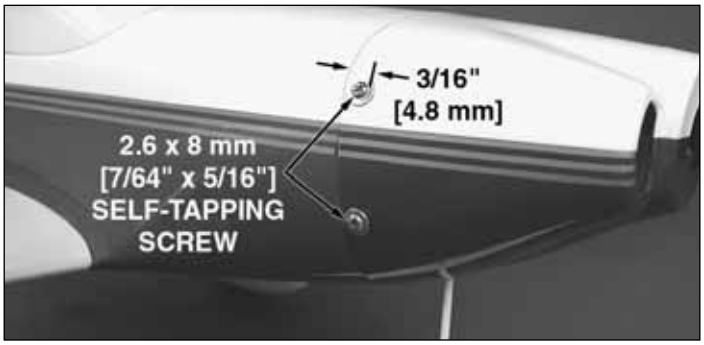


❏ 2. Cut a 1/2" x 1" [13 x 25 mm] piece of clear decal from the decal sheet and use it to tape the front of the canopy to the fuselage. Applying the decal piece in this location will better secure the canopy, but still allow it to open and close easily.



❏ 3. Slide the **cowl** onto the front of the fuselage and make a mark where it should be trimmed for the nose gear.

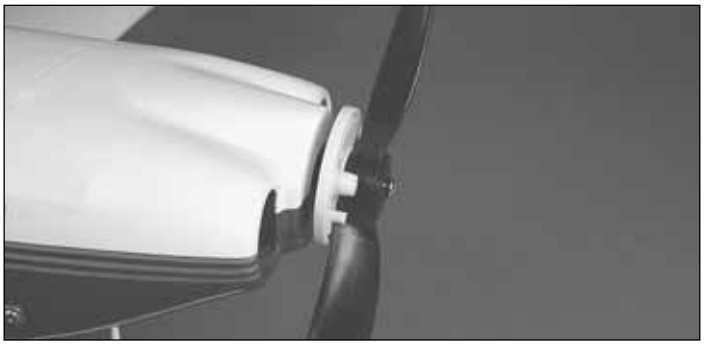
❏ 4. Cut a slot at the mark slightly wider than the nose gear. Test fit the cowl to the fuselage and adjust the slot as necessary until the nose gear wire fits in the slot without touching.



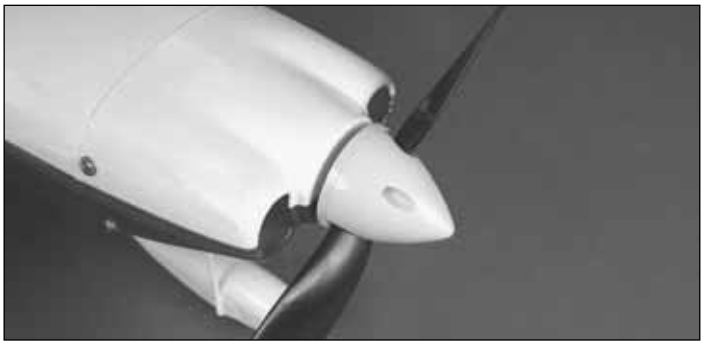
❏ 5. While holding the cowl in place with the paint scheme aligned, drill four evenly spaced 5/64" [2 mm] holes 3/16" [4.8 mm] from the back edge of the cowl as shown. Reinforce the holes with thin CA glue. Attach the cowl to the fuselage with four 2.6 x 8 mm [7/64" x 5/16"] self-tapping screws. For a cleaner look, the cowl can be attached to the fuselage with silicone adhesive. If adhesive is used, be sure that the cowl is properly secured before each flight.

Note: Silicone adhesive will allow the cowl to be removed in the future if you need to replace the motor or gears. Only a couple of dots of adhesive are required to secure the cowl. Make sure you roughen the area with sandpaper on the fuse and cowl, then clean it with alcohol.

Attach the Propeller & Spinner



❏ 1. Confirm that the set screw holding the **prop adapter** to the gearbox shaft is tight using a 1.5 mm [1/16"] allen wrench. Slide the **spinner backplate**, **propeller**, and **prop washer** onto the prop adapter. Tighten the assembly with the 3 x 12 mm [1/8" x 1/2"] propeller machine screw.



❏ 2. Attach the **spinner cone** to the spinner backplate using the 2.6 x 8 mm [7/64" x 5/16"] self-tapping spinner screws.

