

# 'MISTER' MULLIGAN

## EP ARF

**ElectriFly®**



## INSTRUCTION MANUAL

### SPECIFICATIONS

**Wingspan:** 52.5 in  
[1335mm]

**Weight:** 5.25–5.75 lb  
[2380–2610 g]

**Wing Area:** 441 in<sup>2</sup>  
[28.4 dm<sup>2</sup>]

**Wing Loading:** 27–30 oz/ft<sup>2</sup>  
[82–92 g/dm<sup>2</sup>]

**Length:** 41.5 in  
[1055mm]

**Radio:** 4-5 Channel with  
4 micro servos (w/o flaps) or  
6 micro servos (with flaps)

**Motor/ESC/Prop:** RimFire™ .32 (42-50-800)  
ElectriFly SS-45  
APC-E 12x8

### 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

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

**Academy of Model Aeronautics:** 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 47302-9252  
Tele. (800) 435-9262  
Fax (765) 741-0057  
[www.modelaircraft.org](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.

## SCALE COMPETITION

Though the Great Planes Mister Mulligan EP is an ARF and may not have the same level of detail as an "all-out" scratch-built competition model, it is a scale model nonetheless and is therefore eligible to compete in the Fun Scale class in AMA competition (we receive many favorable reports of Great Planes ARF's in scale competition!). In Fun Scale, the "builder of the model" rule does not apply. To receive the five points for scale documentation, the only proof required that a full size aircraft of this type in this paint/markings scheme did exist is a single sheet such as a kit box cover from a plastic model, a photo, or a profile painting, etc. If the photo is in black and white other written documentation of color must be provided. Contact the AMA for a rule book with full details.

If you would like photos of the full-size Mister Mulligan for scale documentation, or if you would like to study the photos to add more scale details, photo packs are available from:

Bob's Aircraft Documentation Phone: (714) 979-8058  
3114 Yukon Ave Fax: (714) 979-7279  
Costa Mesa, CA 92626 [www.bobsairdoc.com](http://www.bobsairdoc.com)

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

1. Your Mister Mulligan 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 Mister Mulligan 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 good condition, a correctly sized engine, and other components as specified in this instruction manual. All components must be correctly installed so that the model operates correctly on the ground and in the air. You must check the operation of the model and all components before **every** flight.

5. 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.

6. 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.

7. **WARNING:** The cowl, wheel pants, and some fairings are made of fiberglass, the fibers of which may cause eye, skin and respiratory tract irritation. Never blow into or on a part 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.**

## ITEMS REQUIRED

### Radio Equipment

A 4-channel minimum radio system is required to fly this model. We recommend using a 6-channel radio so that wing flaps can be used.

- 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\*\*)
  
- (2) 12" [300mm] servo extension  
(HCAM2711 for Futaba)

### No Flaps Option

- (1) Y-harness (FUTM4130)
- (4) Futaba 3115 Micro Precision Servo (FUTM0415)  
**OR**
- (4) minimum 39 oz-in (2.8 kg-cm) Micro Servos

### Operable Flaps Option

- (2) Y-harness (FUTM4130)
- (2) 6" [150mm] servo extension (HCAM2701 for Futaba)
- (6) Futaba 3115 Micro Precision Servo (FUTM0415)  
**OR**
- (6) minimum 39 oz-in (2.8 kg-cm) Micro Servos

## Motor, ESC and Propeller

- Great Planes RimFire .32 (42-50-800kV) Brushless Outrunner Motor (GPMG4700)
- Great Planes Silver Series 45A Brushless ESC (GPMM1840)
- APC 12x8 Electric Propeller (APCQ4133)

## Battery and Charger

*Other battery packs will also work in this model, but please be sure to always use a 4S LiPo pack that can supply at least 45A continuous.*

- FlightPower® EON-X™ 4350mAh 14.8V 30C LiPo (FPWP6576)
- Great Planes ElectriFly Triton™ EQ AC/DC Charger (GPMM3155)

### LIPO 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 Adhesives and Building Supplies

To finish this airplane you will need the following items.

- 1 oz. [30g] Thin Pro™ CA (GPMR6002)
- 1 oz. [30g] Medium Pro CA+ (GPMR6008)
- 2 oz. [60g] Foam Safe CA Activator (GPMR6035)
- Pro 6-minute epoxy (GPMR6045)
- R/C-56 canopy glue 4oz (JOZR5007)
- #11 Hobby knife w/ 5 blades (EXLR9018)
- 3/32" Long Ball-Driver (GPMR8002)
- Drill bits: 1/16" [1.6mm], 5/64" [2mm], 3/32" [2.4mm]
- Builder's Triangle Set (HCAR0480)
- 18" flexible steel rule (HCAR0460)
- Hobbico Heavy Duty Diagonal Cutter 7" (HCAR0627)
- Pliers with wire cutter (HCAR0625)
- Panel Line Pen (TOPQ2510)
- Medium T-pins (100, HCAR5150)
- Epoxy brushes (6, GPMR8060)
- Mixing sticks (50, GPMR8055)
- Mixing cups (GPMR8056)
- Threadlocker™ thread locking cement (GPMR6060)
- Denatured alcohol (for epoxy clean up)
- Light machine oil
- Flat metal file
- Masking tape

## Optional Supplies and Tools

- Pro 30-minute epoxy (GPMR6047)
- 3/8" [9.5mm] heat-shrink tubing (DUBM2180)
- 21st Century® sealing iron (COVR2700)
- 21st Century iron cover (COVR2702)
- Rotary tool such as Dremel®
- Rotary tool reinforced cut-off wheel (GPMR8200)
- CA applicator tips (HCAR3780)
- CA debonder (GPMR6039)
- Dremel Drum Sander, Coarse 3/8" (DRER0968)
- Great Planes Easy-Touch™ Hand Sander 5.5" (GPMR6169)
- Great Planes Easy-Touch Sandpaper 150 Grit (GPMR6183)
- Great Planes 1/5th Scale Sport Pilot – Red (GPMQ9015)
- Great Planes 1/5th Scale Sport Pilot – Blue (GPMQ9016)
- Great Planes 1/5th Scale Sport Pilot – Yellow (GPMQ9017)
- Revell® Razor Saw (RMXR6960)

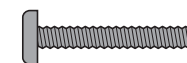
## IMPORTANT BUILDING NOTES

### • There are three types of screws used in this kit:

Sheet metal screws are designated by a number and a length. For example, #6 x 3/4" [19mm]



Machine screws are designated by a number, threads per inch, and a length. For example 4-40 x 3/4" [19mm]



Socket Head Cap Screws (SHCS) are designated by a number, threads per inch, and a length. For example 4-40 x 3/4" [19mm]



• 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**, and 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 Mister Mulligan EP is factory-covered with Jet White Top Flite® MonoKote® film (TOPQ0204). 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.

## 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)

## ORDERING REPLACEMENT PARTS

Replacement parts for the Mister Mulligan EP are available using the order numbers shown below. 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). 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.

Parts may also be ordered directly from Hobby Services by calling (217) 398-0007, or fax 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.

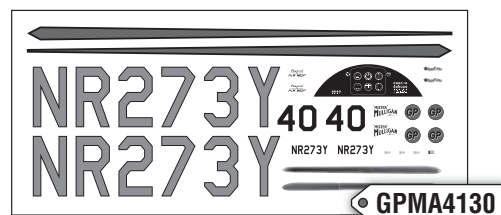
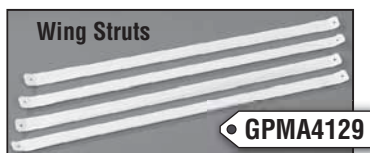
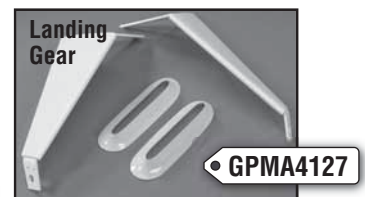
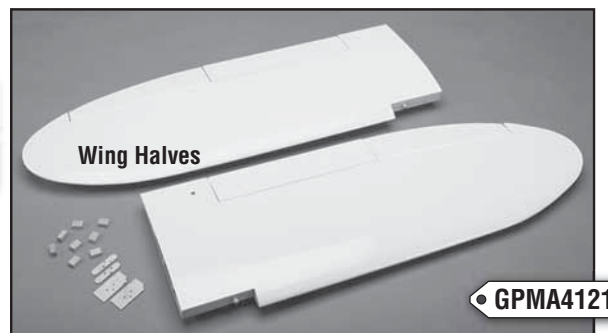
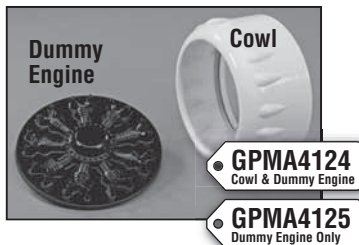
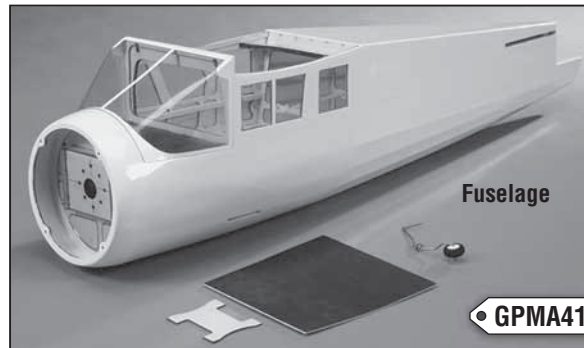
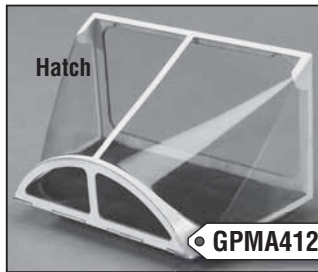
Mail parts orders and payments by personal check to:

**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.

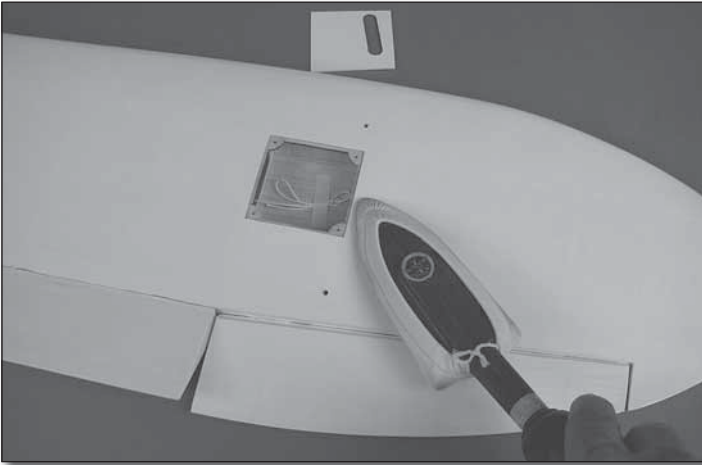
If additional assistance is required for any reason, contact Product Support by telephone at (217) 398-8970, or by e-mail at [productsupport@greatplanes.com](mailto:productsupport@greatplanes.com).

## KIT CONTENTS



**NOTE** ► Full-size plans are not available. You can download a copy of this manual at [greatplanes.com](http://greatplanes.com).

## BEFORE YOU BEGIN

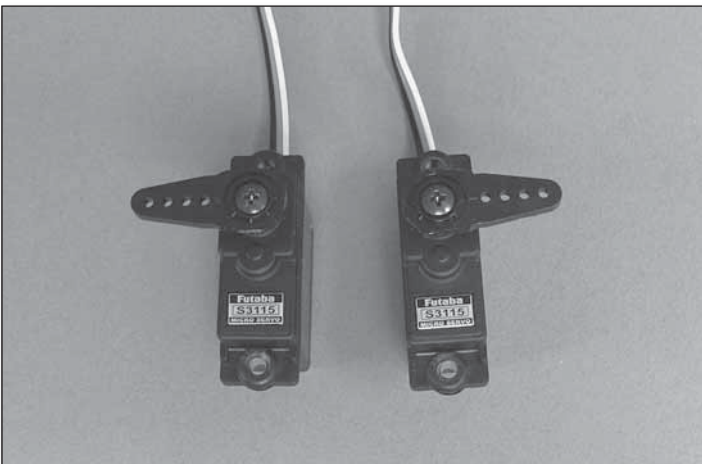


Before you begin assembling your model, inspect it for wrinkled covering and areas where the covering should be tacked down to the wood like the openings for the servo bays. Use Low heat (about 250° F [121° C]) to tack down the edges. Raise the temperature and iron over wrinkles with light pressure. Be careful not to contact the edges that you tacked down while shrinking.

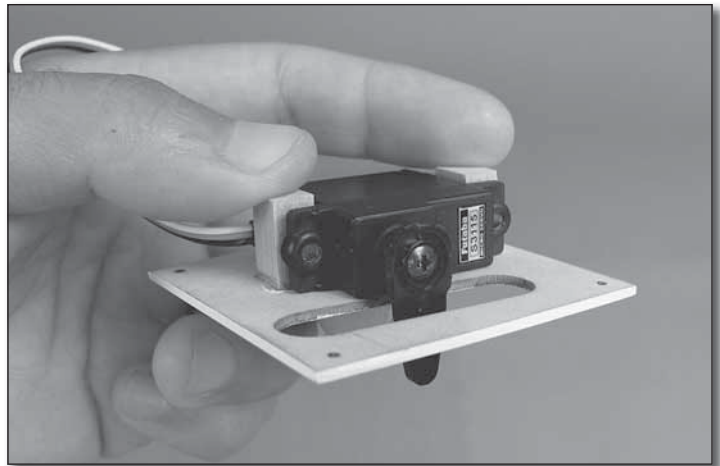
**Note:** Save the plastic bag that the fuselage came in. It will be used later in the assembly.

## WING ASSEMBLY

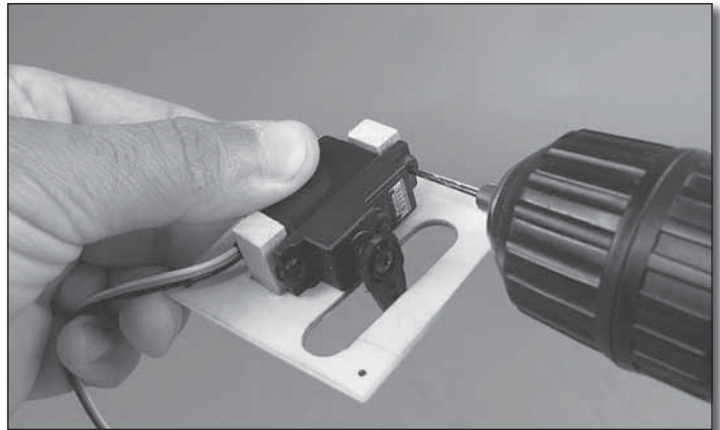
### Aileron Servo Installation



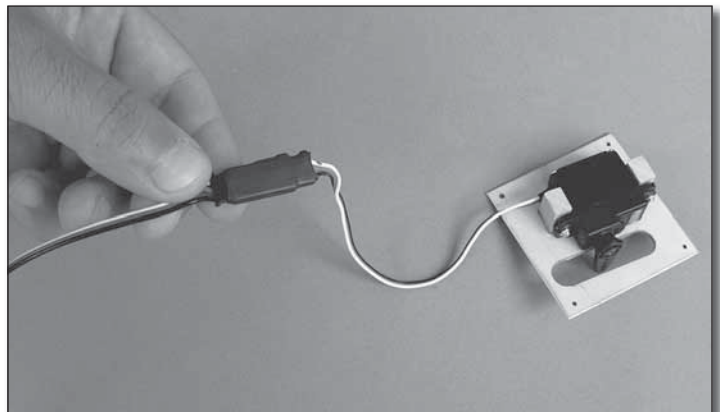
1. Prepare a left and a right servo using your radio system to center the servos. Remove the servo arm retaining screws and the servo arms. Install the standard size servo arms that came with your servos. Rotate the arm on the splined servo shaft and choose the arm that is 90° to the side of the servo case when the servo is centered. Clip off the unused servo arms so that your aileron servos appear as shown. Fit any servo grommets now (if equipped).



