CHRISTEN EAGLE II

Giant-Scale ARF

INSTRUCTION MANUAL

Scale: 28.7%
Length: 62.5 in [1585mm]
Wingspan: **Top:** 68.5 in [1740mm],
Bottom: 64.5 in [1640mm]
Combined Wing Area: 1436 sq in [92.6 dm²]
Weight: 16.5 - 18 lbs [6800 - 8160 g]
Wing Loading: 26 - 29 oz/sq ft [79 - 88 g/dm²]

Radio: 4-channel, 8-9 servos
Engine: 1.6 - 2.2 cu in [26 - 35cc] two-stroke,
1.8 - 3.0 cu in [30 - 49cc] four-stroke,
2.0 - 3.2 cu in [32 - 52cc] gas

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.

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

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

TABLE OF CONTENTS

INTRODUCTION

Congratulations and thank you for purchasing the Great Planes Christen Eagle II ARF. Similar in size, shape, assembly and flying characteristics to the Great Planes Pitts Special ARF, the “Eagle” provides the same aerobatic thrills and enjoyment as the Pitts. In fact, with the exception of a few cosmetic details (such as the trim scheme, cowl, canopy, wheel pants and the outline of the “tail feathers”), the Great Planes Eagle has essentially the same airframe as the Pitts. However, a few structural improvements have also been incorporated into the Eagle, such as the scale location of the flying wires, a shortened “engine box” to accommodate gas engines, a two-place cockpit, two fuel tank mounting locations and a servo tray for the throttle servo, receiver and battery. The full-size Christen Eagle II has a top wingspan of 19'11" [6.07m]. The Great Planes ARF has a top wingspan of 68.5" [.17m]. Therefore, the scale of this model is 28.7%. There are two versions of the original Christen Eagle; the Eagle I and the Eagle II. The “II” preceded the “I” and seated two people. After its introduction, the “Eagles” aerobatic team converted the Eagle II to a single-seater Eagle I. Due to the popularity of the Eagle II, it was decided that this model would be a “II” as well.

For the latest technical updates or manual corrections to the Great Planes Christen Eagle II ARF, visit the web site listed below and select the Great Planes Christen Eagle 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.

http://www.greatplanes.com/airplanes/index.html

IMAA

The Great Planes Christen Eagle is an excellent sport-scale model and is eligible to fly in IMAA events. The IMAA (International Miniature Aircraft Association) is an organization that promotes non-competitive flying of giant-scale models. If you plan to attend an IMAA event, obtain a copy of the **IMAA Safety Code** by contacting the IMAA at the address or telephone number below, or by logging on to their web site at:

www.fly-imaa.org/imaa/sanction.html

IMAA
205 S. Hilldale Road
Salina, KS 67401
(913) 823-5569

Scale Competition

Though the Great Planes Christen Eagle II 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. 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 Eagle 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
3114 Yukon Ave
Costa Mesa, CA 92626

Telephone: (714) 979-8058
Fax: (714) 979-7279
e-mail: www.bobsairdoc.com

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

1. Your Christen Eagle II 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 Christen Eagle II, 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 engine and components (fuel tank, wheels, etc.) throughout the building process.

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

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

7. If you are not already an experienced R/C pilot, you should fly the model only with the help of a competent, experienced R/C pilot.

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 an engine larger than one in the recommended range is used, the modeler is responsible for taking steps to reinforce the high stress points.

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

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

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

If you 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.

In addition to joining an R/C club, we strongly recommend you join the AMA (Academy of Model Aeronautics). In addition to other vital functions, the AMA, the governing body of model aeronautics in the United States, provides insurance to members who fly in compliance with the Safety Code. You must be a member to fly at R/C clubs chartered by the AMA–most of which are. The AMA can also direct you to the closest club whose membership should have qualified flight

instructors. To join the AMA, telephone, write or fax them at the address below, or join on line at www.modelaircraft.org.

Academy of Model Aeronautics
5151 East Memorial Drive
Muncie, IN 47302-9252
Tele. (800) 435-9262
Fax (765) 741-0057

Or via the Internet at: *http://www.modelaircraft.org*

DECISIONS YOU MUST MAKE

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

Radio Equipment

Technically, the Christen Eagle is a giant-scale model, but it's not really THAT large! Expensive, high-torque servos aren't necessary to fly this model, but "standard" servos should not be used either. Servos with a torque rating of at least 50 oz-in [3.9 kg-cm] should be used on the ailerons, elevator and rudder. If you plan on doing lots of aerobatic flying where the rudder will be used heavily, you might consider using an even higher torque servo for the rudder. Of course, a standard servo may be used on the throttle.

Because the elevator servos move in opposition, either a transmitter capable of electronic mixing must be used (so one of the servos can be reversed); or use a separate, in-line servo mixing device such as the Futaba® SR-10 Synchronized Servo Reverser (FUTM4150) to reverse one of the servos.

A receiver battery pack with a capacity of no less than 1,000 mAh is also recommended.

The following servo extension cords and connectors were also used to build this model:

❏ (2) Short Y-connectors such as the Futaba AEC-13 Dual Servo Extension for Futaba radios for the ailerons in the wings (FUTM4130).
❏ (1) 24" [610mm] Y-harness for connecting Y-connectors in wings to the receiver (HCAM2500 for Futaba, HCAM2530 for JR®/Airtronics® Z/Hitec®).
❏ (7) 12" [300mm] servo extension for ailerons, rudder and elevator servos (HCAM2100 for Futaba, HCAM2130 for JR/Airtronics Z/Hitec).

Engine Recommendations

Note: Instructions for mounting every possible engine cannot be incorporated into this manual. Although there are several engines suitable for powering the Christen Eagle ARF, instructions are provided for mounting a Fuji™ Engines 50SB spark-ignition engine, a U.S. Engines™ 41cc engine and an O.S.® MAX 1.60 FX glow engine. Modelers using different engines may refer to the instructions as a guide.

The recommended engine size range for the Eagle is specified on the cover of this manual. All engines within the specified range will power the Eagle well. At no time should an engine larger than the recommended range be flown on this model because it has not been tested for such use. Powered by a two-stroke glow engine such as the O.S. MAX 1.60 FX, the Eagle is able to perform aerobatics and has been said to fly quite "scale-like." The Eagle also flies extremely well with the O.S. MAX FT-300 four-stroke twin. With this engine, the Eagle's vertical performance is virtually unlimited and it is capable of hovering. Additionally, powered by the FT-300, the Eagle has a pleasing, scale-like sound. Powered by the Fuji BT-50 gas engine, the Eagle was very aerobatic and perfectly able to handle the additional weight with no bad tendencies. The Fuji BT-50 is an ideal gas power plant for the Eagle. It is perfectly concealed within the cowl without having to cut unsightly holes for the muffler, spark plug or engine head.

When making the decision between a gas engine and a glow engine, while a gas engine may provide more power, the additional weight of a gas engine can offset some of the power advantage. However, the considerably lower cost of gasoline compared to glow fuel should also be taken into consideration when choosing a power plant for your Eagle.

If using the Fuji BT-50SB engine the Fuji Engines Short Propeller Hub (FJIG6754) and (4) 1/4-20 x 1" [25mm] socket head cap screws and lock washers for mounting the engine will be required (1/4-20 blind nuts are included with the kit). If mounting a different gas engine, different hardware may be required.

If using the U.S. Engines 41cc, a 1/4" x 3-3/4" x 4-1/2" [6.4 x 100 x 115mm] sheet of aircraft plywood will be required for making the engine mount plate. There is a template on page 50 of the manual

If using a two-stroke glow engine, a Bisson brand Pitts-style muffler is recommended:
❏ BISG1180 for the Moki 2.10
❏ BISG4116 for the O.S. 1.60 FX
❏ BISG4220 for the O.S. BGX 3500
❏ BISG2300 for the SuperTigre® 3000 or 3250

Per the IMAA Safety Code, magneto spark-ignition engines must have a coil-grounding switch on the aircraft to stop the engine and prevent accidental starting. The switch must be operated manually (without the use of the transmitter) and accessible by the pilot and assistant. For use with the Fuji

engine shown, the manually-operated switch was made from a .3 Amp slide switch, 16-gauge wire and a covered, crimp-on connector purchased at the local RadioShack. Slightly different hardware may be required if using a different spark-ignition engine. All of the components required should also be available at any hardware or home-improvement store.

Fuel Tank Setup

The fuel tank, stopper and fuel line included with this kit is suitable for use with glow fuel. However, if using a gasoline engine, the stopper and line must be converted to work with gas. There may be several different gas-compatible stoppers and lines available, but of the all the combinations tested, the Du-Bro gas conversion stopper and Du-Bro medium neoprene fuel tubing are the only ones recommended. The Du-Bro stopper holds up best to gasoline and the Du-Bro medium fuel tubing fits tightly and remains attached. Du-Bro fuel line barbs are also highly recommended for keeping the lines attached. To use the barbs however, the aluminum fuel tubes that come with this tank must be replaced with brass tubing so the barbs can be soldered on.

Following is a list of all the items required to convert the stopper and fuel lines for use with gasoline:

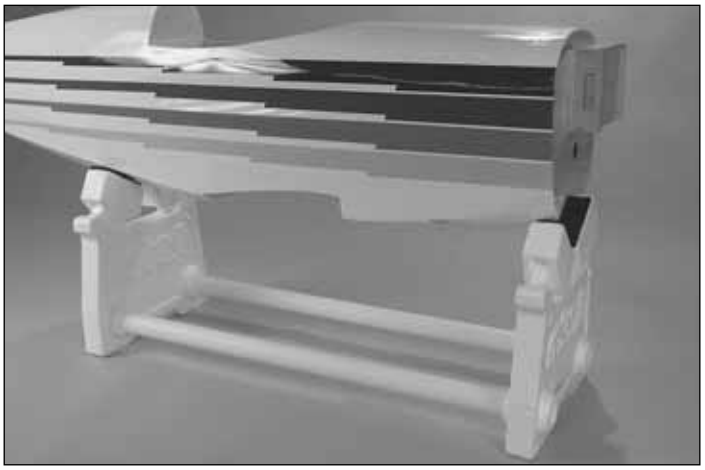
- ❏ (1) Du-Bro #400 gas conversion stopper (DUBQ0675)
- ❏ (2) 2' [610mm] Du-Bro medium neoprene fuel tubing (DUBQ0455)
- ❏ (2 pkgs.) Du-Bro #813 1/8" [3.2mm] I.D. fuel line barbs (DUBQ0670)
- ❏ (1) 12" [300mm] piece of K+S 1/8" [3.2mm] soft brass tubing (K+SR5128-box of 5)

Note: Modelers who use glow engines with **large** silicone fuel tubing should also use fuel line barbs to ensure that the larger tubing remains attached to the metal tubes in the tank. If using fuel line barbs, the aluminum tubes supplied with the fuel tank will have to be replaced with K&S brass tubing so the barbs can be soldered on. Fuel line barbs are not necessary when medium silicone fuel tubing is used.

Optional Flying Wires

The Christen Eagle ARF comes with all the hardware necessary to add semi-scale flying wires. (The wires are mounted near their scale locations, but the flying wires on the full-size Eagle are rigid and streamlined rather than the flexible cable used on this model). The flying wires are for scale enhancement and are not necessary for flying, so the Eagle may be flown with or without them. (Most pilots who are more concerned with aerobatics than they are scale appearance choose to fly without the wires due to the additional set up time). To mount the flying wires, simply follow the instructions in the manual.

Building Stand



While building the Christen Eagle ARF a building stand or cradle is a necessity. We use the Robart Super Stand II (ROBP1402) for all of our projects in R&D.

ADDITIONAL ITEMS REQUIRED

In addition to the items previously listed, following is a list of the rest of the items required to finish the Christen Eagle II ARF. Order numbers are provided in parentheses.

Hardware and Accessories

- ❏ Suitable propellers
- ❏ 1/4" [6mm] (HCAQ1000) or 1/2" [13mm] (HCAQ1050) R/C foam rubber
- ❏ 3' [900mm] standard silicone fuel tubing (for glow engine--GPMQ4131)
- ❏ 30% scale or 1/4-scale pilot

Adhesives and Building Supplies

In addition to common household tools and hobby supplies, following are the most important items required to build the Eagle. ***Great Planes Pro***™ *CA and Epoxy glue are recommended.*

- ❏ 1 oz. [30g] Thin Pro CA (GPMR6002)
- ❏ 1 oz. [30g] Medium Pro CA+ (GPMR6008)
- ❏ CA applicator tips (HCAR3780)
- ❏ Pro 30-minute epoxy (GPMR6047)
- ❏ Epoxy mixing cups (GPMR8056)
- ❏ Microballoons (TOPR1090)
- ❏ Threadlocker thread locking cement (GPMR6060)
- ❏ RTV silicone cement or R/C-56 canopy glue (JOZR5007)
- ❏ Paint assortment and brushes for painting pilot
- ❏ Black or gray paint for cockpit and rear instrument panel
- ❏ Masking tape (TOPR8018)
- ❏ #1 Hobby knife (HCAR0105)

- ❏ #11 blades (100-pack, HCAR0311) -or- #11 blades (5-pack, HCAR0211)
- ❏ Drill bits: 1/16" [1.6mm], 3/32" [2.4mm], 7/64" [2.8mm], 1/8" [3.2mm], an extended 3/16" [4.8mm] drill, or 3/16" [4.8mm] brass tube sharpened on the end, 7/32" [5.6mm], 19/64" [7.6mm] (if using gas engine)
- ❏ 8-32 tap and #29 drill (only if using glow engine--GPMR8103)
- ❏ Small metal file
- ❏ 1/4" [6.4mm] wrench (for mounting wing struts)
- ❏ 3mm and 1.5mm hex wrench
- ❏ Prop Reamer (GPMQ5005)
- ❏ Stick-on segmented lead weights (GPMQ4485)
- ❏ Silver solder w/flux (GPMR8070)
- ❏ Soldering iron or torch for soldering
- ❏ K & S #801 Kevlar thread or similar (for stab alignment, K+SR4575)
- ❏ Rotary tool such as Dremel®
- ❏ Rotary tool reinforced cut-off wheel (GPMR8200)
- ❏ Rotary tool cutting bit (suitable for cutting small holes in fiberglass cowl)
- ❏ Various small to medium-size C-clamps
- ❏ Sandpaper assortment
- ❏ Small, metal straightedge
- ❏ Fine-point felt-tip pen such as a Top Flite® Panel Line Pen (TOPQ2510)
- ❏ Denatured alcohol (for epoxy clean up)
- ❏ Naphtha lighter fuel or denatured alcohol (to remove adhesive from masking tape)

Optional Supplies and Tools

- ❏ Dave Brown Carbon Fibre Tape (DAVR2000) for reinforcing wheel pants (see page 24)
- ❏ 2 oz. [57g] spray CA activator (GPMR6035)
- ❏ CA debonder (GPMR6039)
- ❏ Epoxy brushes (6, GPMR8060)
- ❏ Mixing sticks (50, GPMR8055)
- ❏ Switch & Charge Jack Mounting Set (GPMM1000)
- ❏ Hobbico® Builder's Triangle Set (HCAR0480)
- ❏ Curved-tip canopy scissors for trimming plastic parts (HCAR0667)
- ❏ Hobbico Duster™ can of compressed air (HCAR5500)
- ❏ Milled fiberglass (GPMR6165)
- ❏ Hobby Heat™ micro torch (HCAR0750)
- ❏ Dead Center™ Engine Mount Hole Locator (GPMR8130)
- ❏ AccuPoint™ Laser incidence meter (GPMR4020)
- ❏ Precision Magnetic Prop Balancer™ (TOPQ5700)

Covering Tools

- ❏ 21st Century® sealing iron (COVR2700)
- ❏ 21st Century iron cover (COVR2702)

  -or-
- ❏ Top Flite® MonoKote® sealing iron (TOPR2100)
- ❏ Top Flite Hot Sock™ iron cover (TOPR2175)

IMPORTANT BUILDING NOTES

- The Christen Eagle II ARF is factory-covered with Top Flite MonoKote film. Following are the colors used and order numbers for 6' [1.8m] rolls.

  White **TOPQ0204**
  Yellow **TOPQ0203**
  Orange **TOPQ0202**
  True red **TOPQ0227**
  Sapphire Blue **TOPQ0226**

- The stabilizer and wing incidences and engine thrust angles have been factory-built into this model. However, some technically-minded modelers may wish to check these measurements anyway. To view this information, visit the web site at www.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.

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.

3002 N. Apollo Drive, Suite 1
Champaign, IL 61822
Telephone: (217) 398-8970
Fax: (217) 398-7721
E-mail: airsupport@greatplanes.com

ORDERING REPLACEMENT PARTS

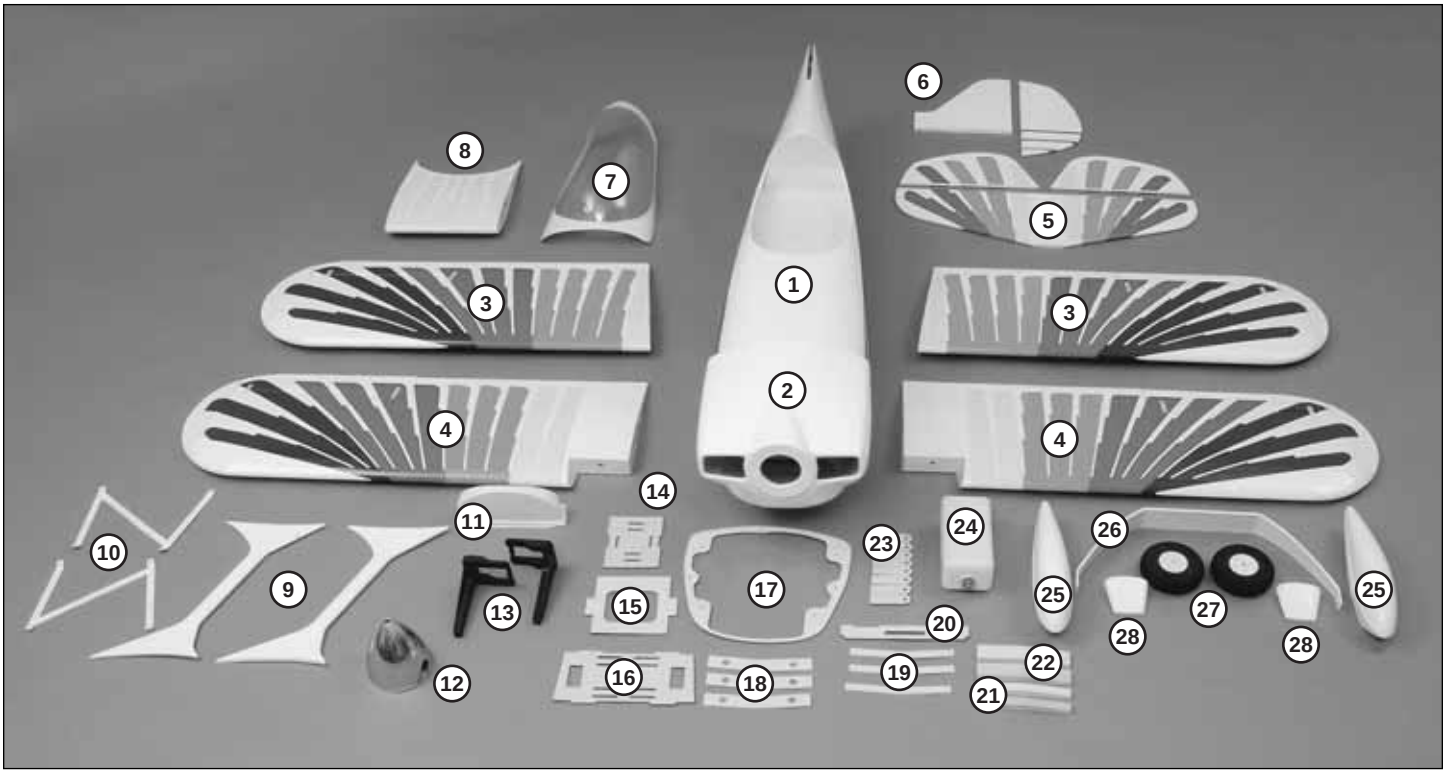
To order replacement parts for the Great Planes Christen Eagle II ARF, use the order numbers in the **Replacement Parts List** that follows. Replacement parts are available only as listed. Not all parts are available separately (an aileron cannot be purchased separately, but is only available with the wing kit). Replacement parts are not available from Product Support, but can be purchased from hobby shops or mail order/Internet order firms. Hardware items (screws, nuts, bolts) are also available from these outlets. If you need assistance locating a dealer to purchase parts, visit **www.greatplanes.com** and click on **"Where to Buy."** If this kit is missing parts, contact Product Support.

Replacement Parts List

Order Number		Order Number	
GPMA2440	Top Wing Set	GPMA2448	Decal Set
GPMA2441	Bottom Wing Set	GPMA2449	Cabanes
GPMA2442	Fuselage	GPMA2450	Metal Bracket Set
GPMA2443	Tail Surface Set	GPMA2451	Wing Struts
GPMA2444	Cowl w/Cowl Ring	GPMA2452	LG Fairing Set
GPMA2445	Canopy	GPMA2453	Spinner
GPMA2446	Wheel Pants	GPMA2454	Flying Wire Set
GPMA2447	Landing Gear	GPMQ4245	Tail Gear Assembly

Missing pieces: .....Contact Product Support
Instruction manual: .....Contact Product Support
Full-size plans: .....Not available

KIT CONTENTS



Kit Contents (Photographed)

1	Fuselage w/balsa LG cover (two 1/4-20 blind nuts and five 4-40 blind nuts factory installed)	**10**	R&L aluminum cabanes	**19**	(3) aft bottom wing joiners
2	Fiberglass cowl	**11**	Rear instrument panel	**20**	Servo tray brace
3	R&L top wing panels w/ailerons	**12**	4" [100mm] polished aluminum spinner (cone, backplate, spacers (2), bolt)	**21**	(2) aft top wing joiners
4	R&L bottom wing panels w/ailerons	**13**	R&L adjustable engine mount	**22**	(2) forward top wing joiners
5	Stab & elevators	**14**	Battery mount	**23**	(8) guide tube supports
6	Fin & rudder	**15**	Lower fuel tank mount (optional)	**24**	Fuel tank w/hardware
7	Canopy	**16**	Servo tray	**25**	R&L fiberglass wheel pants
8	Top, center wing panel	**17**	Cowl ring	**26**	Aluminum landing gear
9	R&L fiberglass wing struts	**18**	(3) forward bottom wing joiners	**27**	(2) 4" [100mm] main wheels
				28	(2) fiberglass landing gear fairings

Kit Contents (Not Photographed)

WASHERS:
(5) #4 lock washers (cowl ring)
(13) #4 flat washers (5-cowl ring, 8-wing strut mounting)
(14) #8 flat washers (6-main wheel spacers, 8 glow engine mounting)
(8) #8 lock washers (4-GP engine mount to firewall, 4-engine to GP mount)

FLYING WIRE CABLES:
(Measurements are from clevis pin to clevis pin)
(2) "Y" bottom tail wires
(4) 10-1/4" [260mm] top tail wires
(4) 21-1/2" [545mm] top wing to fuselage
(4) 22-1/4" [565mm] top wing to bottom wing
(1) bottom tail wire bracket
(30) clevis retainers

SHEET-METAL SCREWS:
(50) #4 x 1/2" [13mm] screw (16-aileron control horns, 4-wheel pant mounting, 30-various strut, cabane & bracket mounting)
(2) #4 x 5/8" [16mm] screw (tail gear mounting)
(6) #8 x 5/8" [16mm] screw (main LG mounting)
(8) #2 x 3/8" [10mm] button-head screw (canopy)

WHEEL COLLARS:
(4) 3/16" [4.8mm] wheel collars (main wheels)
(2) 3/32" [2.4mm] wheel collars (on rudder pushrod for tail steering)
(3) 3mm wheel collars
(4) 3mm set screws for tail gear wire

NYLON:
(2) 2" x 9" [50 x 230mm] CA hinge strip
(7) large control horns (4-ailerons, 2-elevators, 1-rudder)
(3) mounting plate for large control horns (2-elevator, 1-rudder)
(2) 1/4-20 x 2" [50mm] nylon wing bolts
(1) 4-40 torque rod horn (tail steering)
(2) ball link (tail steering pushod, throttle)
(1) clevis (throttle)
(1) nylon retainer for screw lock

TAIL GEAR PARTS:
Aluminum tail gear mount
Tail gear wire
1-1/4" [32mm] tail wheel
Steering arm
(3) 3mm wheel collars
(4) 3mm set screws
(2) springs (not used)
(2) 3 x 12mm screws

PLYWOOD PARTS:
(4 sets) cowl ring mounting tabs
(2) wheel pant braces
(2) brace doublers
(4) axle braces

METAL HARDWARE:
(7) 4-40 threaded metal clevis (4-ailerons, 2-elevators, 1-rudder)
(7) Large solder clevis (4-ailerons, 2-elevators, 1-rudder)
(1) small solder clevis (tail steering pushrod)
(2) 3/16" x 2" [4.8 x 50mm] axles
(30) small threaded metal clevis

MACHINE-THREAD SCREWS:
(4) 8-32 x 1-1/4" [32mm] SHCS (GP engine mount to firewall)
(4) 8-32 x 1" [25mm] SHCS (engine to GP mount)
(1) 8-32 x 3/4" [19mm] SHCS (drawing blind nuts into firewall)
(15) 4-40 x 1/2" [13mm] SHCS (5-cowl ring, 10-wing strut & cabane mounting)
(12) 4-40 x 3/4" [19mm] SHCS (rudder & elevator control horns)
(2) 4-40 set screws (for wheel collars for tail steering)
(1) 2-56 ball link ball (tail steering arm)
(4) 6-32 x 1/4" [6mm] SHCS (main landing gear wheel collars)
(1) 4-40 x 1/8" [3mm] SHCS (for screw-lock)
(1) 2-56 ball link ball (carb end of throttle)
(6) 4-40 x 5/8" [16mm] screw (tail wire bracket mounting)

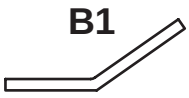
PUSHRODS:
(4) 4-40 x 4-1/2" [115mm] pushrod (ailerons)
(3) 4-40 x 5-3/4" [145mm] pushrod (elevators-2, rudder-1)
(1) 2-56 x 12" [305mm] pushrod (tail steering)
(1) 24" [610mm] pushrod tube (throttle)
(1) 24" [610mm] white, plastic pushrod (throttle-gas)
(1) 2-56 x 36" [910mm] throttle pushrod (glow)
(2) 2-56 x 1" [25mm] threaded rod (throttle gas)

SOLID WOOD PARTS:
(2) 3/8" x 1-3/16" [10x 30mm] wing dowels
(2) 1/8" x 10" [3 x 250mm] wood dowels (firewall)

NUTS:
(9) 4-40 blind nuts (5 factory-installed for cowl ring, 4 extras for relocating screws if necessary)
(6) 1/4-20 blind nuts (2 factory-installed for wing bolts, 4 mounting gas engines)
(13) 4-40 nut (7-clevis jam-nuts, 6-tail wire bracket mounting)
(31) 2-56 nut (tail steering ball link ball)
(4) 8-32 blind nuts (for GP engine mount)
(2) large axle nuts (landing gear axles)
(2) 2-56 nuts (for ball link ball on carb and on tail wheel steering arm)
(10) 4-40 lock nuts (wing strut & cabane mounting)

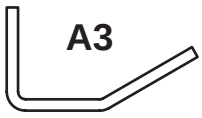
OTHER:
(18) silicone retainers (pushrod clevises)
(4) #64 Rubber bands (fuel tank mounting)
(6) 3/8" [10mm] heat shrink tubing (for servo extensions)
(1) 1" x 12" [25 x 300mm] fiberglass tape (cowl ring)
(1) brass body screw-lock connector (servo end)
(1) 4" [100mm] brass tube (for tail wire collars)
(2) Velcro strips
Decal set
Extended 3/32" [2.4mm] ball-end hex wrench
(1) 3" Silicone tubing (for tail steering pushrod)

METAL BRACKETS:
There are a total of thirty-five metal brackets used to mount the wings and optional flying wires. Below is a description and sketch of each bracket.

