



# FAIRCHILD PT-19

## INSTRUCTION MANUAL

### SPECIFICATIONS

<b>Wingspan:</b>	41.5 in [1055mm]	<b>Wing Loading:</b>	12.3-15.5 oz/ft <sup>2</sup> [38-47g/dm <sup>2</sup> ]	<b>Propeller:</b>	Great Planes® 10x4.5 Slo-Flyer Electric Prop
<b>Wing Area:</b>	270 sq in [17.4dm <sup>2</sup> ]	<b>Length:</b>	31.5 in [800mm]	<b>ESC:</b>	ElectriFly™ SS-25
<b>Weight:</b>	23-29 oz [650-820g]	<b>Motor:</b>	ElectriFly™ RimFire™ 400 (28-30-950) Brushless	<b>Battery:</b>	11.1V, 1250-1600mAh LiPo
				<b>Radio:</b>	4-Channel (minimum) with Micro Receiver, three Micro Servos

### WARRANTY

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

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

**If the buyer is not prepared to accept the liability associated with the use of this product, the buyer is advised to return**

**this kit immediately in new and unused condition to the place of purchase.**

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

#### Hobby Services

3002 N. Apollo Dr. Suite 1  
Champaign IL 61822 USA

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

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



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

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## INTRODUCTION

Thank you for purchasing the Great Planes® PT-19 EP park flyer. We hope you enjoy the docile characteristics of this classic model. PT stands for "Primary Trainer", but don't let this fool you into thinking you can handle flying if you've never been trained. Just as you wouldn't simply jump into a full-scale airplane and fly away, trainer or not, you shouldn't do the same with a sophisticated R/C model like this. If you don't already know how to fly, you should seek the help of an experienced R/C pilot. There are also many training tools available to help you learn to fly R/C. Please see your local hobby dealers for their recommendations.

For the latest technical updates or manual corrections to the PT-19 EP visit the Great Planes web site at [www.greatplanes.com](http://www.greatplanes.com). Open the "Airplanes" link, then select the PT-19 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

If you are not already a member of the AMA, please join! The AMA is the governing body of model aviation and membership provides liability insurance coverage, protects modelers' rights and interests and is required to fly at most R/C sites.

#### 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 PT-19 EP 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 PT-19 EP, if not assembled and operated correctly, could possibly cause injury to yourself or spectators and damage to property.

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

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

4. You must use an R/C radio system that is in first-class condition, and a correctly sized motor and components throughout the building process.

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

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

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

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

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

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

## LITHIUM BATTERY HANDLING & USAGE

**WARNING!!** Read the entire instruction sheet included with the battery. Failure to follow all instructions could cause permanent damage to the battery and its surroundings, and cause bodily harm!

- ONLY use a LiPo approved charger.
- NEVER charge in excess of 4.20V per cell.

- ONLY charge through the "charge" lead. NEVER charge through the "discharge" lead.
- NEVER charge at currents greater than 1C.
- ALWAYS set charger's output volts to match battery volts.
- ALWAYS charge in a fireproof location.
- NEVER trickle charge.
- NEVER allow battery temperature to exceed 150° F (65° C).
- NEVER disassemble or modify pack wiring in any way or puncture cells.
- NEVER discharge below 3.0V per cell.
- NEVER place on combustible materials or leave unattended during charge or discharge.
- ALWAYS KEEP OUT OF REACH OF CHILDREN.

## REQUIRED ITEMS

This is a partial list of items required to finish the PT-19 EP. Order numbers are provided in parentheses.

### Radio Equipment

A 4-channel radio system with three micro servos and a micro receiver are required for this plane. Many radio systems are suitable, but we have chosen the following for this build-up.

- (3) Futaba® S3114 Micro HT Servo (FUTM0414)  
**OR**
- (3) minimum 20 oz-in torque micro servos
- Servo Mounting Screws (FUTM2250)
- Futaba R617FS 7-channel 2.4GHz Receiver  
**OR**
- Futaba R114F FM Micro Receiver  
(Low Band – FUTL0442, High Band – FUTL0443)
- Futaba FM Single Conversion Short Crystal  
(Low Band – FUTL62\*\*, High Band – FUTL63\*\*)

### Motor, ESC & Propeller Recommendations

The PT-19 EP was tested extensively to find the best "power package" that offers light weight, long flight time, and good thrust. The order numbers for these are provided below.

- Great Planes RimFire™ 400 (28-30-950) Brushless Outrunner Motor (GPMG4560)
- Great Planes Silver Series 25A Brushless ESC 5V/2A BEC (GPMM1820)

- Great Planes 10x4.5 PowerFlow™ Propeller (GPMQ6660) (draws 15 amps max.)
- Great Planes 3.5mm Male/2.5mm Female Bullet Connector Adapter (GPMM3122)

## Battery Pack & Accessories

The following battery packs are recommended.

- Great Planes LiPo 1600mAh BP Series 11.1V 20C Discharge w/ Balance (GPMP0719)
- Great Planes LiPo 1500mAh Power Series 11.1V 25C Discharge w/ Balance (GPMP0511)

A LiPo-compatible charger is required for these batteries, along with a cell balancer. We recommend:

- Great Planes Equinox™ 1-5 cell LiPo cell balancer (GPMM3160)
- Great Planes PolyCharge4™ LiPo battery charger (GPMM3015)
- OR**
- Great Planes PolyCharge DC LiPo battery charger (GPMM3010)

## Required Adhesive and Building Supplies

This is the list of adhesive and building supplies required to finish the PT-19 EP.

- 1/2 oz. [15g] Thin Pro™ CA (GPMR6001)
- 1/2 oz. [15g] Medium Pro CA+ (GPMR6007)
- 4oz [113g] Pro 6-minute epoxy (GPMR6042)
- 4oz [113g] Pro 30-minute epoxy (GPMR6043)
- R/C-56 Glue 4oz (JOZR5007)
- Denatured alcohol
- Drill bits: #55 [1.3mm] [1.3mm], 1/16" [1.6mm], 5/64" [2mm], 1/8" [3.2mm]
- #1 Hobby knife (HCAR0105)
- #11 blades (5-pack, HCAR0211)
- Hobbico Steel T-Pins 1" (100) (HCAR5100)
- Great Planes Pro Thread locker (GPMR6060)
- CA applicator tips (HCAR3780)
- 220 grit sandpaper
- Masking tape (TOPR8018)
- Bru Line hemostat – curved 5-1/2" (BRUR1303)
- Fabric Tape Measure (HCAR0478)

## Optional Supplies and Tools

Here is a list of optional tools mentioned in the manual that will help you build the PT-19 EP.

- 21<sup>st</sup> Century® sealing iron (COVR2700)
- 21<sup>st</sup> Century iron cover (COVR2702)
- 2 oz. [57g] spray CA activator (GPMR6035)
- 4 oz. [113g] aerosol CA activator (GPMR634)
- Epoxy brushes (6, GPMR8060)
- Mixing sticks (50, GPMR8055)
- Mixing cups (GPMR8056)
- Great Planes® Hook and Loop material (GPMQ4480)
- 1/2" [13mm] double-sided foam mounting tape (GPMQ4440)
- Excel Small Hobby Clamps (2) 1" x 3.5" [25 x 89mm] (EXLR5663)
- CA debonder (GPMR6039)
- Great Planes Double-Sided Servo Tape 1"x 3" (GPMQ4442)
- Panel Line Pen (TOPQ2510)
- Rotary tool (Dremel®) with cutoff wheel
- Hobbico® Flexible 18" Ruler Stainless Steel (HCAR0460)
- Builder's Triangle Set (HCAR0480)
- AccuThrow™ Deflection Gauge (GPMR2405)
- Hobbico 12 Volt DC power supply (HCAP0250)
- Acrylic paint and paint brushes for painting pilot (found at craft stores)

## Pilot Figure (optional)

The following pilot figures are suggested. Note: The pre-painted pilot listed below is slightly larger than the recommended Williams Brothers pilot figure and is a WWI pilot.

- Williams Brothers 1/8-Scale Pilot Kit Standard (WBRQ1040)
- OR**
- Great Planes Small EP WWI Pilot, Pre-Painted (GPMA2998)

## IMPORTANT BUILDING NOTES

- When you see the term **test fit** in the instructions, it means that you should first position the part on the assembly **without using any glue**, then slightly modify or *custom fit* the part as necessary for the best fit.

- Whenever the term **glue** is written you should rely upon your experience to decide what type of glue to use. When a specific type of adhesive works best for that step, the instructions will make a recommendation.
- **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, 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](http://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.
- The PT-19 EP is factory-covered with Top Flite® MonoKote® film. Should repairs ever be required, MonoKote can be patched with additional MonoKote purchased separately. MonoKote is packaged in six-foot rolls, but some hobby shops also sell it by the foot. If only a small piece of MonoKote is needed for a minor patch, perhaps a fellow modeler would give you some. MonoKote is applied with a model airplane covering iron, but in an emergency a regular iron could be used. A roll of MonoKote includes full

instructions for application. Following are the colors used on this model and order numbers for six foot rolls.

- Yellow TOPQ0203
- Sapphire Blue TOPQ0226
- Missile Red TOPQ0201
- Jet White TOPQ0204
- Black TOPQ0208

## 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

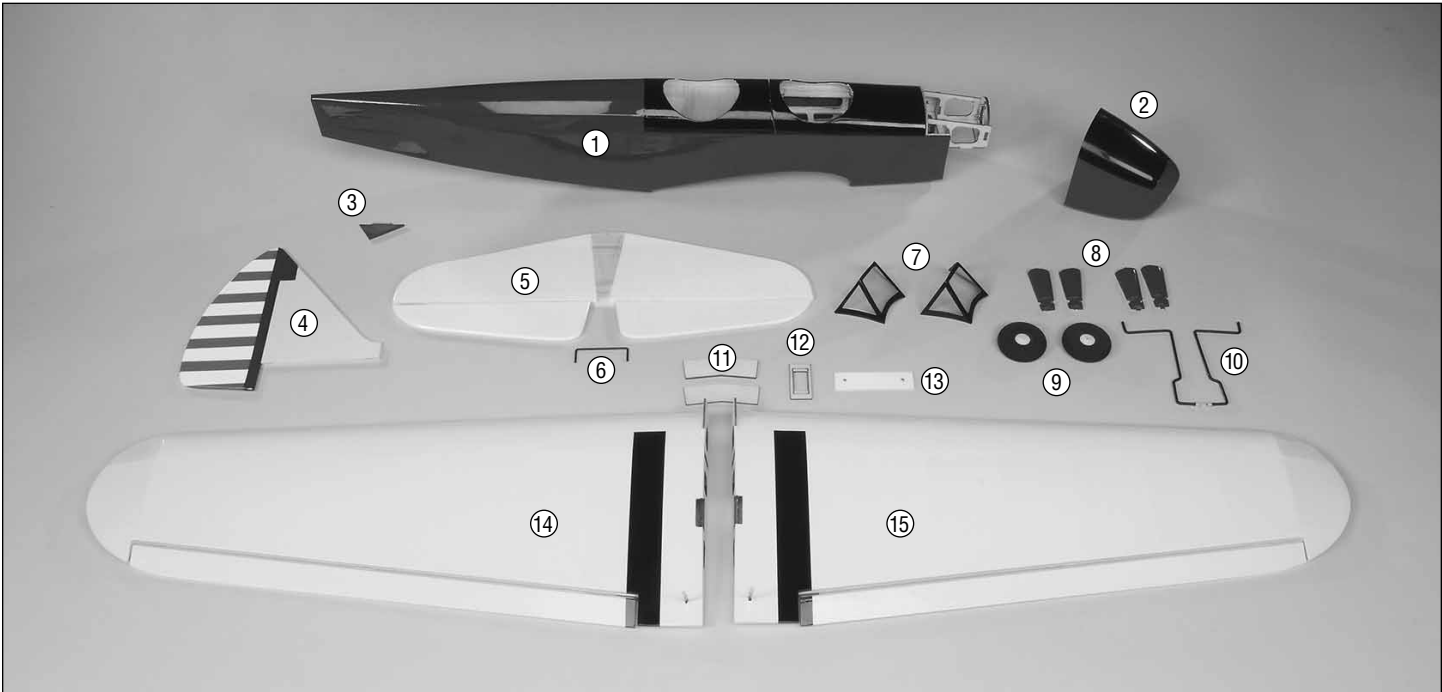
3002 N Apollo Drive, Suite 1  
Champaign, IL 61822

Telephone: (217) 398-8970, ext. 5

Fax: (217) 398-7721

E-mail: [airsupport@greatplanes.com](mailto:airsupport@greatplanes.com)

## KIT CONTENTS



- |                                      |                            |                          |
|--------------------------------------|----------------------------|--------------------------|
| 1. Fuselage                          | 6. Elevator Joiner         | 11. Wing Joiners         |
| 2. Cowl                              | 7. Windscreens             | 12. Servo Mounting Plate |
| 3. Tail Skid                         | 8. Landing Gear Pants      | 13. Wing Bolt Plate      |
| 4. Vertical Fin & Rudder             | 9. Wheels                  | 14. Left Wing            |
| 5. Horizontal Stabilizer & Elevators | 10. Main Landing Gear Legs | 15. Right Wing           |

## ORDERING REPLACEMENT PARTS

Replacement parts for the Great Planes PT-19 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 Great Planes web site at [www.greatplanes.com](http://www.greatplanes.com). Select "Where to Buy" in the menu across the top of the page and follow the instructions provided to locate a U.S., Canadian or International dealer.