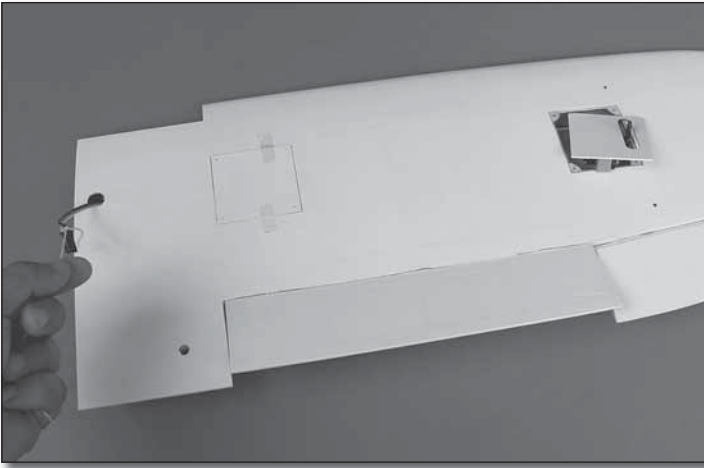
2. Working with the left wing, remove the aileron servo bay cover. Center the servo arm in the opening with the arm pointing out as shown. With the servo in this position, glue two 7mm x 10mm x 14mm hardwood blocks under the servo mounting tabs. If you are using the recommended Futaba S3115 servos, you may simply use epoxy to glue the blocks in the positions marked inside the cover.



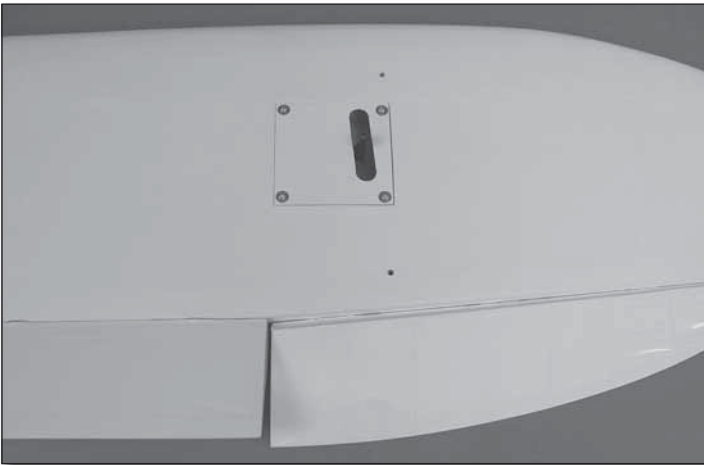
3. Drill mounting holes for the servo using a 1/16" [1.6mm] drill. Install the two servo screws that came with your servo. Remove the screws and the servo and wick a drop of thin CA into the screw threads that you just tapped in the hardwood blocks. After the CA cures, re-install the screws.



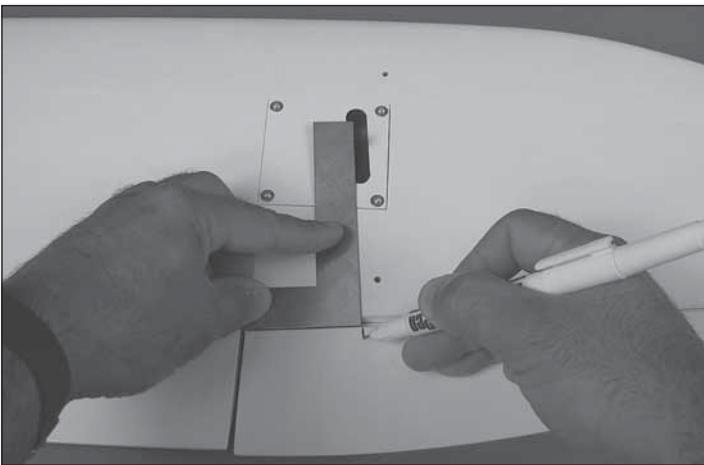
4. Attach a 12" [305mm] servo lead extension to the aileron servo. Secure the connection with a piece of 3/8" [9.5mm] diameter heat shrink tubing (not supplied) or wrap the connection with electrical tape.



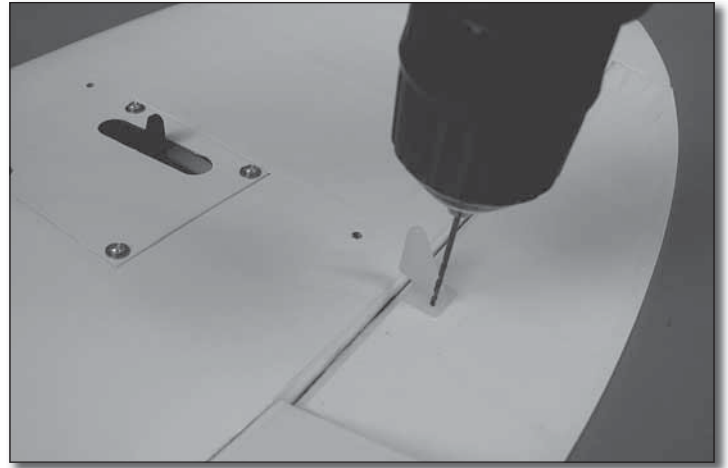
□ □ 5. Tie the guide string to the end of the servo lead and carefully route the servo lead through the wing and out of the hole in the sheeting near the root rib of the wing.



□ □ 6. Orient the servo bay cover as shown and install it using four #2 x 3/8" [9.5mm] sheetmetal screws with four #2 flat washers. Remove the screws, washers and the cover and harden the screw holes in the wing with thin CA. Then, re-install the cover and screws.

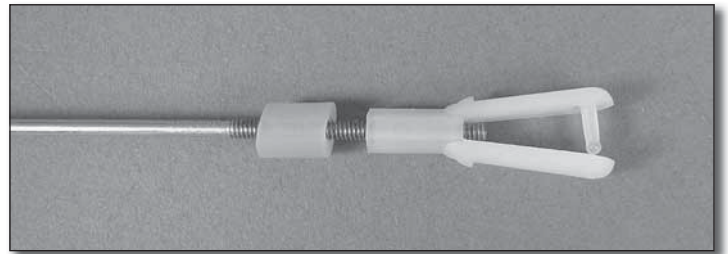


□ □ 7. Using a 90° builder's square or a builder's triangle, make a mark on the aileron directly behind the aileron servo arm. Align the flat base of the square with the aileron hinge line. Then slide the square into position and make your mark.

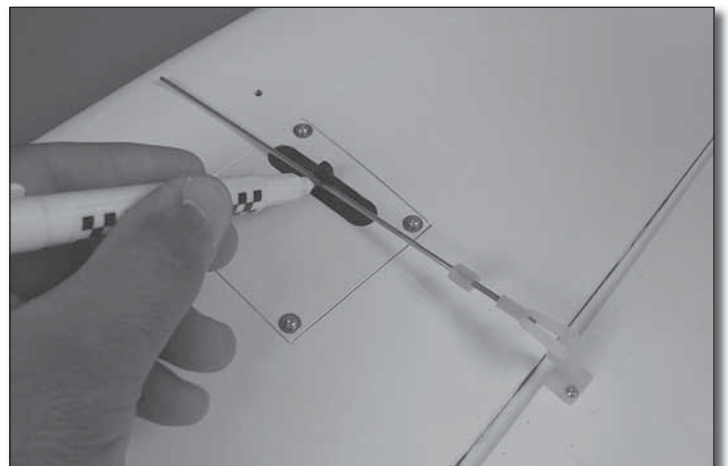


□ □ 8. Clip off and discard the backing plate from a small control horn. Align the horn over the mark you made and slide it forward until the pushrod holes in the horn are directly over the hinge line. Drill two 3/8" [9.5mm] deep holes using a 1/16" [1.6mm] drill. Be careful not to drill completely through the aileron.

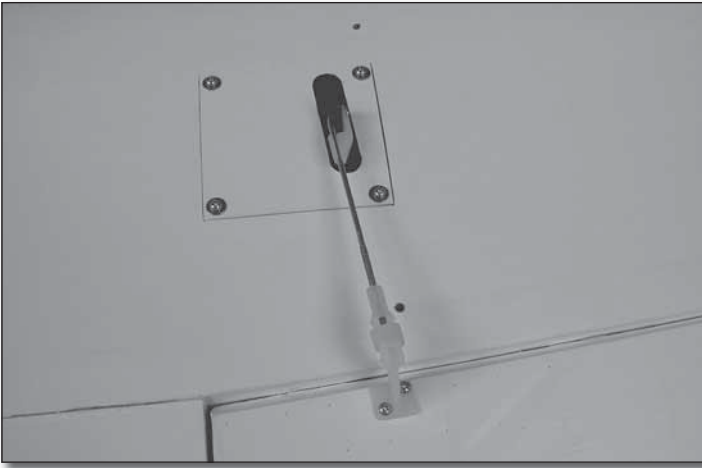
□ □ 9. Install the control horn using two #2 x 3/8" [9.5mm] sheetmetal screws. Remove the screws and the horn and wick about 4-5 drops of thin CA into the screw holes you tapped. Allow the CA to dry and reinstall the control horn.



□ □ 10. Screw a clevis onto a 6" [152mm] threaded pushrod so that at least 1/8" [3.2mm] of thread protrudes past the barrel of the clevis. Loosely fit a silicone clevis retainer to the pushrod.

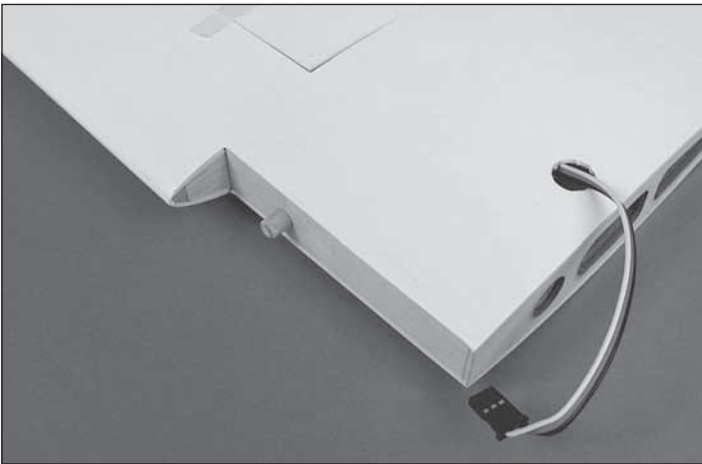


□ □ 11. Fit the clevis to the outermost hole in the aileron control horn. Extend the pushrod forward and align it with the hole you drilled in the servo arm. With the servo arm centered and the aileron at neutral, make a mark at the hole in the servo arm.

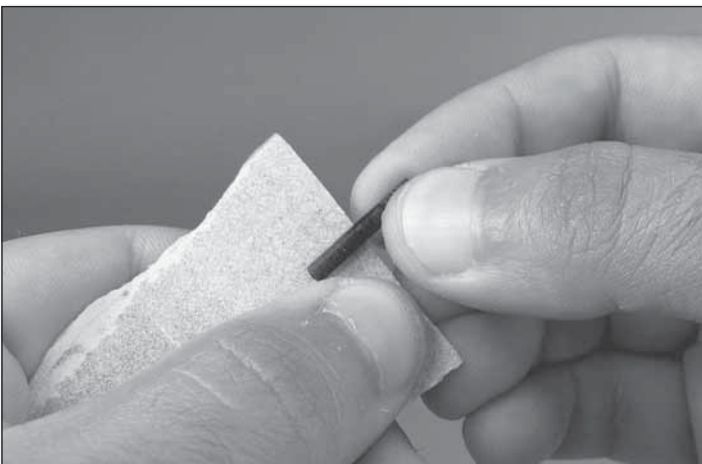


❑ 12. Bend the pushrod 90° at the mark that you made. Fit the pushrod to the servo arm and fasten it with a FasLink pushrod retainer. Cut off the remaining pushrod so that at least 1/4" [6.4mm] of pushrod remains.

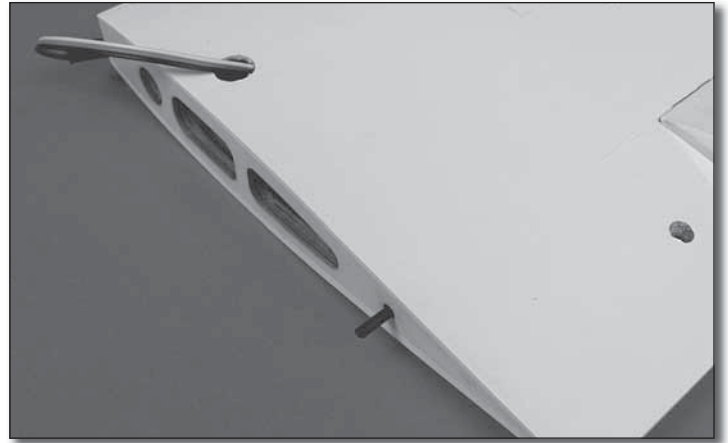
❑ 13. Repeat steps 2 through 12 to prepare the right wing.



❑ 14. Glue a 6mm x 25mm wing dowel into the leading edge of each wing so that the dowel protrudes out 1/4" [6.4mm] as shown.



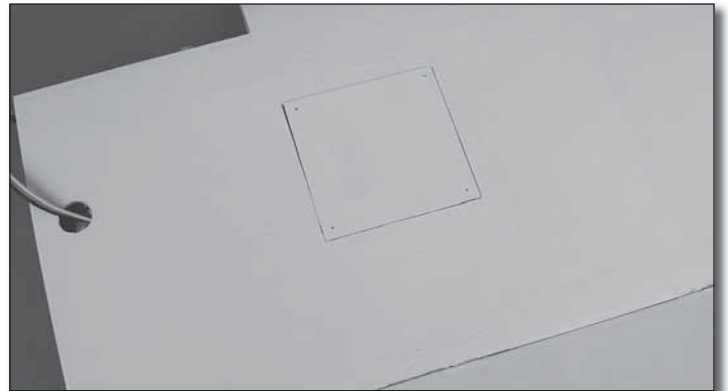
❑ 15. Sand the surface of the wing alignment dowel to prepare it for glue.



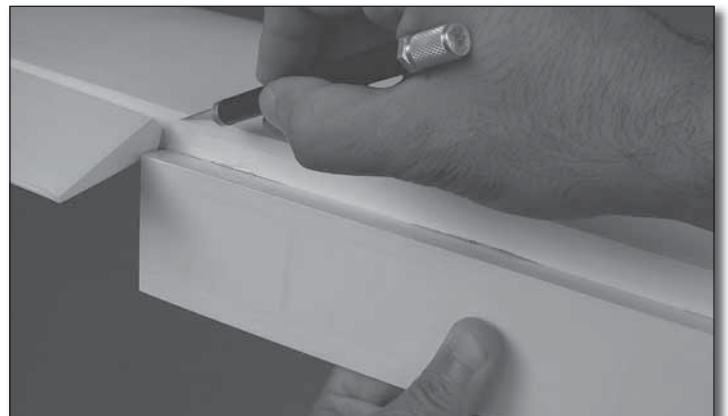
❑ 16. Glue the 3mm x 20mm wing alignment dowel into the left wing as shown so that at least 10mm is protruding.

### **Fixed Wing Flap (Option 1)**

*On this model, you can set up the flaps one of three ways. You can purchase two additional servos and use flaps for landings. If you never intend to use flaps, you may glue the flaps in the fully retracted position. If you want the option to add flaps later you can install the control horns and fix them in place using the supplied flap pushrod.*

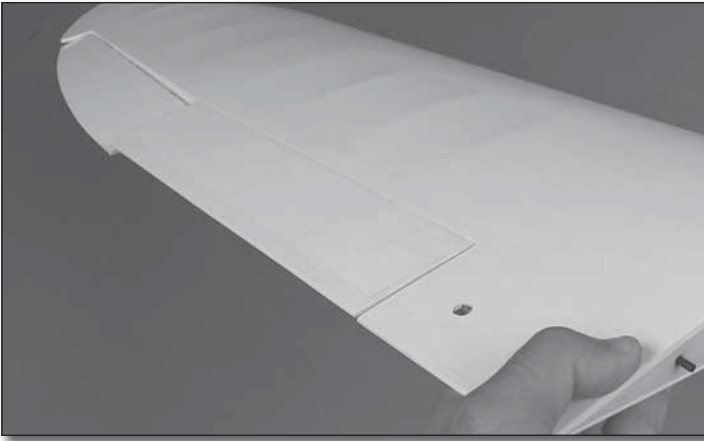


❑ 1. To permanently fix the flaps in the retracted position, glue the wing flap servo bay covers in place.