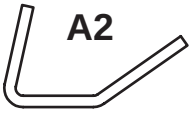


(12) stab flying wire mounts, wing flying wire mounts

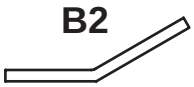
(2) bottom, front wing struts



(2) top, aft cabane mounts



(2) top, front wing struts



(2) top, center of wing flying wire mounts

(4) fuselage flying wire mounts near LG

(4) fin flying wire mounts

(2) bottom, aft wing struts

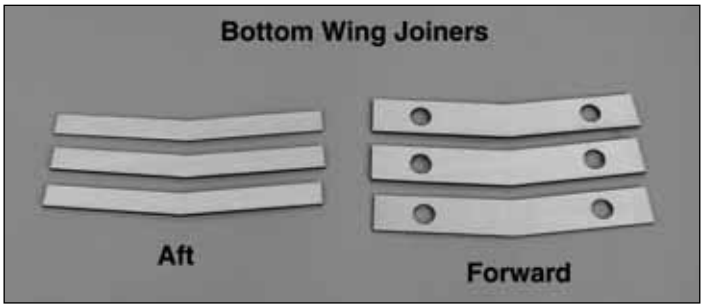
(2) top, aft wing struts

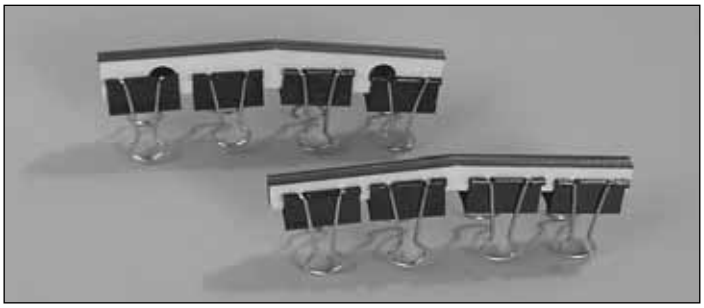
(1) Bottom of fuselage for tail

(2) top, forward cabane mounts

ASSEMBLE THE WINGS

Prepare the Wings





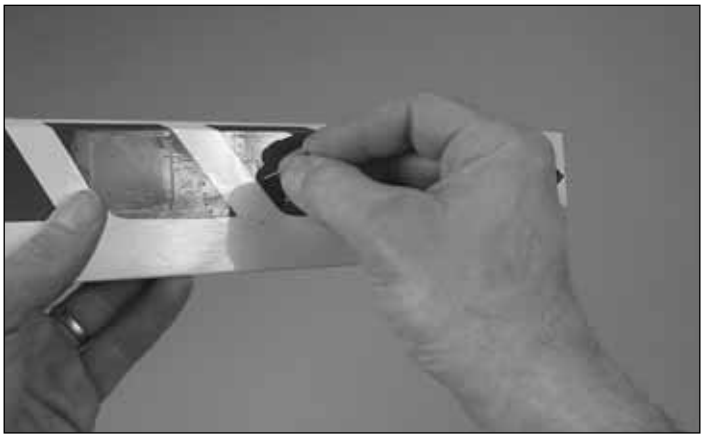
❑ 1. Use 30-minute epoxy to glue together the three plywood **aft bottom wing joiners** and the three plywood **forward bottom wing joiners**. Clamp the joiners together and wipe away excess epoxy. (Steel spring clamps are ideal for holding the joiners together.) **Note:** If you happen to notice that one of the joiners is thinner than the other two, it doesn't matter where in the "stack" it is positioned.

Now the joiners will be ready when it's time to glue together the bottom wings.

Start with the bottom, left wing panel first so yours looks like the photos the first time through.

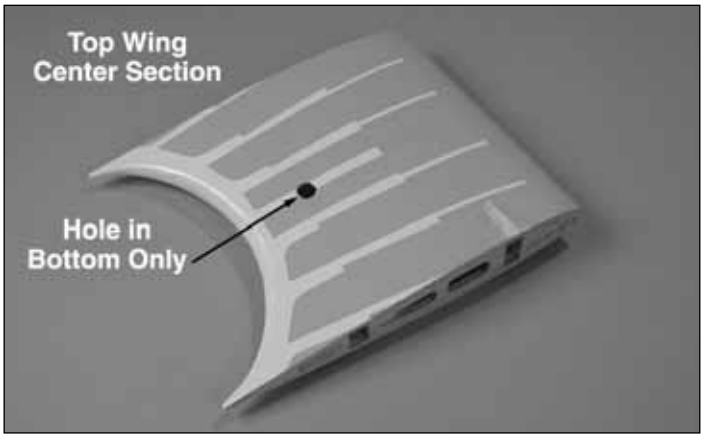
❑ 2. Carefully remove the masking tape holding the aileron to the wing. Residual adhesive from the tape may be removed with naphtha lighter fuel or denatured alcohol.

❑ 3. Use a covering iron with a covering sock to thoroughly bond the covering to the structure and remove any wrinkles in the wing and aileron. The best way is to glide the iron over the covering until the wrinkles disappear, then push down on the iron to bond the covering to the wood. If you come across a wrinkle that won't go away, the balsa in that area may be bending inward. If this is happening, do not apply pressure. Simply let the heat of the iron shrink the covering. If the wrinkles momentarily disappear, then immediately reappear, the iron may be too hot, thus causing air bubbles. Lower the temperature of the iron or use a sharp #11 blade to puncture several small holes in the covering, then reheat. The suggested iron temperature is around 360 degrees F. **Hint:** Any MonoKote pigment that gets smeared on other areas may be removed with a tissue **lightly** dampened with MonoKote Trim Solvent or CA debonder. Trim solvent and debonder are **powerful**, so using too much may loosen the covering if it gets under the seams. To avoid this, **immediately** wipe away excess solvent using another tissue dampened with household spray cleaner (Windex®, Formula 409®).



Suggestion: Before tightening the covering over the ailerons, use a pin to poke six to eight holes in the covering over each lightening hole on the bottom. (Where possible, poke the holes in colored areas where there are two layers of covering.) When heating the covering, expanding air will escape through the holes, thus allowing the covering to fully tighten.

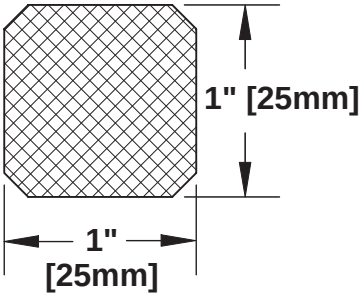
❑ 4. While you've got your covering tools out, use a straightedge and a hobby knife to cut the covering 1/8" [3mm] inside the edges of the opening in the bottom of the wing panel for the aileron servo. Use a trim seal tool to iron the covering down inside the edges of the opening.



❏ 5. Cut the covering from the hole in the bottom of the center section for the aileron servo wire.

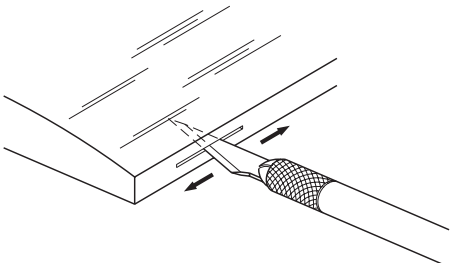
Hinge the Ailerons

Again, start with the bottom, left wing first…

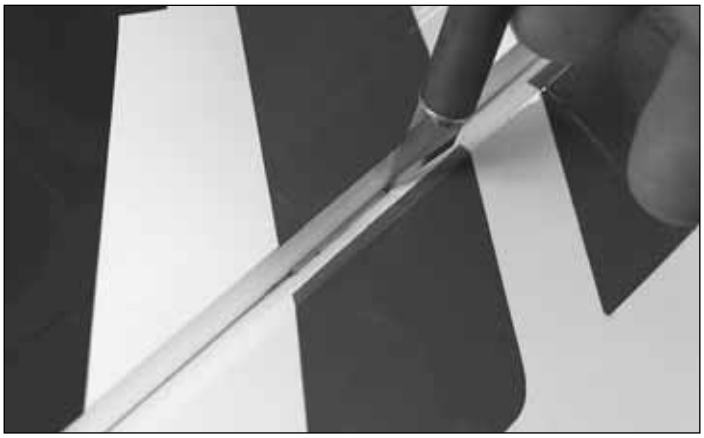


❏ 1. Only three hinges are required for each aileron, but you might as well go ahead and cut all the hinges now. Cut twenty-two 1" x 1" [25 x 25mm] CA hinges from the supplied CA hinge strips. Cut off the corners so the hinges go in easier.

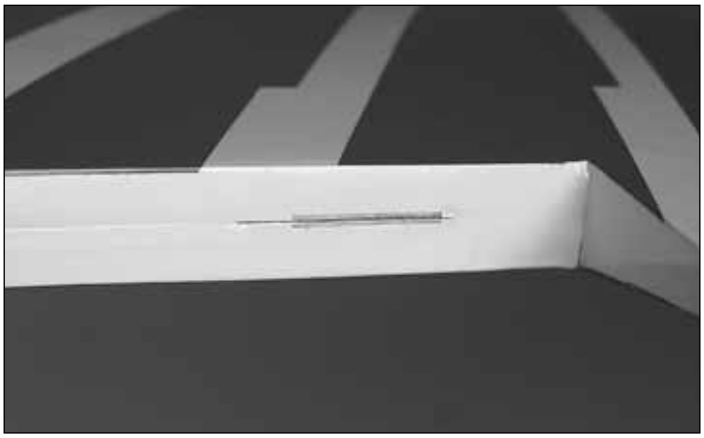
Note: The following three steps describe how to prepare the hinge slots for gluing in the CA hinges. This procedure may appear to be a little more "involved" than one would prefer for an ARF, but you will be rewarded with close, clean hinge gaps and free-moving, **securely** hinged surfaces.



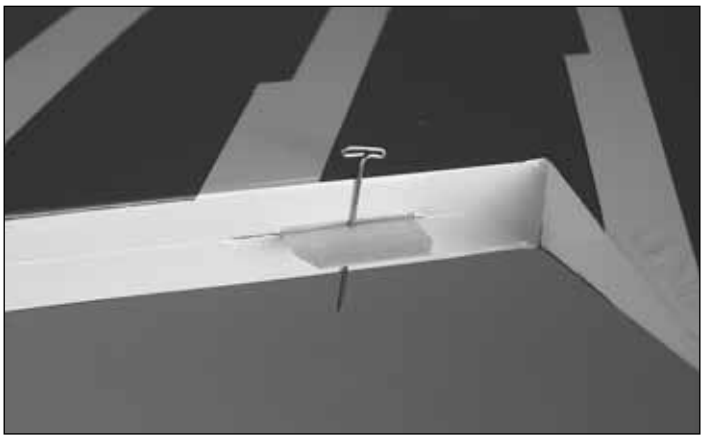
❏ 2. Test fit the aileron to the wing with the hinges. If the hinge slots are too tight, enlarge the slots using a hobby knife with a #11 blade. Move the blade from side-to-side to loosen the slots. Note that it's the back side of the blade that does the work.



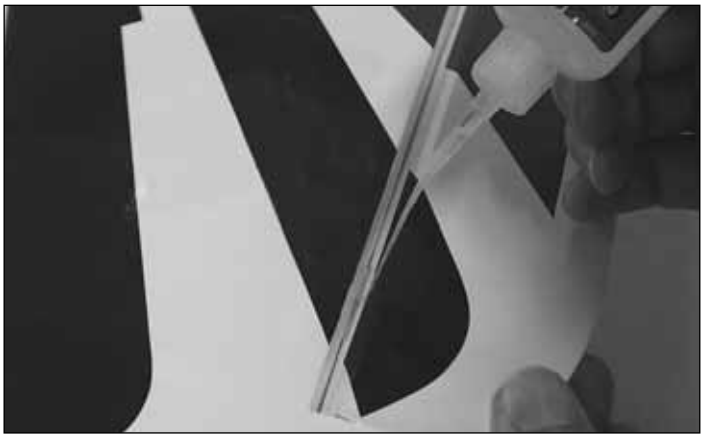
❏ 3. In order for the CA to get full penetration all the way into the hinge slots a strip of covering must be removed from each slot. This is done by first marking the ends of the hinge slots with small slits cut in the covering in the wing and aileron.



❏ 4. Remove the aileron and take out the hinges. Use a small metal ruler and a #11 blade to cut a small strip of covering from the hinge slots between the slits.



❏ 5. Insert a T-pin through the middle of three hinges. Install the hinges in the wing, then join the aileron. Remove the T-pins.



❑ 6. Adjust the aileron so there is a **small** gap between the trailing edge of the wing and the leading edge of the aileron—just enough to see light through or to slip a piece of paper through. Add six to eight drops of thin CA to both sides of all three hinges. Using a CA applicator tip is highly recommended. Allow enough time between drops to allow the CA to soak in—otherwise, excess CA will get into the hinge gap.

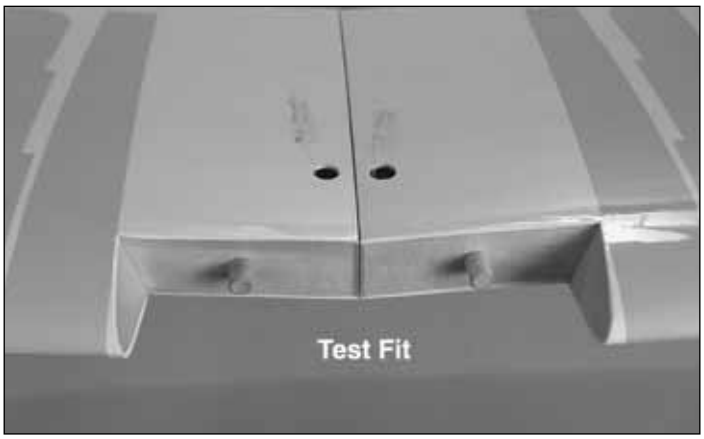
❑ 7. Tighten the covering, open the servo hatches and join the ailerons to the remaining three wing panels the same way.

❑ 8. Cut the covering from the openings in the bottom wing panels for the servo wires and the wing bolts. Tape the string for the servo wires to the top of the panels.

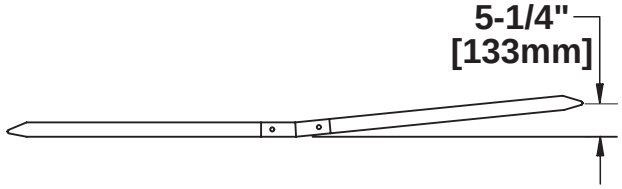
Join the Wings

Do the bottom wing first…

❑ 1. Round both ends of the 3/8" x 1-3/16" [10 x 30mm] hardwood **wing dowels**.



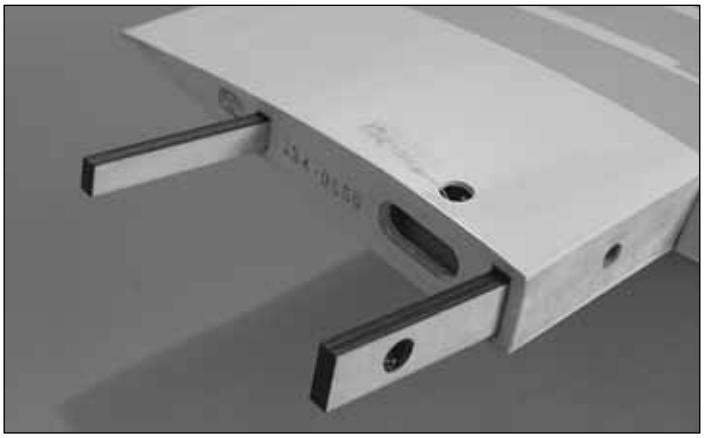
BOTTOM WING



❑ 2. Use a bar sander with coarse sandpaper to true the edges and remove any excess hardened epoxy from the forward and aft bottom wing joiners prepared earlier. **Without using any glue**, test join the bottom wings with the joiners and the dowels. Make any adjustments necessary for a good fit. The dihedral angle of the bottom wing is factory-set and determined by the angle of the wing joiners. However, those who wish to confirm the dihedral angle may do so by placing one wing panel flat on the workbench and measuring the distance from the tip of the other panel to the bench. The distance should be 5-1/4" [133mm], but small variances are acceptable.

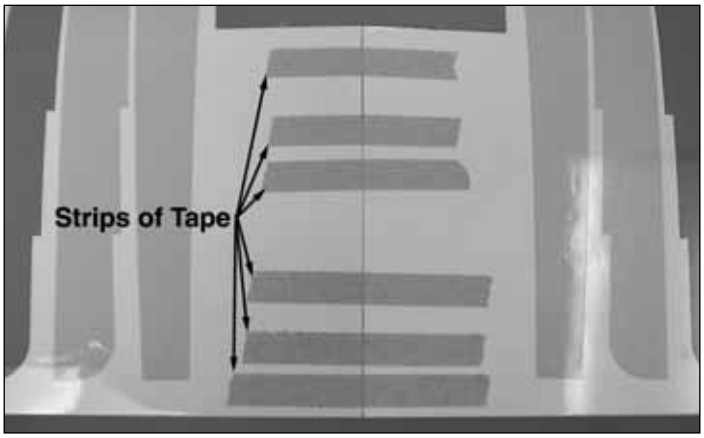
❑ 3. Lay two or three paper towels on top of each other. Use scissors to cut them into smaller squares. These will come in handy throughout assembly. Gather the rest of the items required for joining the bottom wing including 30-minute epoxy, a mixing cup, an epoxy brush, mixing sticks, masking tape and a sheet of wax paper to protect your workbench.

The key to a secure wing joint is applying epoxy to all contacting surfaces—this means both inside the wing between the spars and to the joiners…



❑ 4. Mix approximately 1 oz. [30ml] of 30-minute epoxy. **Working quickly**, pour a generous amount into one wing half where the joiners go. Use a piece of wire or a dowel to **thoroughly** spread the epoxy, coating all surfaces inside. Coat the end of the wing and one half of both joiners with epoxy. Insert the coated ends of the joiners into the wing. **Immediately** proceed to the next step.

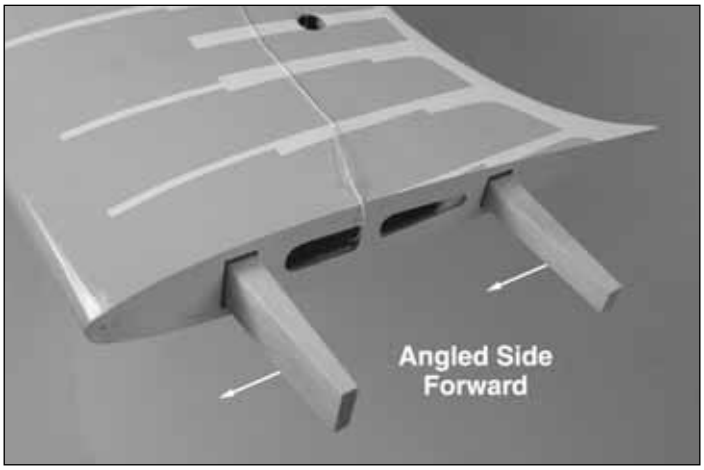
❑ 5. Coat the inside and the end of the other panel with epoxy. Also coat the protruding end of the joiners in the first panel. Join the wings and wipe away excess epoxy as it squeezes out. Coat one end of the dowels with epoxy, then insert them into the wings. Be certain the dowels key into the holes in the forward joiner. 3/8" [10mm] of the dowels should protrude. **Immediately** proceed to the next step.



❑ 6. Tightly tape the wing together with several strips of masking tape on the top and bottom. Use the small paper towel squares dampened with denatured alcohol to wipe away excess epoxy as the tape is applied. Be certain the trailing edges of both wing halves accurately align. After the wing is all taped together, epoxy under any of the strips of masking tape can be wiped away by removing the strip, wiping away the epoxy, then replacing the strip. After all the epoxy has been cleaned up, set the wing aside and do not disturb until the epoxy has hardened.

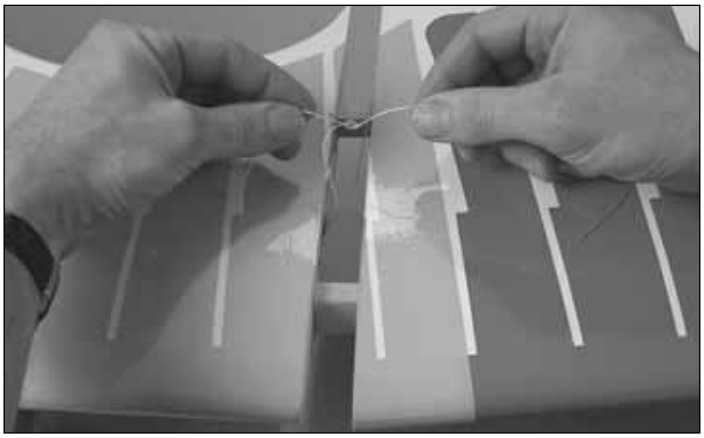
❑ 7. After the epoxy joining the bottom wings has hardened, remove the masking tape. If there is still residual hardened epoxy that you weren't able to remove before, you may be able to pick it off with a #11 blade or, in some cases, remove it with a paper towel square wetted with denatured alcohol. Use a covering iron with a covering sock to re-bond any covering that lifted while peeling off the masking tape.

Now join the top wing. One outer panel at a time will be joined to the center panel…



❑ 8. Without using any glue, test fit the outer panels to the center panel with the **forward** and **aft top wing joiners**. The angled side of the joiners faces forward. There is no dihedral in the top wing, so it should be flat. Make any adjustments necessary for a good fit.

❑ 9. Untape the strings on the ends of both outer panels and on both ends of the center panel. Temporarily put the strings inside the wings so they will not be in the way.



❏ 10. Prepare 1 oz. of 30-minute epoxy. The same as when joining the bottom wing, thoroughly coat one side of the joiners and **all** mating surfaces of one side of the center panel and the adjoining outer panel with epoxy. Take the strings back out of the ends of the joining panels. Slide the panels together until they are about 3/4" [19mm] apart. Tie the ends of the strings together. Slide the panels the rest of the way together, simultaneously pulling the string from the aileron servo opening. Tightly tape the panels together, wiping away excess epoxy as it squeezes out.