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

Mail parts orders and payments by personal check to:

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

Be certain to specify the order number exactly as listed in the **Replacement Parts List**. Payment 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](mailto:productsupport@greatplanes.com), or by telephone at (217) 398-8970.

### REPLACEMENT PARTS LIST

Order No.	Description
GPMA4000	Fuselage
GPMA4001	Wing
GPMA4002	Tail Surface Set
GPMA4003	Landing Gear Set
GPMA4004	Cowl
GPMA4005	Decal
<b>NOTE</b> ▶	Full-size plans are not available. You can download a copy of this manual at <a href="http://www.hobbico.com">www.hobbico.com</a> .

## BEFORE YOU BEGIN



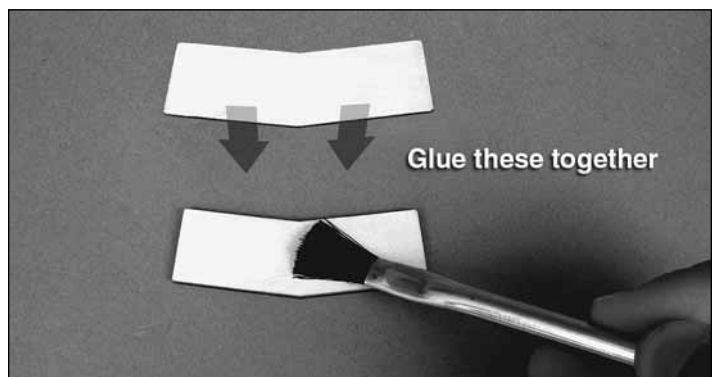
Before you begin assembling your model, inspect it for wrinkled covering and areas where the covering may not be tacked down adequately. The covering should be tacked down to the wood using just enough heat to soften the adhesive backing. **Low heat** (about 250° F [121° C]) should be enough to accomplish this. More heat may be required to begin to tighten the covering.

## ASSEMBLE THE WINGS

### Join the Wings

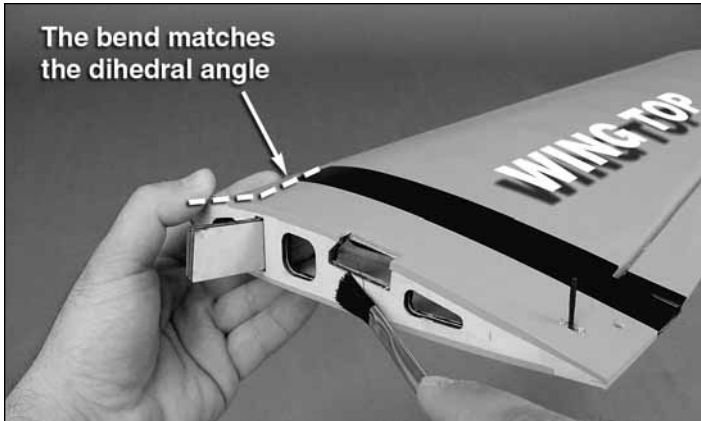


1. For the next few steps you will need epoxy, mixing cups, mixing sticks, and a few epoxy brushes. You should also have some denatured alcohol and paper towels on hand for cleanup.

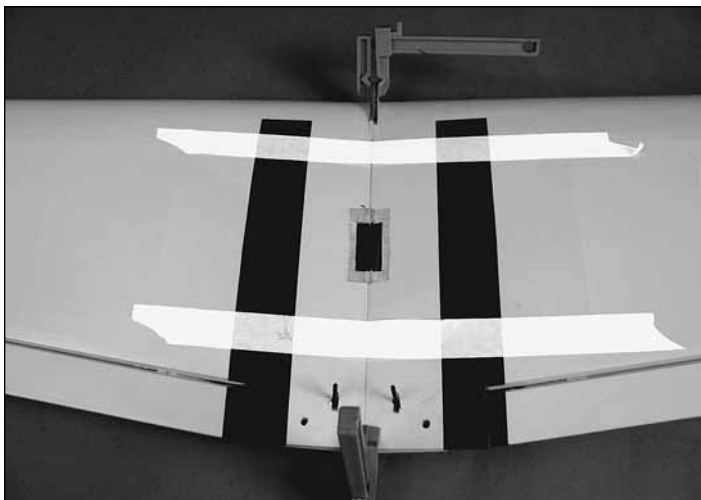


2. Mix up a small batch of 6-minute epoxy and glue the 2mm thick wing joiner and 3mm thick wing joiner together

so that one overlies the other. You now have a single 5mm thick wing joiner.



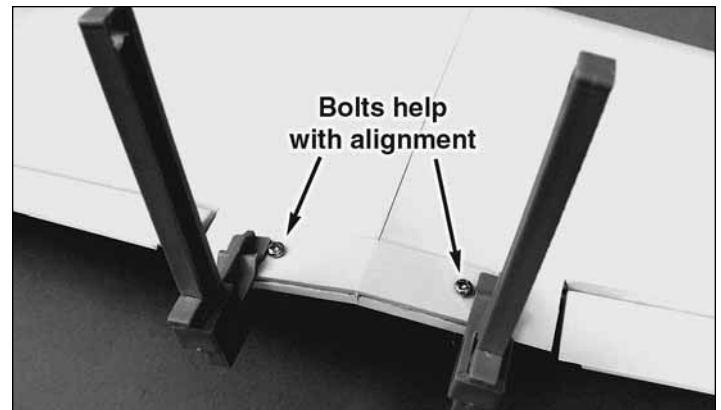
❑ 3. Coat both faces of the wing joiner with 30-minute epoxy and fit the joiner into the slot in one wing so that the bend in the joiner matches the dihedral angle of the root wing rib. Coat the root rib of both wings. Note: The top of the wing is the side of the wing that the torque rod exits.



❑ 4. Join both wings tightly. Clean up any epoxy that squeezes out of the joint with paper towels and denatured alcohol. Hold the wings together tightly with at least four long strips of masking tape. Use two on the top and two on the bottom. Use two small clamps to hold the wings in alignment as the epoxy cures.



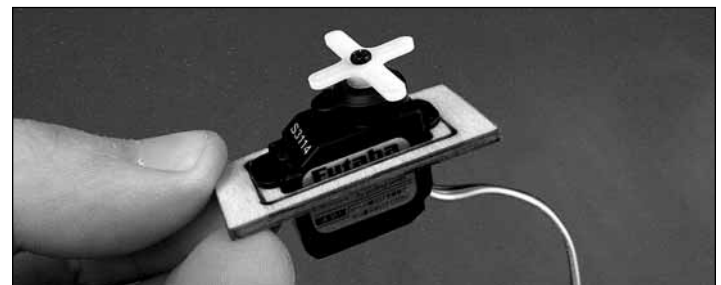
❑ 5. Locate the two 3mm x 25mm wing bolts. Thoroughly coat the threads of each bolt with petroleum jelly (Vaseline® or similar).



❑ 6. After the epoxy cures, remove the clamps and the tape from the wing. Turn the wing over. Apply some 6-minute epoxy to the wing bolt plate and glue it to the bottom side of the wing. Use the two wing bolts to align the plate with the holes in the wing. Clamp the wing bolt plate to the wing and clean up any epoxy that squeezes out of the joint. Allow the epoxy to fully cure.

❑ 7. Remove the clamps and wing bolts. Clean up the bolts with denatured alcohol and set them aside with your other hardware.

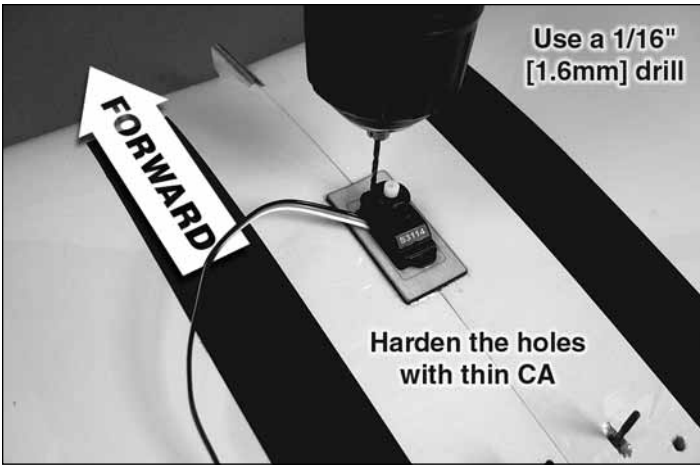
### ***Install the Aileron Servo***



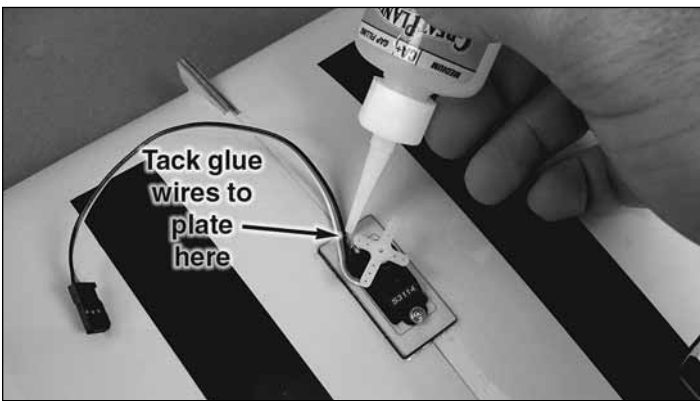
❑ 1. Test fit a servo in the aileron servo mounting plate. If you are using a servo larger than a Futaba 3114 micro servo, use a Dremel® rotary tool or your hobby knife to enlarge the opening in the plate to accommodate your particular servo.



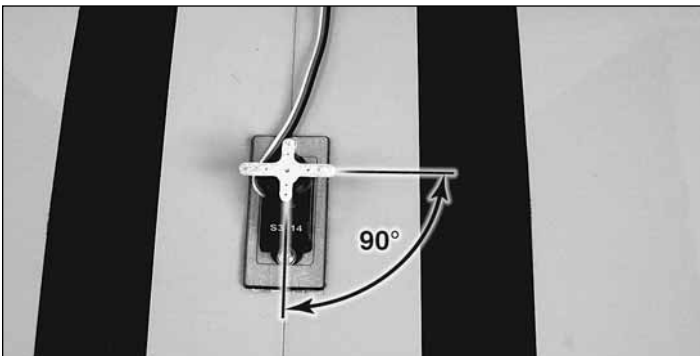
❑ 2. Center the servo mounting plate over the hole in the top of the wing. Epoxy the servo mounting plate in place. Be careful to center it.



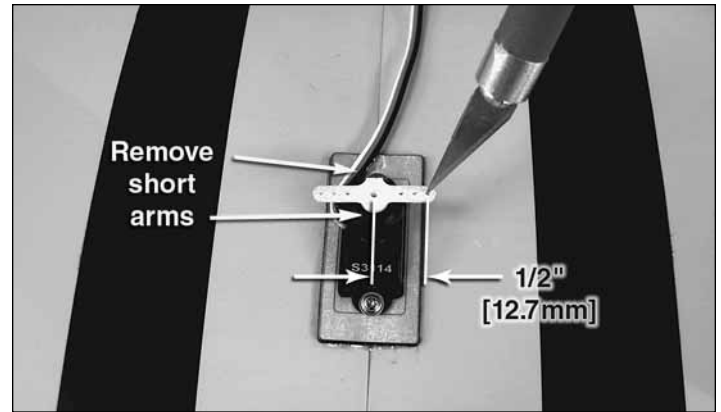
❑ 3. Remove the servo arm from the servo. Install your aileron servo so that the output shaft is oriented forward. Route the lead through the mounting plate on one side of the servo so that it does not interfere with the servo arms. Note: You may have to trim a notch for the wire to pass through. Use a 1/16" [1.6mm] drill to make holes for the servo screws. Install the screws and then remove them. Remove the servo and place a drop of thin CA into each screw hole you just tapped.



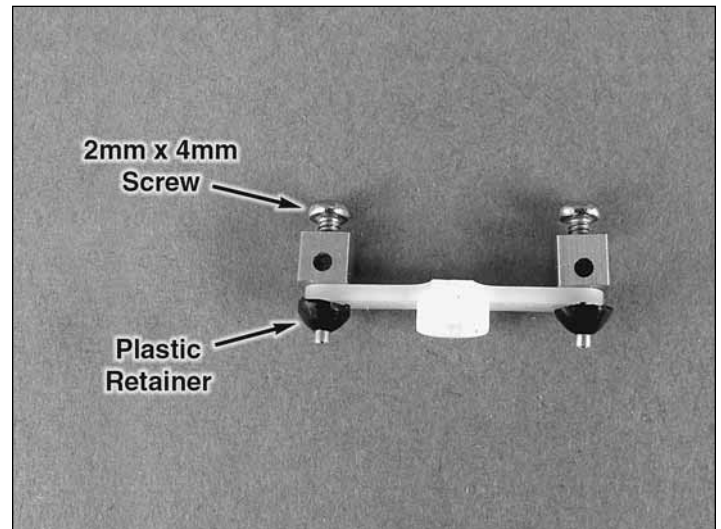
❑ 4. Reinstall the servo, making sure to route the servo lead properly. To keep the servo lead clear of the servo arms, tack glue the lead to the servo mounting plate using one drop of medium CA.