❑ 2. Trim the covering from the leading edge of each flap. Remove the covering from the trailing edge of the wing in front of each flap. Trim the covering about 1/16" [1.6mm] inside of the edge.

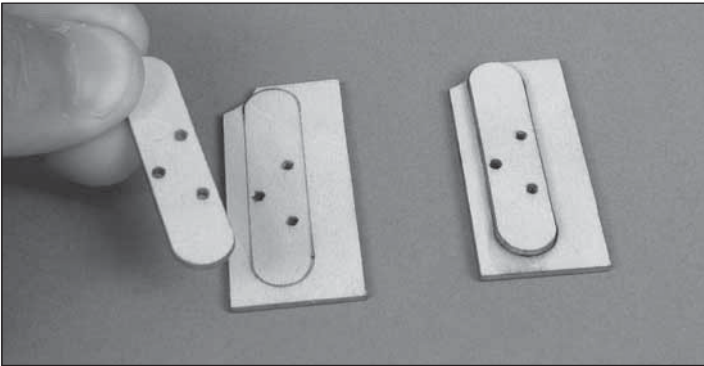




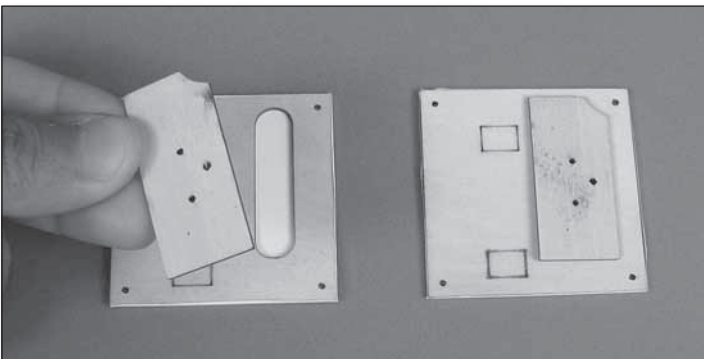
❑ 3. Mix up a batch of 6-minute epoxy. Brush epoxy on the leading edge of each flap and the corresponding trailing edge of each wing. Glue each flap in the retracted position. Before the epoxy cures, wipe off the excess with a paper towel dampened with denatured alcohol.

### Fixed Wing Flap (Option 2)

*With this option, you can easily add operable flaps later.*

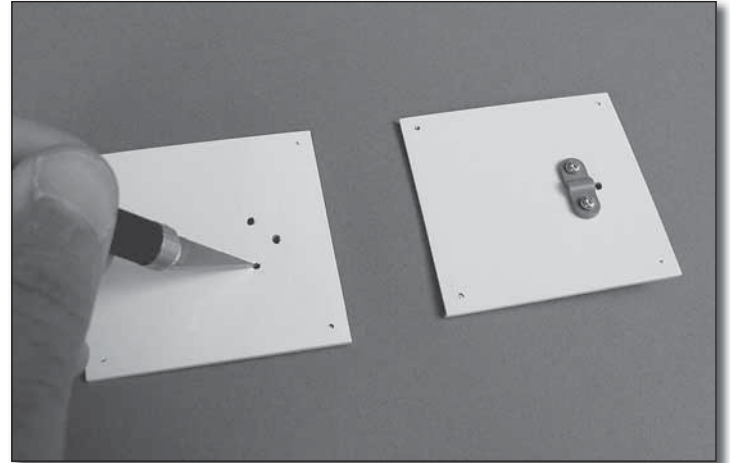


❑ 1. Identify the four wooden fixed flap retainers shown here. Rotate the small oval piece until the three holes in that piece align with the three holes in the larger piece. Glue the small oval piece to the larger piece. Use the laser-etched outline and the holes to center the small oval piece. Allow the glue to dry. Note: The pair that you create will not be mirror images because both flap servo arms must operate in the same direction as they exit the wing.

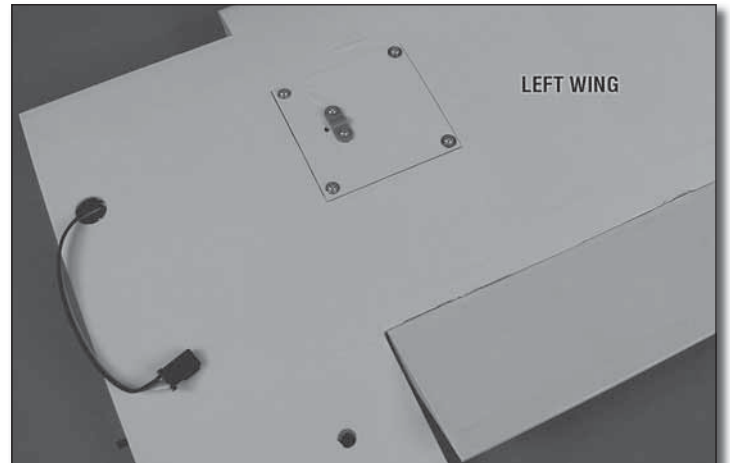


❑ 2. Glue the pieces into the flap servo bay covers using 6-minute epoxy. Do not remove the covering. By using

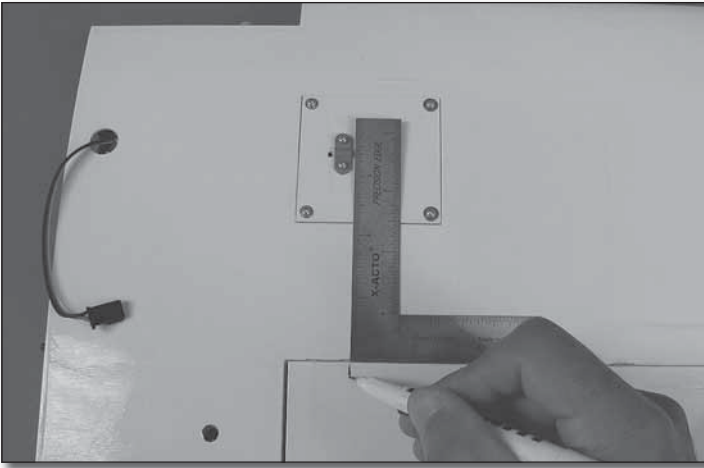
6-minute epoxy, you can heat up the glue joint later and easily remove the fixed flap retainers to convert to operable flaps.



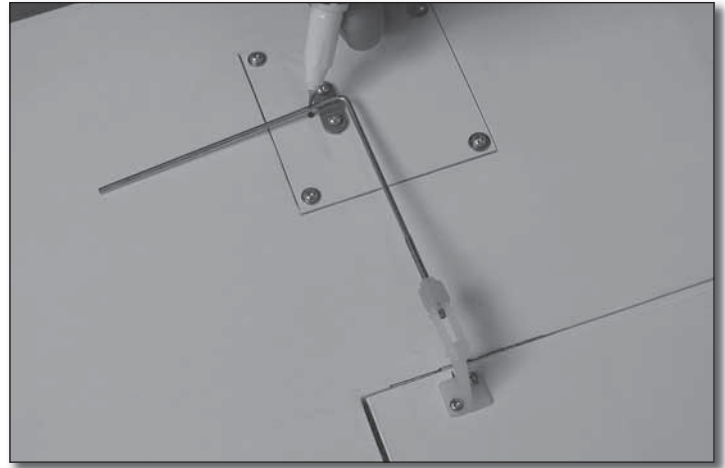
❑ 3. Trim away the covering from the three small holes. Install a nylon strap across the two longitudinal holes using two of the sheetmetal screws included with the straps. Don't forget to harden the screw holes with thin CA. Prepare both servo bay covers.



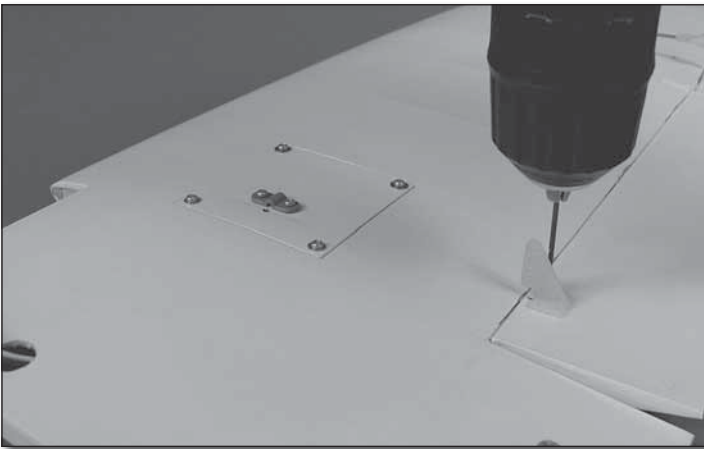
❑ 4. Install the covers onto the wings. Be careful to orient the covers properly as shown.



□ □ 5. Working with the left wing first, make a mark on the flap LE directly behind the side opposite the hole in each servo bay cover. This is the side the pushrod will be on.



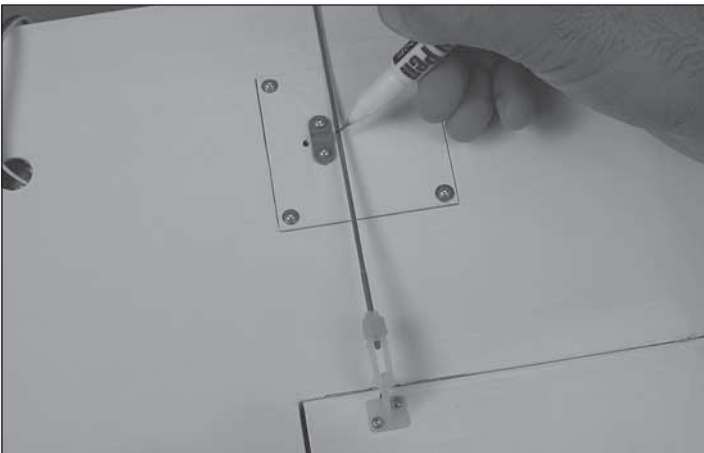
□ □ 10. Bend the pushrod 90°. Insert the bent portion under the hump of the nylon strap. Make a mark at the point you will make the second 90° bend.



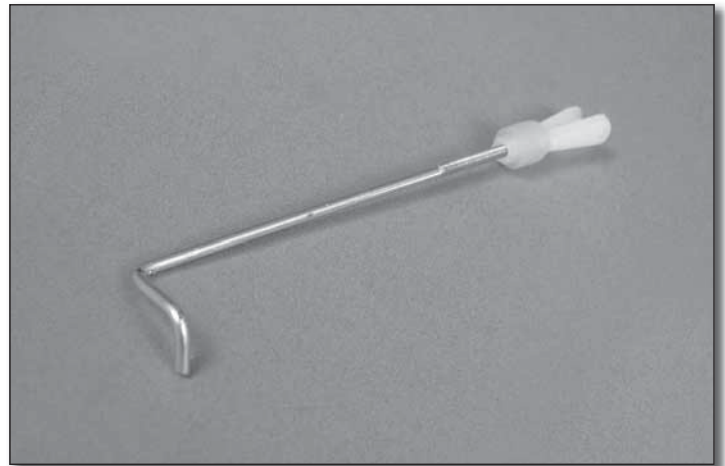
□ □ 6. Hold a small control horn over the mark you made with the pushrod holes directly over the hinge line. Drill two 3/8" [9.5mm] deep holes using a 1/16" [1.6mm] drill bit.

□ □ 7. Install the control horn using two #2 x 3/8" [9.5mm] sheetmetal screws.

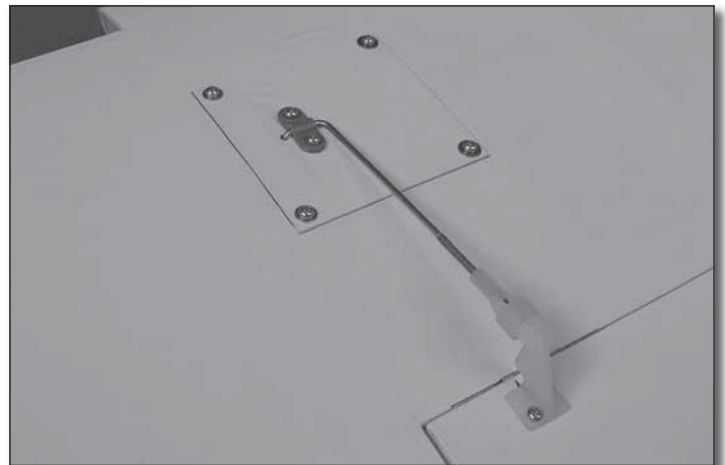
□ □ 8. Prepare a 6" [152mm] pushrod the same way you prepared the aileron servos using one nylon clevis and a silicone clevis retainer.



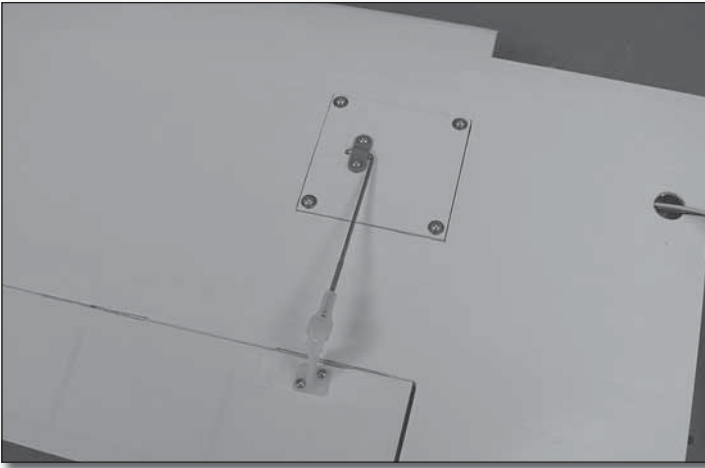
□ □ 9. Attach the clevis to the outermost hole in the flap control horn. Extend the pushrod forward and mark the point that you will make the first 90° bend.



□ □ 11. Remove the pushrod and make the second 90° bend so that it is vertical as shown.

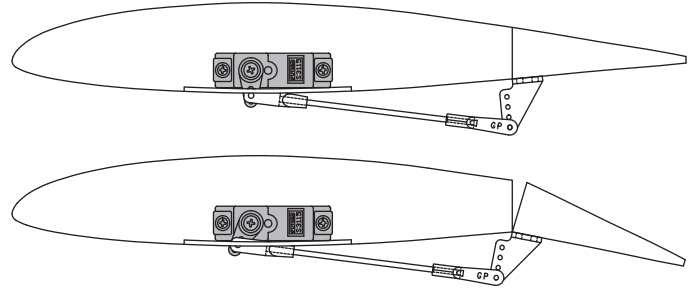


□ □ 12. Remove the nylon strap and reinstall the pushrod. Make any adjustments to the length of the pushrod by tightening or loosening the clevis until the flap is set in the retracted position.

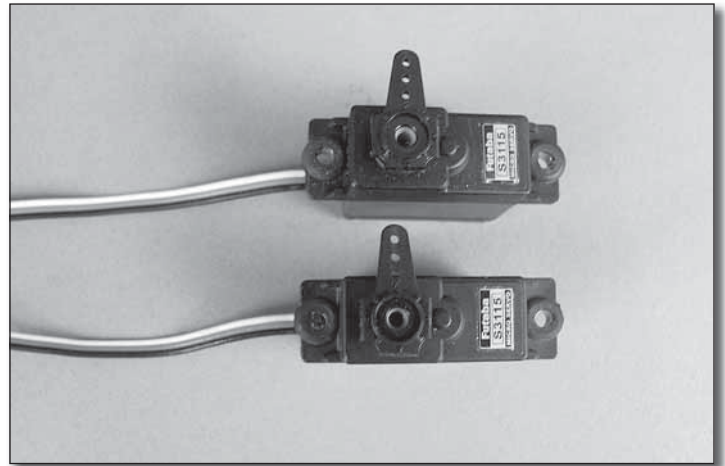


□ 13. Repeat steps 5 through 12 to finish the right wing. Remember to orient the servo bay cover properly. Use the photo above for reference.