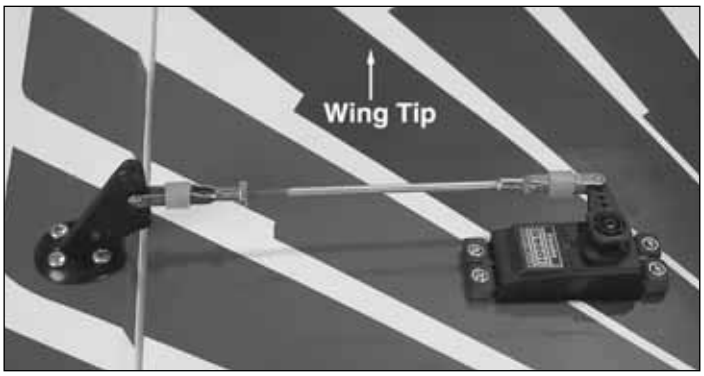
❏ 11. Pulling the string from both ends (from the servo opening in the outer panel and from the other end of the center panel), shift the string back and forth a few times to make sure it does not get glued inside the wing. Do this a few times as the epoxy continues to harden. Set the wing aside until the epoxy fully hardens.

❏ 12. Remove the masking tape and join the other outer panel to the other side of the center panel. Be sure not to glue the string in the wing. After the epoxy hardens remove the masking tape and tighten the covering.

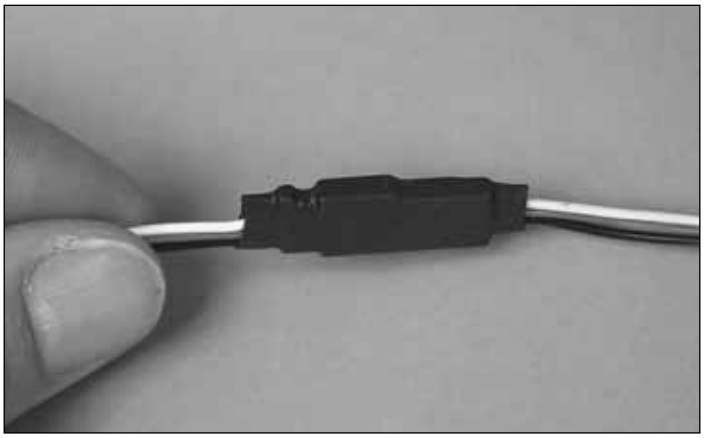
Hook Up the Ailerons

Start with the bottom, right wing so yours looks like the photos the first time through…

Refer to this photo while mounting the aileron servo.



❏ 1. Test fit the aileron servo in the servo opening in the bottom of the wing. If necessary, use a hobby knife to enlarge the opening to fit the servo.

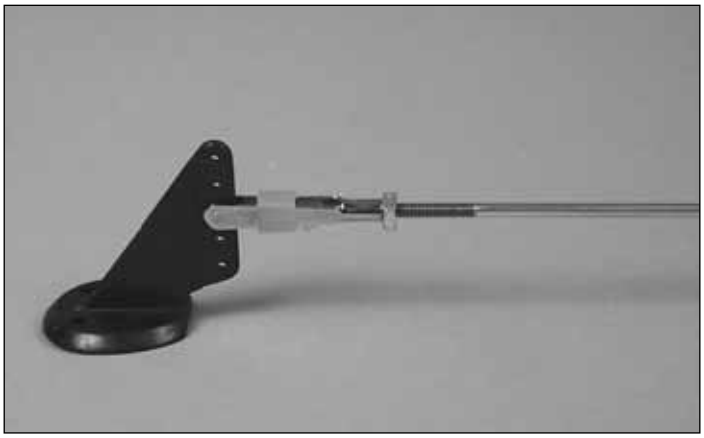


❏ 2. Connect a 12" [300mm] servo extension wire to the aileron servo. Slip a 1-1/2" [38mm] piece of heat shrink tubing supplied with this kit over the connection, then carefully shrink the tubing with a small flame (from a soldering torch) or a heat gun. Tie the string in the servo opening to the end of the servo wire. Pull the wire through the wing and out of the hole in the middle. Place the servo in the opening.

❏ 3. Drill 1/16" [1.6mm] holes into the wing for mounting the servo. Mount the servo using the screws that came with it.

❏ 4. **IMPORTANT!** Remove the screws and the servo. Add a few drops of thin CA to the holes to harden the “threads.” Allow the CA to fully harden, then remount the servo.

❏ 5. Make a one-arm servo arm by cutting off the unused arms. Install the arm on the servo.



❏ 6. Thread a 4-40 nut and a 4-40 clevis onto a 4-40 x 4-1/2" [115mm] pushrod. Slip a silicone retainer over the clevis. Connect the clevis to the middle hole of a nylon control horn.

❏ 7. Position the control horn on the aileron with the pushrod in alignment with the servo arm. Make sure the horn is on the hardwood plate built into the aileron. Push the control horn into the aileron until the spikes on the bottom lock into the wood. Using care not to drill all the way through the aileron, drill four 3/32" [2.4mm] holes for mounting the horn. Mount the control horn to the aileron with four #4 x 1/2" [13mm] screws.

❑ 8. **IMPORTANT!** The same as was done with the servo mounting screws, remove the screws holding the control horn to the aileron and add a few drops of thin CA to harden the “threads” in the aileron. Allow the CA to fully harden, then remount the horn.

❑ 9. Center the aileron and servo arm. Cut the pushrod to the correct length, then solder it to a large, non-threaded metal clevis using the techniques described in the following **Expert Tip**.

EXPERT TIP

How to Solder

❑ 1. Use denatured alcohol or other solvent to thoroughly clean the pushrod. Use coarse sandpaper to roughen the end of the pushrod where it is to be soldered.

❑ 2. Apply a few drops of soldering flux to the end of the pushrod, then use a soldering iron or a torch to heat it. “Tin” the heated area with **silver solder** (GPMR8070) by applying the solder to the end. The heat of the pushrod should melt the solder—not the flame of the torch or soldering iron—thus allowing the solder to flow. The end of the wire should be coated with solder all the way around.

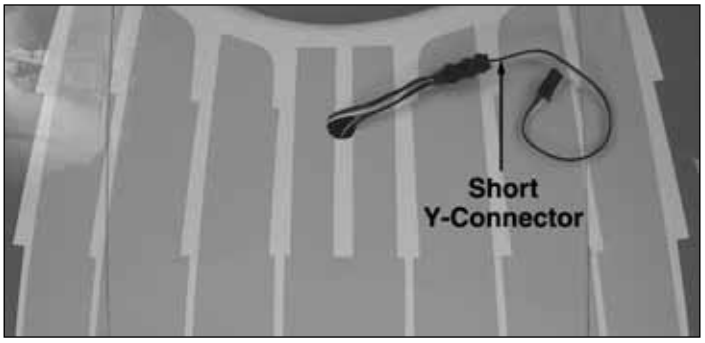
❑ 3. Place the clevis on the end of the pushrod. Add another drop of flux, then simultaneously heat the clevis and pushrod. Slide the clevis the rest of the way onto the pushrod as the solder melts. Apply another small amount of solder while the pushrod and clevis are still hot. The same as before, the heat of the parts being soldered should melt the solder, thus allowing it to flow. Allow the joint to cool naturally without disturbing. Avoid excess blobs, but make certain the joint is thoroughly soldered. The solder should be shiny, not rough. If necessary, reheat the joint and allow to cool.

❑ 4. Immediately after the solder has solidified, but while it is still hot, carefully use a cloth to quickly wipe off the flux before it hardens. **Important:** After the joint cools, coat with oil to prevent rust. **Note:** Do not use the acid flux that comes with silver solder for electrical soldering.

This is what a properly soldered clevis looks like; shiny solder with good flow, no blobs, flux removed.

❑ 10. Slide a silicone retainer over the clevis, then connect the aileron to the servo with the pushrod. The clevis will be adjusted and the nut will be tightened when setting up the radio later.

❑ 11. Mount and hook up the remaining three aileron servos the same way. **Note:** The servo arms on all four servos should “point” toward the wing tips.



❑ 12. Connect the aileron servo wires in the wings to a short Y-connector such as the Futaba AEC-13 J-series dual extension cord (FUTM4130 for Futaba). Secure the connection with tape or heat shrink tubing.

Hey, that’s about it for the wings. Set the wings in a safe place (but not too far away!) and get ready to start on the fuselage.

ASSEMBLE THE FUSELAGE

Prepare the Tail Surfaces for Hinging

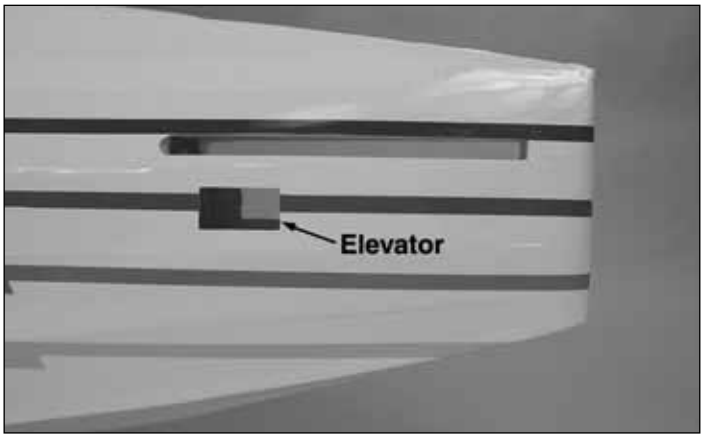
❑ 1. Remove the masking tape and separate the elevators from the stab and the rudder from the fin. The same as was done with the ailerons, use a pin to poke several holes in the covering on the bottom of the stab and elevators and in one side of the fin and rudder to allow air to escape while tightening the covering. Use a covering iron with a covering sock to tighten the covering.

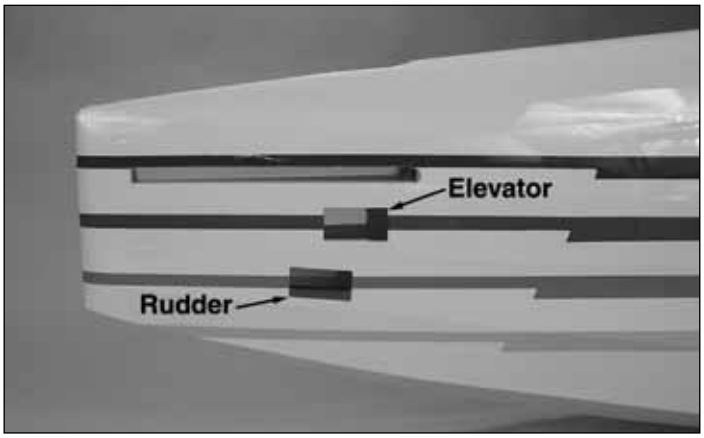
❑ 2. Prepare all the hinge slots by test fitting the hinges and cutting a strip of covering from each slot.

Join the Stab and Fin to the Fuselage

If you haven’t yet done so, get a building stand to support the fuselage while working on it. The Robart Super Stand II (ROBP1402) is recommended.

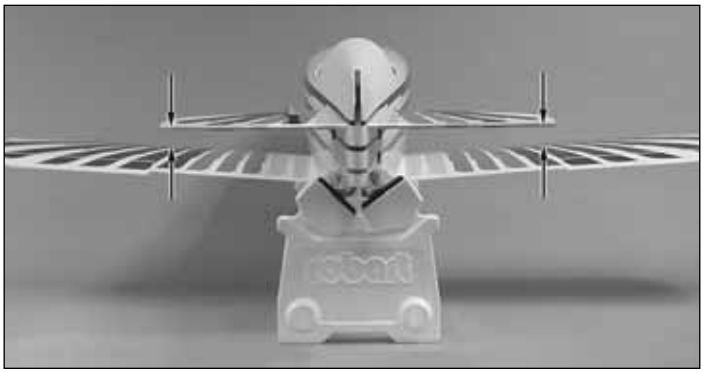
❑ 1. Peel off the masking tape and remove the balsa **landing gear cover** from the bottom of the fuselage. The same as was done with the wings and tail surfaces, use a covering iron with a covering sock to tighten the covering and remove any wrinkles from the fuselage.



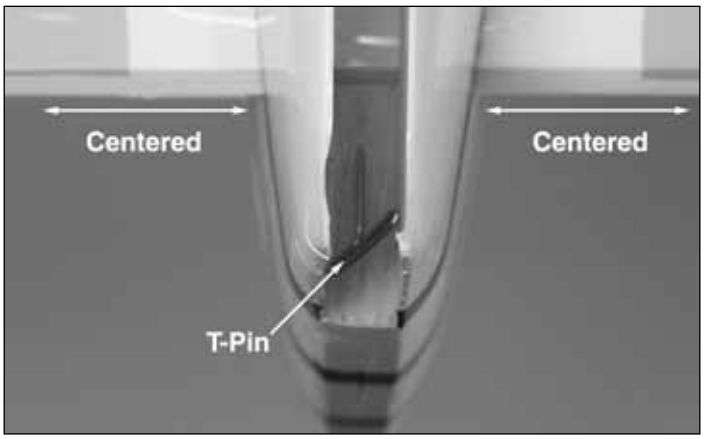


❑ 2. Cut the covering from the slots in both sides of the fuselage for the stabilizer and cut the covering 1/8" [3mm] inside the edges of the openings for the two elevator and one rudder servos. Seal the covering inside the edges of the servo openings.

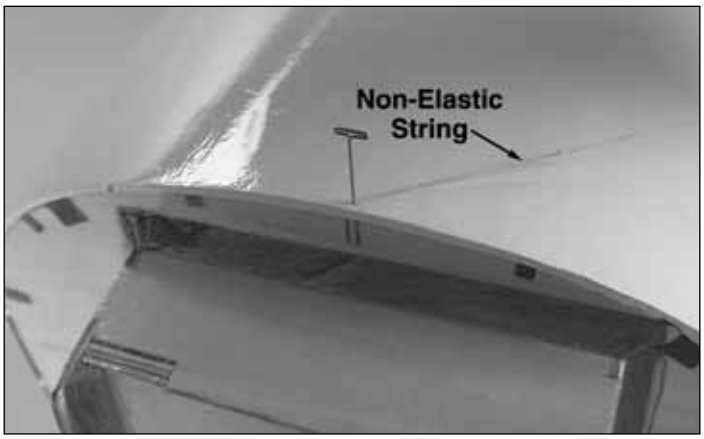
❑ 3. Temporarily place the rudder and elevator servos in the servo openings (for now, it doesn't matter which way the servos go—this step is just for drilling the holes before the stab is glued in). Drill 1/16" [1.6mm] holes for the servo mounting screws. Install, then remove the screws and servos. Add a few drops of thin CA to the screw holes. The servos will be mounted after the stab has been glued in.



❑ 4. Bolt the bottom wing to the fuselage with two 1/4-20 x 2" [50mm] nylon bolts. Slide the stab into the fuselage and temporarily center it as best as you can by eye. Stand approximately ten feet behind the model and view the alignment of the stab and wing. If the stab is not parallel with the wing, place a small weight on the "high side" of the stab to bring it into alignment. If weight is not enough, remove the stab from the fuselage and lightly trim or sand the stab saddle as necessary until you can get the stab parallel with the wing.



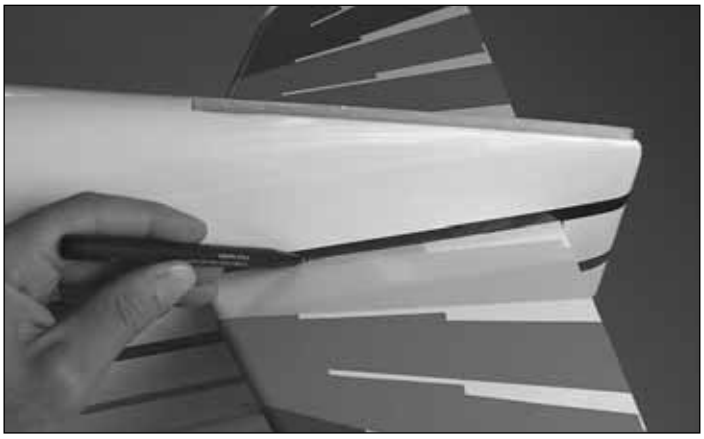
❑ 5. Once the stab and wing align, center the trailing edge of the stab from side-to-side in the fuselage, taking accurate measurements. Stick a T-pin through the back of the fuselage into the stab. This will allow the front of the stab to be shifted while keeping the trailing edge centered.



❑ 6. Stick a T-pin through the top of the fuselage over the center stringer at F-1. Tie a loop in one end of a 50" [1270mm] piece of non-elastic string such as monofilament or Kevlar line (K+SR4575). Slip the loop in the string over the T-pin.

❑ 7. Fold a piece of masking tape over the string near the other end and draw an arrow on it. Slide the tape along the string and align the arrow with one end of the stab as shown

in the photo. Swing the string over to the same position on the other end of the stab. Pivot the stab on the T-pin in the trailing edge and slide the tape along the string until the arrow aligns with both ends of the stab.

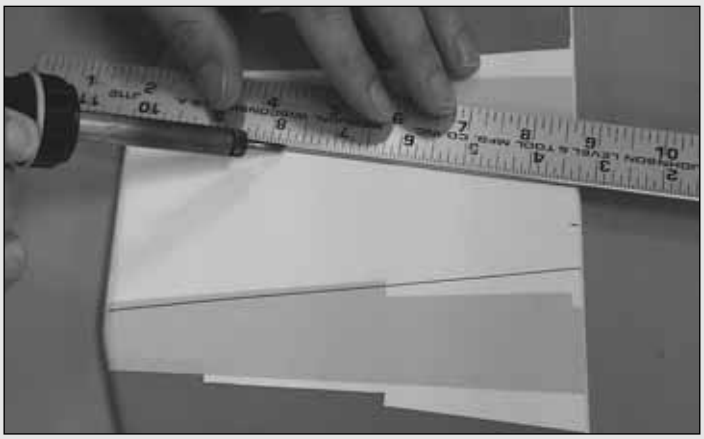


❑ 8. Use a fine-point felt-tip pen such as a Top Flite® Panel Line Pen (TOPQ2510) to mark the outline of the fuselage all the way around both sides of the stab.

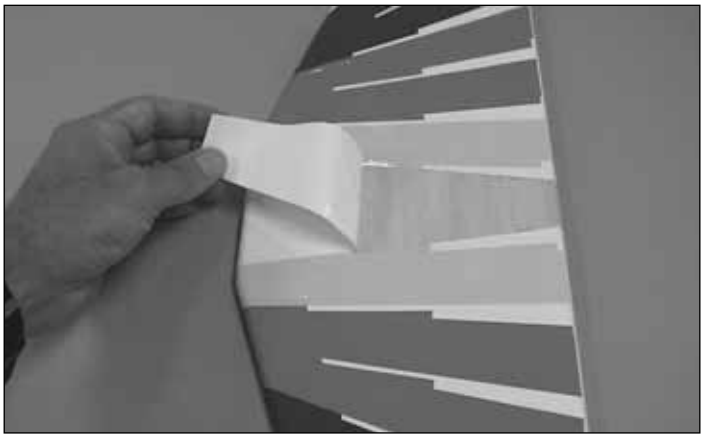
❑ 9. Remove the stab from the fuselage. Use a single-edge razor blade, a **sharp, new** #11 blade or follow the **Expert Tip** below to cut the covering from the stab along the lines. Use care to cut **only** into the covering and **not** into the wood. Cutting into the balsa will weaken the structure.

EXPERT TIP

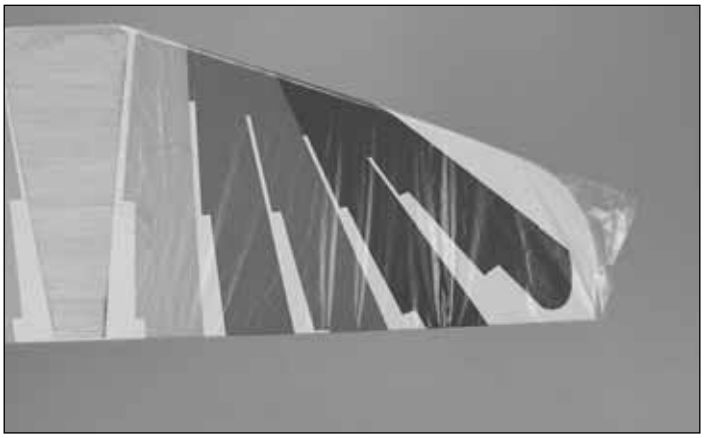
How to Cut Covering from Balsa



To avoid cutting into the balsa, use a soldering iron instead of a hobby knife to cut the covering. The tip of the soldering iron doesn't have to be sharp, but a fine tip does work best. Allow the iron to heat fully. Use a straightedge to guide the soldering iron at a rate that will just melt the covering and not burn into the wood. The hotter the soldering iron, the faster it must travel to melt a fine cut.



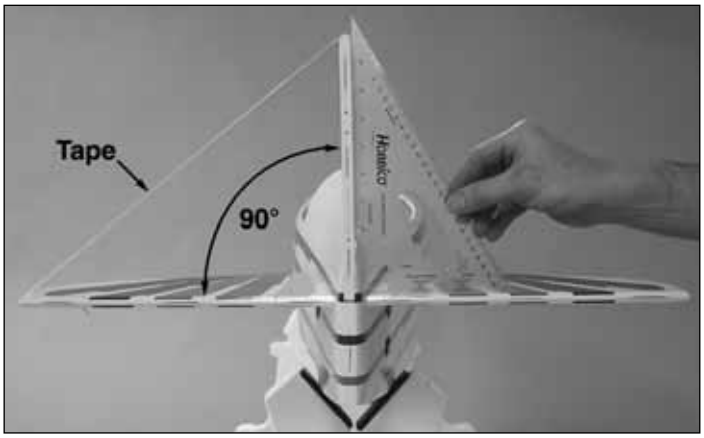
❑ 10. Peel the covering from the center of the stab. Remove any ink with one of your paper towel squares dampened with denatured alcohol. Re-seal the ends of the covering to the stab where it may have lifted while peeling off the covering in the middle.



❑ 11. Wrap one side of the stab with a thin plastic bag or cellophane to protect it from epoxy when it's time to glue it into position.

❑ 12. Thoroughly coat the top and bottom of the stab saddle area in the fuselage where the stab fits and the top and bottom of the stab with 30-minute epoxy. Slide the stab into position. Remove the plastic wrap and use your paper towel squares to wipe off excess epoxy. Check the stab alignment the same way you did before by viewing the alignment with the wing, centering the trailing edge and using the pin and string. Do not disturb the fuselage until the epoxy has hardened.

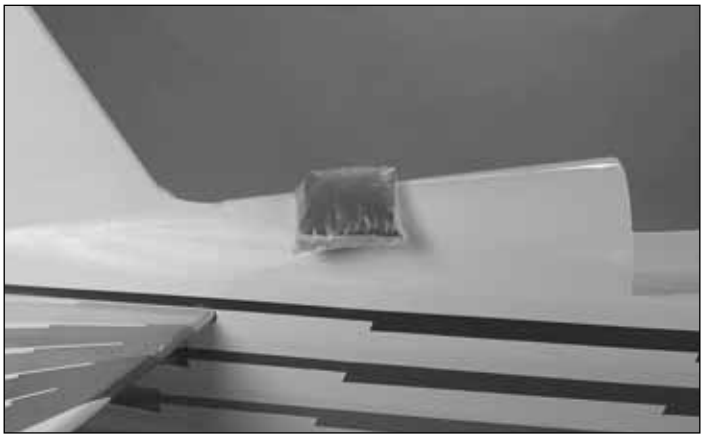
❏ 13. After the epoxy on the stab has hardened, slide the fin into position. Holding the rudder to the fin, make certain the top of the rudder aligns with the top of the fin and the bottom of the rudder aligns with the bottom of the fuselage. Also make sure the trailing edge of the fin is parallel with the end of the fuselage. If necessary, trim the bottom of the fin to achieve the correct alignment.



❏ 14. The same as was done with the stab, use a fine-point felt-tip pen to mark the fuselage all the way around both sides of the fin. Remove the fin. Cut and remove the covering, then wipe the ink from the fin and fuselage. Cut and peel the covering from the fin, then glue it into position with 30-minute epoxy. Use a Hobbico Builder's Triangle to make certain the fin is vertical. If necessary, use masking tape to pull the tip of the fin to one side or the other to get it vertical.

Do not join the rudder and elevators to the fin and stabilizer until instructed to do so.