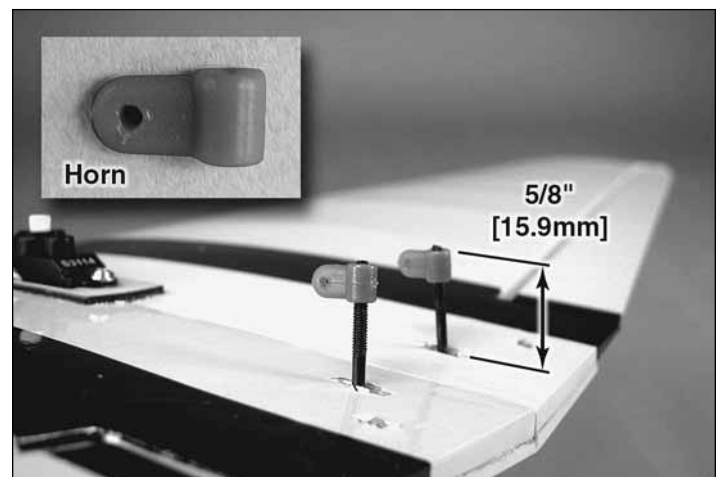
❑ 5. Using your radio system, center your aileron servo. Fit your servo arm to the splined servo shaft and find the position on the splines that allows the two long arms to be 90° to the servo case. Clip off the other two servo arms. To save time, you can plug your other two servos into your receiver and center them at this time.



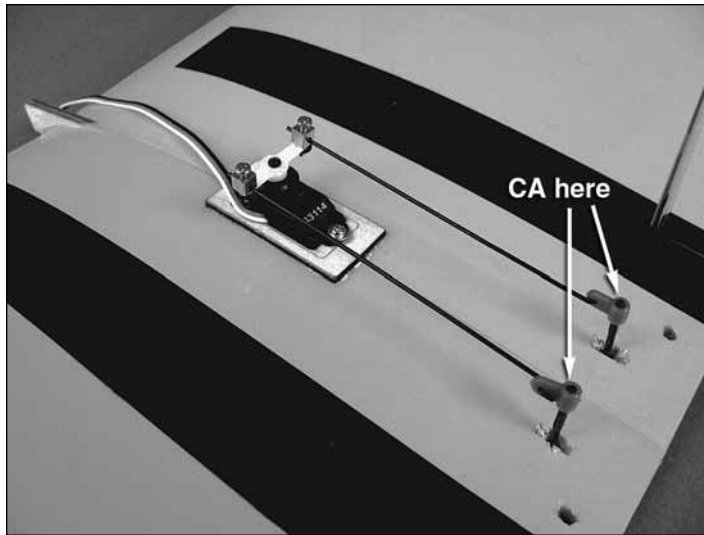
❑ 6. Use a #55 [1.3mm] drill to enlarge the two servo arm holes that are 1/2" [12.7mm] from the center of the output shaft. These are the outermost holes of the standard servo arm. If you don't have a #55 [1.3mm] drill bit, you can use your hobby knife to carefully enlarge the hole until the screw-lock pushrod connector pin fits.



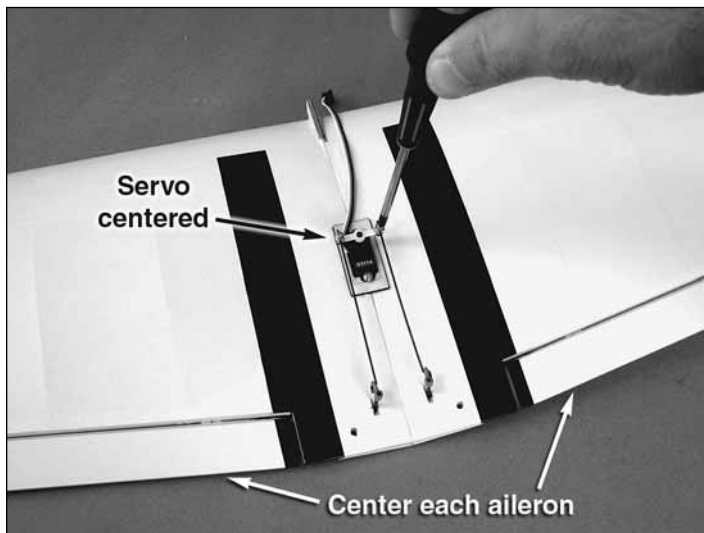
❑ 7. Install a screw-lock pushrod connector to each servo arm and secure each one with a plastic retainer.



❑ 8. Thread each torque rod horn onto the torque rods so that the top of the horn is 5/8" [15.9mm] from the upper surface of the wing with the aileron centered.

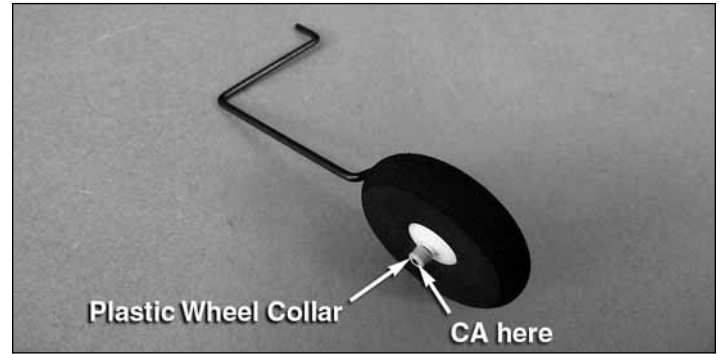


❑ 9. Fit the Z-bend of a 1mm x 80mm pushrod into the hole of each torque rod horn. With the servo still centered, slide the screw-lock pushrod connectors onto each pushrod and fit the servo arm to the servo. Install the servo arm screw. Apply a drop of medium CA to the tip of each aileron torque rod to secure the horns and keep them from rotating.



❑ 10. Apply a drop of thread-locking compound to each pushrod connector locking screw and center each aileron so that it is at zero deflection with the aileron servo centered. Tighten the locking screws.

## Install the Main Landing Gear



❑ 1. Install a wheel onto the main landing gear axle. Fit a plastic wheel collar onto the end of the axle. Apply a drop of medium CA to the end of the axle and wheel collar to secure it.



❑ 2. Turn the wing over. Place a flat nylon strap over the landing gear wire channel in the locations shown. Using the nylon strap as a guide, drill two 1/16" [1.6mm] holes for each strap. Remove the straps and apply a drop of thin CA into the screw holes you just tapped. Be careful not to drill completely through the wing!



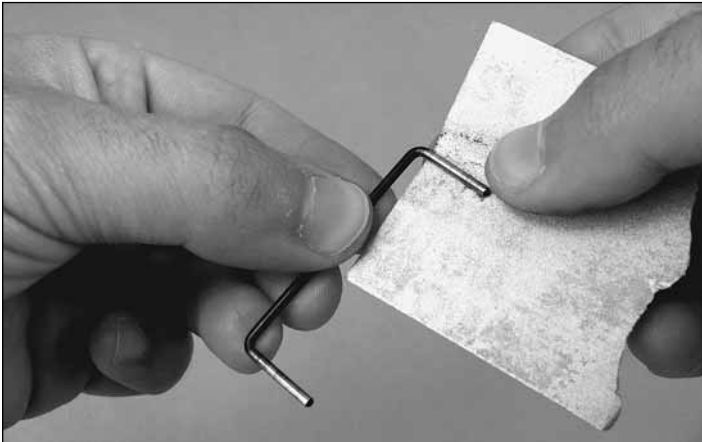
❑ 3. Install the landing gear.

❑ 4. Repeat steps 1 through 3 above for the other gear leg.

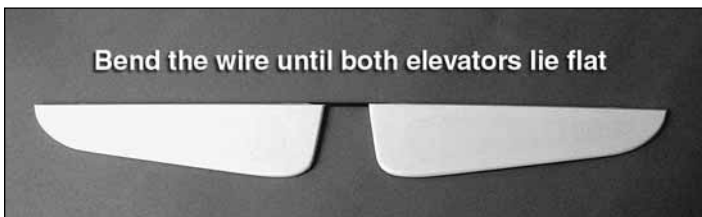
## INSTALL THE TAIL

### Install the Horizontal Stabilizer & Elevators

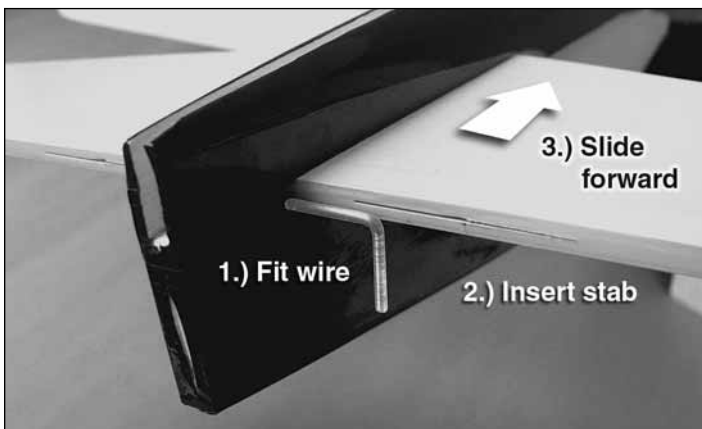
- ❑ 1. Temporarily fit the wing to the fuselage using two 3mm x 25mm machine screws and two 3mm washers.



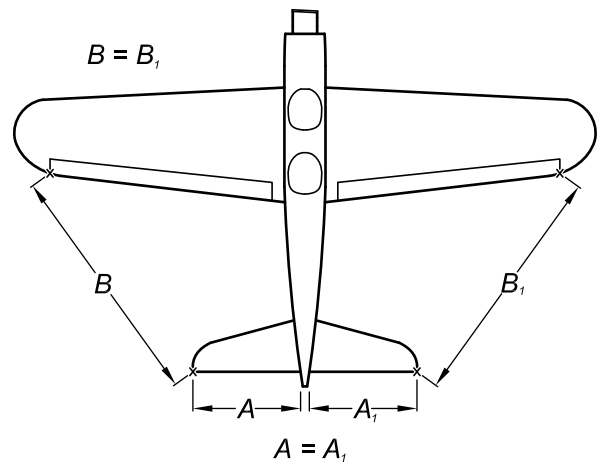
- ❑ 2. Use some 220-grit sandpaper to roughen the ends of the elevator joiner wire.



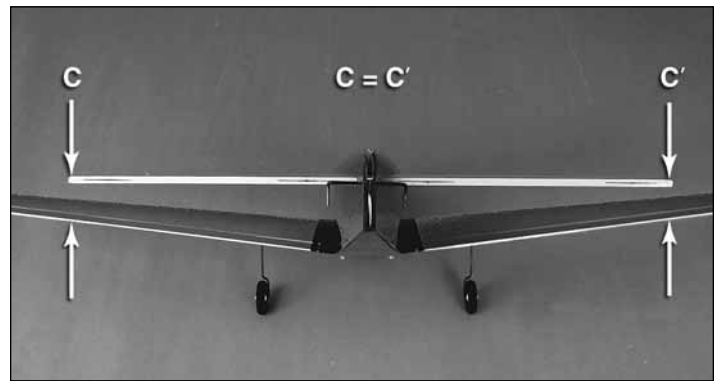
- ❑ 3. Test fit the joiner wire into both elevator halves and lay the joined elevators on a flat table. Both elevators should lie flat. If they are not aligned, remove the joiner wire and twist it slightly using two sets of pliers. Note: DO NOT attempt to twist the joiner wire while it is installed in the elevators. You will damage the wood! Remove it completely and make a small adjustment. Then re-check it.



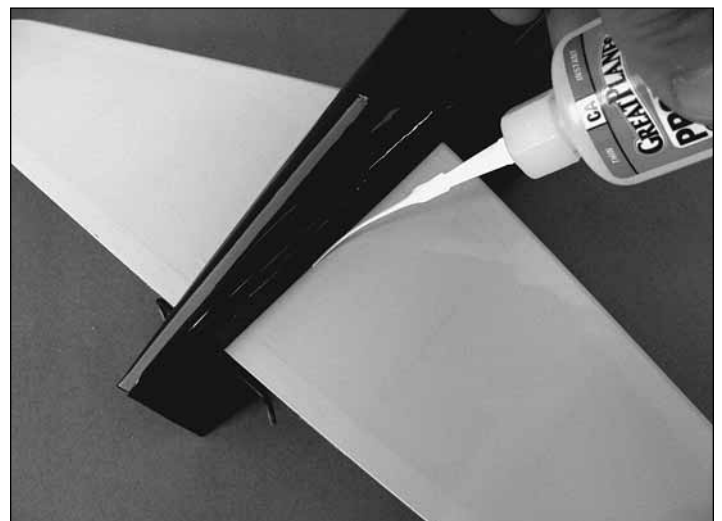
- ❑ 4. Place the elevator joiner wire in the horizontal stabilizer slot and slide it all the way back in the slot. Center the stabilizer in the slot and slide it all the way forward.