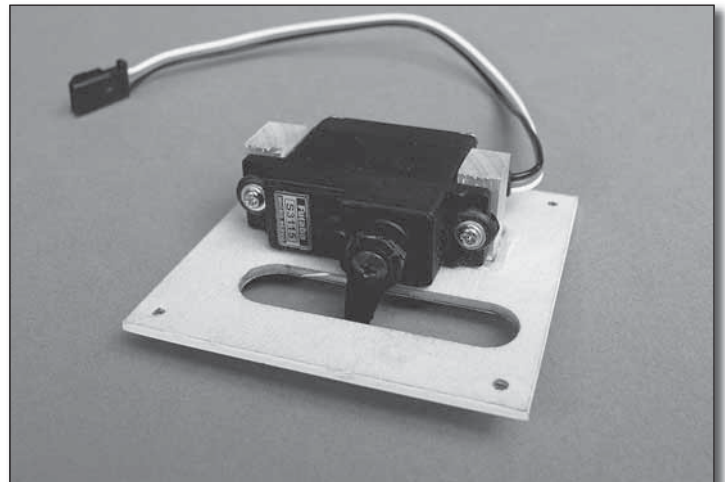
□ 14. To add operable flaps later, remove the pushrod from the servo bay cover. Using a heat gun, heat up the wooden flap retainer pieces you glued in place until you soften the epoxy. Use a flat razor blade to separate the glue joint and remove the retainer pieces from the servo bay covers. Follow the directions in the next section to install and set up flap servos. Note: Clip off the last 90° bend from the pushrods and reuse them to hook up your servos.



□ □ 2. Establish the rotation direction of your flap servos. Lay one flap servo on its side as shown in the sketch. Turn on your radio and actuate the flap channel. Make sure that the servo rotates in the proper direction in conjunction with the movement of the flap dial or slider. If it doesn't, reverse the servo operation so that it does.



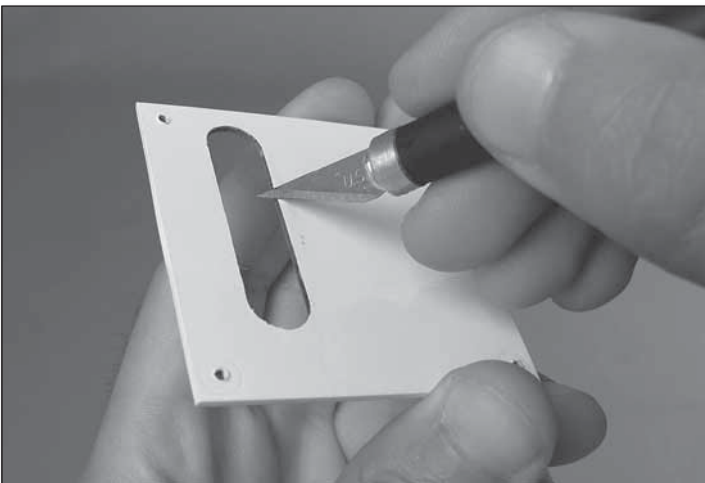
□ □ 3. With the radio still switched on, set the flaps on the transmitter to the fully retracted position. Using the short arms that came with your servos, prepare two servos as shown choosing the servo arm that aligns perpendicular to the servo centerline. Drill the outermost hole in the short arm or the hole that is approximately 5/16" [8mm] out from the center of the output shaft.



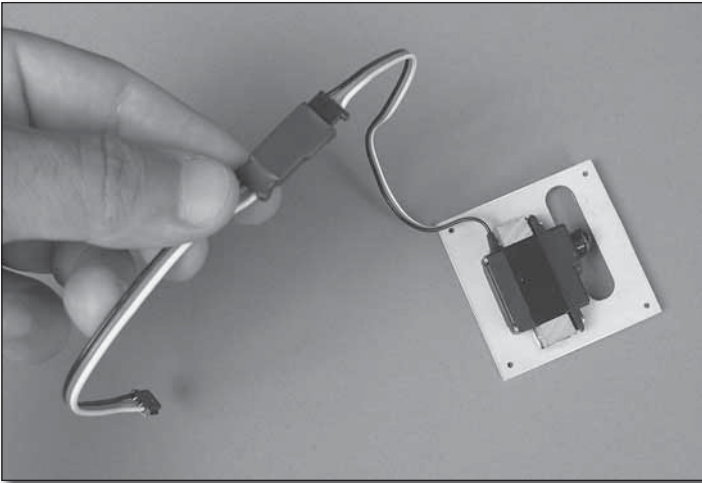
□ □ 4. Prepare each flap servo bay cover using two 7mm x 10mm x 14mm hardwood blocks. Glue these in place and drill the holes for the servo screws using a 1/16" [1.6mm] drill. Install the servos. Both covers should look the same.

### Servo Operated Flaps (Option 3)

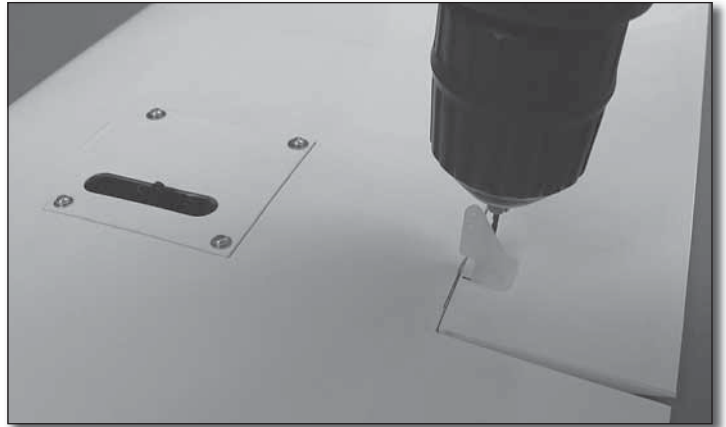
*Because of the relatively small amount of control throw that is needed for the flaps, we recommend that you use a radio system that has adjustable end-points. The small amount of control throw necessary is very difficult to achieve mechanically. We found that we had to set our end points to 30–40%.*



□ □ 1. Trim away the covering from the servo arm hole.

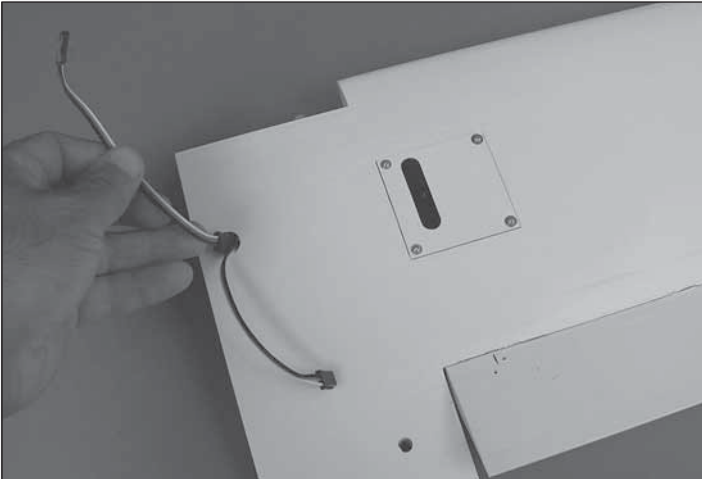


□ □ 5. Attach a 6" [152mm] servo lead extension to the flap servo. Secure the connection using 3/8" [9.5mm] heat shrink tubing or electrical tape.



□ □ 8. Hold a small control horn over the mark you made with the pushrod holes directly over the hinge line. Drill two 3/8" [9.5mm] deep holes using a 1/16" [1.6mm] drill bit. Be careful not to drill completely through the flap. Install the control horn using two #2x3/8" [9.5mm] sheetmetal screws. Harden the threads in the wood with thin CA.

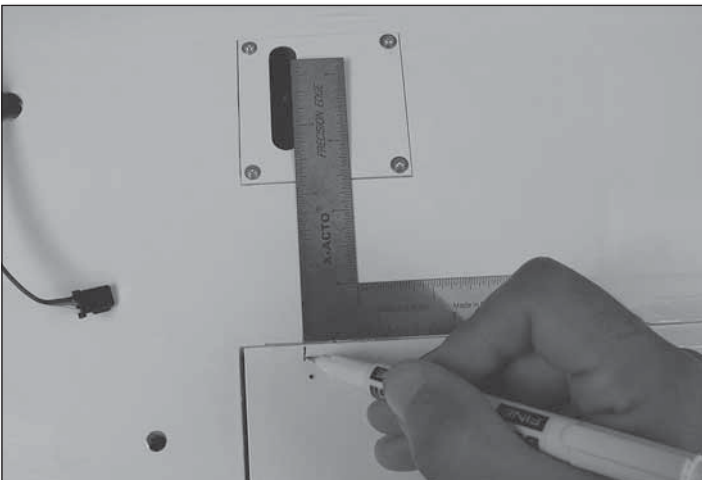
□ □ 9. Prepare a 6" [152mm] pushrod the same way you prepared the aileron servos using one nylon clevis and a silicone clevis retainer.



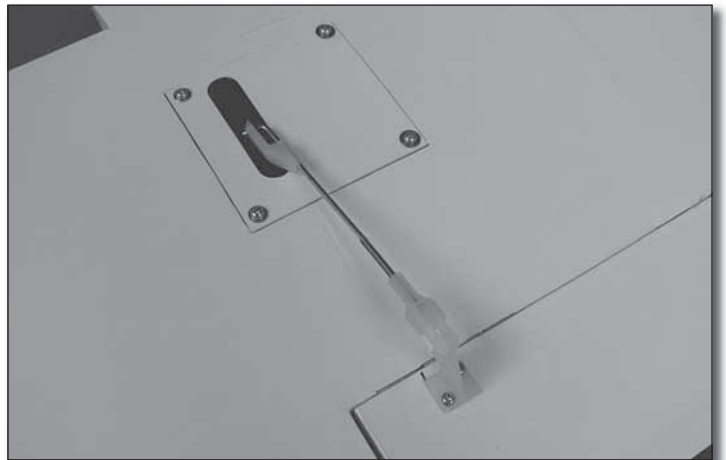
□ □ 6. Route the servo lead through the wing and out of the hole in the sheeting as shown. Install the servo bay cover in the orientation shown using four #2 x 3/8" [9.5mm] sheetmetal screws and four #2 flat washers. Harden the threads in the wood with thin CA as instructed before.



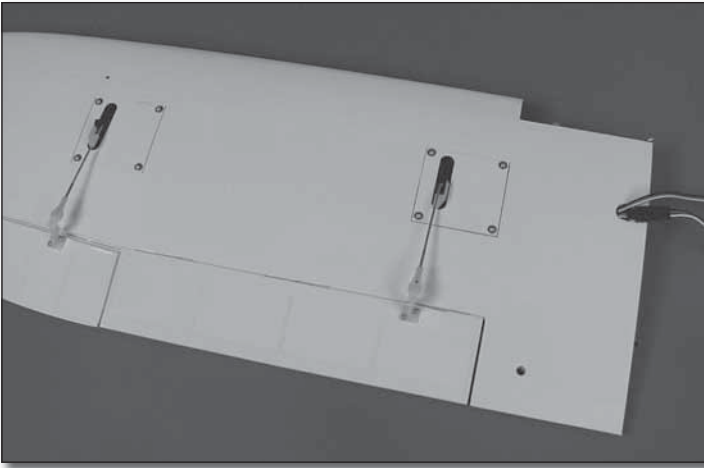
□ □ 10. Attach the pushrod to the outermost hole in the flap control horn. Extend the pushrod forward and line it up with the outermost hole in the servo arm. With the flap retracted and the servo in the retracted position as shown, mark your first bend point on the pushrod. Make a 90° bend at the mark you made.



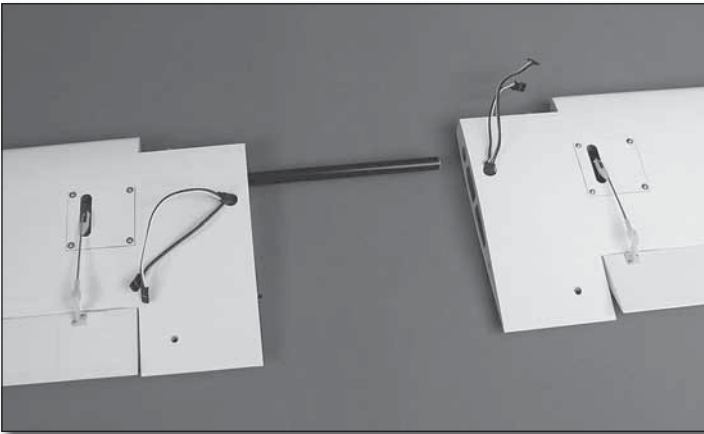
□ □ 7. Make a mark on the flap LE directly behind the servo arm.



□ □ 11. Attach the pushrod to the servo using a nylon Faslink.



❑ 12. Repeat steps 1 through 11 for the right wing.



❑ 13. Insert the wing tube into one wing and join the two wings. You may use epoxy to glue the wings together if you wish, but it is not required.



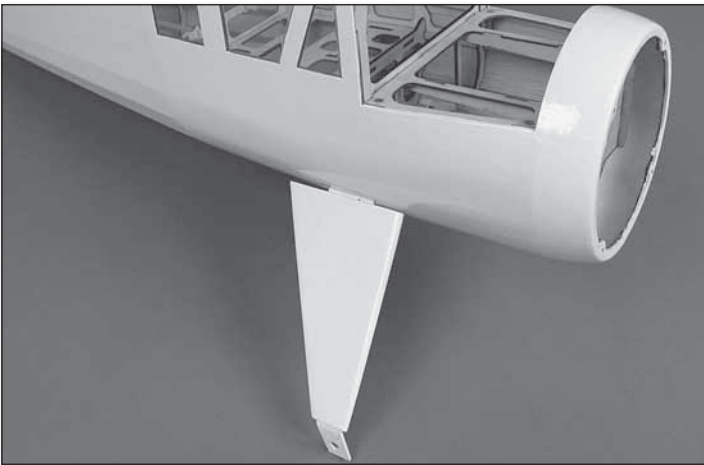
❑ 2. The main landing gear leg fairings are only slightly different. It is difficult to see the difference by just looking at them. We recommend test fitting both of the landing gear fairings over the main landing gear and checking the fit. If they are properly oriented, they should fit against the fuselage closely. If they do not, try switching them or rotating them front to back.



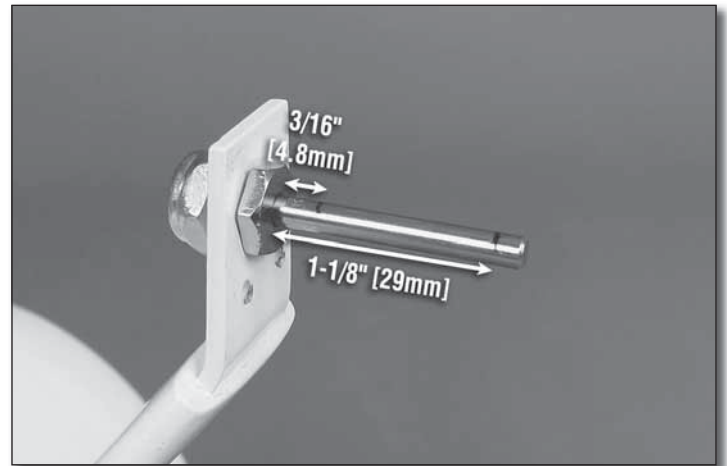
❑ 3. Glue the fairings to the gear legs using R/C-56 canopy glue around the flange. Clean up any excess glue with a damp paper towel. Tape the fairings in place. Remove the tape after the glue dries.