Apply the Decals

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

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

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

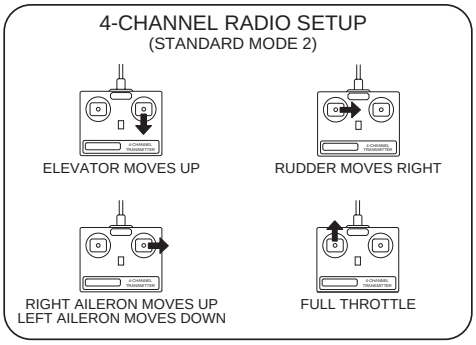
4. Use a piece of soft balsa or something similar to squeegee remaining water from under the decal. Apply the rest of the decals the same way.

GET THE MODEL READY TO FLY

Check the Control Directions

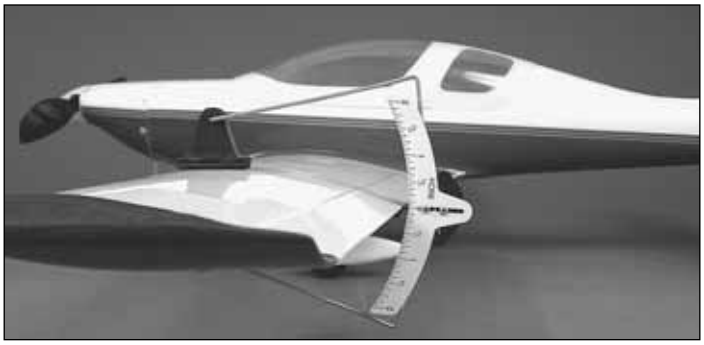
❏ 1. Turn on the transmitter and receiver and center the trims. If necessary, remove the servo arms from the servos and reposition them so they are centered. Reinstall the screws that hold on the servo arms.

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



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

Set the Control Throws



Use a Great Planes AccuThrow (or a ruler) to accurately measure and set the control throw of each control surface as indicated in the chart on page 20.

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

These are the recommended control surface throws:

ELEVATOR:	3/8" [10 mm] up 3/8" [10 mm] down
RUDDER:	1/2" [13 mm] right 1/2" [13 mm] left
AILERONS:	3/8" [10 mm] up 3/8" [10 mm] down

IMPORTANT: The Lancair EP 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 Lancair EP 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."

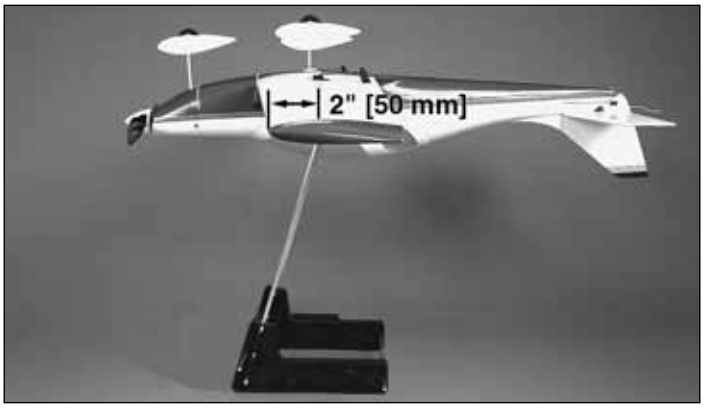
Balance the Model (C.G.)

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 engine, landing gear, covering and paint, and the radio system.

❏ 1. Use a felt-tip pen or 1/8" [3 mm]-wide tape to accurately mark the C.G. on the top of the wing on both sides of the fuselage. The balance point should be measured **at the fuselage**. The C.G. is located 2" [50 mm] back from the leading edge of the wing at the fuselage.

This is where your model should balance for the first flights. Later, you may wish to experiment by shifting the C.G. up to 1/4" [6 mm] forward or 1/8" [3 mm] 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 the battery pack installed, place the model upside-down on a Great Planes CG Machine, or lift it upside-down 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 to balance. If the nose drops, the model is "nose heavy" and the battery pack and/or receiver must be shifted aft to balance.

❏ 4. **IMPORTANT:** After you have shifted the radio gear, recheck the C.G.

❏ 5. If you use a different battery pack it will be necessary to recheck the C.G.

Balance the Model Laterally

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

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

PREFLIGHT

Identify Your Model

No matter if you fly at an AMA sanctioned R/C club site or if you fly somewhere on your own, you should always have your name, address, telephone number and AMA number on 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 the back cover page (or on the decal sheet) 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 motor batteries the night before you go flying, and at other times as recommended by the radio manufacturer.