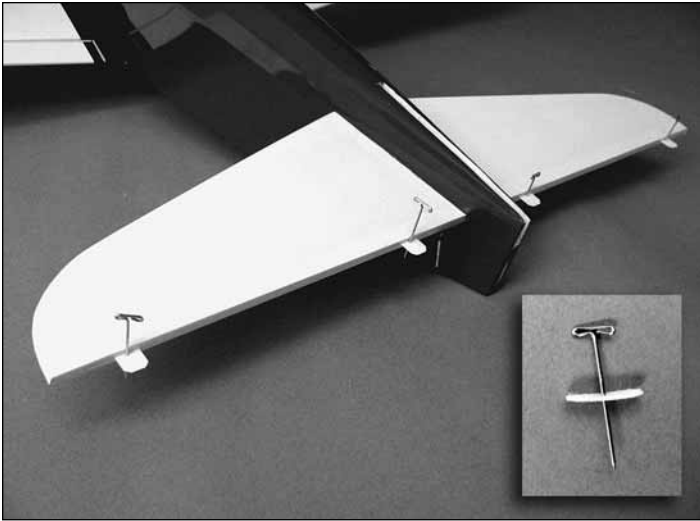
- ❑ 5. Align the trailing edge (TE) of the stabilizer left to right so that distance  $A = A_1$ . Align the stabilizer tips fore and aft so that distance  $B = B_1$ . Use a fabric measuring tape to measure these distances.



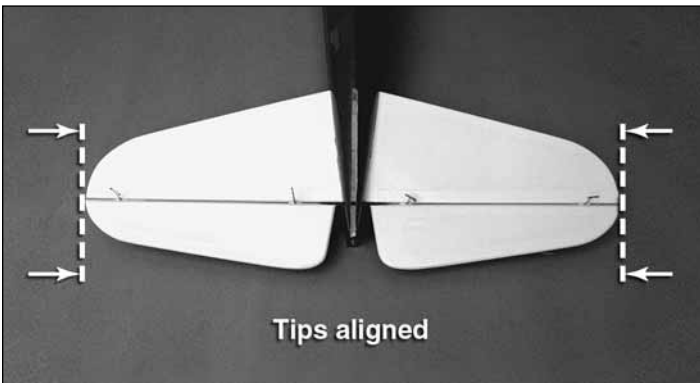
- ❑ 6. Prop the tail up and take a few steps back from the model. Check to see that the tips of the horizontal tail are at an equal distance from the wing so that  $C = C_1$ . If one side is higher than the other, remove the stabilizer and sand the bottom of the stab slot slightly (on the high side) and recheck the alignment.



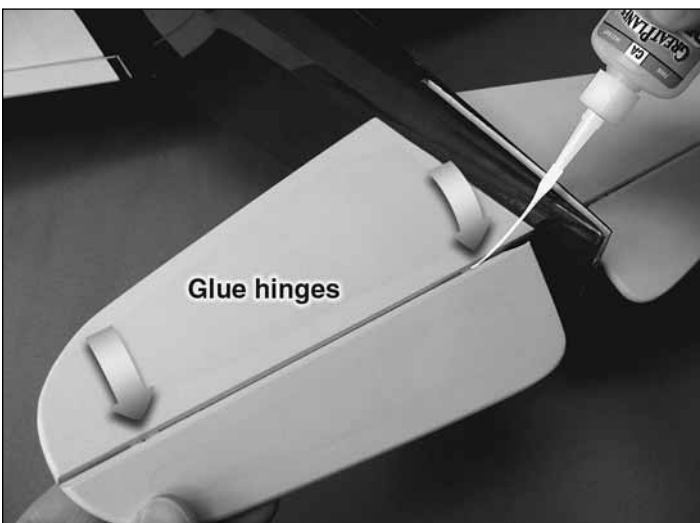
- ❑ 7. When you're satisfied with the alignment of the stabilizer, wick thin CA into each joint.



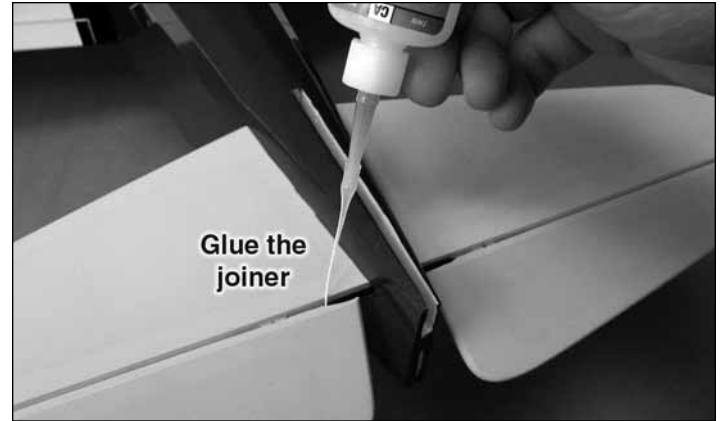
❑ 8. Prepare four hinges using T-pins as shown. Insert the T-pin through the center of each hinge. Fit a hinge to each hinge slot in the elevator. The T-pin will center the hinge and hold it in place as you fit the elevator.



❑ 9. Fit the elevators to the stabilizer and to the elevator joiner wire. Slide the elevators left or right so that the tips of each elevator match the tips of the stab.



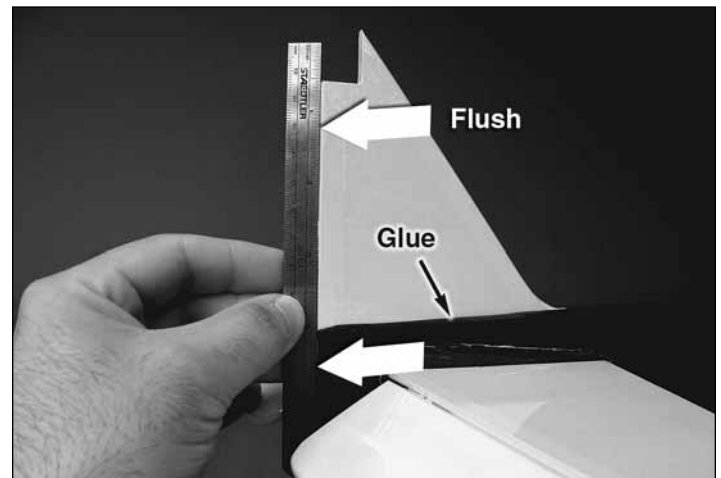
❑ 10. Push the elevators up against the stab and deflect the elevators up and down several times. Place about 4-5 drops of thin CA to each hinge. Turn the model over and glue the other side of each hinge.



❑ 11. Wick about 4-5 drops of thin CA into each leg of the elevator joiner wire. Do this for both elevator halves. Clean up any excess CA with a paper towel.

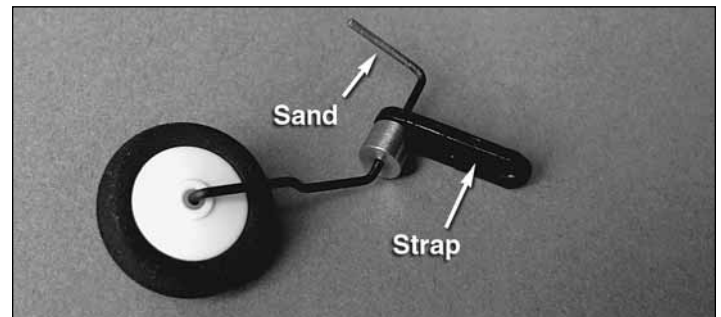
### ***Install the Vertical Stabilizer, Rudder & Tailwheel***

❑ 1. Remove the wing and set the screws aside.

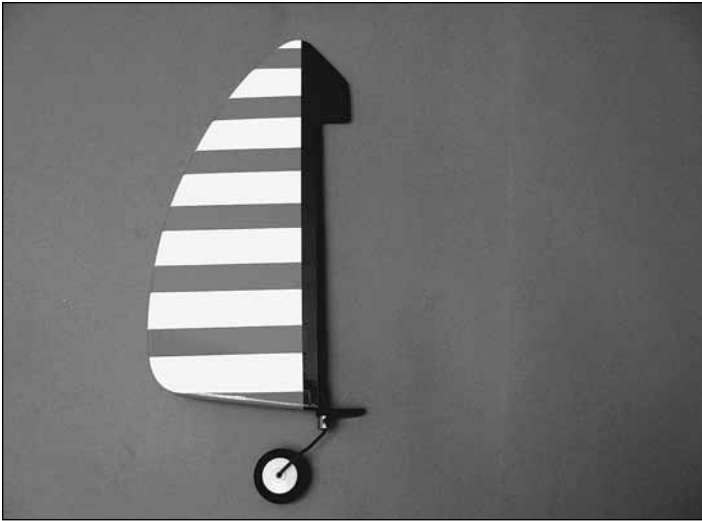


❑ 2. Fit the vertical fin to the fuselage. Push it all the way down and adjust the fin so the TE of the fin is flush with the TE of the fuselage.

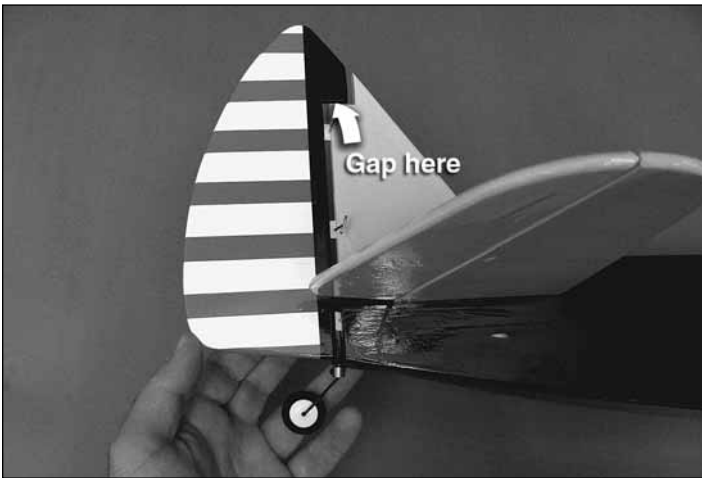
❑ 3. When you're satisfied with the position of the fin, glue it in place by running a bead of thin CA into the fuse to fin joint.



❑ 4. Sand the guide wire of the tailwheel assembly and fit the tailwheel strap as shown.



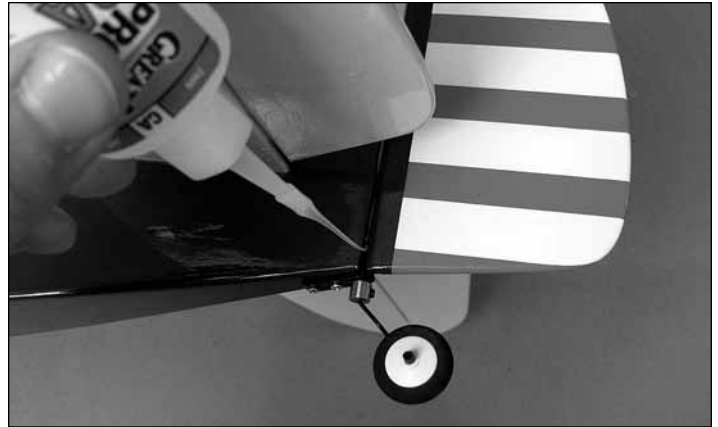
❑ 5. Fit the tailwheel assembly to the rudder by sliding the guide wire into the pre-drilled hole in the rudder. Do not glue it in place at this time.



❑ 6. Prepare three hinges and fit the rudder to the fin. Slide the rudder up enough to leave a gap between the counterbalance portion of the rudder and the top of the fin. Deflect the rudder left and right a few times as you push it up against the TE of the fin. Check for smooth operation. When you're satisfied, glue the rudder in place.

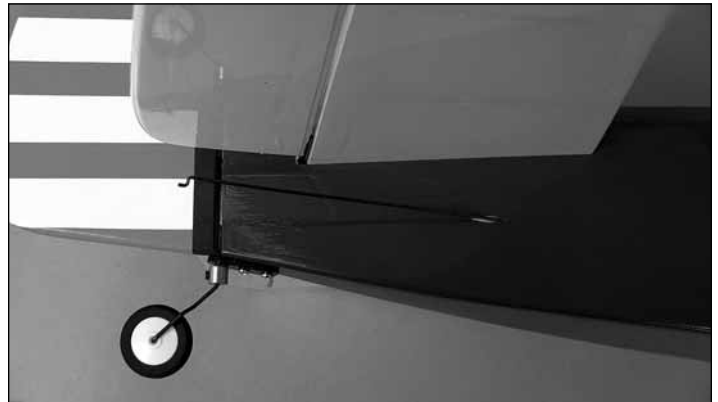


❑ 7. Turn the model upside down and position the tailwheel strap as shown. Drill two 1/16" [1.6mm] holes through the fuselage and install the strap using two 2mm x 7mm sheet metal screws.



❑ 8. Tighten the set screw on the wheel collar for the tailwheel wire and apply a few drops of thin CA into the tailwheel guide wire.