## FUSELAGE ASSEMBLY

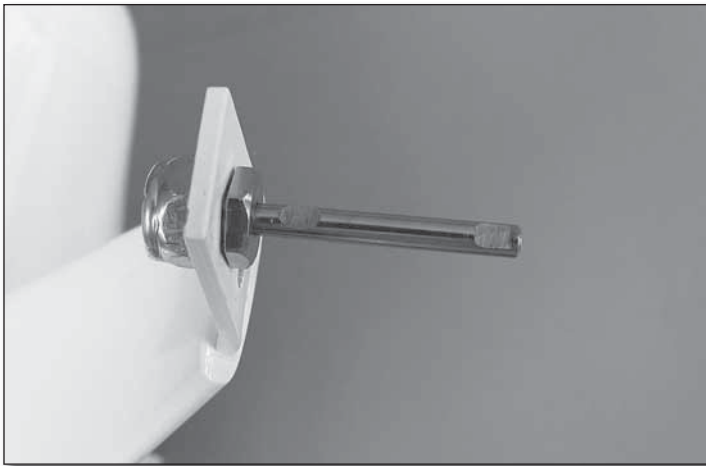
### Main Landing Gear Installation



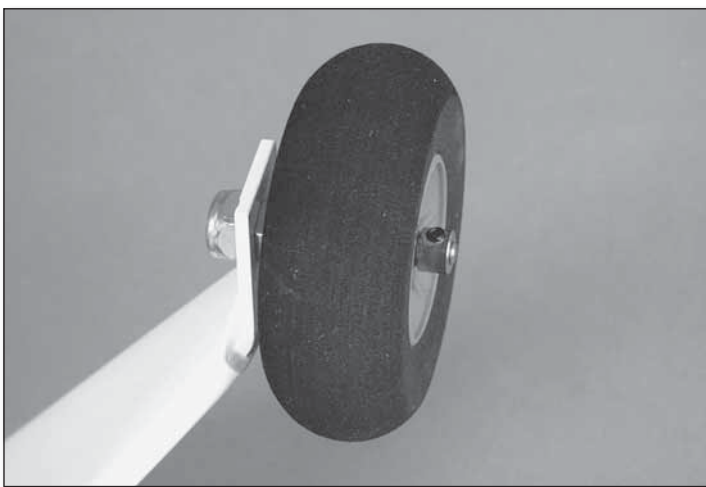
❑ 1. Install the main landing gear to the fuselage using six 4-40 x 1/2" [12.7mm] socket-head cap screws, six #4 lock washers, and six #4 flat washers. Apply a drop of threadlocker to the screws before installing.



❑ 4. Install an axle onto a landing gear leg using a 5/16-24 lock nut. Using a felt tipped pen, mark the bottom side of each axle as shown. Make one mark 3/16" [4.8mm] from the base of the axle and the other mark 1-1/8" [29mm] from the base of the axle.



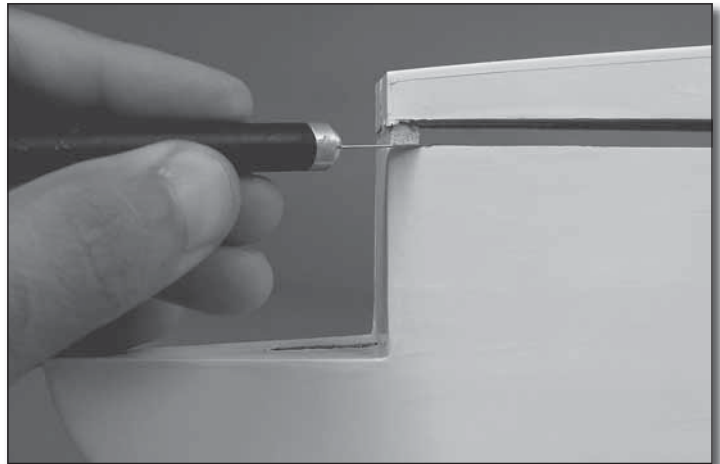
❑ 5. Grind one 3/16" [4.8mm] wide flat spot at each mark you made.



❑ 6. Install the main wheel on the axle using a 5/32" [4mm] wheel collar on either side of the wheel. Use thread locking compound on the 6-32 set screws and tighten the set screws against the flat spots. Add a drop of light weight household machine oil between the axle and the wheel and check that the wheel spins freely.

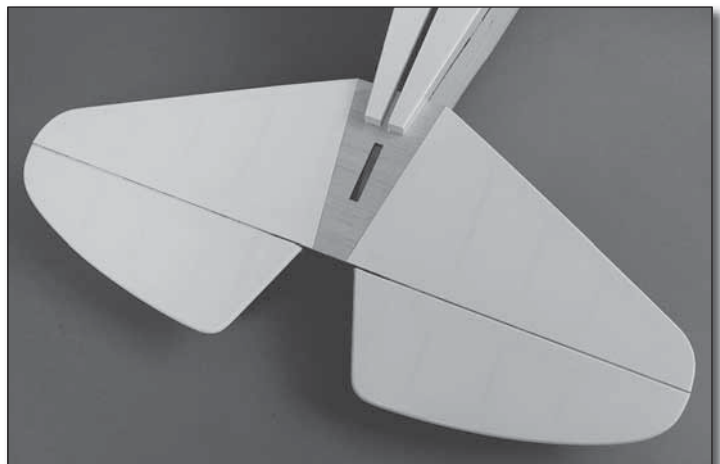
*Let's finish assembling the fuselage before putting the wheel pants on.*

## Tail Installation



❑ 1. Cut the protective piece of balsa wood out of the TE of the horizontal stabilizer slot on the fuselage.

❑ 2. Fit the wing to the fuselage using two 1/4-20 nylon wing bolts.

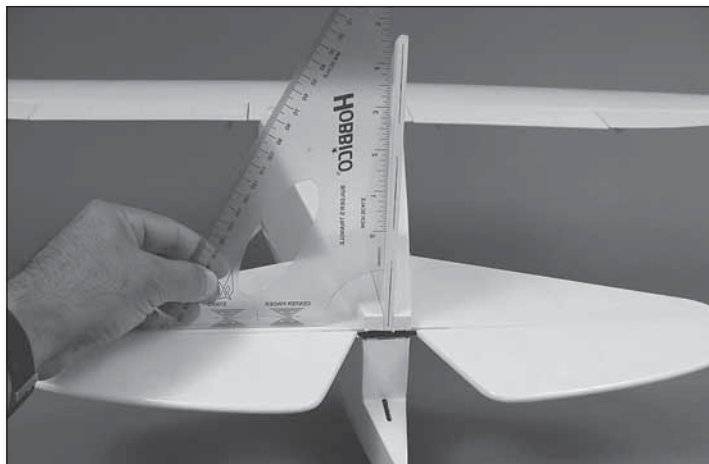


❑ 3. Test fit the horizontal tail to the fuselage. Align the slot in the center of the horizontal stab with the slot for the vertical fin. Test fit the vertical tail.



❑ 4. Raise and support the tail of the model and take a few steps back. Look at the alignment between the horizontal tail and the wing. If one side of the tail sits higher than the other,

remove the tail and lightly sand the bottom of the horizontal stab slot on the high side and the top of the slot on the low side. Re-fit the horizontal and vertical tail and check the alignment once again.



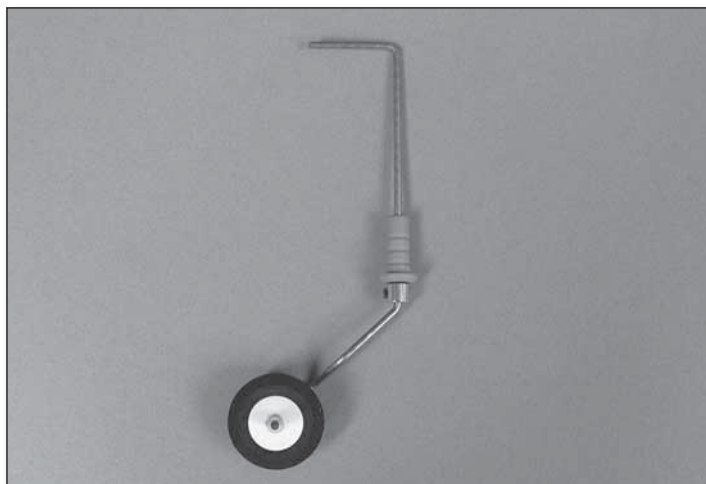
❑ 5. Using a large builder's triangle, check the vertical tail to see that it is square with the horizontal tail.



❑ 6. Pull the vertical fin out of the fuselage. Using a toothpick apply 30-minute epoxy to the top of the horizontal stabilizer, through the vertical fin slot. Glue the horizontal and vertical tail to the fuselage using thin CA. Wick several generous beads of CA into the tail to fuselage joints. Remember to apply glue to both sides and the top and bottom of the horizontal stabilizer.

❑ 7. Remove the wing.

## Tailwheel and Rudder Installation

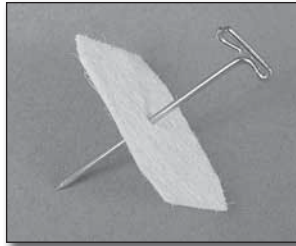


❑ 1. Clean the surface of the plastic tailwheel bushing using denatured alcohol. Sand the bent portion of the tailwheel wire. Apply a drop of oil onto the tailwheel wire to prevent the wire from being glued to the bushing.

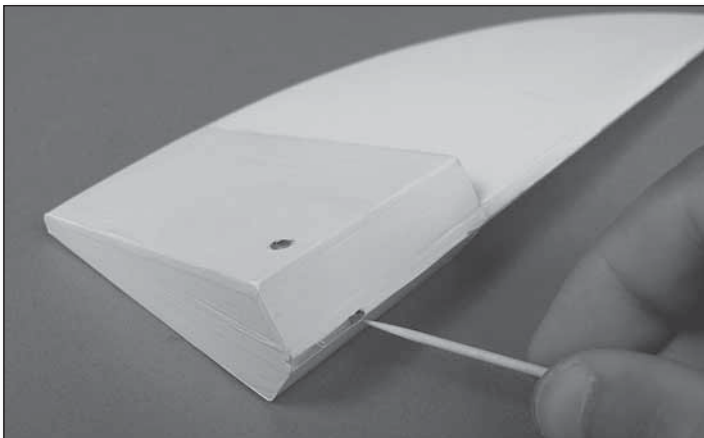


❑ 2. Insert the tailwheel assembly into the fuselage from the bottom. Using 6-minute epoxy, glue the tailwheel bushing into the fuselage. Don't get epoxy in the bushing or on the wire.

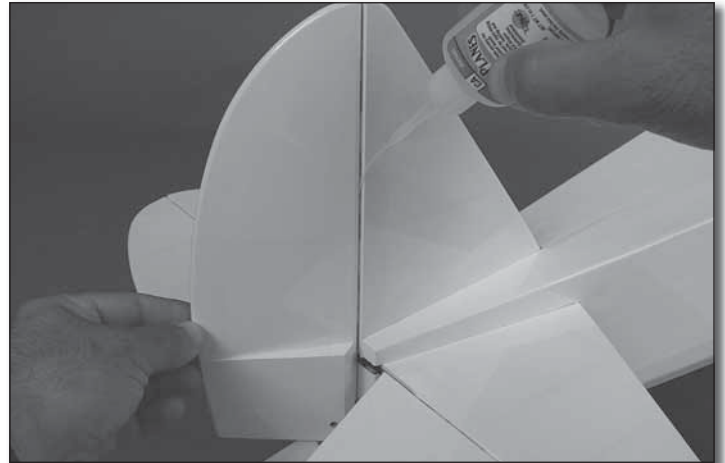
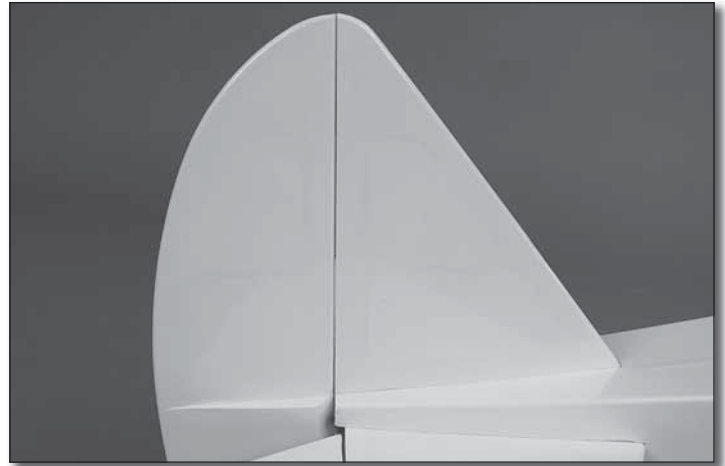
❑ 3. Prepare three CA hinges by poking a T-pin through the center of the hinge.



❑ 4. Test fit the hinges in the slot of the vertical fin. Then, test fit the rudder onto the hinges. If you are having trouble fitting the hinges into the fin or the rudder, use the back of a hobby knife to dig out the hinge slot.

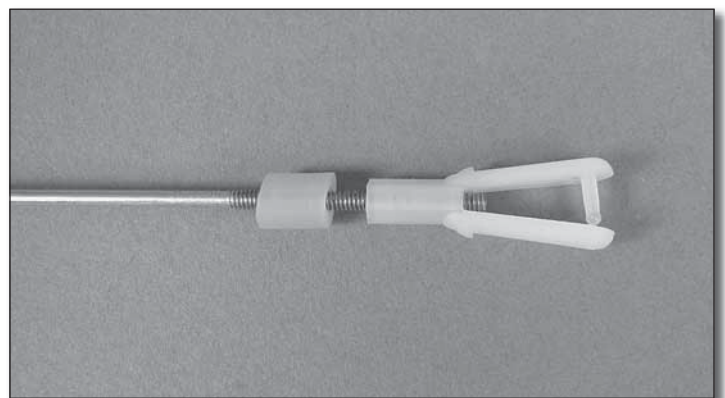


❑ 5. Using a toothpick, apply some 6-minute epoxy to the hole in the rudder for the tailwheel wire. Apply a bit of epoxy to the tip of the tailwheel wire. Proceed immediately to the next step.



❑ 6. Fit the rudder onto the hinges and the tailwheel wire. Push the rudder forward up against the fin and remove the T-pins. Slide the rudder up or down until the top of the rudder is even with the top of the fin. Deflect the rudder left and right a few times. Hold the rudder to one side and apply 5-7 drops of thin CA to each hinge. Deflect the rudder in the opposite direction and apply 5-7 drops of CA to the other side of each hinge. Clean up any excess CA using a paper towel, dampened with CA debonder.

## Servo Installation

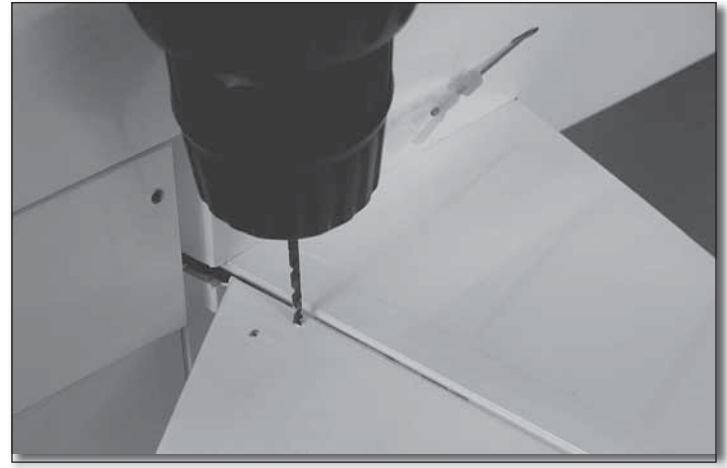


❑ 1. Prepare two 36" [914mm] pushrods using two nylon clevises and two silicone clevis retainers. Thread the clevis onto the pushrod so that at least 1/8" [3.2mm] of thread protrudes past the barrel of the clevis.