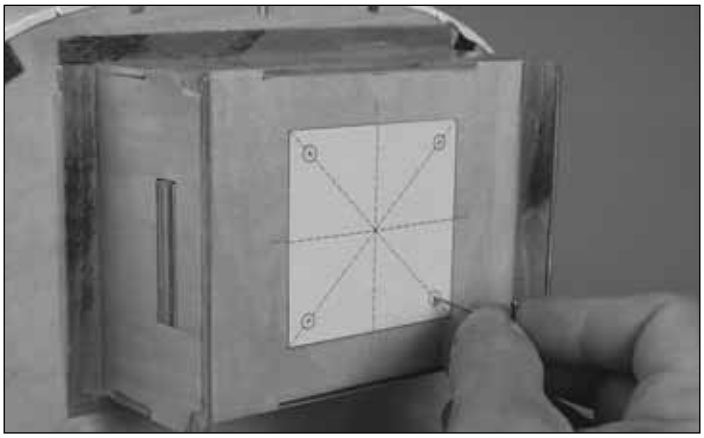
Mount the Engine



Place a weight over the aft end of the fuselage to hold it down while mounting the engine (or skip ahead to page 28 and perform steps 1 and 2 to mount the elevator and rudder servos). The fuselage will be nose-heavy and could nose-over and fall off your building stand until the servos are installed. A small zip-lock sandwich bag half-filled with shot is shown in the photo.

MOUNTING A GLOW ENGINE

Follow these instructions if mounting a glow engine. If mounting a gas engine, proceed to the gas engine mounting instructions on page 18.

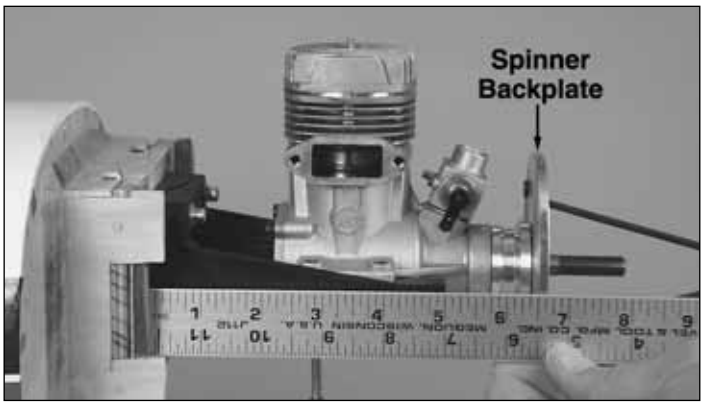


❏ 1. Cut the **glow engine mounting bolt pattern** from page 49. (If making a photo copy, be certain it comes out the same size as the pattern and is not dimensionally distorted.) Tape the pattern to the firewall, aligning the lines on the pattern with the lines on the firewall. Use a large T-pin to mark the center of the holes on the pattern onto the firewall.

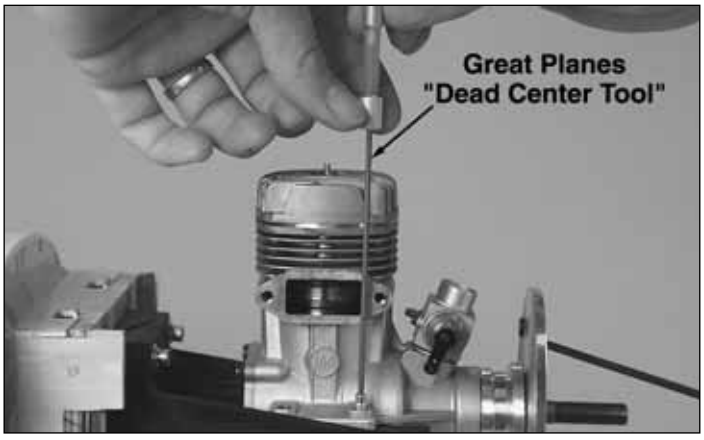
❏ 2. Remove the pattern from the firewall. Drill 1/16" [1.6mm] pilot holes at the marks. Enlarge the holes with a 7/32" [5.6mm] drill. Mount 8-32 blind nuts to the back of the firewall by pulling them into the wood with an 8-32 screw from the front, but before installing the blind nuts apply a few dabs of epoxy to the flange of each one.

In this step, the engine is shown upright. This is only to determine the mounting position of the engine on the mount. Later, the engine will be mounted horizontally.

❑ 3. Temporarily mount the engine mount to the firewall with four 8-32 x 1-1/4" [32mm] socket head cap screws, #8 lock washers and #8 flat washers, but do not fully tighten the screws. Adjust the mount spacing to fit the engine, then tighten the screws.



❑ 4. Using the appropriate brass spinner adapter that came with this kit, fit the backplate of the included spinner onto the engine. Position the engine on the mount so the backplate is 6-1/2" [165mm] from the firewall.



❑ 5. Using a Great Planes Dead Center Hole Locator or another suitable method, mark the location of the holes in the engine on the mount.

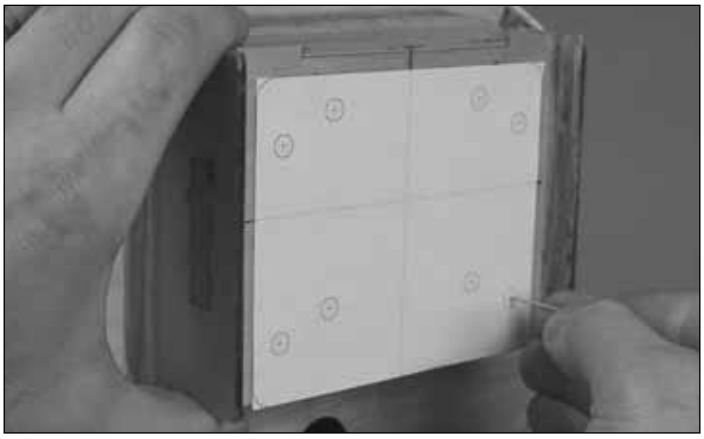
❑ 6. Remove the engine and mount from the firewall. Drill holes through the mount at the marks you made with a #29 drill. Tap 8-32 threads into the holes.

❑ 7. Momentarily skip ahead to page 19 and "pin" the firewall to the fuselage by performing steps 6 and 7. When complete, return to this page and finish mounting the engine in step 8 below.

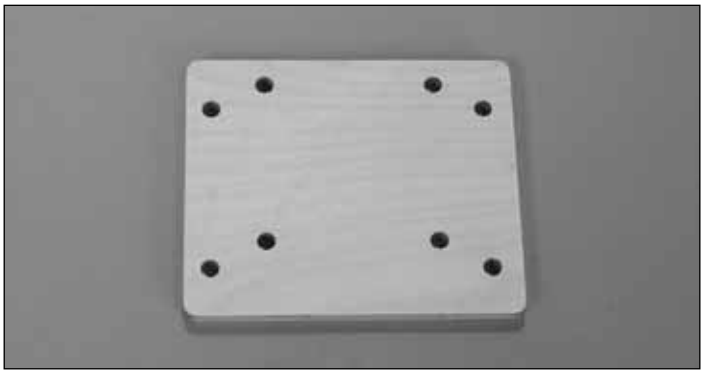
❑ 8. Mount the engine mount to the firewall horizontally, but do not fully tighten the screws. Mount the engine to the mount with four 8-32 x 1" [25mm] socket head cap screws, #8 lock washers and #8 flat washers. Center the mount vertically, then tighten the screws.

MOUNTING A U.S. ENGINES 41CC ENGINE

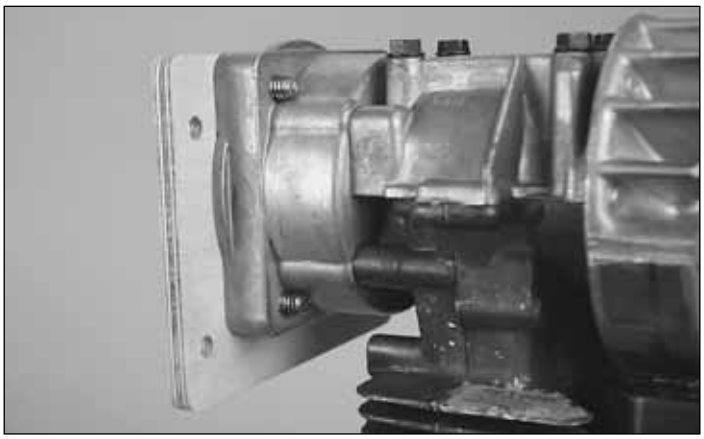
❑ 1. Use a straightedge and a pen to extend the horizontal and vertical **centerlines** on the firewall all the way to the edges.



❑ 2. Use the **U.S. Engines 41cc engine mount template** on page 50 to mark the locations of the four **outer** holes in the template onto the firewall. (If making a photo copy of the template, be certain it comes out the same size as the template and is not dimensionally distorted.) Drill 19/64" [7.6mm] holes through the firewall at the marks.



❑ 3. Use 3M spray adhesive to adhere the template to a piece of 1/4" [6.4mm] aircraft plywood. Cut out the plywood and drill all eight 1/4" [6.4mm] holes. Remove the template from the plywood (naphtha lighter fluid helps this process).



❑ 4. Fuelproof the engine mount with a thin coating of 30-minute epoxy. After the epoxy hardens, bolt the engine to the mount with 1/4-20 x 3/4" [19mm] bolts and 1/4" flat washers.

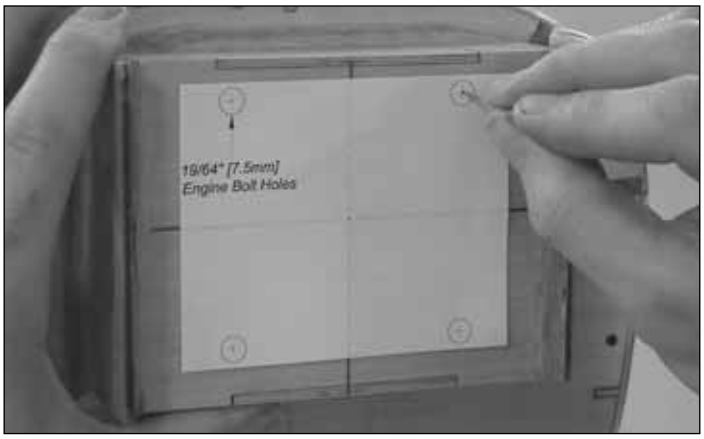
❏ 5. Cut or drill clearance holes in the firewall for the heads of the bolts that hold the engine to the mount plate, then mount the plate to the firewall with four more 1/4-20 x 3/4" [19mm] bolts, washers and 1/4-20 blind nuts included with this kit. When mounted to the engine, the backplate of the spinner should be 6-1/2" [165mm] from the firewall.

❏ 6. Pin the firewall to the fuselage by performing steps 6 and 7.

MOUNTING A FUJI BT-50SB GAS ENGINE

These instructions show how to mount a Fuji BT-50SB engine. The prop hub that comes with the engine must be exchanged for a Fuji short prop hub (FJIG6754—sold separately). *If mounting a different gas engine, these instructions may be used as a guide. The Fuji 50 with the short prop hub will automatically have the correct spacing from the firewall, but if mounting another engine, the back plate of the spinner should be 6-1/2" [165mm] from the firewall.*

❏ 1. Use a straightedge and a pen to extend the horizontal and vertical **centerlines** on the firewall all the way to the edges.

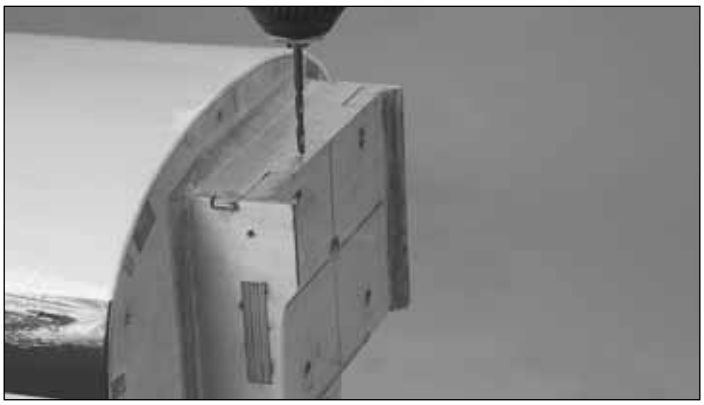


❏ 2. Cut the Fuji BT-50 **engine mounting bolt pattern** from page 49. (If making a photo copy, be certain it comes out the same size as the pattern and is not dimensionally distorted.) Tape the pattern to the firewall aligning the lines on the pattern with the lines on the firewall. Use a large T-pin to mark the center of the engine mounting holes onto the firewall.

❏ 3. Remove the pattern from the firewall. Drill 1/16" [1.6mm] pilot holes at the marks. Enlarge the holes with a 19/64" [7.6mm] drill.

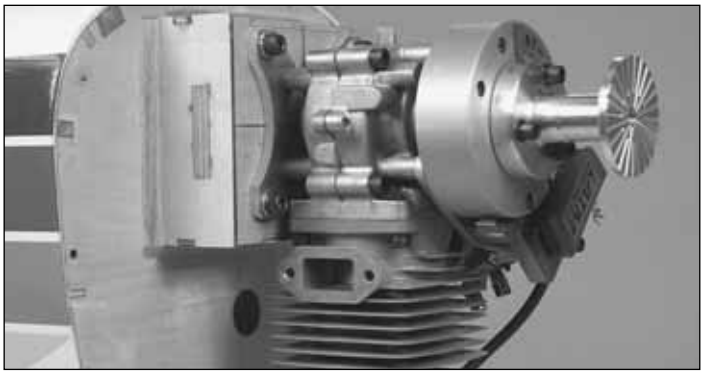
❏ 4. Use large wire cutters, a metal file or a rotary tool with a cutoff wheel to trim two 1/4-20 blind nuts so they will fit in the top holes in the firewall without interfering with the top of the engine box.

❏ 5. Apply a few dabs of epoxy to the flange of one of the blind nuts. Use hemostats or needle nose pliers to hold the nut to the back of the firewall while threading a 1/4-20 x 1" [25mm] socket head cap screw (not included) with a large 1/4" [6.4mm] washer to the nut. Use a 3/16" [4.8mm] hex wrench to tighten the screw fully, drawing the nut into the back of the firewall. Install the remaining three blind nuts the same way.



❏ 6. Drill 1/8" [3.2mm] holes 3/4" [20mm] deep through the top, bottom and both sides of the “box” that holds the firewall. The holes should be centered over the sides of the firewall and there should be at least two holes per side.

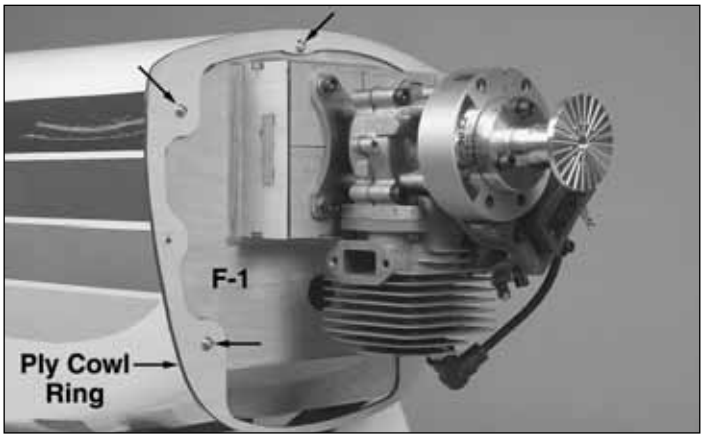
❏ 7. Cut one of the supplied 1/8" x 10" [3.2 x 250mm] wood dowels into as many 3/4" [20mm] pieces as holes were drilled around the firewall. Use epoxy to glue the dowels into the holes. Cut or sand the ends of the dowels even with the engine box sides.



❏ 8. Mount the engine to the firewall with 1/4-20 x 1" [25mm] socket head cap screws and 1/4" [6.4mm] lock washers.

Mount the Cowl

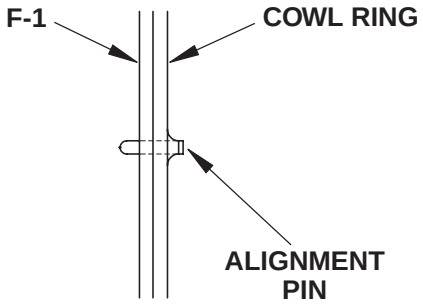
Note: The Christen Eagle II ARF features a unique cowl ring mounting system for holding the cowl to the fuselage. In addition to providing a much more secure, durable and attractive method of attaching the cowl, it also makes the cowl alignment process during assembly much easier and more precise. Follow these instructions to mount the cowl.



❏ 1. Temporarily mount the plywood **cowl ring** to F-1 with five 4-40 x 1/2" [13mm] socket head cap screws, lock washers and flat washers. (If any of the screws are difficult to turn, there may be a little glue in the blind nuts. If so, just run a 4-40 tap through the nuts to clean out the threads.)

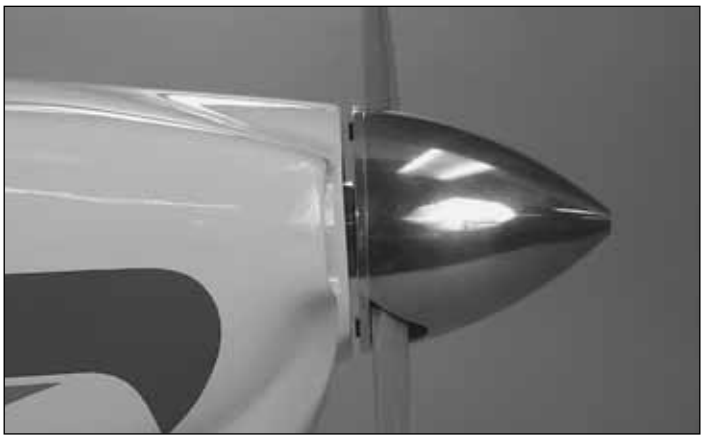
❏ 2. Drill out the two remaining holes in both sides of the cowl ring and F-1 on the fuselage using a 1/8" [3.2mm] drill. (Temporary engine removal may be required if the carburetor or any other part of the engine is in the way).

❏ 3. Cut two 1" [25mm] **cowl alignment pins** from any remaining 1/8" [3.2mm] dowel. Chuck the pins in a hand drill and use sandpaper to round one end of both pins.



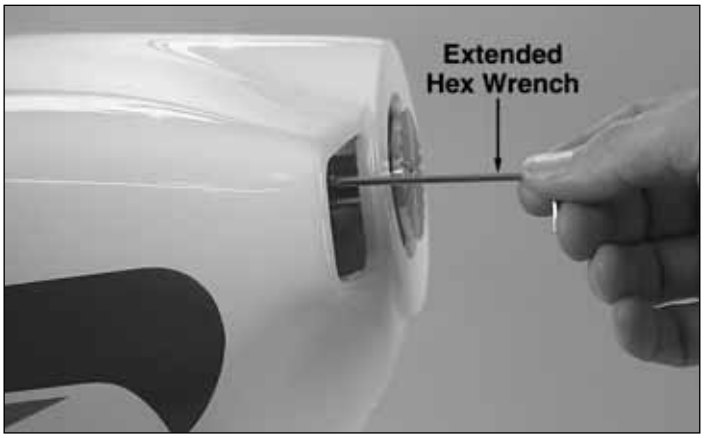
❏ 4. Cut the alignment pins to a length of 1/2" [13mm]. With the cowl ring fastened to the fuselage, push the alignment pins, rounded end first, into the cowl ring and F-1. Approximately 1/8" of the pins should protrude through the front of the cowl ring—this will improve the glue joint. Use a few dabs of epoxy to glue the alignment pins into the cowl ring (but not to the fuselage). Allow the epoxy to harden before proceeding.

❏ 5. Remove the cowl ring from the fuselage. Trim off any epoxy that may have leaked past the alignment pins onto the back of the cowl ring. Reinstall the cowl ring with the screws.

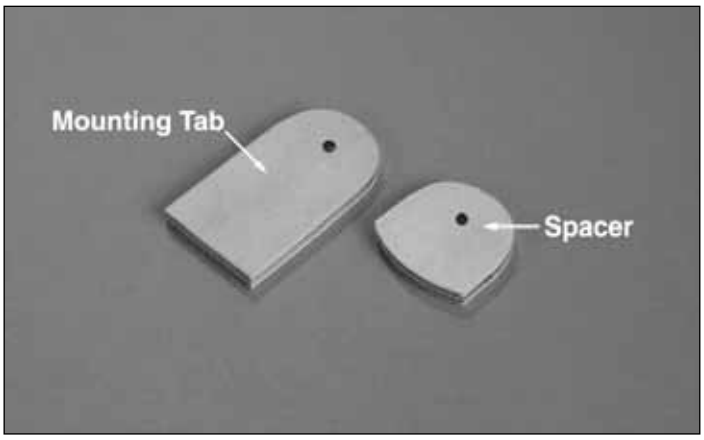


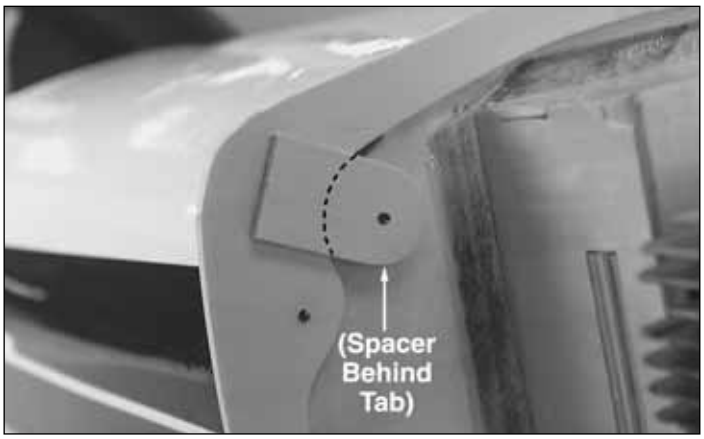
❏ 6. Carefully slide the cowl onto the fuselage over the cowl ring. Using the appropriate spacer in the spinner backplate, mount the spinner and a prop to the engine (a 3mm hex wrench will be required for tightening the spinner bolt). Center the front of the cowl on the spinner while providing adequate clearance between the rivets on the backplate and the front of the cowl (3/32" [2.5mm] should be adequate). If the cowl fits too tightly, look through the air inlets on both sides of the cowl and observe any “high spots” where the cowl and cowl ring meet. Remove the cowl and cowl ring. Sand down the high spots and refit the cowl ring and cowl.

❏ 7. View the cowl and fuselage from all angles. Make sure the cowl matches up well to the fuselage and spinner. From the front, also make sure the cowl is positioned horizontally. Make any adjustments necessary for a good fit.



❑ 8. Remove the prop and spinner. Look inside the cowl through the air inlets. Be certain you will be able to access the five cowl mounting screws around the cowl ring with the extended 3/32" [2.4mm] ball end hex wrench included with this kit. (**Note:** After the cowl has been glued to the cowl ring, access holes will be cut in the bottom of the cowl for the bottom two screws). If any of the screws are concealed by the engine (or will be concealed by the muffler when it is in position), those screws will have to be relocated. If any screws do have to be relocated, proceed to the next step. If not, proceed to step 11.





❑ 9. Any cowl mounting screws that cannot be reached from outside the cowl with the extended wrench will have to be relocated using the included 1/8" [3mm] plywood **mounting tabs** and **spacers**. Glue the tabs and spacers to the cowl ring where necessary so you will be able to access the screws through the front of the cowl. Four sets of mounting tabs are provided.

❑ 10. Using the holes in the tabs as guides, drill 7/64" [2.8mm] holes through F-1. Remove the cowl ring. Enlarge the holes **in F-1 only** with a 9/64" [3.6mm] drill. Install new 4-40 blind nuts (included) by threading one onto a 4-40 pushrod. Add a drop of epoxy to the flange of the blind nut, then, from inside the fuselage, guide the rod through the hole in F-1. Pull the blind nut into the wood on the back of F-1. Unthread the rod, then use a 4-40 x 1/2" [13mm] socket head cap screw and several washers to fully draw the blind nut all the way in. Install the rest of the blind nuts the same way, then mount the cowl ring with the screws.

Okay, we've got the cowl ring mounted to the fuselage and we know the cowl will align with the spinner, so it's time to glue on the cowl!

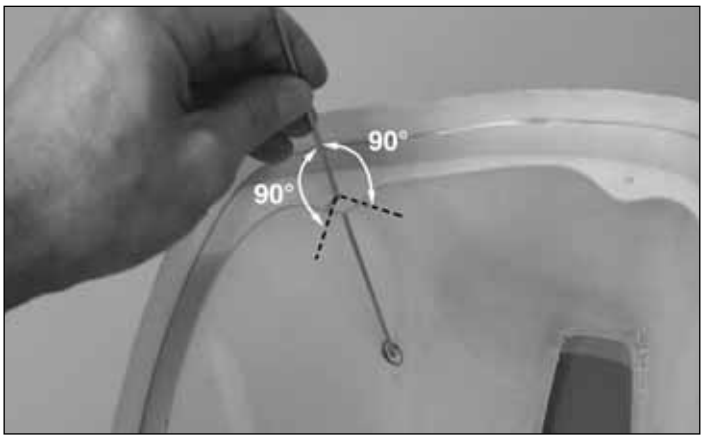
❑ 11. Use a few paper towel squares dampened with denatured alcohol to remove any residue left over from the molding process from inside the cowl where the cowl ring will go. Use coarse sandpaper to roughen the inside of the cowl in the same area. This will increase the bonding strength of the epoxy when gluing the cowl to the cowl ring.