## INSTALL THE ELEVATOR & RUDDER SERVOS



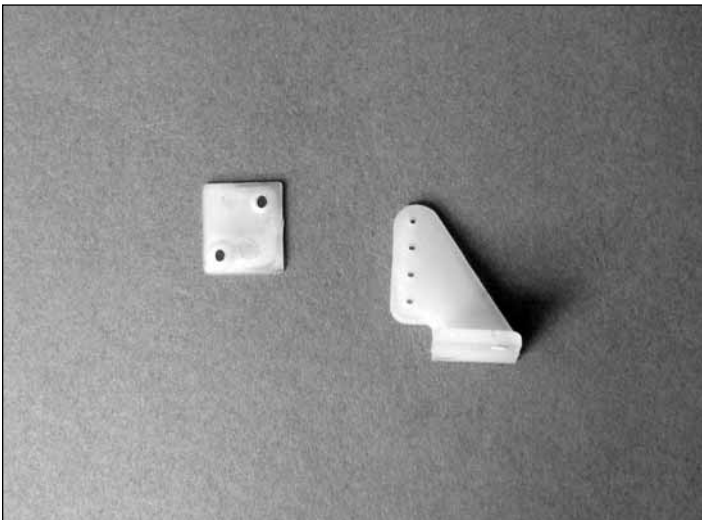
❑ 1. Fit a 1mm x 440mm Z-bend pushrod through the pushrod guide tube on the **right** side of the fuselage.



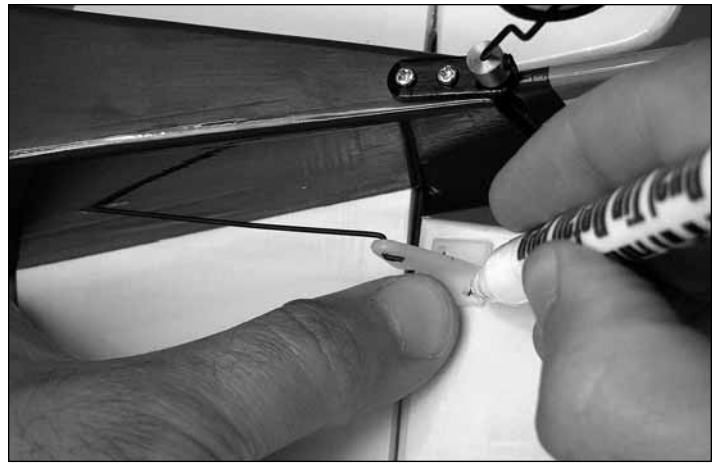
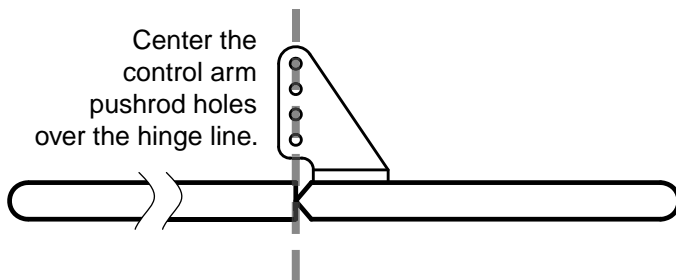
❑ 2. Fit your elevator servo to the servo tray in the fuse as shown. Use a servo mounting plate to fit your particular servo to the servo tray. Position the servo on the tray so that the outermost hole of the servo arm is aligned with the straight pushrod.



❑ 3. Epoxy the servo mounting plate to the servo tray. Screw the elevator servo in position so that the output shaft of the servo is oriented forward.



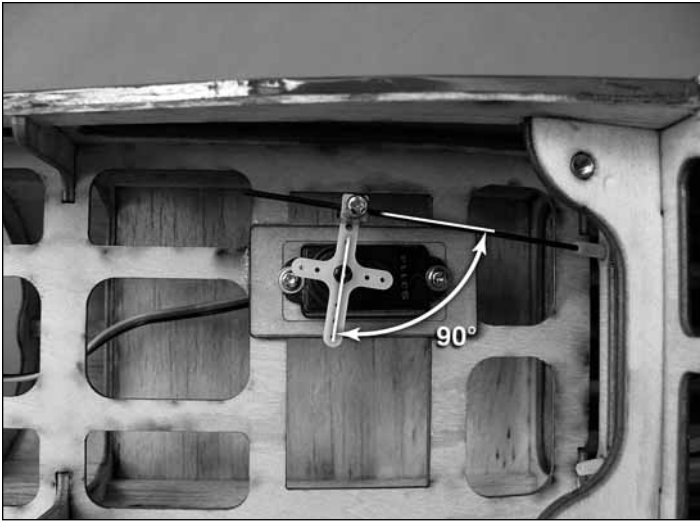
❑ 4. Locate a nylon control horn. Clip the backplate from the horn and trim off the sprue.



❑ 5. Fit the Z-bend side of the elevator pushrod into the outer pushrod hole of the control horn. Position the horn over the elevator as shown so that the pushrod holes are aligned directly over the hinge line and the pushrod is relaxed side-to-side. Mark the position of the screw holes and drill the elevator using a 5/64" [2mm] drill. **Note:** Be careful when you position the horn! Align it side-to-side so that you won't interfere with the elevator joiner wire when you drill through the elevator.

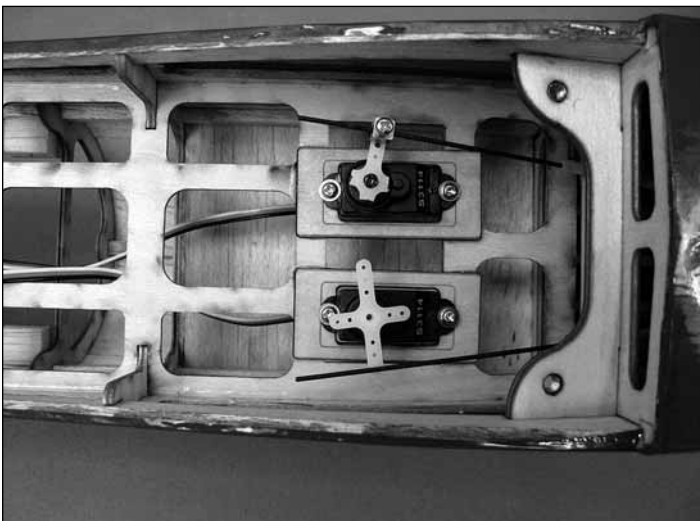


❑ 6. Install the elevator horn onto the elevator using two 2mm x 10mm machine screws and the nylon control horn backplate.

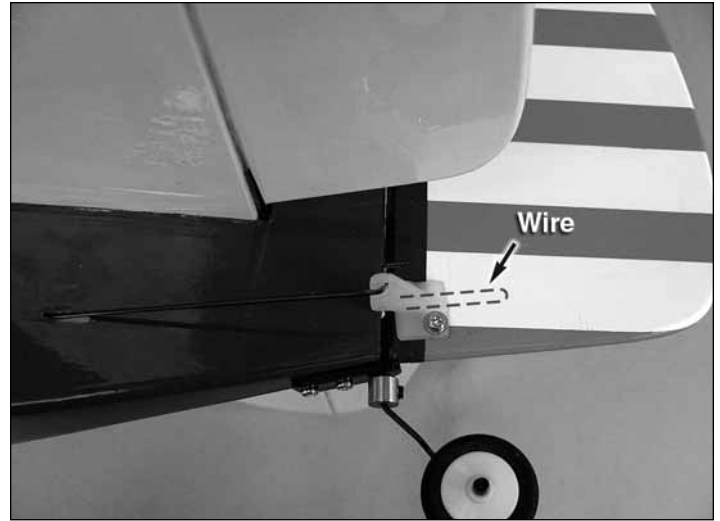


❑ 7. With your servo centered, fit the standard size servo arm to your servo so that the servo arm is 90° to the pushrod. Use a #55 [1.3mm] drill to enlarge the outermost hole in the servo arm or the hole that is 1/2" [12.7mm] from the center of the output shaft. Install a screw-lock pushrod connector on that arm using a plastic retainer. Clip off the unused arm and install the servo arm screw.

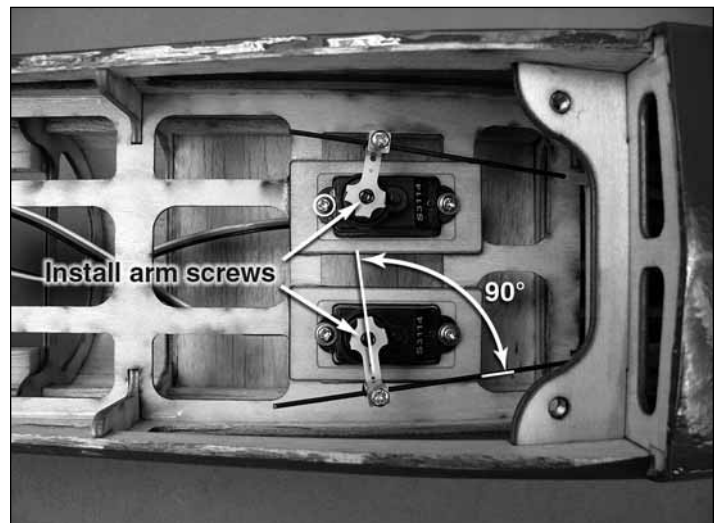
❑ 8. Center the elevator at zero deflection and clip off the excess pushrod wire about 3/4" [19.1mm] from the end of the screw-lock pushrod connector. Apply a drop of thread locking compound on the 2mm x 4mm pushrod locking screw and tighten the locking screw with the elevator at zero deflection.



❑ 9. Fit the other 1mm x 440mm Z-bend pushrod through the pushrod guide tube on the **left** side of the fuselage. Use it to help you install your rudder servo. Install the rudder servo using a servo mounting plate and two servo screws.



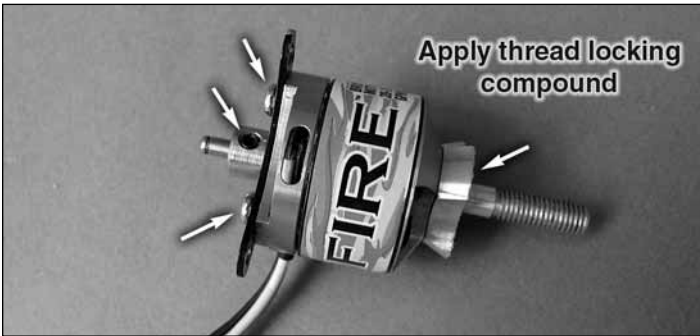
❑ 10. Fit the remaining control horn to the pushrod. Align the horn over the rudder hinge line and vertically. Drill the rudder using a 5/64" [2mm] drill. Install the control horn and backplate using two 2mm x 10mm machine screws.



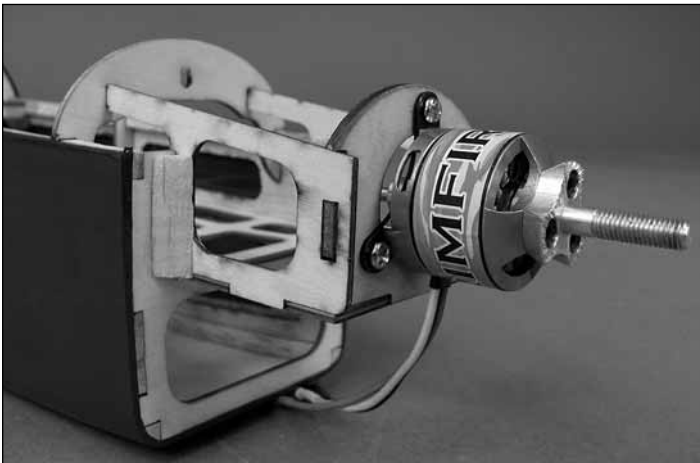
❑ 11. Center your rudder servo and fit a servo arm. Drill the arm with a #55 [1.3mm] drill and install a screw-lock pushrod connector on the outermost hole of the servo arm. Don't forget to install your servo arm screw!

❑ 12. Apply a drop of thread locking compound to the 2mm x 4mm pushrod locking screw. Center the rudder at zero deflection and tighten the locking screw. Trim off the unused servo arms and the excess pushrod wire.