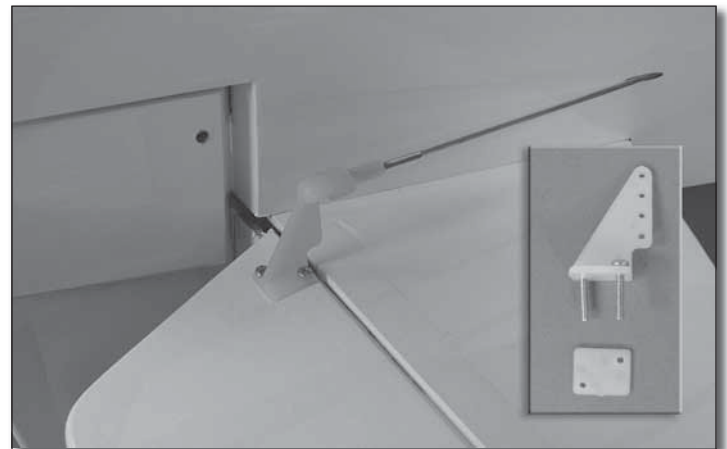
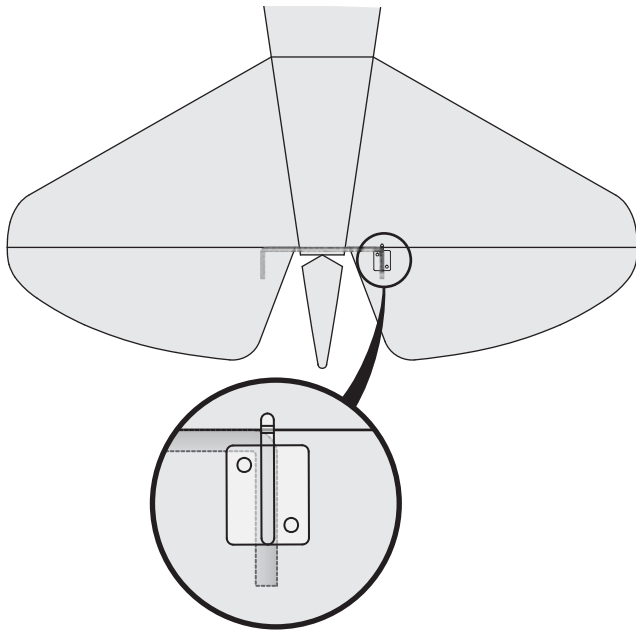




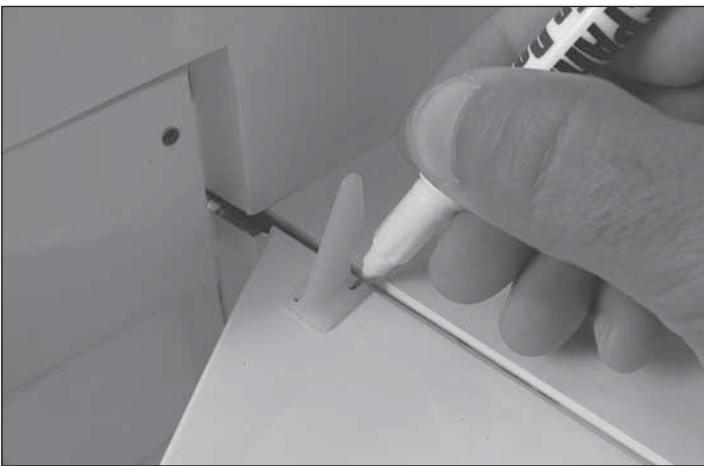
❑ 2. Fit one pushrod into the elevator pushrod guide tube on the left side of the fuselage.



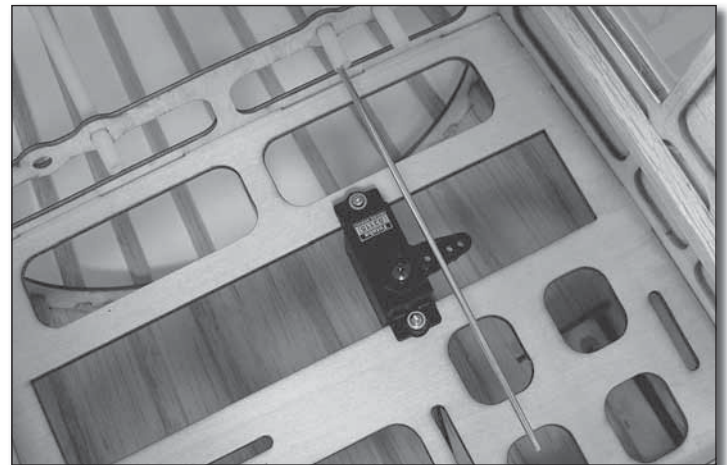
❑ 4. Drill two 3/32" [2.4mm] holes completely through the elevator.



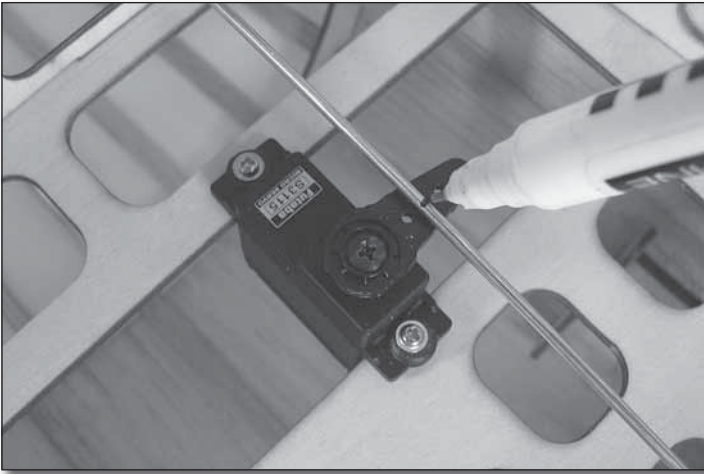
❑ 5. Install the control horn using the backing plate and two 2-56 x 1/2" [12.7mm] machine screws. Fit the clevis to the outermost hole in the control horn.



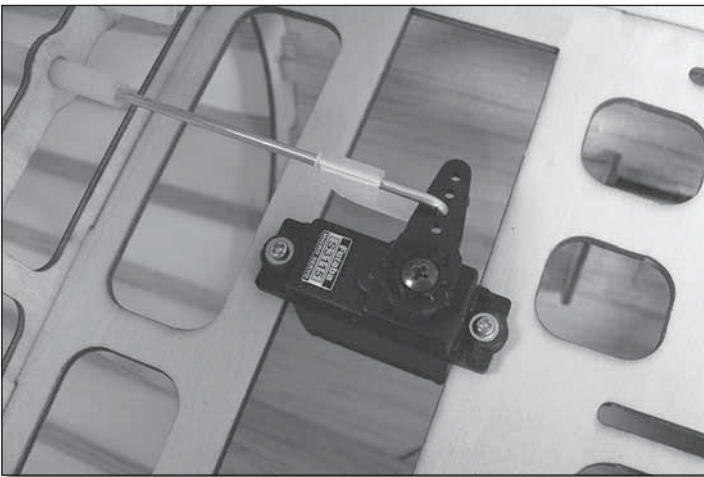
❑ 3. Cut the backing plate from the large control horn and set it aside for now. Align the center of the control horn directly over the arm of the elevator torque rod as shown in the sketch. Make sure that the horn is also aligned fore and aft so that the pushrod holes are directly over the hingeline. Using the horn as a guide, mark the location of the mounting holes.



❑ 6. Clip the excess length of pushrod to allow you to work with the elevator pushrod easily. Prepare a servo using a standard arm so that the servo arm is 90° to the servo case. Fit it to the servo tray so that the second hole outboard or the hole that is 13/32" [10.3mm] outboard of the center of the servo shaft is lined up with the pushrod. Use a 1/16" [1.6mm] drill to drill two holes for the servo. Install the servo using the screws that came with your servo. As before, harden the threads in the wood with thin CA.

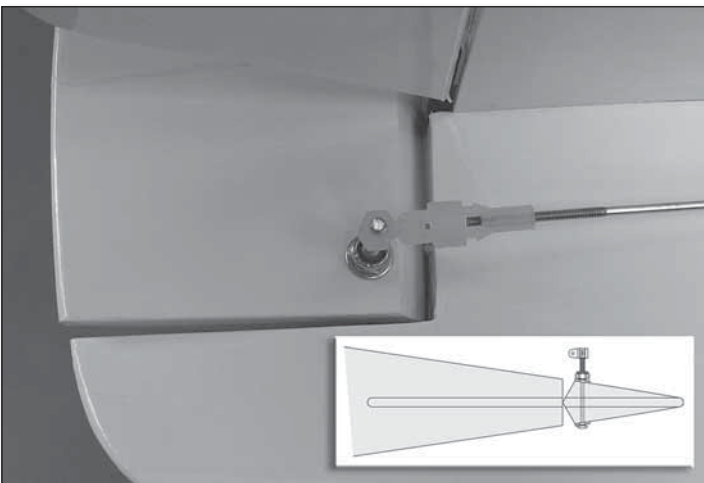


□ 7. Drill the servo arm at the second hole outboard using a 5/64 [2mm] drill. Hold the elevators at zero throw and mark where to bend the elevator pushrod.



□ 8. Bend the pushrod 90° and trim the excess pushrod so that at least 1/4" [6.4mm] of pushrod remains. Connect the pushrod to the second hole of the servo arm. Use a nylon Faslink to secure the pushrod.

□ 9. Fit the other pushrod to the rudder guide tube on the right side of the fuselage.



□ 10. Assemble the rudder horn as shown in the sketch. Fit a #6 flat washer under the head of the 6-32 x 2" machine screw and fit the screw to the rudder so that the head of the screw is on the left side of the rudder. Use a #6 flat washer

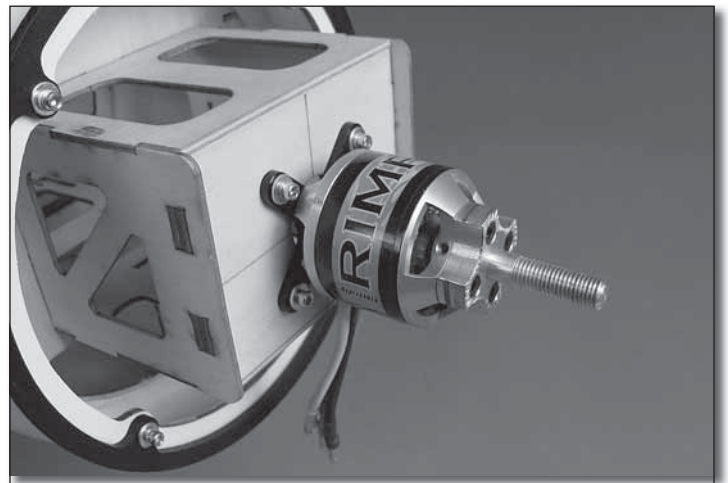
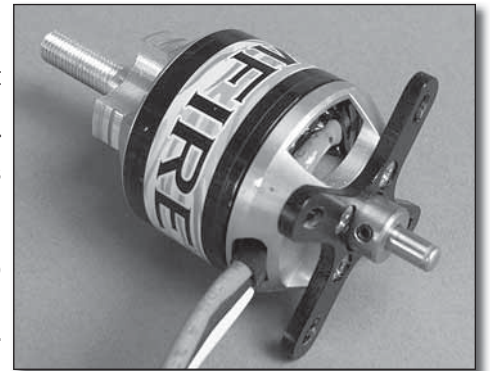
and a #6 lock nut to secure the screw. Now screw a nylon torque rod horn onto the threaded end of the screw so that it is flush with the end. Connect the clevis.



□ 11. Prepare a servo. Install the rudder servo the same way you installed the elevator servo. Bend the pushrod 90° and trim the excess pushrod so that at least 1/4" [6.4mm] of pushrod remains. Connect the pushrod to the second hole of the servo arm using a nylon Faslink to secure it.

## MOTOR, ESC, & RADIO INSTALLATION

□ 1. Install the standard X-mount to the back of the Rimfire .32 motor using the screws supplied with the motor. Apply a drop of threadlocker to the threads before installing the screws.



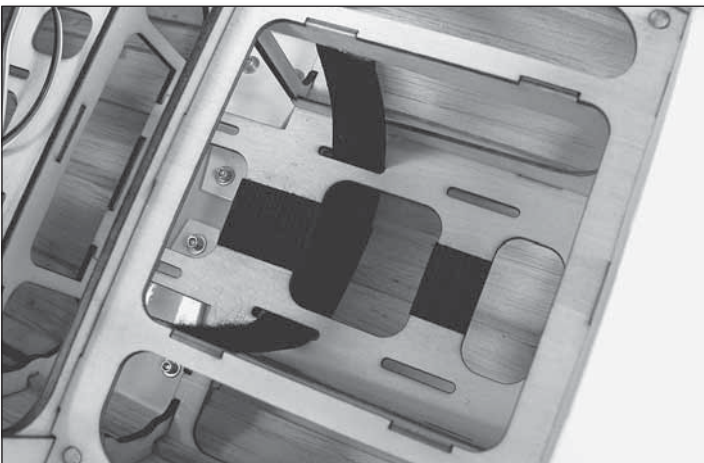
□ 2. Orient the motor wires as shown and attach the motor to the firewall with four 4-40 x 1/2" socket head cap screws, four #4 lock washers and four #4 flat washers. Use thread locking compound on the screw threads for added security.



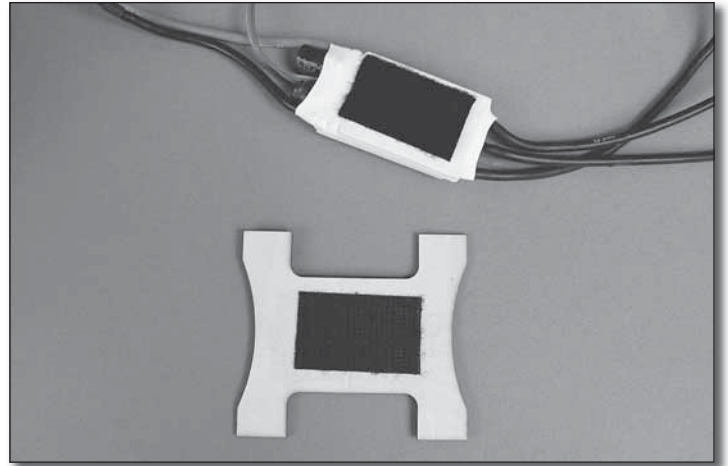
❑ 3. Mix up some 6-minute epoxy and thin it down with some denatured alcohol. Brush it onto the ESC tray and the battery tray to prepare the wood. Allow the epoxy to cure.



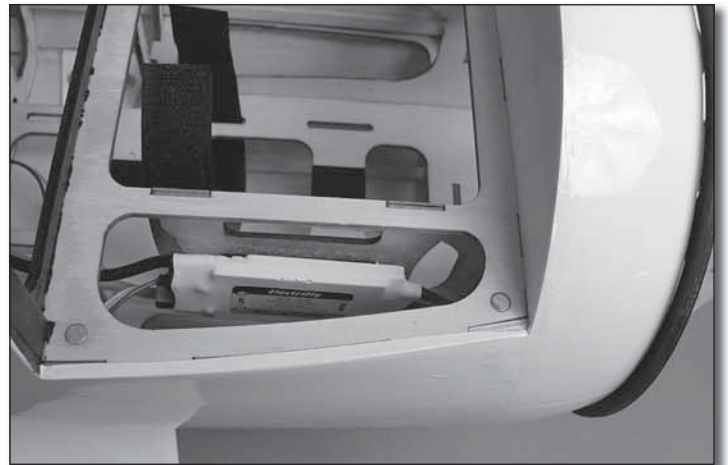
❑ 4. Cut 5" of non-adhesive backed hook and loop material. Separate the hook side from the loop side and join the two pieces so that 1-1/2" [38mm] overlaps in the middle.



❑ 5. Cut a 1-1/4" [32mm] and a 3/4" [19.1mm] piece of adhesive backed hook and loop material. Stick the hook side to the battery tray as shown. Fit the strap you made to the battery tray.



❑ 6. Cut a 1-1/2" [38mm] piece of adhesive backed hook and loop material. Stick one side to the back of the ESC and the other side to the ESC tray. Clean the back side of your ESC with some denatured alcohol before you stick the hook and loop material onto it.

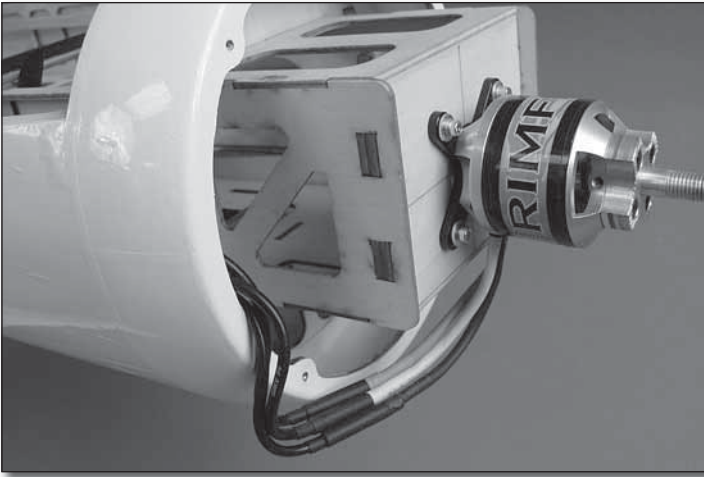


❑ 7. Glue the ESC tray into the fuselage as shown. Fit the ESC. Connect the ESC leads to the motor leads.