❑ 12. With the cowl ring mounted to the fuselage with the screws, slide the cowl into position. Mount the prop and spinner. Align the cowl with the spinner just as was done before (providing adequate clearance). Stand the fuselage vertically on the trailing edge of the fin. Rest the fuselage against your workbench or other stable object.

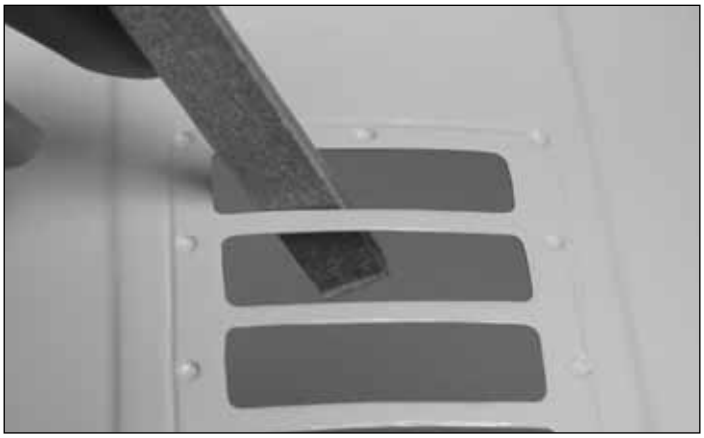
❑ 13. Use a 12" [300mm] strip of basswood, hard balsa or something similar that can be used to apply epoxy to the cowl ring down inside the cowl. Round one end of the stick. Mix up a batch of 30-minute epoxy and microballoons. Be certain to use **plenty** of microballoons to thicken the epoxy so it does not leak past the cowl ring and get onto the fuselage (a one-to-one ratio is appropriate). Immediately proceed to the next step.

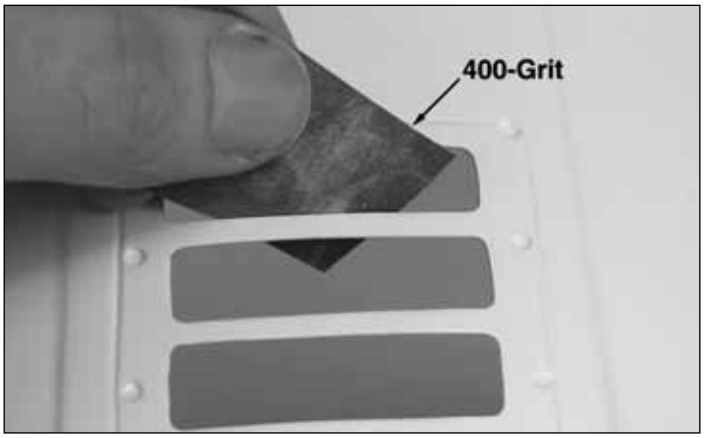
❏ 14. Tack glue the cowl to the cowl ring by using the wood strip to apply eight to ten evenly spaced, 1/2" long “dabs” of epoxy to the cowl and cowl ring inside—the rest will be glued later. This is your chance to achieve perfect cowl alignment! View the model from all angles, making sure the cowl aligns with the spinner and there is adequate spacing between the cowl and spinner. Do not disturb the model until the epoxy has hardened.

❏ 15. After the epoxy has hardened, use the extended wrench to loosen the screws and remove the cowl. (The bottom two screws are accessible enough for removing the cowl with the extended wrench, but they are not accessible enough for installing the cowl without access holes which will be cut in the next step.)



❏ 16. Using a piece of leftover wire as an alignment cue, use a pencil to mark the holes in the bottom of the cowl for the bottom mounting screws.



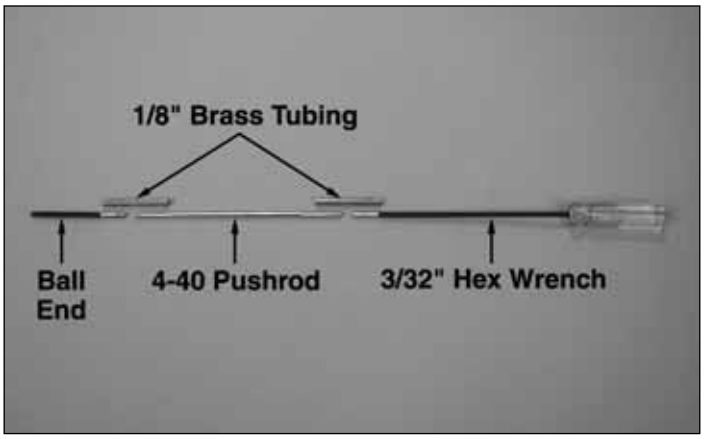


❏ 17. Put on your safety glasses, ear protection, particle mask, and a long-sleeve shirt. Use a rotary tool with a cutting bit like the one in the photo to cut out the louvers and the holes you marked for the extended hex wrench. Proceed **slowly** and start by making the holes **small**, then “zero-in” on the edges but don’t get too close. After the louvers have been cut use a hardwood stick with a piece of medium-grit sandpaper to true the edges. Use a round file to finish the corners. Finish by sanding the edges of the openings with 400-grit sandpaper.

❑ 18. Mix up another thick batch of epoxy and microballoons. Apply a small fillet all the way around the front of the cowl ring and the cowl. Reinstall the cowl, tighten the screws and stand the model up on end again. Allow the epoxy to harden.

❑ 19. Remove the cowl after the epoxy has hardened. Use coarse sandpaper to roughen the epoxy fillet. Cut the 12" [300mm] fiberglass strip into 1-1/2" [40mm] strips, then use 30-minute epoxy to glue the strips, evenly spaced, inside the cowl and cowl ring to reinforce the joint. While you've got the epoxy out, **lightly** coat any other areas of bare wood on the cowl ring. Allow the epoxy to fully harden.

❑ 20. Mount the cowl and see how it all fits. The easiest way is to insert the screws into the cowl ring, then position the cowl and tighten the screws. When removing the cowl, the screws should stay in the cowl ring.

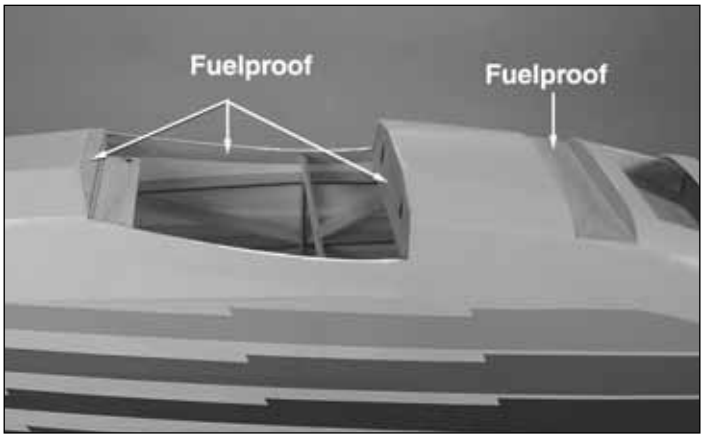


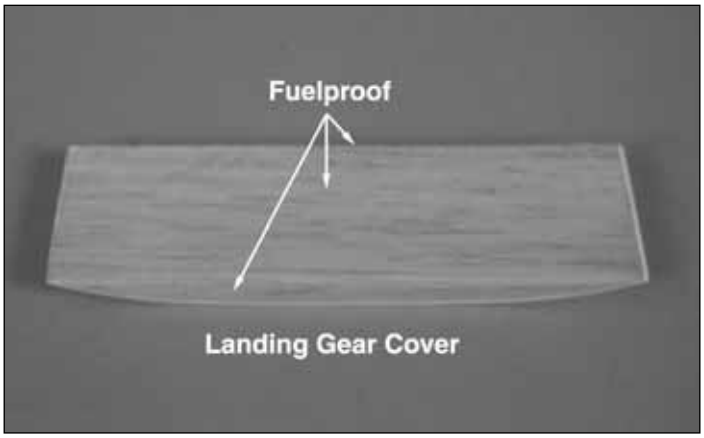
❑ 21. Should you prefer an extended wrench with a handle rather than the one supplied with an "L" bend on the end, one could be made by splicing together a 3/32" [2.4mm] ball-end hex wrench with a piece of 4-40 pushrod and 1/8" [3.2mm] brass tubing. Use a file to round the ends of the wrench so they will fit into the brass tubes, then hold it all together with silver solder.

❑ 22. Now that the cowl is all fitted-up, use thin CA to permanently join the elevators to the stabilizer and the rudder to the fin with the hinges.

MOUNT THE LANDING GEAR

Fuelproof the Landing Gear Cutout



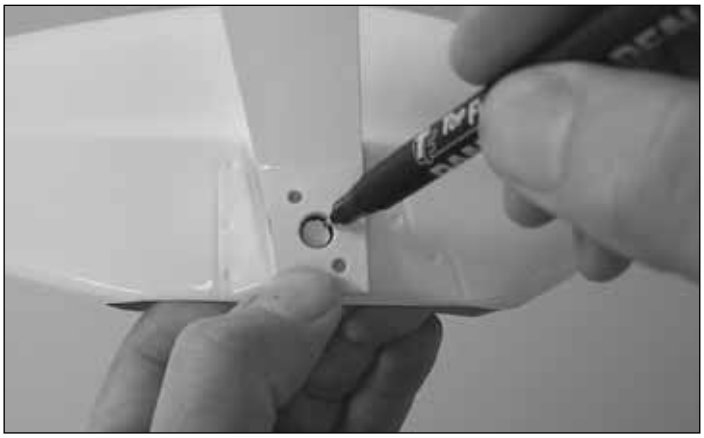


❑ Use 30-minute epoxy, 30-minute epoxy thinned with denatured alcohol, or fuelproof paint to **lightly** coat the main landing gear cutout on the bottom of the fuselage and the exposed balsa areas of the **landing gear cover**. While you're at it, go ahead and coat any other areas on the bottom of the fuselage that may be exposed to fuel or exhaust residue such as the area where the wing fits and both sides of the wing saddle. It's not necessary to apply heavy coats of epoxy—one light coat will do. Allow the epoxy to soak into the wood for a few minutes, then wipe the areas down with a few paper towel squares. Allow the epoxy to fully harden, then lightly sand with 400-grit sandpaper.

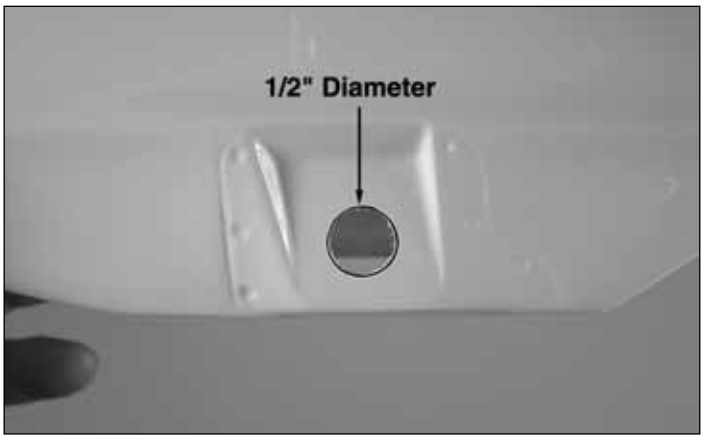
Prepare the Wheel Pants

Note: In the following steps one plywood **wheel pant brace** will be glued inside each wheel pant. This significantly strengthens the mounting area so the pants will withstand rough fields or bouncy landings (of course, all of your landings will be perfect!). The braces go on the inside of each pant that gets mounted to the landing gear. Refer to the sketch at step 1 on page 27 to see how all the parts fit together.

❑ 1. The same as was done for the cowl, wipe the inside of the wheel pants where the plywood braces will go with paper towel squares dampened with denatured alcohol. Use coarse-grit sandpaper to roughen the inside of the wheel pants in the same area.



❑ 2. Mark the location of the axle hole in the left side of the landing gear onto the left wheel pant.



❑ 3. Use a rotary tool with a cutting bit to cut a 1/2" [13mm] hole **centered** over the hole marked in the previous step.

❑ 4. Mark and cut the hole in the right wheel pant the same way.

❑ 5. Follow the Expert Tip that follows if you would like to add additional reinforcement in the wheel pants.

EXPERT TIP

How to "Bullet-Proof" Your Wheel Pants

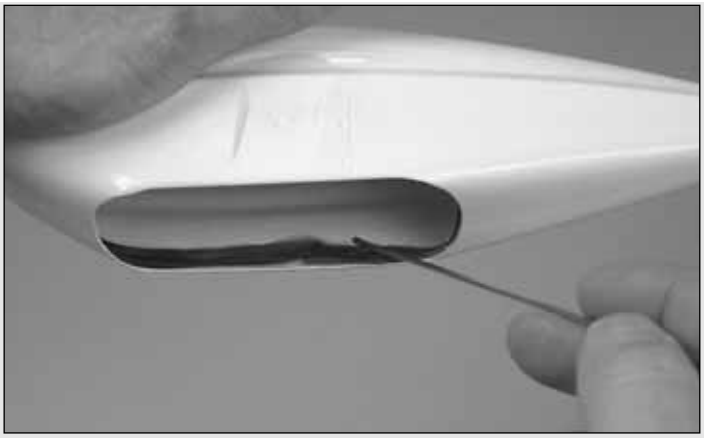
Here's a way to add rigidity to the wheel pants and increase their service life. They still may not hold up to a crash, but they will survive the day-to-day rigors of bouncy landings and rough runways. This could get messy, so take precautions and wear a shop apron and rubber gloves. The instructions show how to do one pant at a time, but they could be done simultaneously.

❑ A. **Thoroughly** sand the inside of the wheel pants where the carbon fiber will go. Cut an approximately 13" [330mm] long, 3/8" [10mm] wide "swatch" of Dave Brown Carbon Fibre Tape (DAVR2000).

❑ B. Mix approximately 1/4 oz. of 30-minute epoxy. Pour a bead of epoxy onto an approximately 16" [400mm] sheet of plastic (leftover from the kit packaging or another plastic bag).

❑ C. Lay the carbon fiber swatch onto the bead of epoxy. Let it sit there for a minute or so. Holding one end of the carbon fiber with an epoxy mixing stick, use an epoxy brush to work the epoxy up through the fibers.

❑ D. Apply a light coating of epoxy to the inside of the wheel pant all the way around the wheel opening.

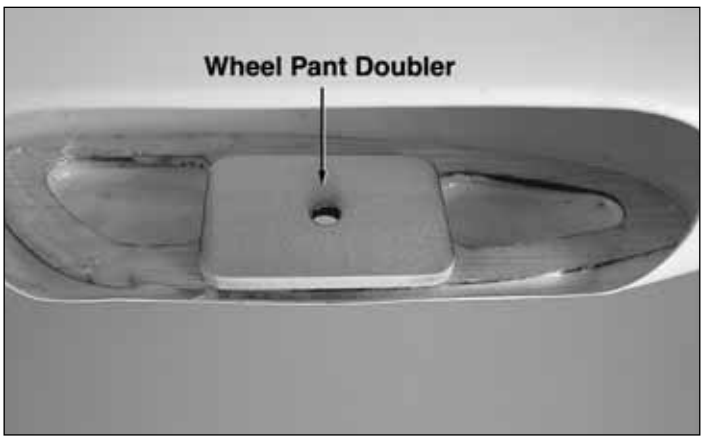


❑ E. Use your fingers or a wire to lift the epoxy-soaked carbon fiber swatch from the plastic bag and place it inside the opening of the wheel pant. Use the wire to maneuver the swatch into position.

❑ F. When the swatch is pretty much where you want it, dip your finger in denatured (or rubbing) alcohol and smooth it all out.

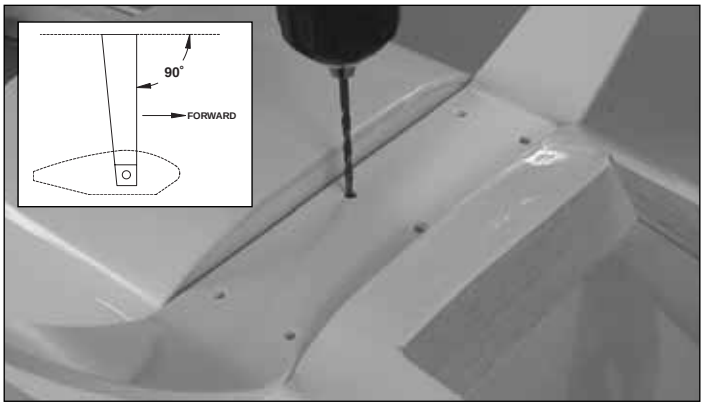
❑ G. Clean up with alcohol and allow the epoxy to harden.

❑ 6. Bevel the edges around the side of the plywood **wheel pant braces** that contact the inside of the pants. Use a *generous* amount of 30-minute epoxy mixed with microballoons to glue one brace to the inside of each wheel pant as shown. Make sure the hole in the braces aligns with the hole the wheel pants. Wipe away excess epoxy before it hardens.



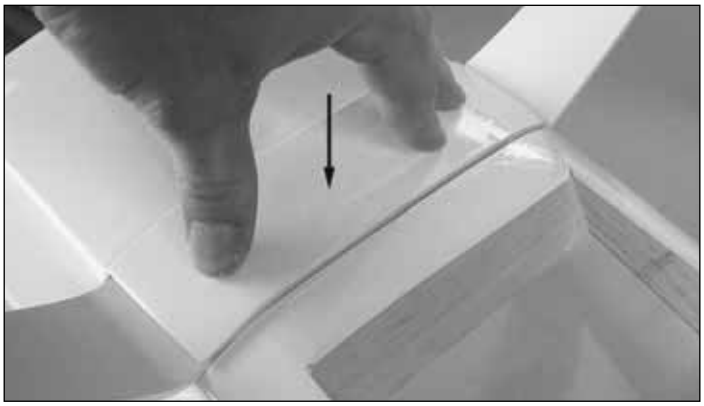
❑ 7. Glue the plywood **wheel pant doubler** to the wheel pant brace inside each pant. The 3/16" [4.8mm] hole in the doubler must be centered over the 1/2" [13mm] hole in the pant (the wheel axles, cut to the correct length as shown on page 27, could be used to align the holes).

Prepare the Landing Gear

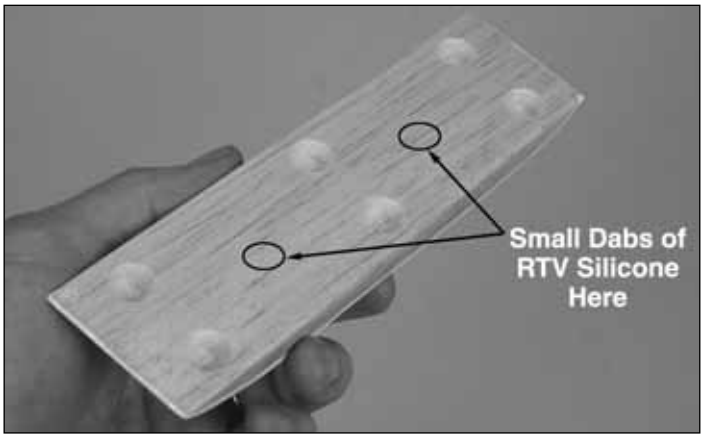


❑ 1. Noting which direction is forward as shown in the sketch, center the **main landing gear** on the landing gear plate on the bottom of the fuselage. Use the holes in the gear as a guide to drill 1/8" [3.2mm] holes through the bottom of the fuselage.

❑ 2. Bolt the landing gear to the fuselage with six #8 x 5/8" [116mm] screws. **IMPORTANT!** Remove the landing gear and harden the holes in the landing gear plate with a few drops of thin CA. Remount the gear.



❑ 3. Position the balsa **landing gear cover** over the landing gear in the fuselage. Press down on the cover to mark the heads of the screws into the cover.

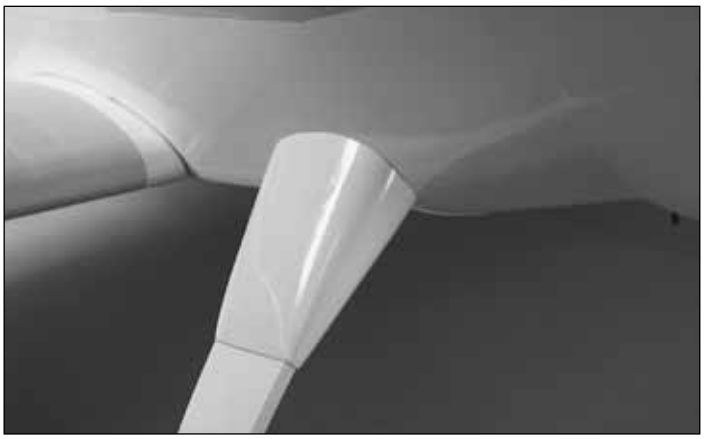


❑ 4. Relieve the inside of the balsa cover where screw heads made their indentations. Set the cover aside.

❑ 5. Use RTV silicone or thin, double-sided foam mounting tape to mount the landing gear cover to the landing gear. If using RTV silicone, only two **small** dabs are required to securely hold the cover to the gear. (If too much adhesive is used it will be extremely difficult to remove the landing gear cover if the landing gear ever needs to be removed.)

Mount the Landing Gear Fairings

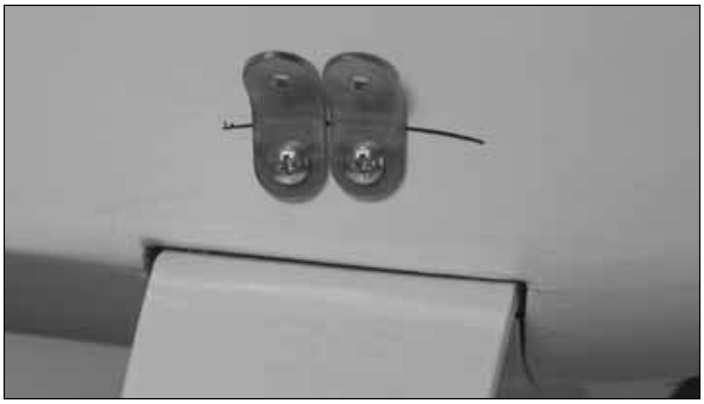
❑ 1. Test fit the molded fiberglass **landing gear fairings** to the fuselage over the landing gear. If necessary, use a small file to enlarge the slots so the fairings will go all the way on.



❑ 2. Sand the edges of the fairings as necessary to get them to fit the fuselage. A soft, lead pencil may be used for marking the “high spots” so you’ll know where to sand.

Perform the following four steps only if you will be mounting the optional flying wires on the wings.

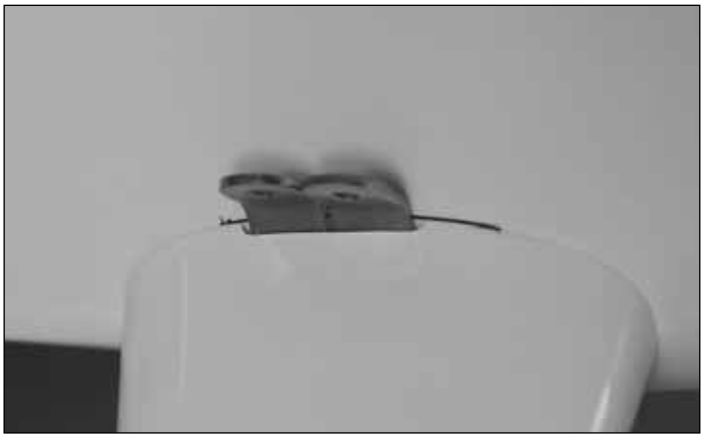
❑ 3. Use a fine-point felt-tip pen to mark the outline of the top of the landing gear fairings onto fuselage.



❑ 4. Remove the fairings. Position one of the **B3** metal brackets on the fuselage so the bend in the bracket is even with the line and centered over the landing gear. Holding the bracket in position, mark the hole in the bracket onto the fuselage. Drill a 3/32" [2.4mm] hole through the fuselage at the mark.

❑ 5. Mount the bracket with a #4 x 1/2" [13mm] screw. Hold the other bracket next to the first and mark and drill another hole. Mount the second bracket. Mount two more brackets on the other side of the fuselage the same way.

❑ 6. Temporarily remove the brackets and screws. Wipe away the ink lines. Add a few drops of thin CA to each screw hole to harden the threads. Allow the CA to harden, then permanently mount the brackets and tighten the screws.