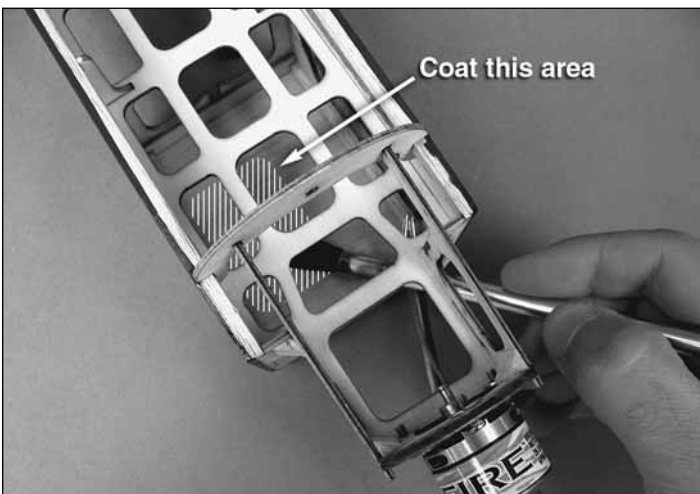
## INSTALL THE MOTOR, ESC, RECEIVER, & BATTERY



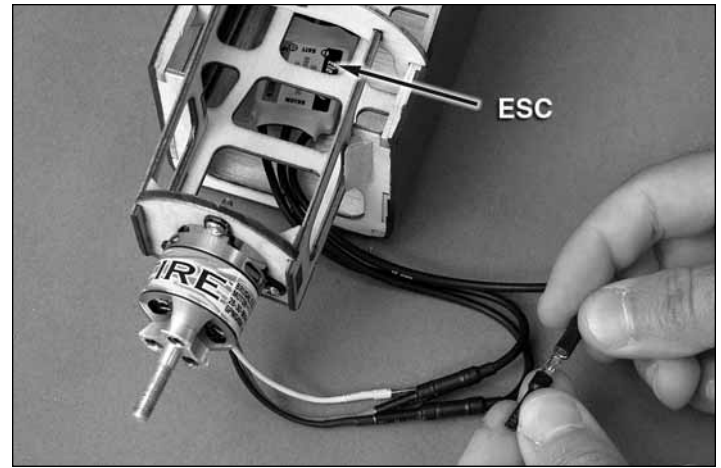
- ❑ 1. Remove the three backplate screws, the brass collar set screw, and apply thread locking compound to the screw threads and reinstall the screws. Install the prop adapter shown. Apply thread locking compound to the screws and tighten them.



- ❑ 2. Install the motor to the firewall using thread locking compound, three 3mm x 8mm machine screws, and three 3mm lock washers.

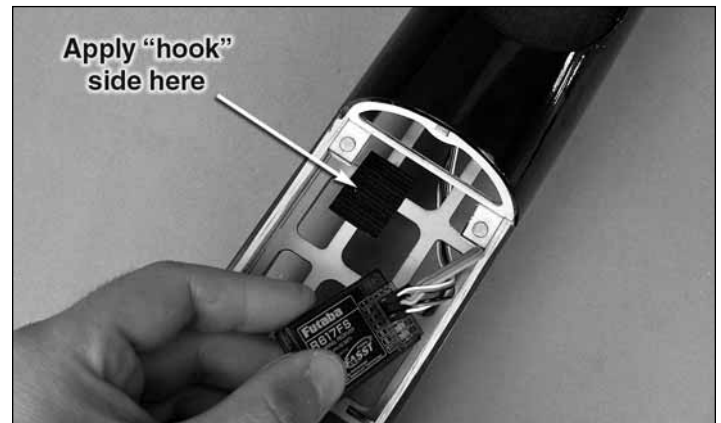


- ❑ 3. Mix up a small amount of epoxy or spread a thin layer of medium CA on the inside surface of the bottom of the fuselage where you want to stick your ESC. Allow it to fully cure.



- ❑ 4. Cut a 1" [25.4mm] length of adhesive backed hook-and-loop material and apply the loop side (fuzzy side) to the back of your ESC. Attach the hook side to that and peel off the backing paper to expose the adhesive. Stick the ESC into position as shown.

- ❑ 5. Fit three 3.5mm to 2mm bullet connector adapters (GPMM3122) to the ESC leads and connect the ESC to the motor.

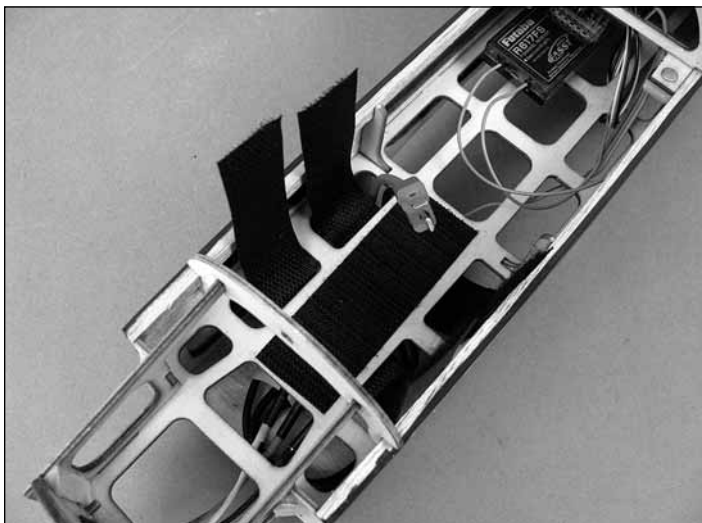
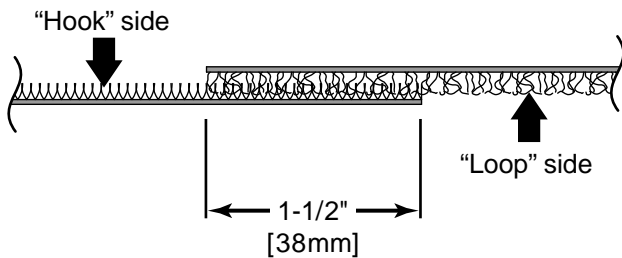


- ❑ 6. Using the same method as you did for the ESC to prepare the battery tray, cut a 1" [25.4mm] length of adhesive backed hook-and-loop material and apply the hook side to the aft battery tray as shown. Stick the loop side to your receiver and connect the servo leads and ESC signal lead to it. Attach the receiver to the battery tray.

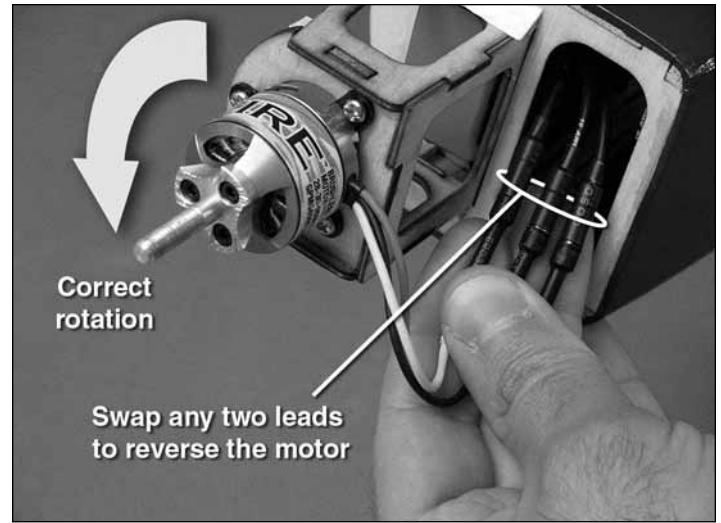


❑ 7. Prepare the surface and attach the remaining *adhesive* backed hook-and-loop material (hook side) to the battery tray in the location shown. Stick the loop side to your battery. For extra hook & loop material, please purchase GPMQ4480.

Cut the hook & loop to the correct length and join the pieces together to make a strap.



❑ 8. Using the two 110mm strips of non-adhesive backed hook-and-loop material, make two battery straps by separating the hook side from the loop side and reattaching them to each other so that there is 1-1/2" [38mm] of overlap. Fit the straps to your battery compartment as shown. After you balance (C.G.) your model later, you may use some CA to glue these to the bottom of the battery tray.

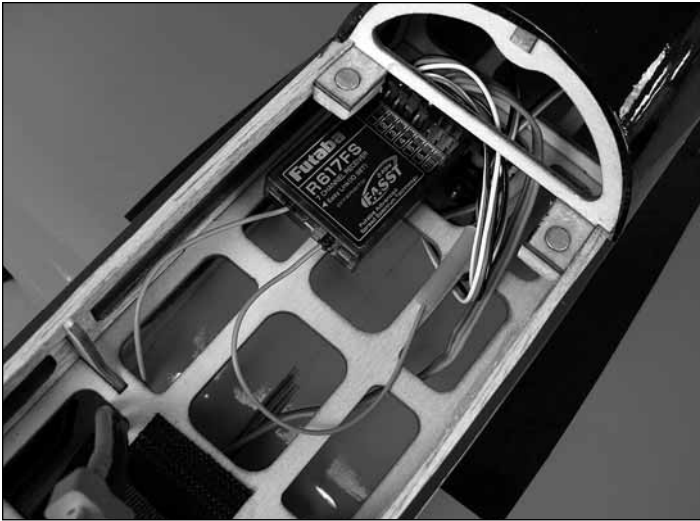


❑ 9. **Note:** DO NOT accomplish this step with the propeller installed! Turn on your transmitter. If you have a Futaba radio system reverse channel 3 at your transmitter. Place the throttle stick to idle. Read and understand the instructions that came with your ESC so that you know how to arm the ESC and operate it safely. Plug the charged LiPo battery into the ESC now and arm the motor. Slowly advance the throttle to spin the motor. Check the direction of motor rotation. If the motor rotates clockwise as viewed from the front, unplug and reverse the position of any two ESC motor wires. Unplug the LiPo and turn off your transmitter.

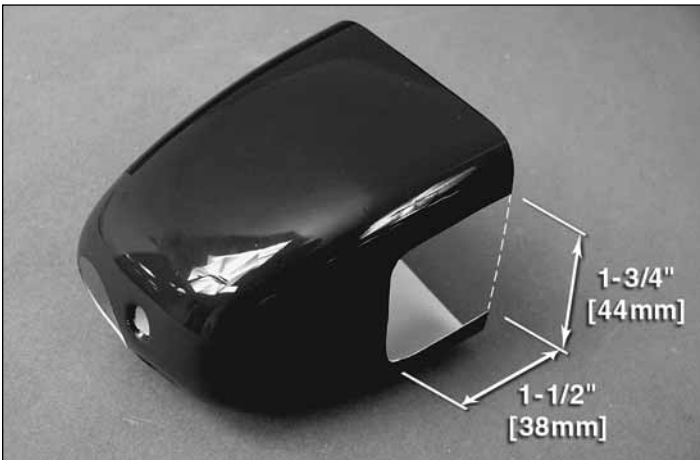
## FINISH THE MODEL



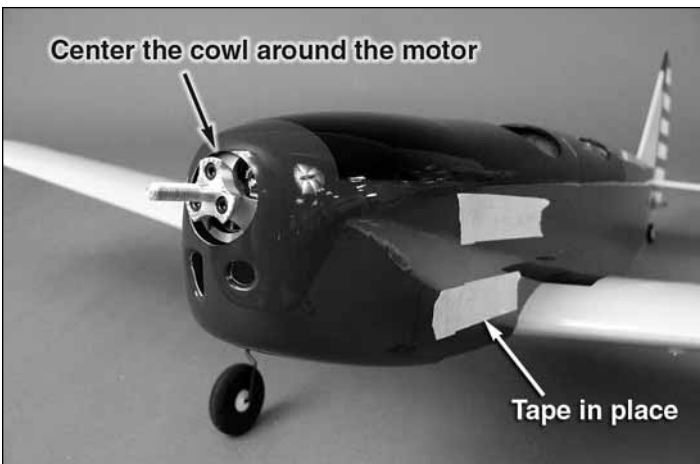
❑ 1. If you are using a 72MHz radio system, make a hole in the bottom of the fuselage in the location shown and route the receiver antenna out of the fuse. Tape it in place at the tail. Install the wing using two 3 x 25mm machine screws and two 3mm washers. Apply a drop of thread locking compound to the screw threads and route the aileron servo lead up through the battery tray to the receiver.



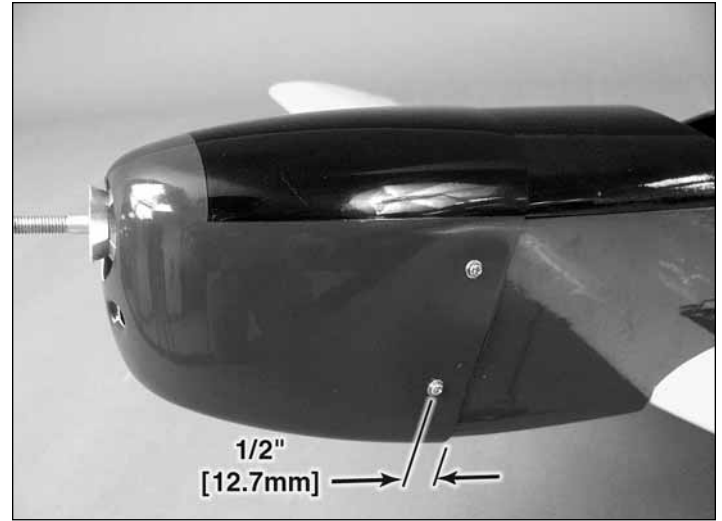
❑ 2. Connect the aileron servo lead to the receiver. If you are using a 2.4GHz radio, arrange your receiver's antennas as directed by the radio manufacturer.