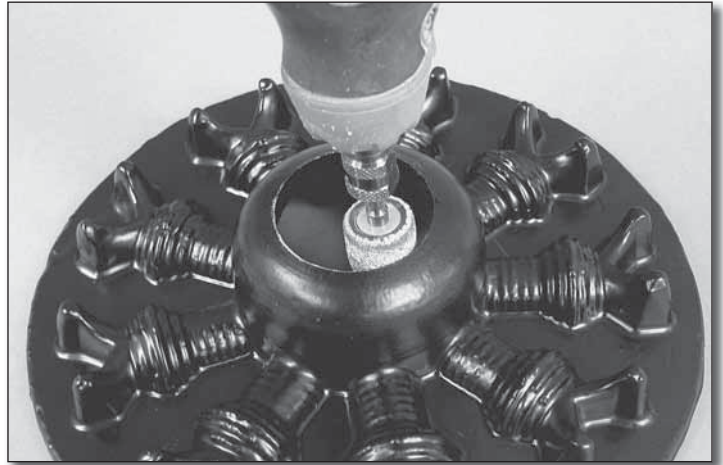


❑ 8. Use the remaining adhesive backed hook and loop material to attach your receiver to the radio equipment tray. Connect the elevator and rudder servo leads to the receiver. Plug a Y-connector into the aileron channel and a Y-connector into the flap channel (if you are using flaps). Connect the ESC servo plug to the throttle channel on your receiver.

## COWL & PROPELLER INSTALLATION



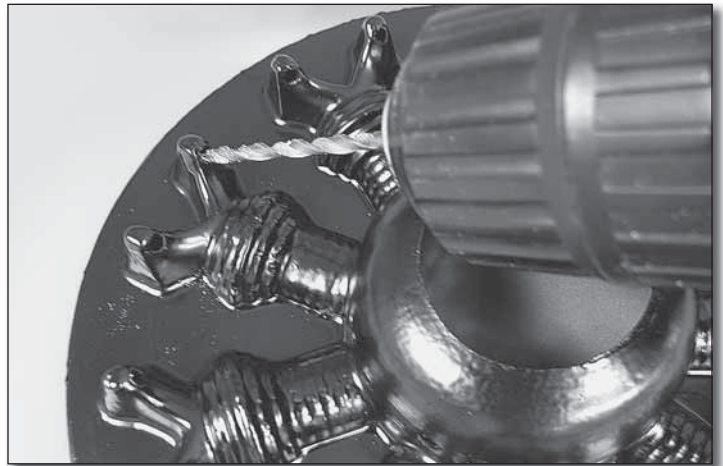
❑ 9. Test the motor for proper operation. If the motor does not spin in the correct direction, unplug two of the motor wires from the ESC and swap the position of the two wires. Test the motor once again to confirm. **Warning:** Do not install the propeller until you have performed this check and have determined that the motor works properly.



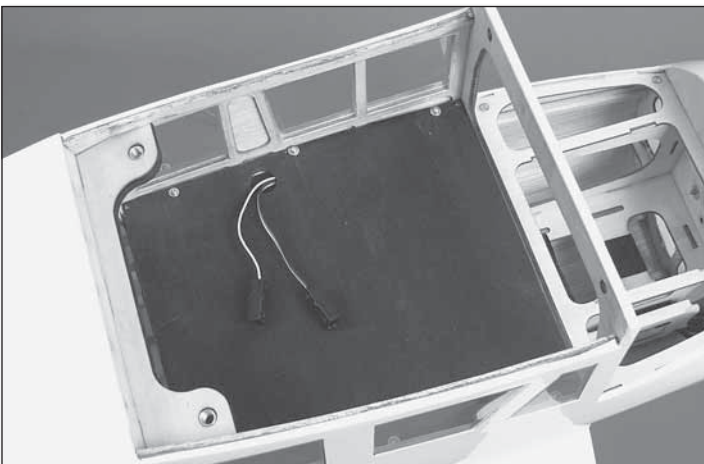
❑ 1. Cut out the center of the dummy engine to allow access for the prop adapter. Use a rotary tool with a sanding drum to smooth the edges.



❑ 10. If you have a 72MHz radio system, route your antenna through the antenna tube.



❑ 2. Pushrod tubes are provided for you if you choose to detail the dummy engine. Drill a hole in the bottom of the rocker cover and a corresponding hole in the crank case using a 3/32" [2.4mm] drill. To start the hole, use your hobby knife and poke a small "starter hole" to keep your drill centered.



❑ 11. Route the Y-connector(s) through the cabin floor panel. Hold the panel in place against the pre-installed rails and drill six 1/16" [1.6mm] holes into the rails using the holes in the floor panel as guides. Install the cabin floor using six #2 x 3/8" sheetmetal screws and six #2 flat washers.

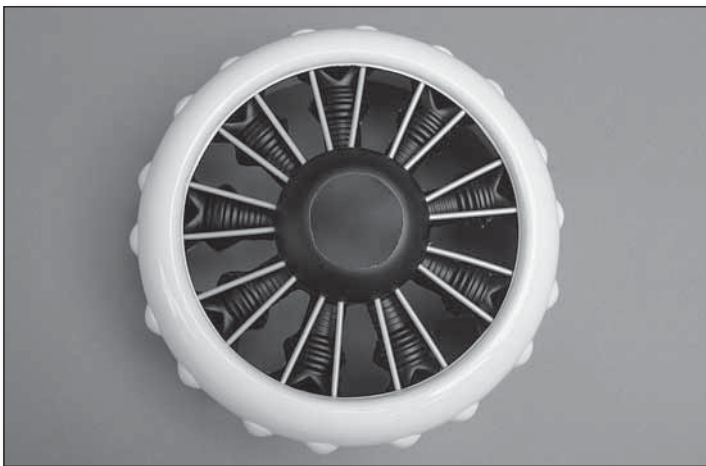


❑ 3. Install the aluminum pushrod tubes from the inside. Glue them in place.

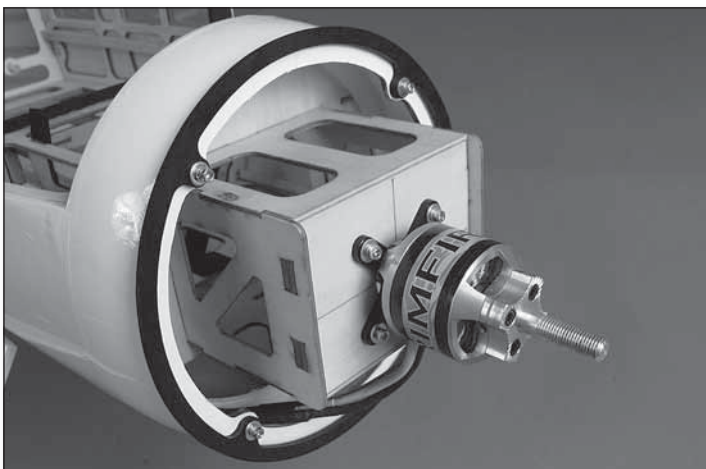


❑ 4. Use a sharp hobby knife or small sanding drum to remove the plastic between the dummy engine cylinders. Leave a 20mm wide ring around the edge of the dummy engine. Use sand paper to remove the paint from the lip of the dummy engine. Clean the lip using denatured alcohol.

❑ 5. Sand the inside of the cowl near the rear lip and where the dummy engine will mount. Clean the surfaces you just sanded using denatured alcohol.

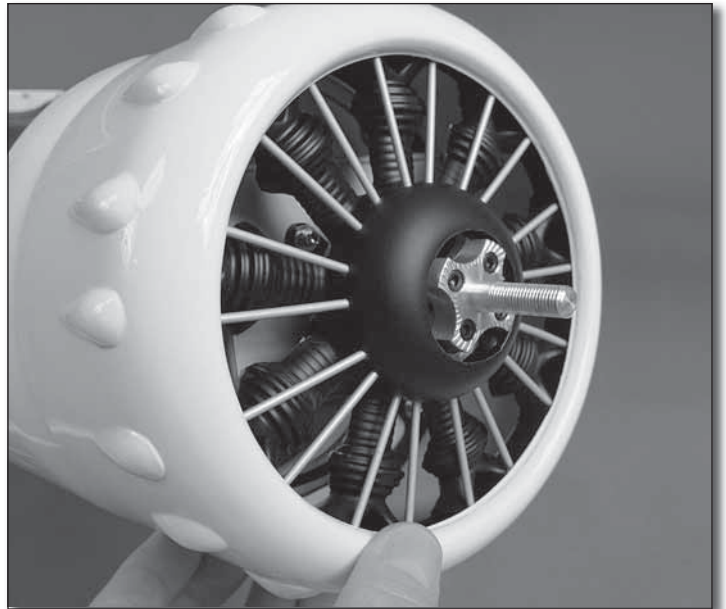


❑ 6. Fit the dummy engine inside the cowl. Position it as far forward as possible, aligning the rocker arm covers with the blisters on the cowl. Apply epoxy along the seam between the dummy engine and the cowl.

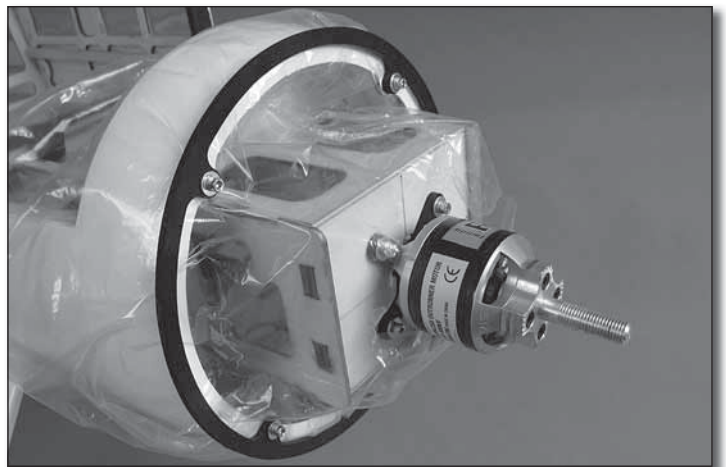


❑ 7. Temporarily attach the plywood cowl ring to the fuselage with four 4-40 x 1/2" [13mm] socket head cap screws, four

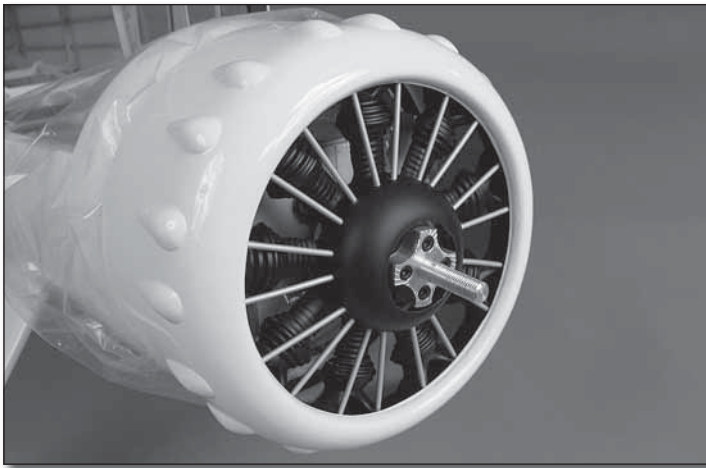
#4 lock washers and four #4 flat washers. Use a 3/32" ball wrench (GPMR8002) to tighten the screws.



❑ 8. Slide the cowl over the cowl ring and center the motor prop adapter in the dummy engine. Install a propeller to check that it rotates without rubbing on the cowl or dummy engine. Make any adjustments to the dummy engine or cowl so that the propeller spins freely. **Note:** The cowl ring should be at the back edge of the cowl when everything is positioned correctly.



❑ 9. Remove the cowl and the cowl ring. Cut the fuselage bag (you did keep the bag, right?) 12" [305mm] from the closed end. Slide the bag over the front of the fuselage. A hole will need to be cut for the motor. Also cut four small holes for the cowl ring screws. Reinstall the cowl ring with the 4-40 x 1/2" [13mm] socket head screws.

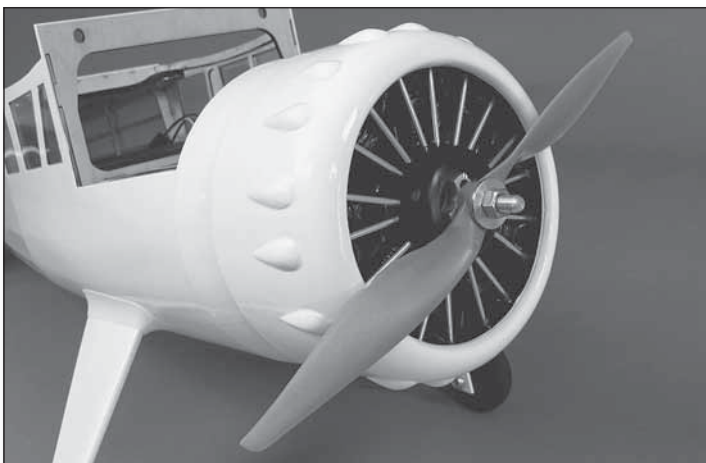


❑ 10. Apply a thin layer of 6-minute epoxy along the inside edge of the cowl. Slide the cowl over the cowl ring and position the cowl so that one of the dummy engine cylinders is straight up and the prop adapter is centered.



❑ 11. Once the epoxy has cured, remove the cowl and plastic bag. To increase the strength of the joint between the cowl and cowl ring, apply a small fillet of epoxy on the inside of the cowl ring.

❑ 12. Once the epoxy has cured, reinstall the cowl using the 4-40 x 1/2" [13mm] socket head cap screws, #4 lock washers and #4 flat washers.



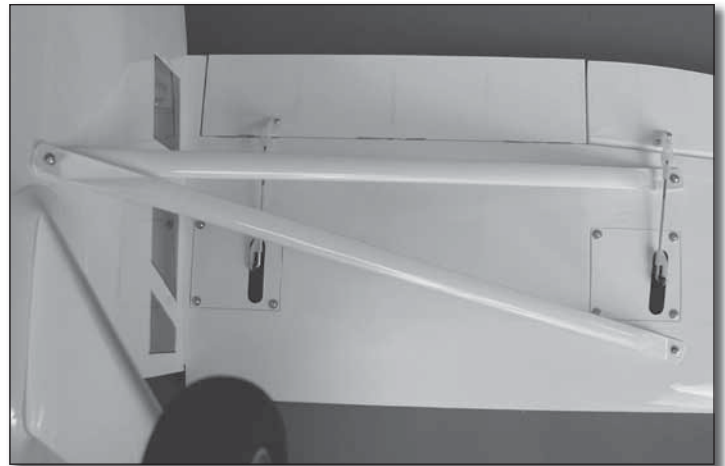
❑ 13. Install the propeller using the prop washer and nut that came with the motor. Tighten the prop nut securely.

## FINAL ASSEMBLY

❑ 1. Connect the aileron and flap servo leads to the Y-connectors. Install the wing using two 1/4-20 nylon wing bolts.



❑ 2. Identify the two right wing struts. Use the picture above to identify the proper orientation of each strut.



❑ 3. Turn the model over and install the wing struts onto the wing and the fuselage using three 2-56 x 1/2" [12.7mm] machine screws, three #2 lock washers, and three #2 flat washers. Add a bit of thread locking compound to the screw threads for added security. Lay the front strut over the rear strut at the fuselage attachment point. Then, install the screw.

❑ 4. Identify the left wing struts and install them using three 2-56 x 1/2" [12.7mm] machine screws, three #2 lock washers, and three #2 flat washers.



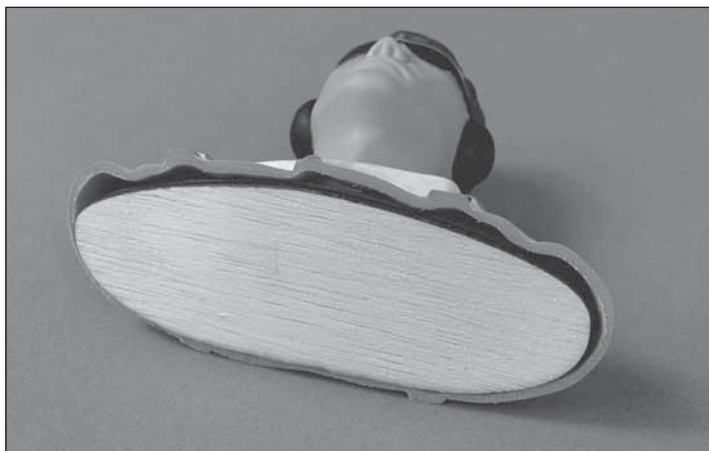
❑ 5. Install the left and right wheel pants using four 4-40 x 1/2" [12.7mm] SHCS, four #4 lock washers, and four #4 flat washers.