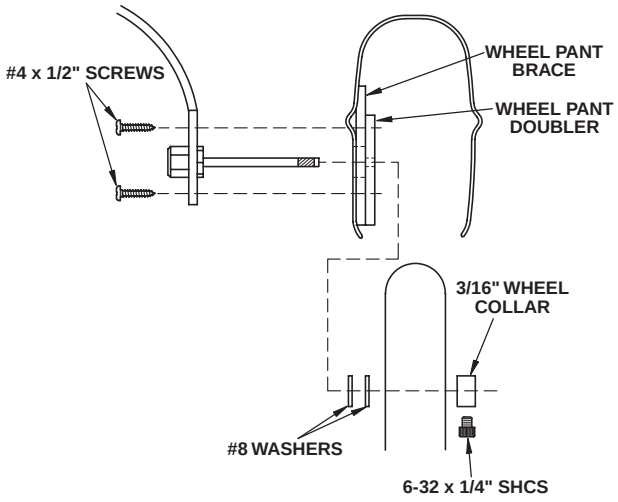


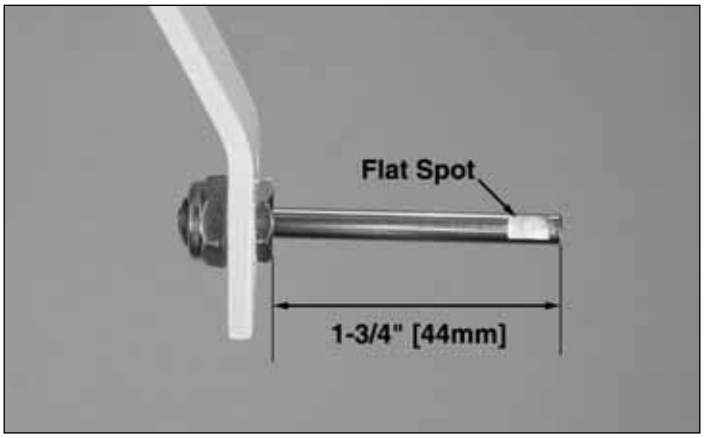
❑ 7. Trim the fairings where they meet the brackets.

❑ 8. Use R/C 56 canopy glue or RTV silicone to glue the fairings to the bottom of the landing gear. There should be a clearance of 1/16" to 1/8" [2 to 3mm] between the fairing and the fuselage to allow for movement of the gear on rough landings. Use balsa sticks as shown in the photo to hold the fairings in position until the adhesive dries.

Mount the Wheel Pants

Refer to this sketch while mounting the wheel pants.



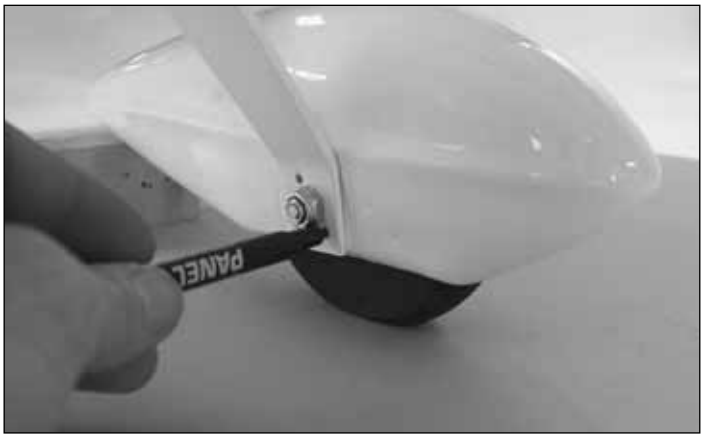


❑ 1. Cut both 3/16" x 2" [4.8 x 50mm] wheel axles to a length of 1-3/4" [44mm]. File flat spots near the end of the axles, then use a 7/16" wrench and a 1/2" wrench to bolt the axles to the gear with 5/16-24 lock nuts. (Rotate the axles so the flat spots are facing downward.)

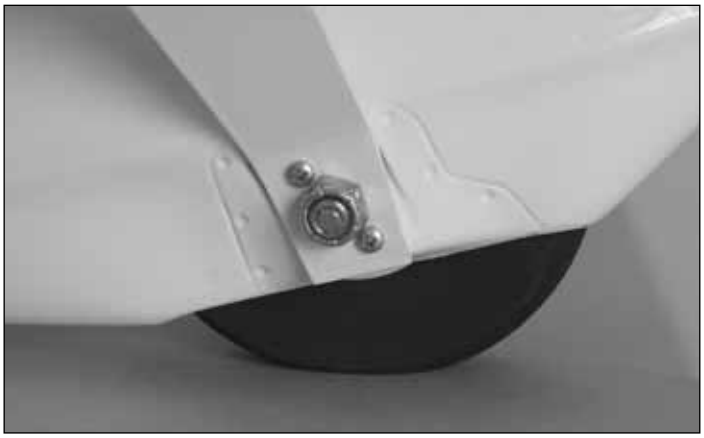
❑ 2. Take the fuselage off the building stand and place it on your workbench resting on its gear. Slip the pants and wheels onto the axles.

In the following step, the wheel pants should be positioned as shown on this finished model. The wheel pants should be parallel with the ground (workbench) when the fuselage is parallel with the ground.

❑ 3. Raise the aft end of the fuselage so it is in a level, flying attitude. Use a box or something similar to hold it in this position. Level the wheel pants by propping them up the same way.



❑ 4. Mark the two holes in both sides of the landing gear onto the pants. **Note:** Although there are molded-in indentations in both wheel pants for the landing gear, there is still room for adjustment so it is best to get it right by aligning the wheel pants in this way.

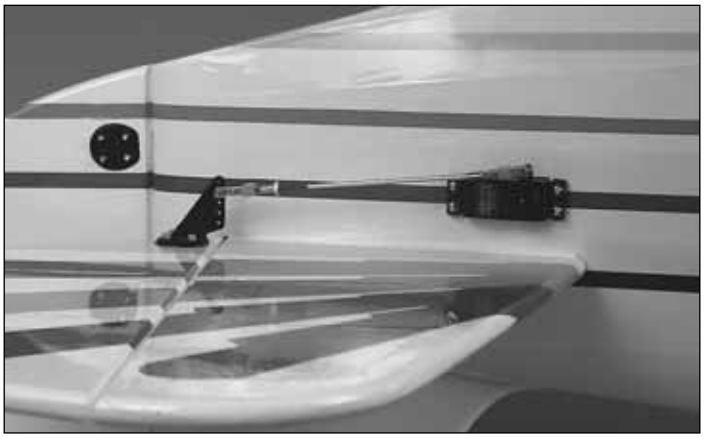


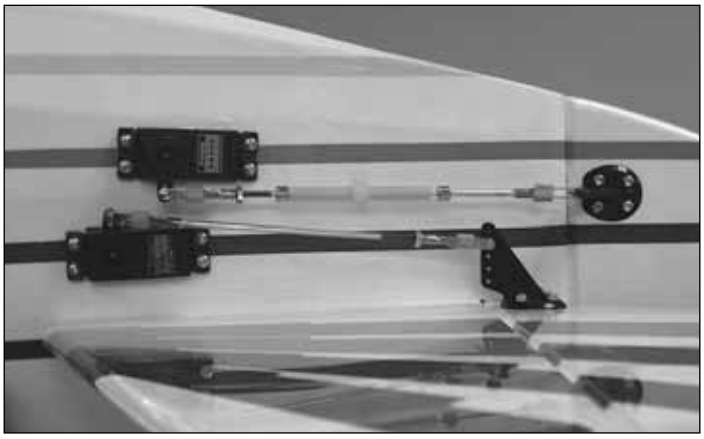
❑ 5. Remove the wheels and pants. Drill 3/32" [2.4mm] holes at marks you made in both wheel pants. Fit the pants and wheels onto the gear. If necessary, use #8 flat washers (supplied) to space the wheels so they are centered in the pants. Once the wheels have been centered, mount the pants to the gear with #4 x 1/2" [13mm] screws. Secure the wheels with 3/16" [4.8mm] wheel collars and 6-32 x 1/4" [6mm] socket head cap screws. Be certain the screws in the wheel collars "land" on the flat spots and also be certain to use a **small** drop of threadlocker on them. Place a drop of oil on both sides of both wheels.

FINAL ASSEMBLY

Mount the Servos

Refer to these photos while mounting the servos and hooking up the pushrods.



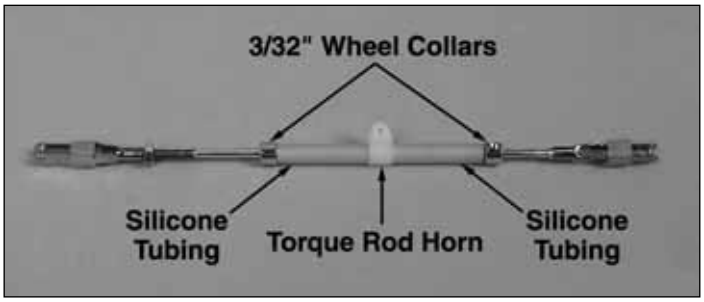


Note: To achieve perfect symmetry in both elevator linkages the elevator servos move in opposition. For this reason, a computer radio will be required to electronically mix the servos so one of them can be reversed. Or, if you do not have a computer radio, an in-line mixer such as the Futaba SR-10 servo reverser will be required.

❑ 1. The same as was done for the aileron servos, connect 12" [300mm] servo extension wires to each elevator servo and the rudder servo. Secure the connections with 1-1/2" [40mm] pieces of heat shrink tubing included with this kit.

❑ 2. Mount all three servos in the fuselage using the previously drilled holes.

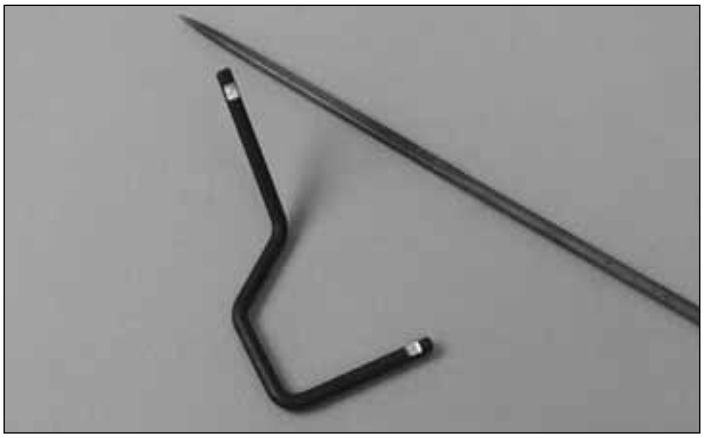
❑ 3. The same as the aileron pushrods, make two **elevator** pushrods from the hardware shown in the previous two photos. Position the elevator control horns on the elevators so the clevis holes in the horns align with the pivot point of the elevators. Mount the horns to the elevators by drilling 7/64" [2.8mm] (or 1/8" [3.2mm]) holes for the screws and using four 4-40 x 3/4" [19mm] socket-heat cap screws and the nylon mounting plates.



❑ 4. Make the rudder pushrod, but before soldering on the metal clevis, slip a 3/32" [2.4mm] wheel collar, followed by a 1" [25mm] piece of silicone tubing (cut from the 3" [75mm] silicone tube supplied with this kit), a 4-40 nylon torque rod horn, another 1" [25mm] piece of silicone tubing and a wheel collar onto the pushrod. Solder on the clevis. Mount the rudder control horn to the rudder the same as the elevator horns, then connect the pushrod.

While we've got the fuselage upside-down and we're working on the tail end, let's go ahead and hook up the tail wheel…

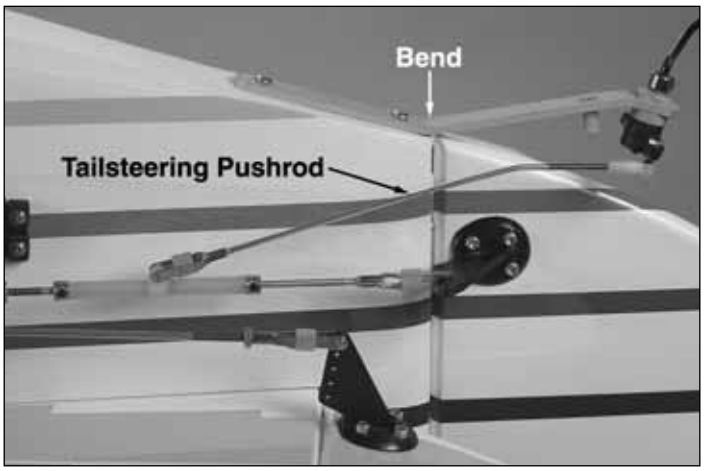
Mount the Tail Gear



❑ 1. File two small flat spots in the **tail gear wire** for the set screw in the steering arm and the set screw in the wheel collar that holds on the wheel.

❑ 2. Assemble the tail gear as shown. Apply a small drop of thread locking compound on all the set screws, then securely tighten with a 1.5mm hex wrench. Add a few drops of oil to the wire where it enters the aluminum mount and on both sides of the tail wheel.

❑ 3. Enlarge the hole in the **steering arm** with a 3/32" [2.4mm] drill. Mount a 2-56 threaded ball to the arm with a 2-56 nut and a drop of thread locking compound.



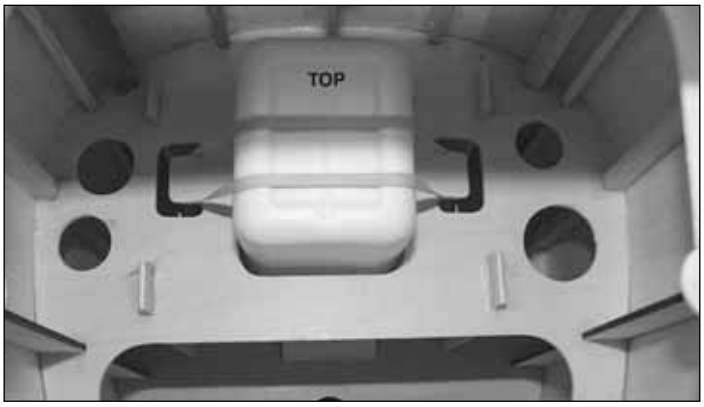
❑ 4. Position the tail gear mount on the bottom of the fuselage so the bend in the mount aligns with the aft end of the fuselage. Using the holes in the mount as a guide, drill 3/32" [2.4mm] holes through the bottom of the fuselage for the mounting screws. Mount the tail gear to the fuselage with two #4 x 5/8" [16mm] screws. Remove the screws, harden the holes with thin CA, allow to harden, then remount the gear.

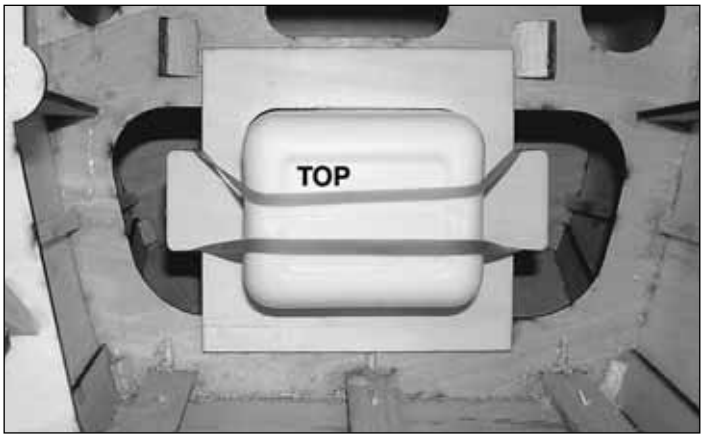
❑ 5. Make the **tail steering pushrod** from a 2-56 x 12" [300mm] pushrod, a nylon ball link and a small solder on clevis. Bend the pushrod as shown. Connect the pushrod to the steering arm and to the torque rod horn on the rudder pushrod. Center the rudder and the tail wheel, then fasten the wheel collars to the rudder pushrod with two 4-40 set screws and a drop of threadlocker. **Note:** Squeeze the wheel collars against the tubing just enough to apply light pressure.

Assemble the Fuel Tank

❑ 1. Remove the rubber stopper from the fuel tank and shake out the contents.

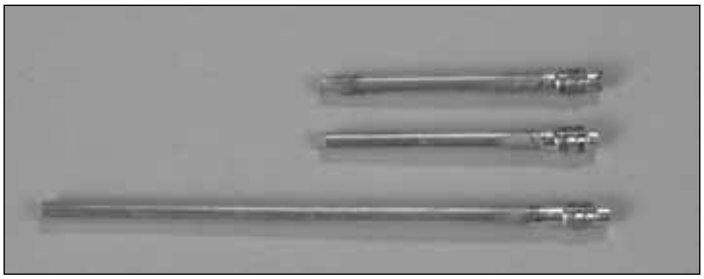
If using a gas engine, the fuel tank must be converted from glow fuel application to gasoline application. The items suggested for making the conversion are listed on page 5.



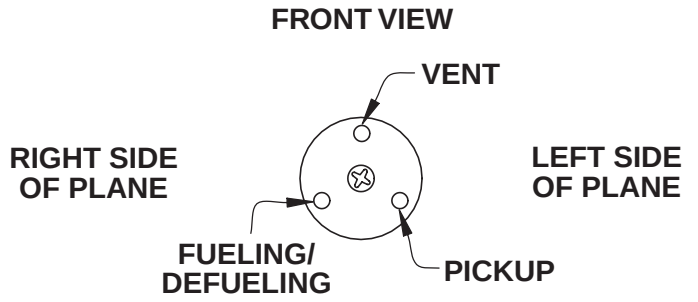


❑ 2. Note that there is an upper and a lower mounting location for the fuel tank. Determine the mounting location for the engine you will be using. The **upper** location will be used for glow engines and most other engines. However, if using a Fuji 50 engine or another type of engine that interferes with the front of the fuel tank, mount the tank in the **lower** location using the separate plywood **fuel tank former**. The lower fuel tank location is also recommended if using the O.S. MAX FT300 Twin due to the low placement of the carburetor. Notice that, if using the lower location, the fuel tank will lie flat.

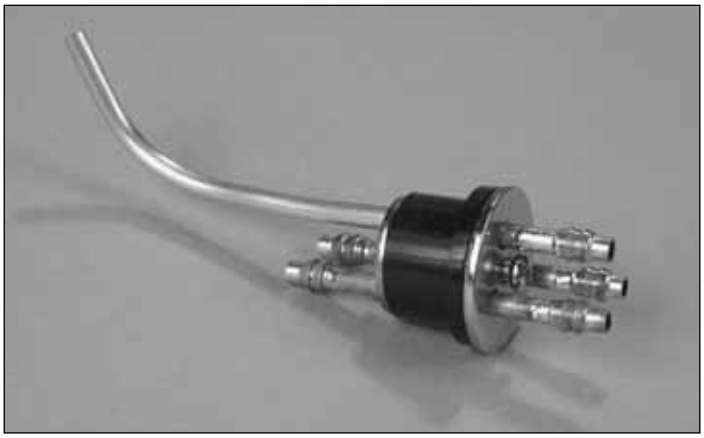
❑ 3. Determine the type of fuel tank setup you will be using and how many metal fuel tubes will be used in the stopper. The suggested method is to use a three-line system—one line for filling/emptying the tank, one line for the vent (or pressure if using a glow engine) and one line for fuel pickup. This setup is great for modelers who prefer not to use a fueling valve. It also allows defueling with the model upright (as opposed to defueling through the vent, which would require that the model be turned upside-down to pump out all the fuel). If using a fueling valve, a two-line system will be used.

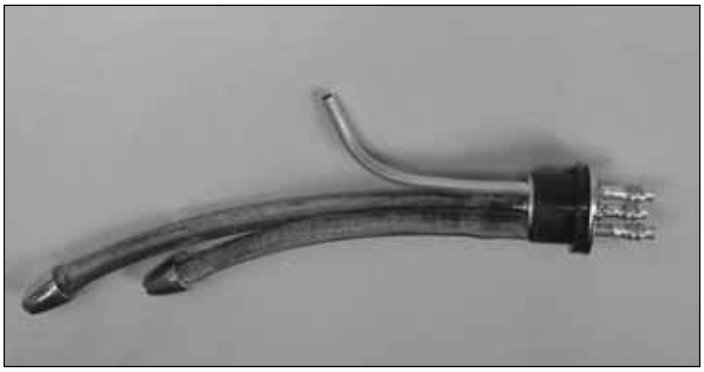


❑ 4. If using fuel line barbs (as recommended for gas engines), replace the aluminum fuel tubes with 1/8" [3.2mm] brass tubing (not included). Cut the brass tubes to the correct length, then solder the barbs onto one end of the tubes. The long brass tube will be bent upward for the vent inside the tank.

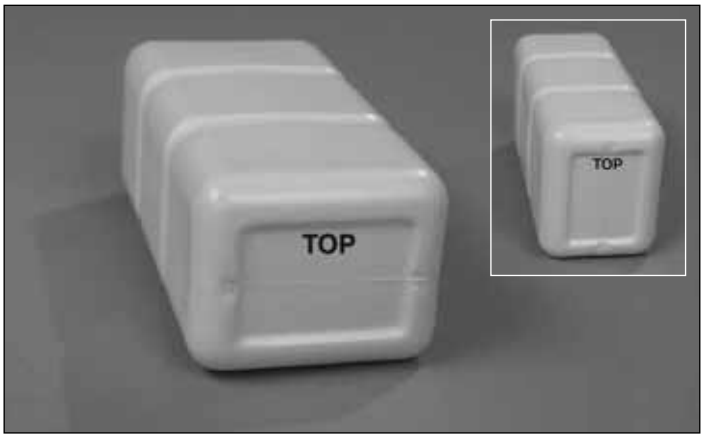


❑ 5. Assemble the rubber stopper with the metal plates, screw and metal fuel tubes as shown in the sketch. (Refer to this sketch when connecting the fuel lines later on.)





❑ 6. Bend the vent tube upward. Solder on the remaining two fuel line barbs—if used. Connect the pickup and fueling/de fueling lines to the respective tubes on the back of the stopper. Be certain to use the correct type of fuel tubing for the type of engine (gas or glow) you are using. (Remember, Du-Bro medium neoprene tubing is recommended for gas engines because it fits tightly. Most types of gas-compatible tubing expand when immersed in gas, so if the tubing does not initially fit very tightly, it may loosen its hold and possibly become disconnected from the clunk or the tubes in the stopper). Connect a fuel line weight ("clunk") to both lines. Be certain the clunk on the end of the pickup line will not contact the rear of the tank. Make the fueling/defueling line shorter than the pickup line so they do not become entangled.



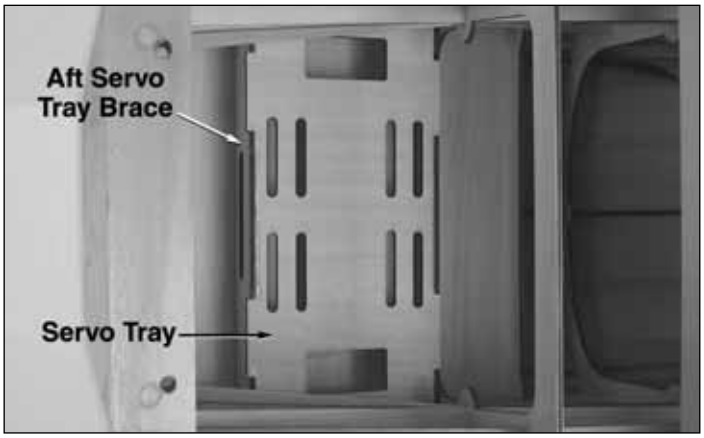
❑ 7. Insert the stopper and lines into the tank, but do not tighten the stopper. Use a felt-tip pen to write "top" on the top of the back of the tank so you won't inadvertently install it upside-down.

❑ 8. Place the tank in the fuselage in the upper or lower location. Push the neck of the tank through the hole in F-1. Secure the tank and expand the stopper by tightening the screw with a Phillips screwdriver.

❑ 9. If the tank is mounted in the lower location, apply a liberal amount of epoxy mixed with microballoons to the front of the plywood fuel tank former, then slip it over the tank and push it forward until it contacts the former. Place the fuselage vertically on its nose until the epoxy hardens.

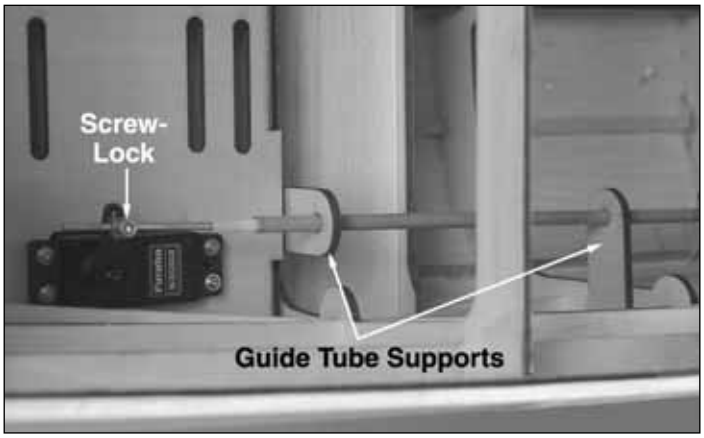
❑ 10. Use a couple of #64 rubber bands to hold the tank in position.