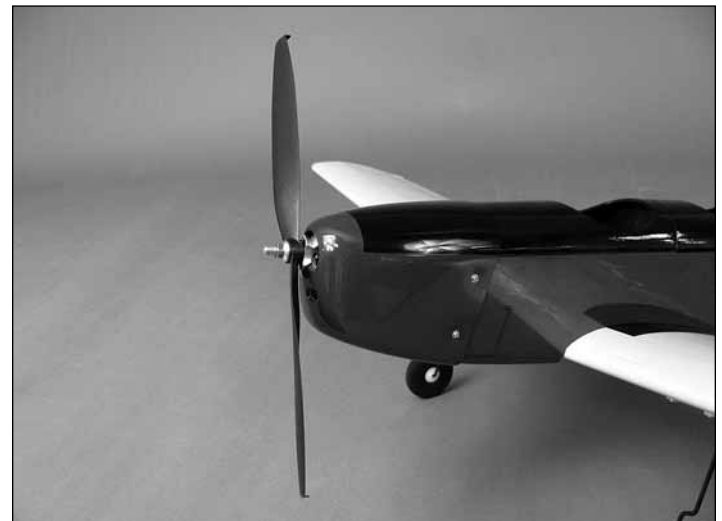
❑ 3. Trim the bottom of the cowl open so that the opening is 1-3/4" [44mm] wide and 1-1/2" [38mm] long as shown.



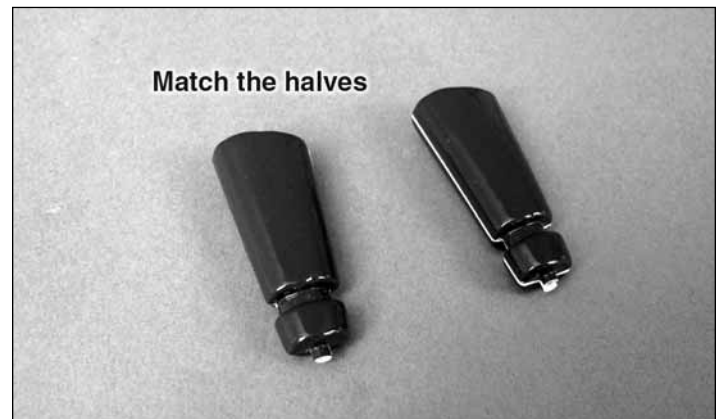
❑ 4. Fit the hatch to the fuselage. Slide the cowl in place. Center the cowl so that the motor opening is centered with the motor case. Adjust the cowl fore and aft so that it clears the motor and allows the prop adapter to protrude forward of the cowl. Tape the cowl in this position with four pieces of masking tape.



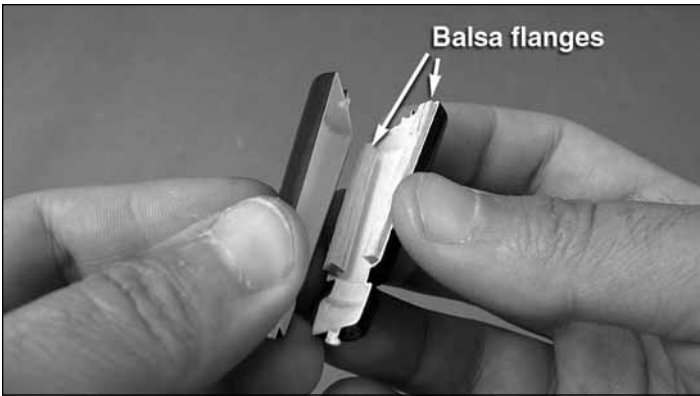
❑ 5. Using a 1/16" [1.6mm] drill bit, drill two holes per side of the cowl that are 1/2" [12.7mm] forward of the rear edge of the cowl. Install the cowl using four 2mm x 7mm sheet metal screws and four 2mm flat washers.



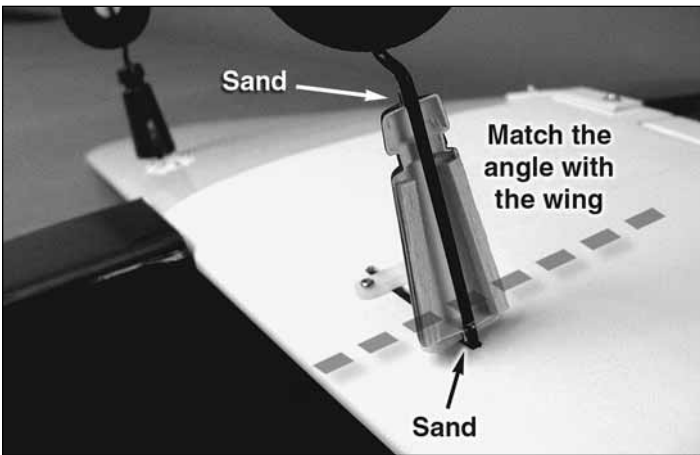
❑ 6. Balance a propeller. For this motor, we recommend using the 10x4.5 Power Flow™ propeller (GPMQ6660). Install the propeller, prop washer, and prop nut. Tighten the prop nut securely. Check to see that the propeller rotates freely.



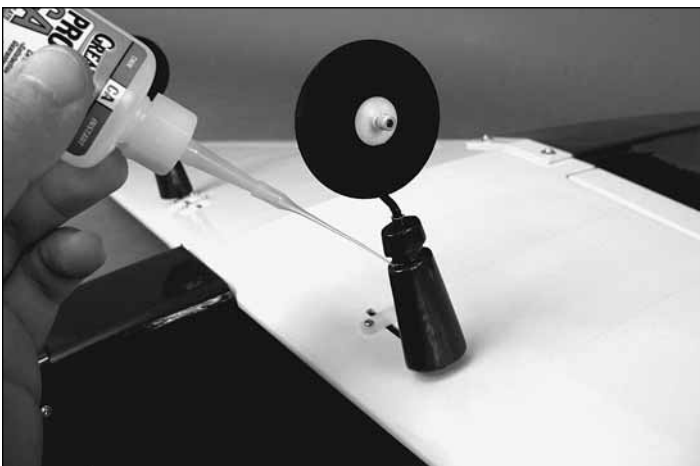
❑ 7. Match the landing gear pant halves together. Set them apart or label each part with a felt-tipped pen on the inside.



❑ 8. Using some scrap balsa, cut four short strips to make flanges to help join the left and right pieces. Glue two flanges to one half using thin CA. Look at the picture to help you see how the parts will be joined. Test fit them, but do not join them yet.



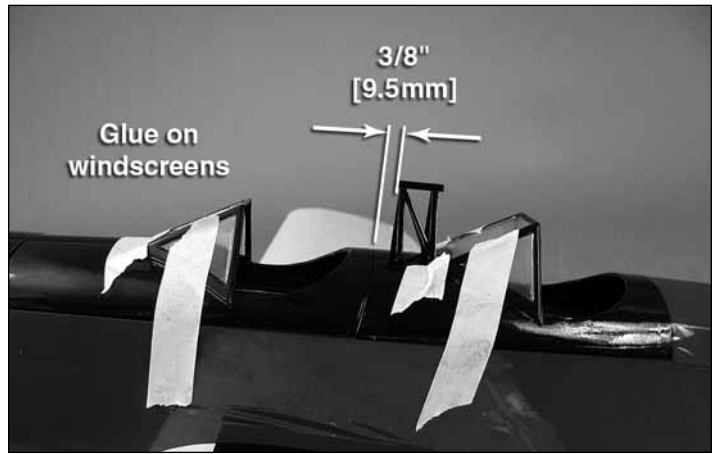
❑ 9. Turn the model over. Lightly sand the landing gear wire where each pant will attach. Glue the flanged half of each gear pant to each landing gear wire using medium CA. Pay special attention to the way the top of the gear pant is angled and install the flanged side accordingly (inboard or outboard).



❑ 10. Fit the other half of each gear pant to the flange and hold it in position. Carefully wick a bit of thin CA into each flange. Clean up any excess using CA debonder and a clean paper towel. Do this for both gear pants.



❑ 11. Cut out the instrument panel decals. Trim them to fit and apply them to both cockpits now.



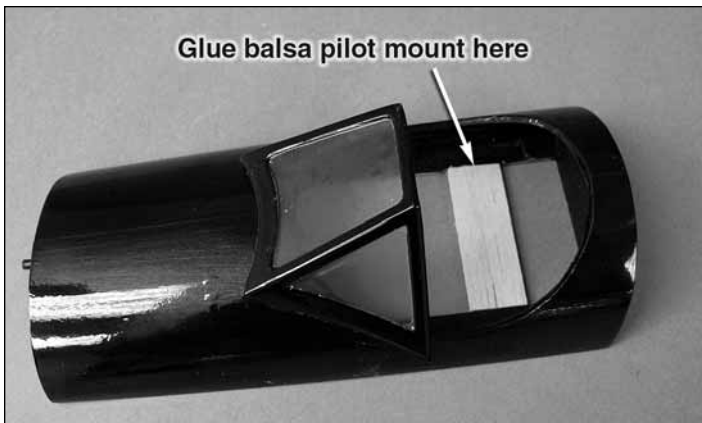
❑ 12. Install the safety bar assembly behind the edge of the rear hatch so that it is 3/8" [9.5mm] from that edge. Note: For the best results use R/C-56 canopy glue (JOZR5007) and drill four 1/8" [3.2mm] holes for the legs of the safety bar to fit into.

❑ 13. Install the windscreens using R/C-56 canopy glue or the eight 2mm x 4mm sheet metal screws supplied in this kit.

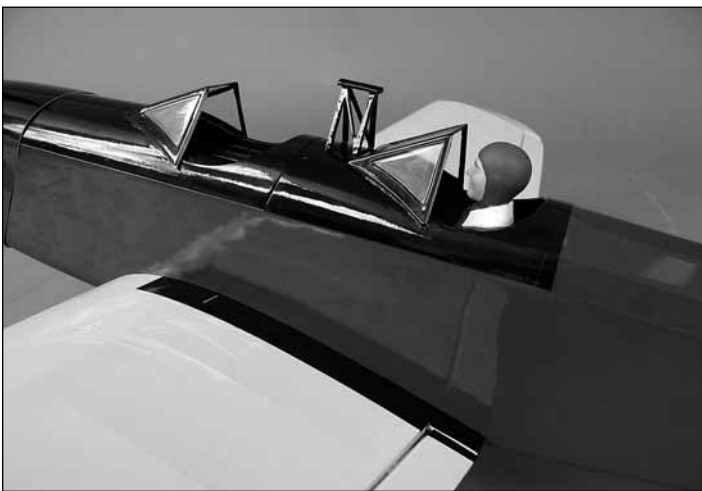
## PILOT INSTALLATION (OPTIONAL)



❑ 1. If you want to install a pilot figure, please purchase Williams Brothers 1/8 Standard Pilot (WBRQ1040). Note: You will have to paint this pilot. We recommend using a regular hobby paint brush and acrylic modeling paint.



- ❑ 2. Position your pilot(s) where you want them. Remove the hatch. Glue the 45mm x 15mm piece of balsa sheet in the front cockpit as shown if you will be installing a pilot there.



- ❑ 3. Glue the pilot(s) in each cockpit or use double sided foam mounting tape (GPMQ4440).

## 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. Submerge the decal in the soap and water and peel off the paper backing. **Note:** Even though the decals have a “sticky-back” and are not the water transfer type, submersing them in soap & water allows accurate positioning and reduces air bubbles underneath.
- ❑ 3. Position decal on the model where desired. Holding the decal down, use a paper towel to wipe most of the water away.
- ❑ 4. Use a piece of soft balsa or something similar to squeegee remaining water from under the decal. Apply the rest of the decals the same way.

## GET THE MODEL READY TO FLY

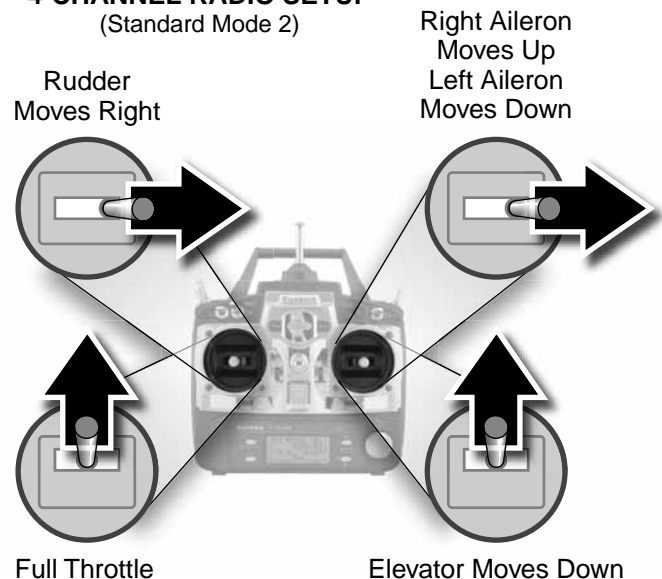
### Check the Control Directions

**Warning:** Once the battery is connected to the ESC, stay clear of the propeller! Always stay behind the propeller!

- ❑ 1. Turn on the transmitter, center the trims, and move the throttle stick all the way down. Plug your airplane's battery into the ESC and check to see that all servo arms are positioned properly. 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. If you have not already done so, center each of your control surfaces so that they are all at zero deflection. If you need to make an adjustment, apply thread locking compound to the locking screw threads and tighten all of the screw-lock pushrod connectors.