## Pilot Installation (Optional)

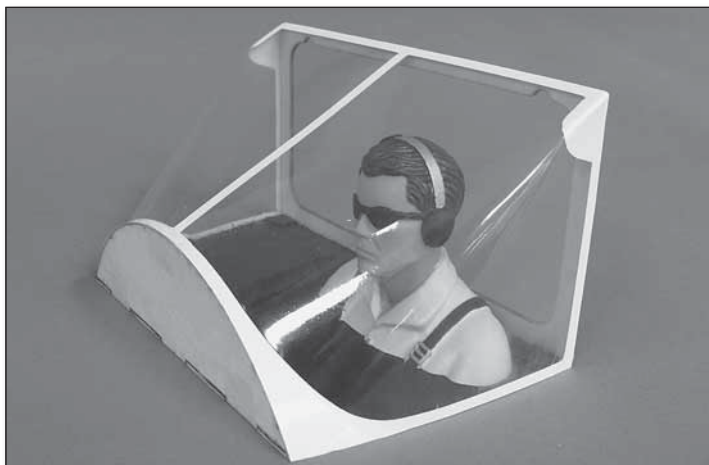
To install a pilot figure, please use the Great Planes 1/5th scale sport pilot. This is available in red, yellow, or blue. Please see the parts list earlier in this manual for these part numbers.



❑ 1. Cut the pilot figure down to 3" [76mm] using a razor saw or your hobby knife. Sand the bottom of the figure flat using a belt sander or a sanding block.



❑ 2. Sand the inside surface of the pilot figure and clean it with denatured alcohol. Cut and glue a wooden base (not included) inside the pilot figure using 6-minute epoxy. Let the epoxy cure.



- ❑ 3. Glue the pilot figure in the cockpit.
- ❑ 4. Install the canopy.

## Apply the Decals

1. 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.

2. Position decal on the model where desired. Use the photos on the box for reference. Holding the decal down, use a paper towel to wipe most of the water away.

3. 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.



4. We have also included a template for the passenger door. Turn to the back of this manual and cut this out. Hold it up to the right hand side of the model and trace the outline of the door onto the fuselage using a panel line pen.

## GET THE MODEL READY TO FLY

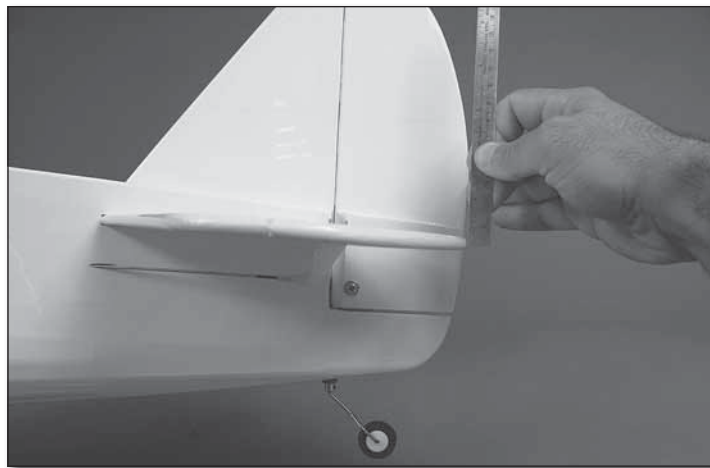
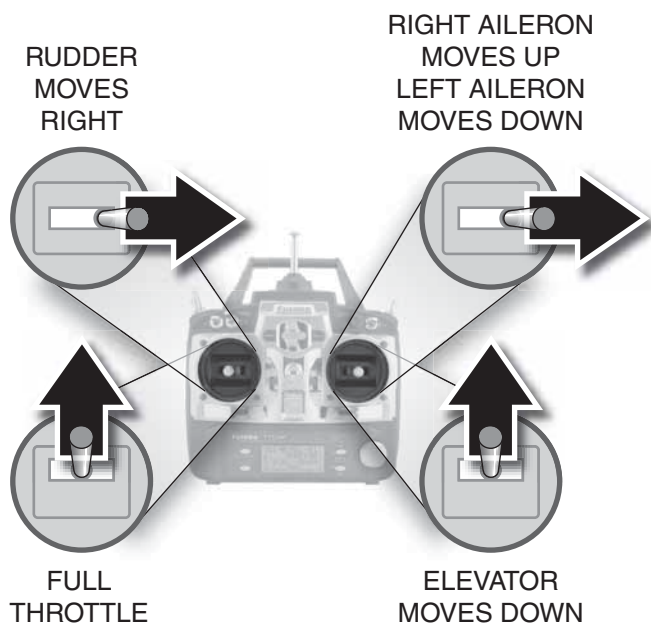
### Center the Controls and Check the Control Directions

Warning: Once the battery is connected to the ESC, stay clear of 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.

❑ 2. Check to see that the controls are centered. If any control requires adjustment, remove the clevis and tighten or loosen it to adjust the length of the pushrod. Tighten the clevis to “shorten” the pushrod or loosen it to “lengthen” the pushrod. Reinstall the clevis snapping closed the arms, and fit the silicone retainer over the clevis arms to secure it. If you have to remove a servo arm to make an adjustment, don't forget to reinstall the locking screw.

## 4-CHANNEL RADIO SET UP (STANDARD MODE 2)



❑ 1. Use a Great Planes AccuThrow™ gauge, a ruler, or an inclinometer to accurately measure and set the control throw of each control surface as indicated in the chart that follows. If your radio does not have dual rates, we recommend setting the throws at the LOW rate setting. Under normal circumstances, and if you have both high and low rates set up, you will perform takeoffs and landings using high rate aileron and elevator and then switch to low rates for flight. With this model, we recommend using high rate rudder only during taxi on the ground. Switch to low rate rudder before you initiate your takeoff.

❑ 2. When setting up flaps for this model, please use only the amount that we suggest below. This is the right amount required to slow the model down without causing it to balloon up excessively.

❑ 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 model 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 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 pushrods in different holes on the servo arms or 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 can be used to "fine-tune" to get the proper throws.

#### These are the recommended control surface throws:

	HIGH RATE		LOW RATE	
	Up	Down	Up	Down
ELEVATOR	5/8" [16 mm]	5/8" [16 mm]	1/2" [13 mm]	1/2" [13 mm]
	12°	12°	9°	9°
RUDDER	Right	Left	Right	Left
	3/4" [19 mm]	3/4" [19 mm]	5/8" [16 mm]	5/8" [16 mm]
	13°	13°	11°	11°
AILERONS	Up	Down	Up	Down
	7/8" [22 mm]	7/8" [22 mm]	5/8" [16 mm]	5/8" [16 mm]
	22°	22°	15°	15°
FLAPS		11/16" [17 mm]		16°



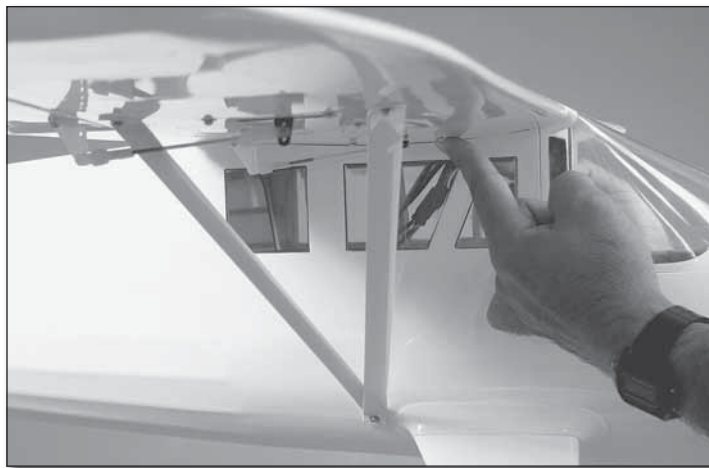
## Balance the Model (C.G.)

At this stage the model should be in ready-to-fly condition with all of the systems in place including the motor, prop, landing gear, radio system, wheel pants, struts, and battery hatch (canopy).



1. Turn the model over and mark the C.G. location on the bottom of the wing using a felt-tip pen. The C.G., or balance point, is located at 2-1/4" [57mm] back from the leading edge of the wing at the wing root. This is where your plane should balance and fly for the first few flights. Note: It is permissible to fly the airplane with the C.G. up to 1/4" [6.4mm] forward or 1/4" [6.4mm] aft of this point. Do not fly outside of the listed C.G. range!

To ensure a successful first flight, fly your Mr. Mulligan 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 will be dangerous, unstable, and possibly unflyable.



2. Strap the battery to the battery tray, but do not connect it. Fit the canopy. Suspend the model upright by placing your fingers on the marks you made.

3. If the tail drops, the model is "tail heavy" and the battery pack and/or receiver must be shifted forward or weight must be added to the nose to balance. If the nose drops, the model is "nose heavy" and the battery pack and/or receiver must be shifted aft or weight must be added to the tail to balance. If possible, relocate the battery pack and receiver to minimize or eliminate any additional ballast required. If additional weight is required, nose weight may be easily added by using a "spinner weight" (GPMQ4645 for the 1 oz. [28g] weight, or GPMQ4646 for the 2 oz. [57g] weight). If spinner weight is not practical or is not enough, use Great Planes (GPMQ4485) "stick-on" lead. A good place to add stick-on nose weight is to the structure around the firewall (don't attach weight to the cowl—it is not intended to support weight). Begin by placing incrementally increasing amounts of weight on the bottom of the fuse over the firewall until the model balances. Once you have determined the amount of weight required, it can be permanently attached. If required, tail weight may be added by cutting open the bottom of the fuse and gluing it permanently inside.

**Note:** Do not rely upon the adhesive on the back of the lead weight to permanently hold it in place. Use #2 sheet-metal screws or epoxy to permanently hold the weight in place.

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

## Balance the Model Laterally

1. With the wings level, have an assistant help you lift the model by the propeller shaft and the bottom of the fuse under the TE of the fin. Do this several times.

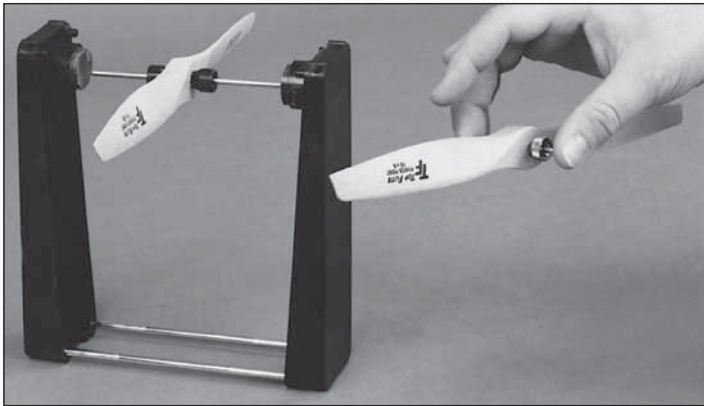
2. If one wing always drops when you lift the model, it means that side is heavy. Balance the airplane by adding weight to the other wing tip. An airplane that has been laterally balanced will track better in loops and other maneuvers.

## ***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 included identification tag on page 29 and place it on or inside your model.

### ***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 loosen, possibly with disastrous effect, but vibration may also damage your 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 or the transmitter in “power down” mode 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, remount the receiver in a different location or reroute some of the wires. 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 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, sweater strings, 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 keep your radio on when plugging the motor batteries into the ESC.
- Stay clear of the propeller at all times: Some ESC units do not have safety arming features, so any movement of the throttle stick may cause the propeller to turn.
- 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.

- 1. Check the motor for secure attachment.
- 2. Check the cowl for secure attachment.
- 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. Make sure that the dummy engine does not interfere with rotation.
- 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. Check 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. If you wish to photograph your model, do so before your first flight.

## 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 overpowered model at excessive speeds.

## Takeoff

The goals of your first flight should be to trim the airplane. Before you get ready to takeoff, see how the model handles on the ground by doing a few practice runs at **low speeds** on the runway. Hold "up" elevator to keep the tail wheel on the ground. If necessary, adjust the tail wheel so the model will roll straight down the runway.

Takeoff directly into the wind. Gradually advance the throttle while holding a bit of up elevator to keep the tail on the ground to maintain tail wheel steering. Also start applying right rudder. If the throttle is advanced too quickly, the plane will want to turn quickly to the left. As the model gains speed, decrease up elevator allowing the tail to come 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. On the first flight the assistant can help you adjust the trims.

In the air, the Mister Mulligan flies similar to a sport plane. It can perform the basic aerobatic maneuvers; loops, rolls, stall turns and wing overs. Be mindful of the flight time. With electric planes it is best to have a timer set so that the plane can be landed with power to spare, just in case you have to abort the landing and go around. A dead stick with an electric plane is the same as a dead stick with a glow plane. Risky!

## Landing

Before the battery power drops, make a few passes with the flaps down to see how the plane slows down. If this is your first plane equipped with flaps, here are a couple of notes on how to land with flaps. Only lower the flaps at half throttle or less. When the flaps are lowered, the plane will balloon up slightly, then, level off as the speed slows. On final approach, keep the power on and control the descent with the throttle. The plane will land slower with flaps than without. Don't let the plane get too slow, even with flaps the plane can tip stall if it gets too slow.

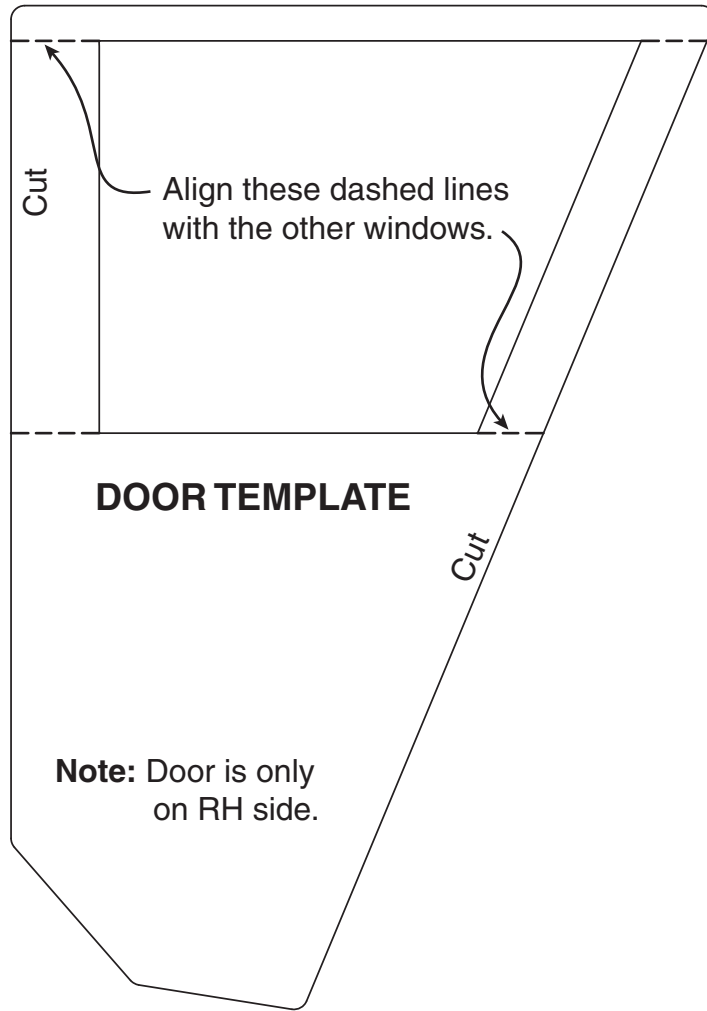
One final note about flying the Mister Mulligan. Have a goal or flight plan in mind for **every** flight. This can be learning a new maneuver(s), improving a maneuver(s) you already know, or learning how the model behaves in certain conditions (such as on high or low rates). This is not necessarily to 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