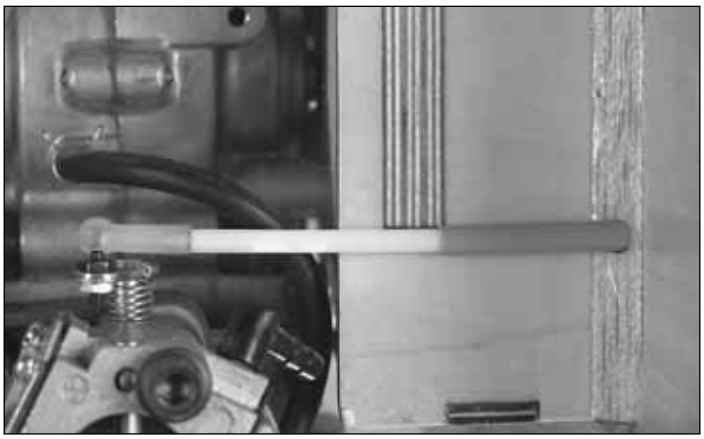
Hook Up the Throttle



❑ 1. Glue the plywood **servo tray** and **aft servo tray brace** into position where shown.

Refer to the following photos while hooking up the throttle. The setup shown is for the Fuji 50.

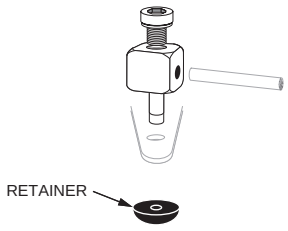




❑ 2. Mount the throttle servo in either of the two locations that will work best for your engine. Determine how you will be connecting the throttle to the carburetor arm on the engine. The hardware in the photos is supplied with this kit, but other hardware may be substituted as necessary for your particular engine setup and preferences. **Note:** Do not use full-length, all metal pushrods for the throttle on spark-ignition engines.

❑ 3. Use an extended 3/16" [4.8mm] drill bit or a 3/16" [4.8mm] brass tube sharpened on the end to drill holes through F1 and the former behind it to pass the 3/16" x 24" [4.8 x 610mm] **throttle pushrod guide tube**. Be certain not to drill into the fuel tank!

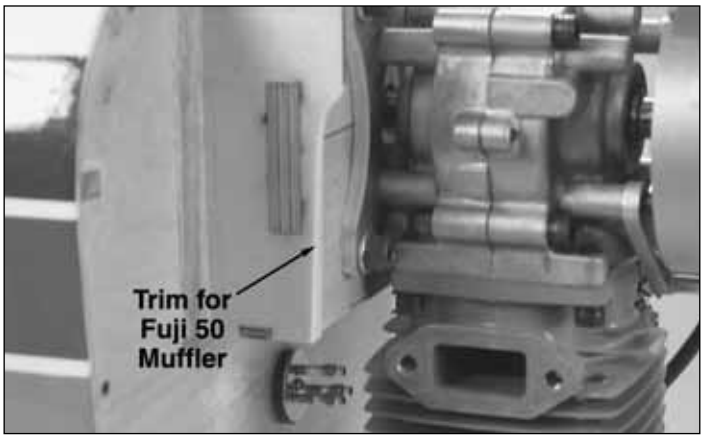
❑ 4. Cut the guide tube to the correct length, then use coarse sandpaper to roughen the outside so glue will adhere.



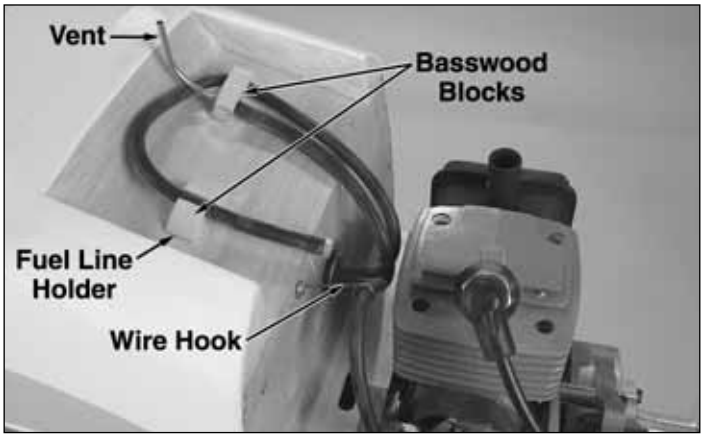
❑ 5. Connect a brass screw-lock connector to the throttle servo arm with a nylon retainer. Partially thread a 4-40 x 1/8" [3mm] socket head cap screw into the screw-lock connector.

❏ 6. If using a glow engine, hook up the throttle using the 36" [910mm] wire pushrod. The threaded end of the pushrod is connected to a 2-56 ball link on the carburetor arm with a nylon ball link. The other end is cut to length, then connected to the screw-lock connector on the throttle servo arm. If using a gas engine, hook up the throttle using the 24" [610mm] white plastic pushrod (as shown in the photos). The pushrod is connected to a 2-56 ball link on the carburetor arm (or bellcrank) with a 2-56 x 1" [25mm] threaded rod and a nylon ball link. The other end is cut to length, then connected to the screw-lock connector on the servo arm with a short piece of wire cut from the threaded end of the 36" [910mm] wire pushrod that is threaded into the plastic pushrod.

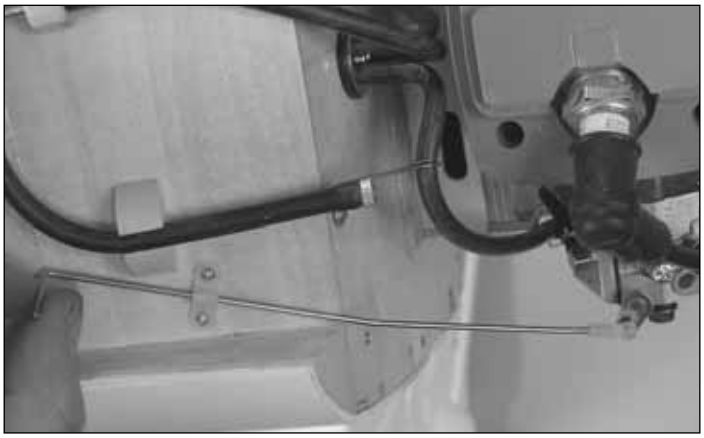
❏ 7. Slide the plywood **guide tube supports** over the throttle pushrod guide tube, then glue them inside the fuselage where necessary to support the guide tube.



❏ 8. Mount the muffler and cut a hole in the cowl for the engine exhaust. If the exhaust outlet on the muffler does not extend outside the cowl, use a suitable exhaust extension. **Note:** If using the Fuji 50 engine, a portion of the right side of the engine box will have to be trimmed to accommodate the muffler. After trimming, lightly coat the exposed wood with epoxy.



❏ 9. Connect the fuel lines. If using a glow engine, connect the vent line coming from the fuel tank to the pressure tap on the muffler. If using a gas engine, route the vent line out the bottom of the cowl. For the Fuji gas engine setup shown in the photo, a 1/4" [6.4mm] and a 1/8" [3.2mm] hole were drilled through a basswood block (not included) to secure the fueling line and the vent. A fuel line holder was made for the fueling line by drilling a 1/4" [6.4mm] hole through a basswood block (not included) and cutting a slot so the line can be press-fit into the hole. If using a gas engine, be certain the lines cannot contact the engine or muffler—most fuel tubing used for gas engines will not stand up to heat. A wire hook was made for the fuel line and screwed to F-1 so the line would not contact the engine.



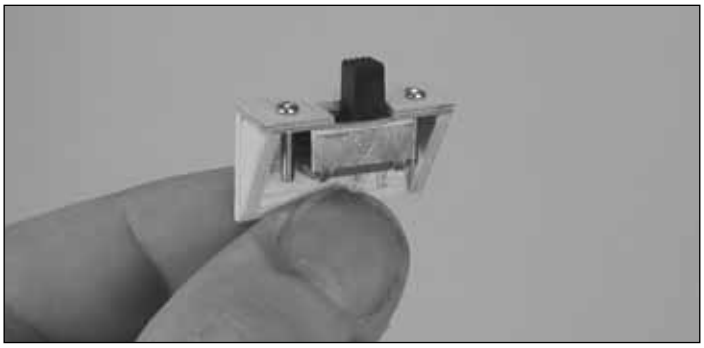
❏ 10. If using an engine with a choke, make a pushrod so the choke can be activated from outside the fuselage.

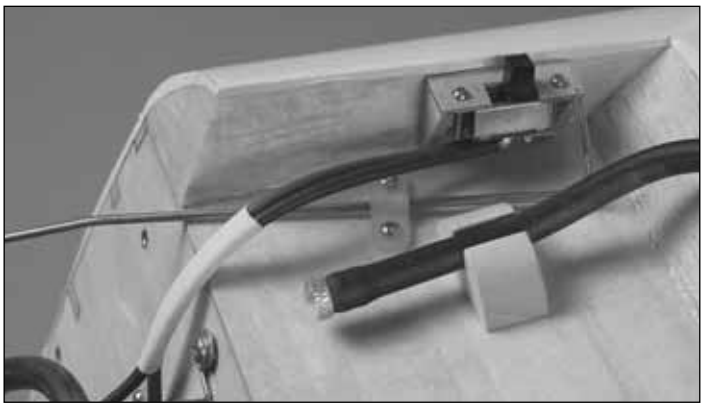
❏ 11. Cut any other holes in the cowl where necessary for the glow plug igniter, fueling system, muffler etc.

Mount the Kill Switch (For Spark Ignition Engines Only)

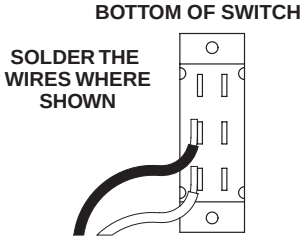
As stated in the IMAA Safety Code, all magneto spark ignition engines must have a manually operated, coil-grounding on/off switch to stop the engine and prevent accidental starting. In addition to the required, manually operated switch mounted outside the model, some pilots may also elect to use a servo-operated on/off ignition switch. This is not required, but could be installed for redundancy. A servo-operated on/off ignition switch is also a good idea if you have a spark-ignition engine that does not reliably shut off by closing the carburetor.

For use with the Fuji engine shown, the manually operated switch was made from a .3 Amp slide switch, 16 gauge wire and a covered connector purchased at the local Radio Shack.® Slightly different hardware may be required if using a different spark-ignition engine. All of the components required should be available at any hardware or home-improvement store.





❑ 1. Determine where and how you will be mounting the on/off ignition switch. **Note:** It is advisable to mount the switch on the **top** or **side** of the fuselage where it will be more readily accessible than it would be on the bottom of the fuselage where shown on the model in the photos.

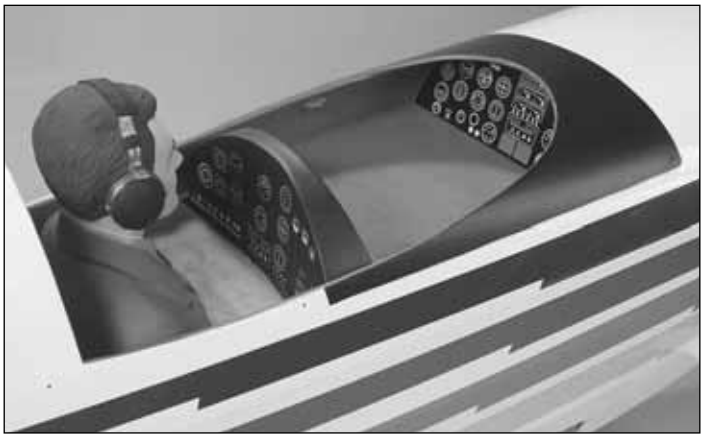


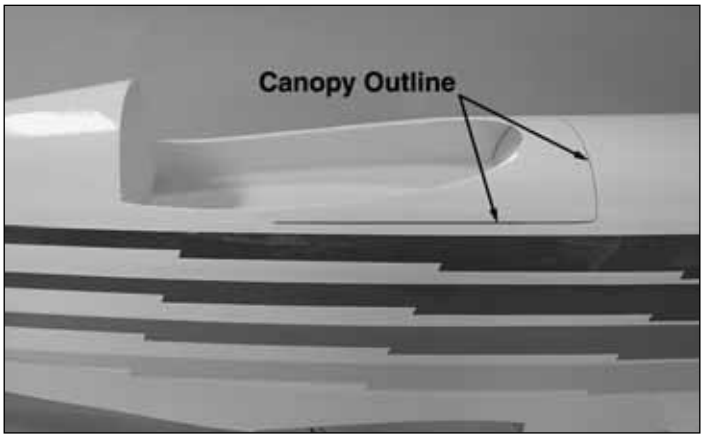
❑ 2. If necessary, make a switch mount from scrap plywood (not supplied). Fuelproof the mount, then fasten the switch to the mount. Solder one end of the wires to the switch, then securely glue the switch mount into position.

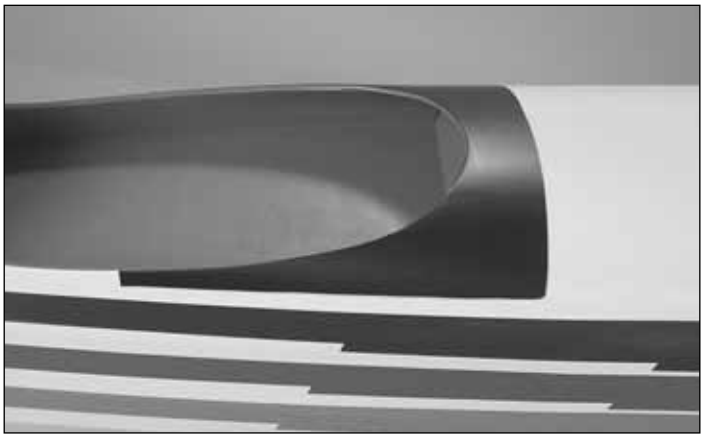
❑ 3. Cut the wires to the correct length, then crimp or solder the connectors to the wires. Mount the connectors to the engine. Be certain the wires will not contact the muffler.

Finish the Cockpit

Refer to this photo while finishing the cockpit.







❑ 1. **Optional:** Should you desire to enhance the scale appearance of the cockpit area, an anti-glare panel could be made by covering the fuselage inside the canopy with flat black MonoKote. This can be done by cutting out the canopy as shown on page 34, then placing it on the fuselage. Use a fine-point felt-tip pen to trace around the front of the canopy, then cut the covering from the fuselage along the lines. Use the cut off piece of covering as a template to make another piece of covering from flat black MonoKote. Iron the anti-glare panel into position.

❏ 2. “Clean up” the cockpit area by trimming the covering over the edges of the sheeting around the cockpit opening. The covering should end in the middle of the edge of the sheeting. Use a covering iron to securely iron the covering down along the edges.

❏ 3. The cockpit may be painted with your color of choice, but the first coat or two should be with white primer or white or clear paint. After the first coat has dried, use 400-grit sandpaper to lightly sand the cockpit and remove any raised wood grain. Apply the final coat of paint. Flat black or gray is recommended—using an airbrush to apply the final coat of paint provides the best results, but using a paint brush is suitable too. **Note:** If the cockpit is not first coated with white or clear, the black or gray color coat may bleed through the balsa and become visible under the white MonoKote outside the model.

❏ 4. Paint the pilot (not included) as desired. Though this Eagle is 29% scale, any 1/4-scale or 30% scale pilot is suitable. Acrylic modeling paint (available at craft stores) is recommended for painting the pilot. It has a matte, realistic finish and washes up with water.

❏ 5. Cut out and paint the rear instrument panel. Flat black spray paint is recommended. After the paint dries, apply the forward and aft instrument panel decals. **Hint:** When installing the instrument panel decals, first peel the backing halfway off one side of the decal. Cut the backing vertically in half. Now cut 1/4" from the piece of backing you just cut from the decal. Carefully reposition the backing onto the decal. This will leave a 1/4" strip of the back of the decal exposed, but the rest of the decal will be protected by the paper backing. Now place the decal on the instrument panel and position as desired. This will be easy to do since most of the decal is covered with the paper backing. Once the decal is in position, rub your finger up and down the front, sticking the 1/4" exposed area down. Now peel one side of the backing off. Rub your finger over it to stick it down, then peel off the other side.

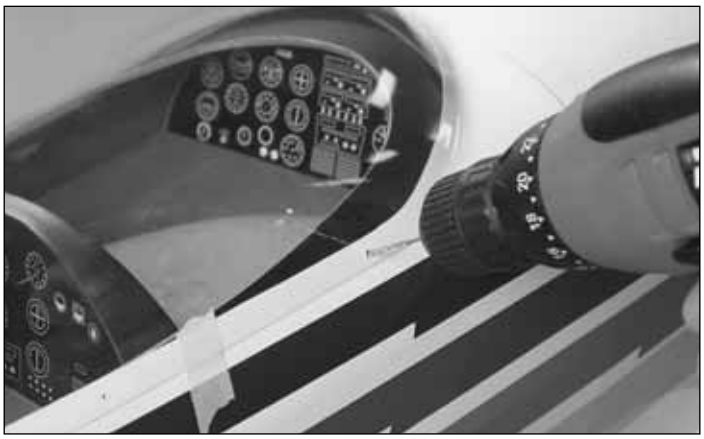
❏ 6. Glue the pilot and rear instrument panel into position. In addition to gluing in the pilot, for the most security it should also be fastened mechanically with #4 or #6 screws. If the type of pilot you are using does not have a solid base, make a base from 1/8" [3mm] plywood (not supplied) and glue it inside the bottom of the pilot. Make a doubler for the screws out of plywood for the other side of the cockpit floor inside the fuselage. Drill the appropriate size holes for the screws, then glue and screw the pilot to the cockpit floor. Fabricate and install any other scale cockpit details desired.

Mount the Canopy

❏ 1. Use scissors to cut the canopy approximately 1/8" [3mm] outside the molded-in cutlines. Now cut right on the cutlines. **Hint:** The cutlines are more visible inside the canopy. Curved-tip hobby scissors work best for cutting plastic.

❏ 2. Use a bar sander with coarse sandpaper to true the edges of the canopy. Use 320 or 400-grit sandpaper to smooth the edges and remove any plastic fuzz.

3. Place the canopy on the fuselage and make sure it is centered from side-to-side. Also make sure the front of the canopy does not cover the built-in hardwood mounting points for the cabanes. Tape the canopy into position.



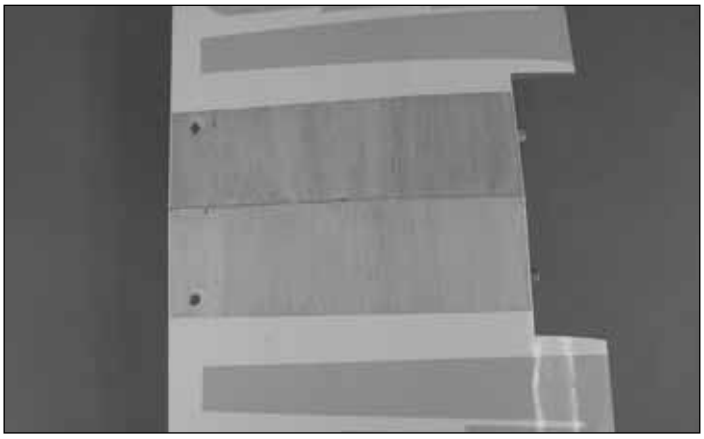
❏ 4. Drill four, evenly spaced 1/16" [1.6mm] holes through both sides of the canopy and the fuselage. Remove the canopy. Enlarge the holes **in the canopy only** with a 3/32" [2.4mm] drill.

❏ 5. Mount the canopy to the fuselage with eight #2 x 3/8" [9.5mm] button-head screws. Remove the screws, harden the holes in the sheeting with a drop of thin CA, allow to harden, then remount the canopy. **Optional:** Glue small pieces of balsa inside the cockpit to cover the threads of the wood screws. Redrill holes for the canopy screws.

Glue on the Belly Pan

❑ 1. Cut the covering from the wing bolt holes in the rear of the belly pan. Use a covering iron to thoroughly seal the covering to the belly pan—especially around the holes for the wing bolts.

❑ 2. With the belly pan in position, bolt the wing to the fuselage. Use a fine-point felt-tip pen to mark the sides of the belly pan onto the wing.



❑ 3. Remove the belly pan. CAREFULLY cut the covering from the bottom of the wing just inside the line. Use great care not to cut into the balsa—you could use the soldering iron technique here too. Peel the covering from the center of the wing.

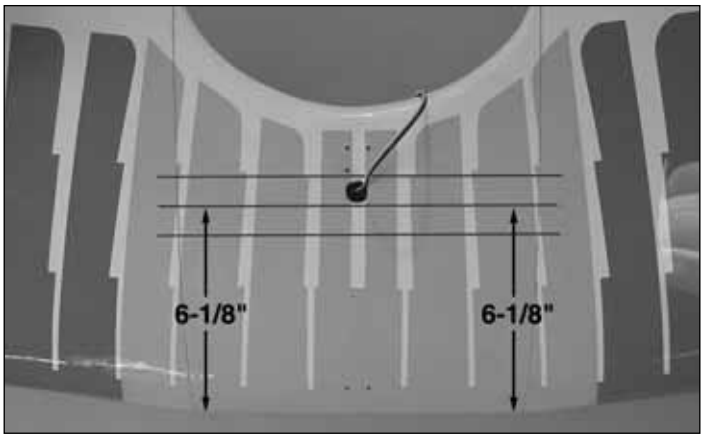
❑ 4. Test fit the belly pan to the wing once more before permanently gluing it on. Make any adjustments necessary.

❑ 5. Apply 30-minute epoxy to the bottom of the wing and the belly pan where they contact each other—except for the **front** of the belly pan—this area will be glued down with medium CA.

❑ 6. Position the belly pan on the wing and bolt it down with the wing bolts. There should be a small gap between both ends of the belly pan and the fuselage.

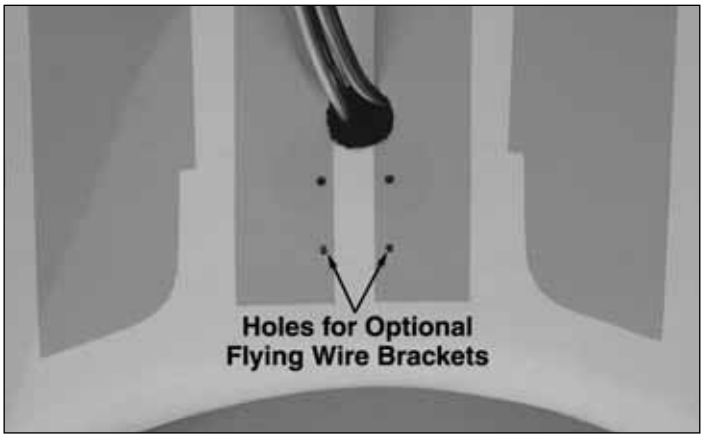
❑ 7. Apply medium CA to the bottom of the wing where the front of the belly pan comes into contact. Press the belly pan down holding it in position until the CA hardens. Wipe away excess epoxy and do not disturb the wing until the epoxy has hardened.

Mount the Wings

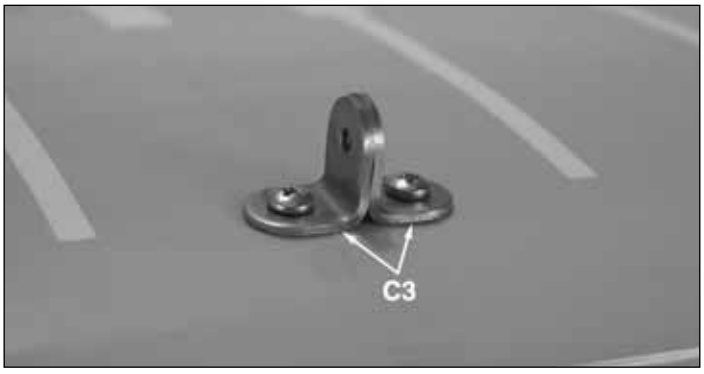


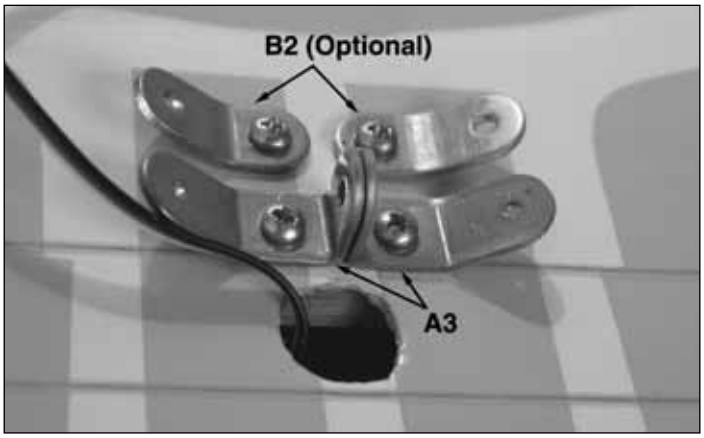
❑ 1. Mark the **recommended C.G. location** and the **forward** and **aft C.G. limits** on the **bottom** of the **top wing** where shown. The recommended C.G. location is **6-1/8" [156mm]** back from the leading edge of the center section of the top wing. The forward recommended C.G. limit is **5-3/8" [137mm]** from the leading edge and the aft recommended C.G. limit is **6-7/8" [175mm]** from the leading edge. The best way to mark the locations is by taking accurate measurements and drawing the lines directly on the wing with a fine-point felt-tip pen. Apply narrow (1/16" [1mm]) tape over the lines so you will be able to feel them while balancing the model with your fingertips.