#### 4-CHANNEL RADIO SETUP

(Standard Mode 2)



- ❑ 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

To ensure a successful first flight, fly your PT-19 set up only according to the C.G. and control surface throws specified in this manual. The throws and C.G. are not arbitrary, but have been determined through extensive testing and accurate record-keeping. This provides you with the best chance for success and enjoyable first flights that should be surprise-free. Additionally, the throws and C.G. shown are true, real data which will allow the model to perform in the manner in which it was intended when flown by a pilot of the skill level

for which it was intended. **DO NOT OVERLOOK THESE IMPORTANT PROCEDURES.** A model that is not properly setup may be unstable and possibly unflyable.

The building steps earlier in this manual that show the mechanical setup for the elevator, rudder, and aileron linkages show you the best way to configure the linkages to achieve the proper throws using Futaba micro servos and a Futaba radio system. If you are using a different radio system or you cannot achieve the proper control throws using our suggested linkage configuration, you may have to install the pushrod connector in different holes on the servo arms or the pushrod z-bends in different holes on the control horns. Keep in mind that changing the throws mechanically is preferred to changing them using your radio's end-point adjustment. End points should be used to "fine-tune" to get the proper throws.

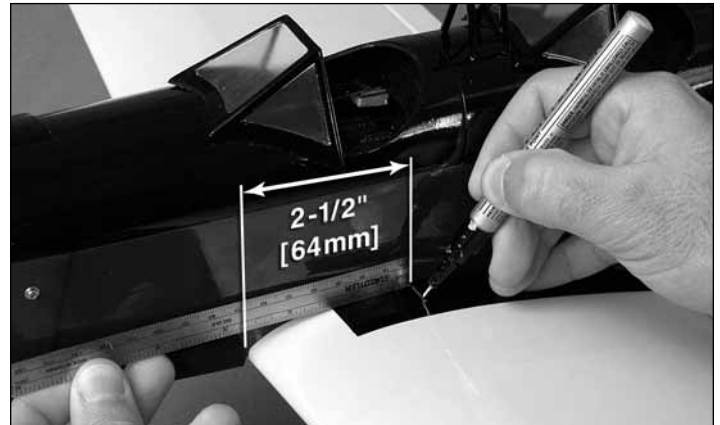


Use a Great Planes AccuThrow gauge, a ruler, or the templates in the back of this manual to accurately measure and set the control throw of each control surface as indicated in the chart that follows. If your radio does not have dual rates, we recommend setting the throws at the **HIGH** rate setting. **NOTE:** The throws are measured at the **widest part** of the elevators, rudder and ailerons.

These are the recommended control surface throws:				
	HIGH RATE		LOW RATE	
	Up	Down	Up	Down
ELEVATOR	1/2" [13mm]	1/2" [13mm]	1/4" [6mm]	1/4" [6mm]
	15 deg	15 deg	7 deg	7 deg
RUDDER	7/8" [22mm]	7/8" [22mm]	1/2" [13mm]	1/2" [13mm]
	17 deg	17 deg	10 deg	10 deg
AILERONS	3/8" [10mm]	3/8" [10mm]	1/4" [6mm]	1/4" [6mm]
	23 deg	23 deg	15 deg	15 deg

## Balance the Model (C.G.)

- ❑ 1. At this stage the model should be in ready-to-fly condition with all of the systems in place including the motor, landing gear, radio system, battery, and all hatches. Place the battery in the battery compartment but **do not** connect it. Fit the cowl in place.



- ❑ 2. Use a felt-tip pen or 1/8" [3mm]-wide tape to accurately mark the C.G. on the **top of the wing** on both sides of the fuselage at the wing root. The C.G. is located **2-1/2" [64mm]** back from the leading edge of the wing at the wing root.

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 1/4" [6mm] 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.



- ❑ 3. With all parts of the model installed (ready to fly) and a battery pack in place (do not connect it), use a Great Planes C.G. Machine, or place your fingers on the marks you made and balance the model.

❑ 4. If the tail drops, the model is “tail heavy” and the battery pack 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 must be shifted aft or weight must be added to the tail to balance.

❑ 5. Using a felt-tip pen, mark the position of the battery pack in the battery compartment. This will help eliminate trim changes or unwanted surprises each time that you change the battery. When using different capacity batteries, you may have to re-balance your plane and place an additional mark in the battery compartment.

❑ 6. If additional weight is required, use Great Planes (GPMQ4485) “stick-on” lead. A good place to add stick-on nose weight is to the firewall (don’t attach weight to the cowl—it is not intended to support weight). Begin by placing increasing amounts of weight on the top of the fuse over the firewall until the model balances. Once you have determined the amount of weight required, it can be permanently attached. If required, tail weight may be added by cutting open the bottom of the fuse and gluing it permanently inside.

**IMPORTANT:** If you found it necessary to add any weight, recheck the C.G. after the weight has been installed.

### ***Balance the Model Laterally***

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

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

## ***PREFLIGHT***

### ***Identify Your Model***

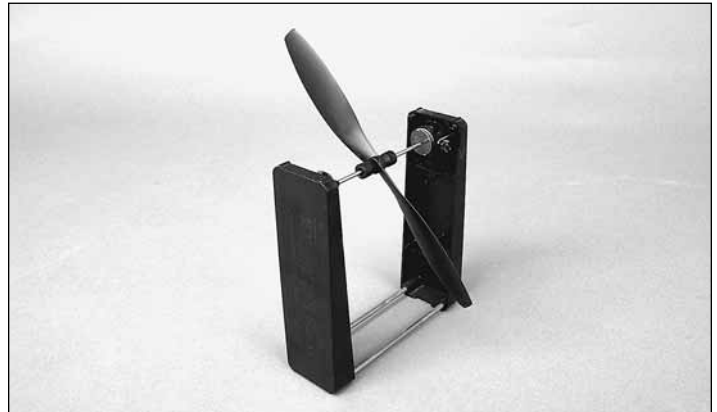
No matter if you fly at an AMA sanctioned R/C club site or if you fly somewhere on your own, you should always have your name, address, telephone number and AMA number on or inside your model. It is **required** at all AMA R/C club flying sites and AMA sanctioned flying events. Fill out the identification tag on page 24 and place it on or inside your model.

### ***Charge the Batteries***

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

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

### ***Balance Propellers***



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

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

### ***Range Check***

When you get to your flying site, ground check the operational range of the radio before the first flight of the day. With the transmitter antenna collapsed and the receiver and transmitter on, you should be able to walk at least 100 feet away from the model and still have control. Have an assistant stand by your model and, while you work the controls, tell you what the control surfaces are doing. Repeat this test **with the motor running** at various speeds with an assistant holding the model, using hand signals to show you what is happening. If the control surfaces do not respond correctly, **do not fly!** Find and correct the problem first. Look for loose servo or battery connections, damaged wires or a damaged receiver crystal from a previous crash in another model. One other possible source of radio “noise” that could cause interference is the arrangement and relative location of the receiver, receiver antenna and motor wires. If possible, re-mount the receiver in a different location or re-route some of the wires and then try the range check again.

## MOTOR SAFETY PRECAUTIONS

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

Get help from an experienced pilot when learning to operate electric motors.

Use safety glasses when operating electric motors.

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

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

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

Always use a charger designed to charge LiPo batteries for charging the LiPo flight battery.

Never leave the LiPo battery unattended while charging. If the battery becomes hot, discontinue charging.

## 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 (that's why it's called a *check list!*).

- 1. Check the motor for secure attachment.
- 2. Check the cowl for secure attachment and proper alignment.
- 3. Balance your propeller (and spare propellers).
- 4. Tighten the propeller nut and check to make sure that a prop washer is in place.
- 5. Rotate the propeller a full turn. Check for free rotation of the prop.
- 6. Check the wheels for free rotation, the axles and landing gear for security, and add a drop of light machine oil to the axles.
- 7. Make sure all hinges are **securely** glued in place.
- 8. Check the control horns for secure attachment to the control surfaces.

- 9. Pull / push on each of the pushrods and check to see that the adjustable pushrod connectors do not slip.
- 10. Check the servo arms for secure attachment and make sure that the arm screws are in place and are tight.
- 11. Reinforce holes for wood screws with thin CA where appropriate (servo mounting screws, etc.).
- 12. Check that all servo connectors are fully plugged into their respective channels on the receiver.
- 13. Make sure any servo extension cords you may have used do not interfere with other systems (servo arms, pushrods, etc.).
- 14. Check the receiver for secure attachment. This must not be "stuffed into place."
- 15. Balance your model *laterally* as explained in the instructions.
- 16. Set the C.G. according to the measurements provided in the manual.
- 17. Place your name, address, AMA number and telephone number on or inside your model.
- 18. Fully charge your transmitter battery and check the battery voltage after it is charged.
- 19. Range-check your radio at the flying field.
- 20. **Confirm that all controls operate in the correct direction** and the throws are set up according to the manual.
- 21. Photograph your model!

## FLYING

**CAUTION (This applies to all R/C airplanes):** If, while flying, you notice an alarming or unusual sound such as a low-pitched "buzz," this may indicate control surface *flutter*. Flutter occurs when a control surface (such as an aileron or elevator) or a flying surface (such as a wing or stab) rapidly vibrates up and down (thus causing the noise). In extreme cases, if not detected immediately, flutter can actually cause the control surface to detach or the flying surface to fail, thus causing loss of control followed by an impending crash. The best thing to do when flutter is detected is to slow the model **immediately** by reducing power, then land as soon as safely possible. Identify which surface fluttered (so the problem may be resolved) by checking all the servo grommets for deterioration or signs of vibration. Make certain all pushrod linkages are secure and free of play. If it fluttered once, under similar circumstances it will probably flutter again unless the problem is fixed. Some things which can cause flutter are: Excessive hinge gap; Not mounting control horns solidly; Poor fit of clevis pin in horn; Side-play of wire pushrods caused by large bends; Excessive free play in servo gears; Insecure servo mounting; and one of the most prevalent causes of flutter; Flying an over-powered model at excessive speeds.

## Takeoff

The goals of your first flight should be to trim the airplane and familiarize yourself with the airplane's flight and landing characteristics. You'll want to perform a few tests at a safe altitude to see how the airplane reacts. Take an assistant with you or ask a friend at your flying field to help you spot other traffic, adjust your trim for you, and mind the time as you fly.

If you have access to a paved runway, we suggest using it to take off, especially for the first few flights. Position the model onto the runway pointed into the wind. Slowly advance the throttle stick to half throttle, pulling back slightly on the elevator to keep from nosing over. As the tail rises off the ground, slowly increase throttle and apply a bit of up elevator to lift the model into the air.

If you do not have access to a smooth runway or very short grass, the PT-19 can be hand launched. For the first flight, have your assistant launch the plane for you. This allows you to keep your hands on the radio sticks and correct any trim problems that are present. Have the person launching the plane hold it by the fuselage just behind the lower wing. Throttle up to full power, and have your helper give the plane a gentle toss at about a 30-degree angle upward into the wind. Climb to a comfortable altitude and throttle back to a lower power setting.

## Flight

When you get up to a safe altitude and are throttled back to a comfortable flying speed, let go of the right stick and see if the plane dives or climbs. Have your assistant add some elevator trim and aileron trim if necessary. Fly the plane a bit more and further adjust your throttle. Make a few more trim changes while you fly your traffic pattern. Execute normal left and right aileron turns, watching the tail to see how it drops in each turn. Make a few more turns, adding a bit of rudder to coordinate your turns.

While still at a safe altitude, slow your airplane down and execute a normal, straight-ahead, power-off stall. Hold full elevator and watch how the airplane breaks at the stall. If it "wing-walks," keep in mind that rudder will have more effect than ailerons will at low power settings. Knowing your stall characteristics will prepare you to judge the airplane's speed on landing, so pay special attention to how the airplane feels when it's slowing down to a stall. If your plane enters a spin from a stall, neutralize your elevator and ailerons and add opposite rudder as you throttle up. The goal is to get the stalled wing flying again.

When you're comfortable with stalls, try some slow speed maneuvering. Practice making shallow left and right banking turns at low power while holding your altitude. Pay attention at how the airplane tries to fall into the turn. At slow speeds you will find that you will initiate a banking turn with a little aileron,

but to hold the turn you'll need rudder and a little opposite aileron to keep your bank angle. Try transitioning from left to right and making turns into the wind and with the wind.

Line yourself up for a few practice landing approaches. Slow down and line yourself up while practicing your descent. Establish a glide slope that the airplane likes and use power to adjust your descent rate while holding a constant pitch angle. Power up and go around. Remember that you have about 8 minutes of safe flying with the batteries we've recommended here.

**Landing**

Respecting your flying field's current traffic pattern (landing into the wind), enter your downwind leg at half-throttle and maintain altitude as you set up for landing. You should anticipate at least a 200 foot final approach, so start your base leg turn with that in mind. Your base leg will start your descent. On base, reduce power to 1/4 throttle. Turn to final and power back. Establish a comfortable glide slope and use the power to control your descent rate. Blipping the throttle may help you get a feel for where your throttle should be. When you're over the runway, power off and settle into a flare. Remember that if it's going to be a bad landing, go around and try it again. When you land, rollout is short and should be performed "tail-low" to keep from nosing over.

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

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

**GOOD LUCK AND GREAT FLYING!**

This model belongs to:	Name	Address	City, State, Zip	Phone Number	AMA Number
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