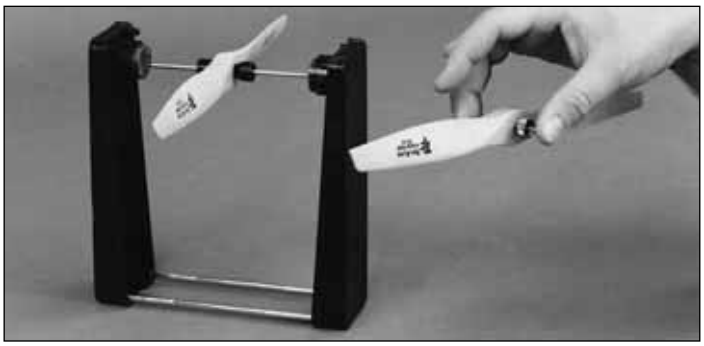
The included 1800mAh NiMH battery pack should be charged by a NiMH-compatible charger at no more than 1.5A. Compatible chargers available are listed on page 4 of this manual.

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.

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

Balance the Propellers



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

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

After you test the operation of 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 ESC and transmitter on, you should be able to walk at least 100 feet [30 m] away from the model and still have control. Have an assistant stand by your model and, while you work the controls, tell you what the control surfaces are doing. Repeat this test **with the motor running** at various speeds with an assistant holding the model, using hand signals to show you what is happening. If the control surfaces do not respond correctly, **do not fly!** Find and correct the problem first. Look for loose servo connections or broken wires, corroded wires on old servo connectors, poor solder joints in your battery pack or a defective cell, or a damaged receiver crystal from a previous crash.

MOTOR SAFETY PRECAUTIONS

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

Use safety glasses when running motors.

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

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

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

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

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 your model *laterally* as explained in the instructions.
- ❏ 5. Add a drop of oil to the axles so the wheels will turn freely.
- ❏ 6. Make sure all control surfaces are **secure**.
- ❏ 7. Reinforce holes for wood screws with thin CA where appropriate (servo mounting screws, cowl mounting screws, etc.).
- ❏ 8. Confirm that all controls operate in the correct direction and the throws are set up according to the manual.
- ❏ 9. Make sure all servo arms are secured to the servos with the screws included with your radio.
- ❏ 10. Secure connections between servo wires and Y-connectors or servo extensions, and the connection between your battery pack and the on/off switch with vinyl tape, heat-shrink tubing or special clips suitable for that purpose.
- ❏ 11. Make sure any servo extension cords you may have used do not interfere with other systems (servo arms, pushrods, etc.).
- ❏ 12. Balance your propeller (and spare propellers).
- ❏ 13. Tighten the propeller screw and spinner.
- ❏ 14. Place your name, address, AMA number and telephone number on or inside your model.
- ❏ 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

The Lancair ES EP ARF is a great-flying model that flies smoothly and predictably. The Lancair 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.

Speed Control Set-Up

CAUTION: While setting up and checking the control throws on your airplane. remove the propeller from the motor.

1. Plug the servo connector from your speed control into the throttle socket of your receiver.
2. Connect the motor battery to the speed control.
3. Move the throttle stick to idle (towards you).
4. Switch on the transmitter then the speed control.
5. Move the throttle stick to full power (away from you) for at least 2 seconds.
6. Move the throttle stick back to idle (toward you). The speed control is now ready to operate. **Note:** If the motor does not start as the throttle is advanced, you may need to reverse the servo throw setting of the throttle.
7. As a safety precaution to prevent the motor from starting when the speed control is first switched on, you will need to move the throttle to full and back to idle every time the speed control is switched on.

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. 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, the nose will lift off the ground. Gain as much speed as your runway and flying site will practically allow before gently applying up elevator, lifting the model into the air. Be smooth on the elevator stick, allowing the model to establish a **gentle** climb to a safe altitude before turning into the traffic pattern.

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

Landing

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

One final note about flying your model – have a goal or flight plan in mind for **every** flight. This can be learning a new

maneuver(s), improving a maneuver(s) you already know, or learning how the model behaves in certain conditions (such as on high or low rates). This is not necessarily to improve your skills *(though it is never a bad idea!)*, but more importantly so you do not surprise yourself by impulsively attempting a maneuver and suddenly finding that you've run out of time, altitude or airspeed. Every maneuver should be deliberate, not impulsive. For example, if you're going to do a loop, check your altitude, mind the wind direction (anticipating rudder corrections that will be required to maintain heading), remember to throttle back at the top, and make certain you are on the desired rates (high/low rates). A flight plan greatly reduces the chances of crashing your model just because of poor planning and impulsive moves. ***Remember to think.***

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

GOOD LUCK AND GREAT FLYING!

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