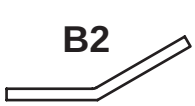
Do the top wing first.

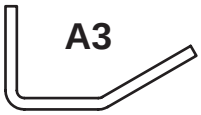


❑ 2. Lay the top wing upside-down on your building stand or workbench (covered with a towel). Enlarge the factory-punched holes near the leading edge in the bottom of the center panel using a 3/32" [2.4mm] drill (there are two holes near the leading edge and two holes near the trailing edge). The holes only need to be 1/2" [13mm] deep. A 3/32" [2.4mm] wheel collar or a block of wood could be used to keep the drill from going too far. If installing the optional flying wires, drill out the two additional holes behind the aft wing bracket holes as well.



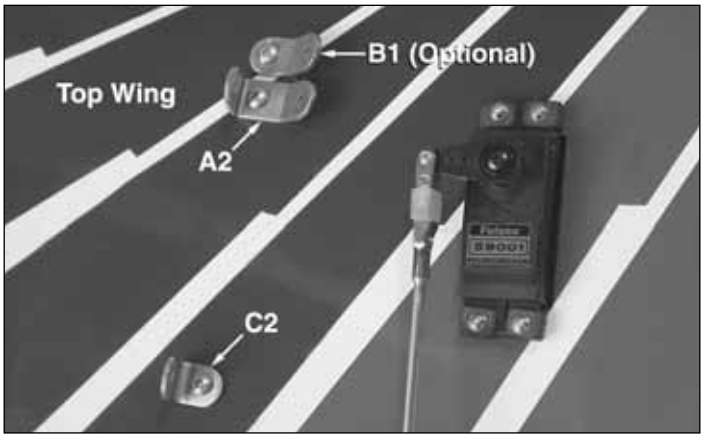


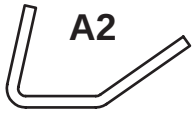




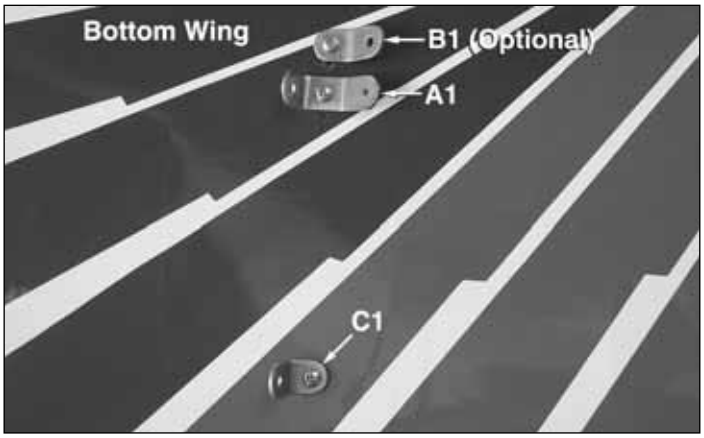
❑ 3. Use #4 x 1/2" [13mm] screws to mount two each of the **C3** and **A3 metal brackets** as shown. Note that the shorter surface of the C3 brackets contacts the wing. Also mount two **B2** metal brackets for if installing flying wires. Note that the shorter part of the B2 brackets contacts the wing.

❑ 4. **IMPORTANT!** Remove the screws, harden the holes with a few drops of thin CA, allow to harden, then reinstall the brackets with the screws. As you proceed, this procedure **MUST** be done for all the screws that hold on the brackets.

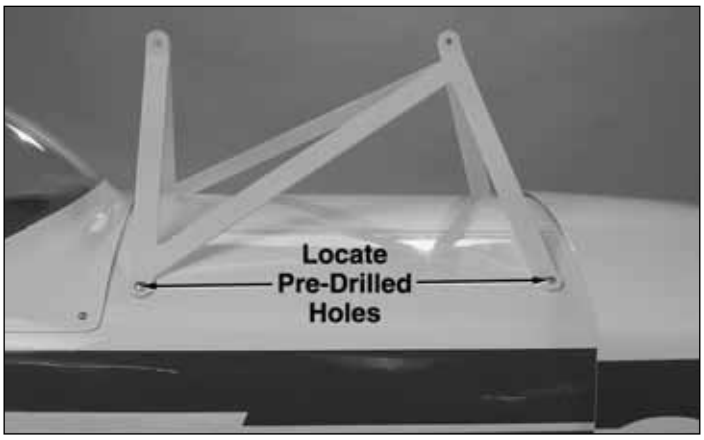




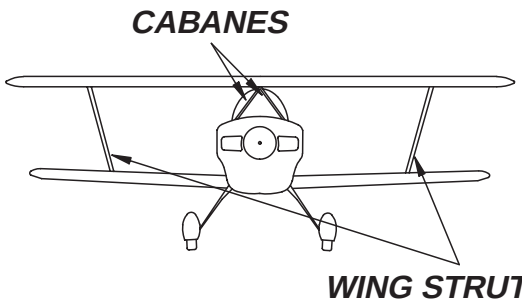
❑ 5. Enlarge the holes in the outer panels for the bracket screws the same way. Mount the **A2** and **C2** brackets. If using flying wires mount the **B1** brackets as well. Remove the screws, harden the holes with thin CA, allow to harden, then reinstall the brackets and screws. Set the top wing aside.



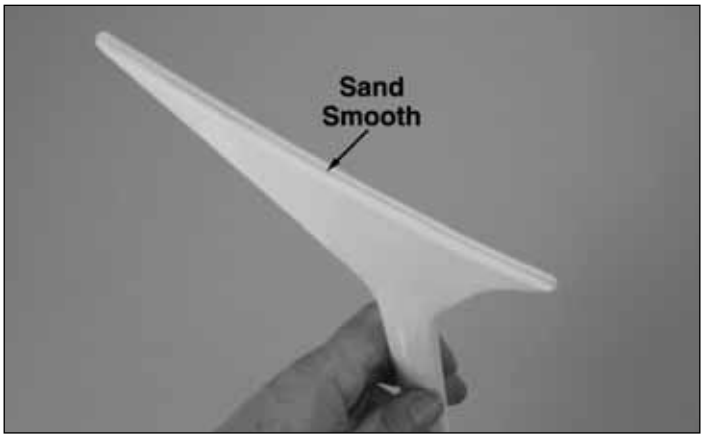
❑ 6. Drill the holes in the bottom panel and mount the **A1**, **C1** and **B1** (for the optional flying wires) brackets as shown in the photo. Harden the holes with thin CA.



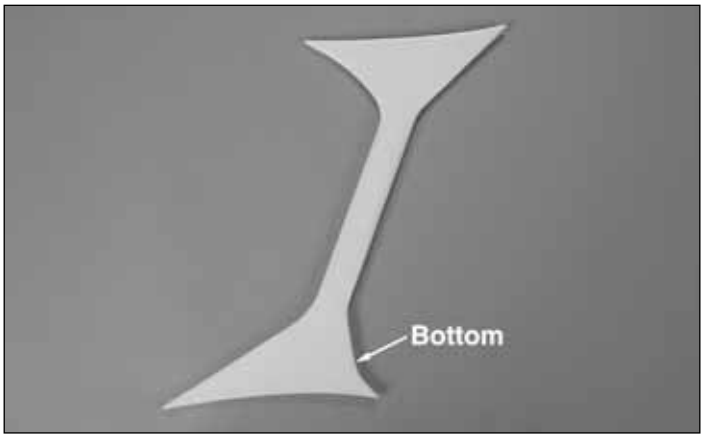
❑ 7. Drill four 3/32" [2.4mm] holes, 1/2" [13mm] deep through the factory-drilled holes in the hardwood blocks under the covering on the front of the fuselage. If the covering has not been punched for locating the holes, they can be easily located by probing with a toothpick to poke through the covering.



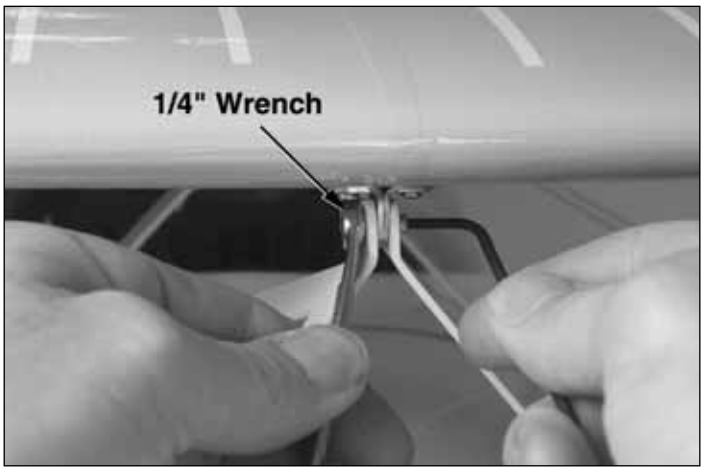
❑ 8. Use four #2 x 1/2" [13mm] screws to mount the pre-bent aluminum **cabanes** to the fuselage as shown. Remove the screws, harden the holes with thin CA, and then remount the cabanes.



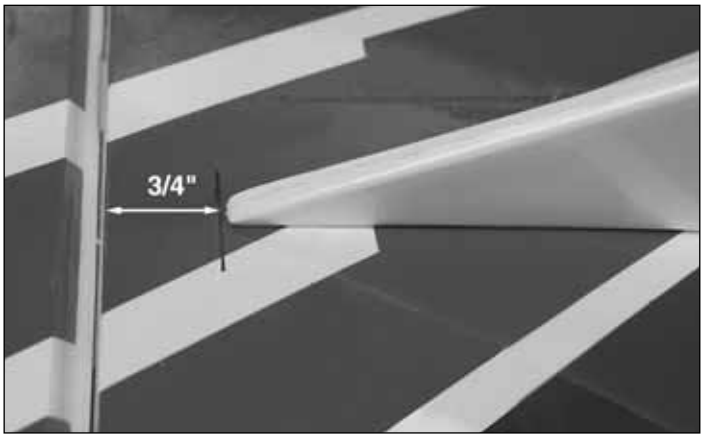
❑ 9. Use coarse sandpaper to smooth the molded-in parting line from both ends of both fiberglass **wing struts** where they contact the top and bottom wings.



❑ 10. Identify the top and bottom of the struts. The bottom is the end with the short, straight section as indicated by the arrow.



❑ 11. Bolt the bottom wing to the fuselage. Mount the top wing to the cabanes with two 4-40 x 1/2" [13mm] socket head cap screws and two 4-40 lock nuts. From here on out it will be **extremely** helpful if you have a 1/4" wrench for tightening the nylon lock nuts. If you don't already own a 1/4" wrench, run out to the hardware store at your earliest convenience and get one!



❏ 12. Use a fine-point felt-tip pen to mark a line behind the strut brackets on both sides of the bottom wing 3/4" [19mm] from the aileron hinge line. Fit the **right** strut to the wing against the outside of the brackets. The aft end of the strut should be contacting the line you marked. You'll know you've selected the **right** strut because the top and bottom will be angled correctly to fit the top and bottom wings.

❏ 13. Mark the holes in the bottom strut brackets onto the strut.

❏ 14. Drill 1/8" [3.2mm] holes at the marks. Bolt the strut into position with two 4-40 x 1/2" [13mm] socket head cap screws, flat washers and lock nuts.

❏ 15. Mark and drill the holes in the top of the strut the same way. Mount the strut to the top and bottom wing.

❏ 16. Mark and drill the **bottom** holes in the **left** strut, then mount the strut.

❏ 17. Holding the top wing and left strut together, mark the holes in the top brackets onto the strut. It's okay if pressure is required to hold them together. The struts will hold the wings at the correct incidences.

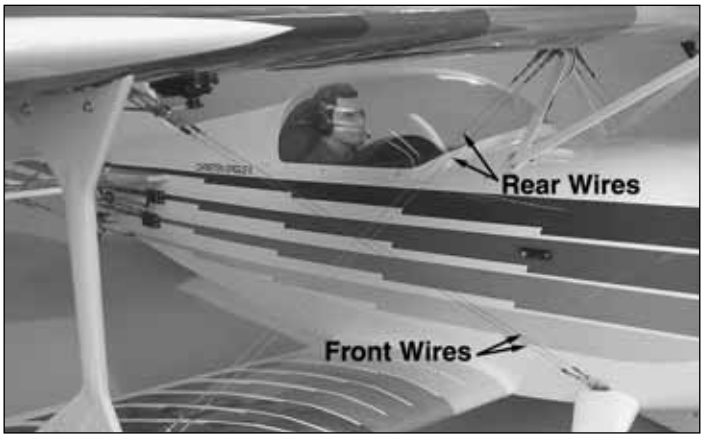
❏ 18. Remove the left strut, drill the top holes, then mount the strut to the top and bottom wings.

Now the wings are mounted! If you will be mounting the optional flying wires, skip the following two steps, then return and perform these steps after the wires have been mounted.

❏ 19. If **not** mounting the optional flying wires, lift the model at the recommended balance point on the tape lines previously marked on the bottom of the top wing. The strongest part of the top wing is where the center panels join the outer panels, so this is a good place to lift. Be certain your fingertips are on the middle lines, not on the forward or aft lines.

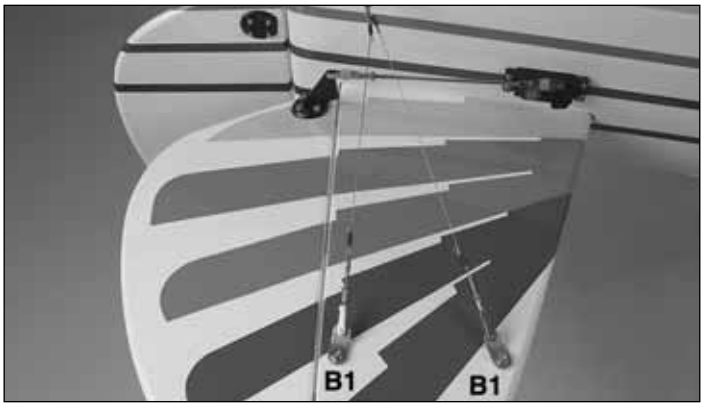
❏ 20. Observe whether the tail or nose drops, indicating a tail-heavy or nose-heavy situation. This will give you an indication of where to mount the receiver battery inside the fuselage to reduce or eliminate any additional lead ballast that would be required to balance the model. Make a mental note (or write it down on a piece of paper) whether you will be mounting the battery pack in front of, behind or directly below the cockpit.

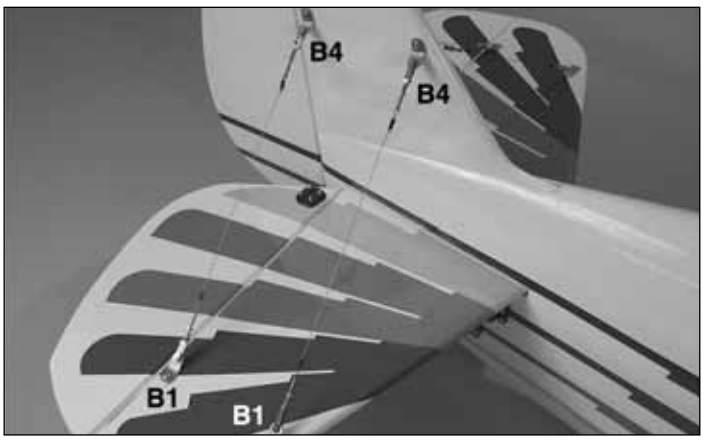
Mount the Flying Wires (Optional)

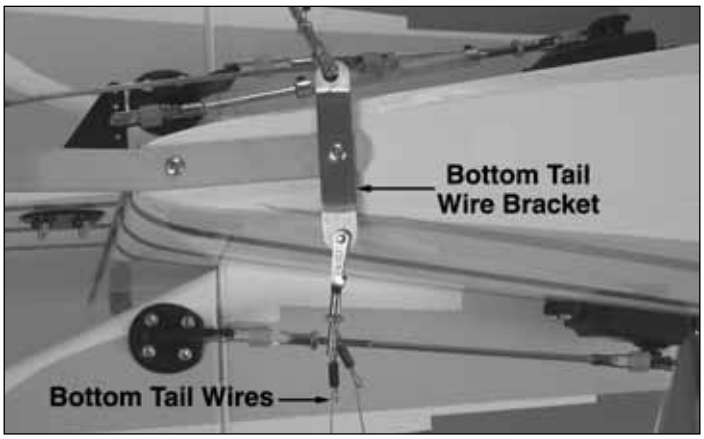


❑ 1. From clevis pin to clevis pin, measure the length of the wires supplied. The wires measuring 21-1/2" [545mm] are the **front** wing flying wires and go from the top wing down to the fuselage by the landing gear. The wires measuring 22-1/4" [565mm] are the **rear** wing flying wires and go from the bottom wing up to the top wing near the half-round cutout for the trailing edge over the cockpit. Fit and carefully adjust the length of all the wires for **equal tension**, then tighten the nuts on the brass couplers. **Note:** Silicone clevis retainers are provided for the clevises on all the flying wires. It isn't necessary to have the retainers installed during assembly and initial setup, but **make certain** the retainers are installed when flying the model. Otherwise, some of the clevises may detach from the brackets.

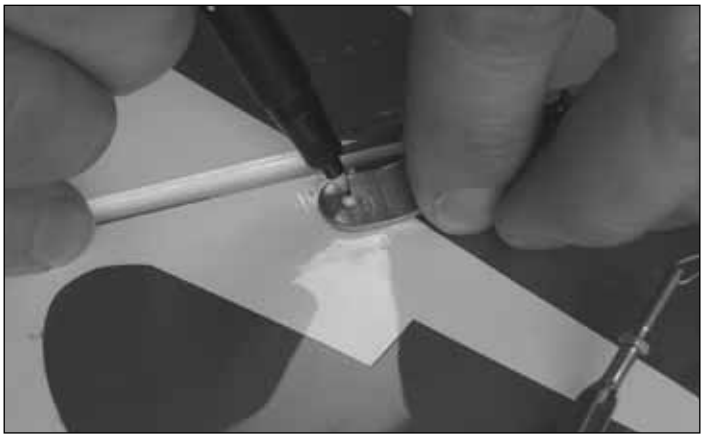
Refer to the following photos while mounting the tail wires.





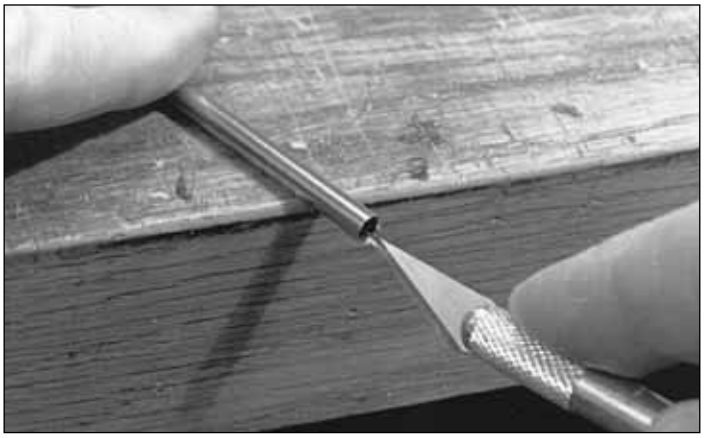


❑ 2. Mount the **bottom tail wire bracket** to the tail gear mount using the screw that is already in the front of the mount. Connect both double-wire bottom tail wires to the bracket.



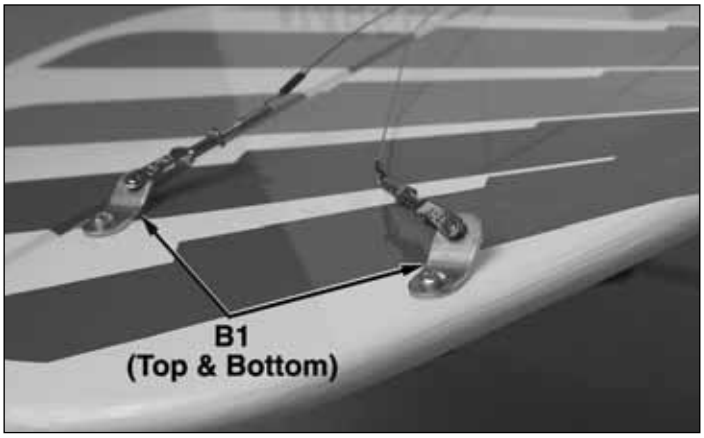
❑ 3. Connect four B1 metal brackets to each of the four clevises on the ends of the bottom wires. Use light tension to pull the bracket on one of the aft wires to the middle of the stabilizer trailing edge. Mark the hole in the bracket onto the stab.

❏ 4. Mark the rear bracket on the other side of the fuselage and both front brackets on the middle of the stab leading edge the same way.



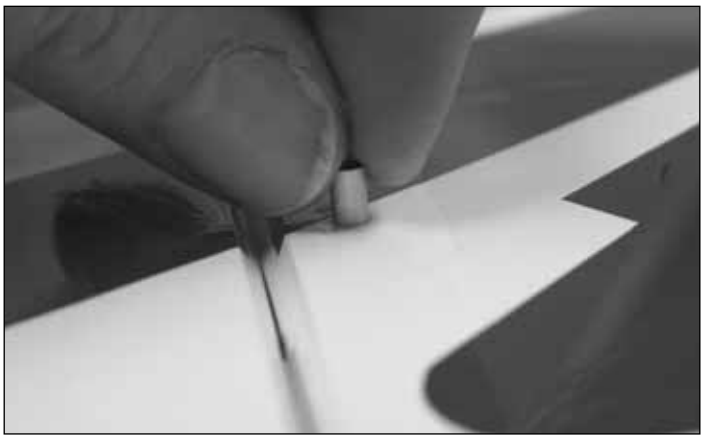
❏ 5. Use a file or a cut-off wheel to sharpen the outside of the included 5/32" x 4" [4 x 100mm] brass tube and a #11 blade to sharpen the inside of the tube. Now the tube can be used to cut through balsa.

❏ 6. Use the sharpened end of the tube to cut four holes in the stab at the marks you made. Twist the brass tube as you push it into the wood. Support the other side of the stab with a thick piece of balsa.



❏ 7. Use four 4-40 x 5/8" [16mm] Phillips-head screws and 4-40 nuts to **temporarily** mount the bottom B1 brackets (already on the wires) to the bottom of the stab and four more B1 brackets to the top of the stab at each hole.

❏ 8. Turn the fuselage over. Connect the remaining four **top tail wires** to the brackets on the top of the stab. The same way the holes were marked in the bottom of the stab, mount four **B4** brackets to the clevises on the ends of the top tail wires. Pull the brackets on one side of the stab up to the trailing and leading edge of the fin. Mark the locations of the holes. Cut the holes with the sharpened brass tube.



❏ 9. Now there are six holes in the tail surfaces—two in both sides of the stab and two in the fin. Roughen the brass tube with coarse sandpaper so glue will adhere. Use a rotary tool with a cutoff wheel to cut six 3/8" [10mm] pieces from the tube (cut the tubes slightly long, then use a metal file to square and debur the ends). Remove the screws and brackets from the stab, then use epoxy to glue the tubes into the holes (don't try to glue the brass tubes into the holes with CA—you'll mess it up!). Remove any excess epoxy with a paper towel square dampened with denatured alcohol.

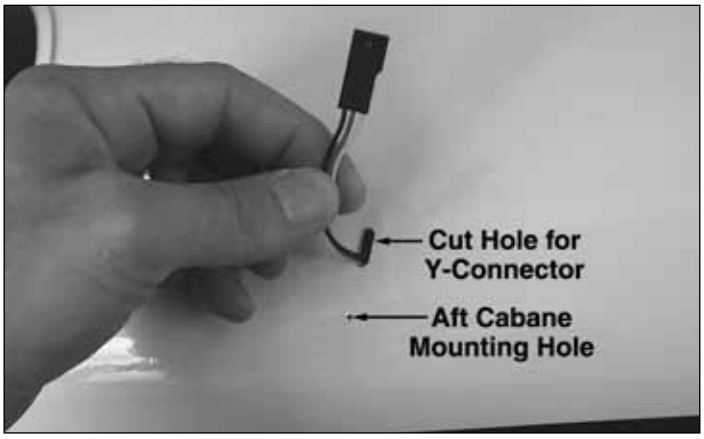
❏ 10. Remount all the brackets to the stab and fin. Use a small drop of threadlocker on all the 4-40 nuts. Adjust the length of all the flying wires to equalize the tension, then tighten the 2mm nuts on the brass couplers.

❏ 11. Return to step 19 and 20 on page 40 and test-balance the model.

DO NOT FORGET TO DO A FINAL C.G. CHECK AFTER THE MODEL HAS BEEN COMPLETED. REFER TO "BALANCE THE MODEL" AFTER APPLYING THE DECALS.

Install the Aileron Extension Cord

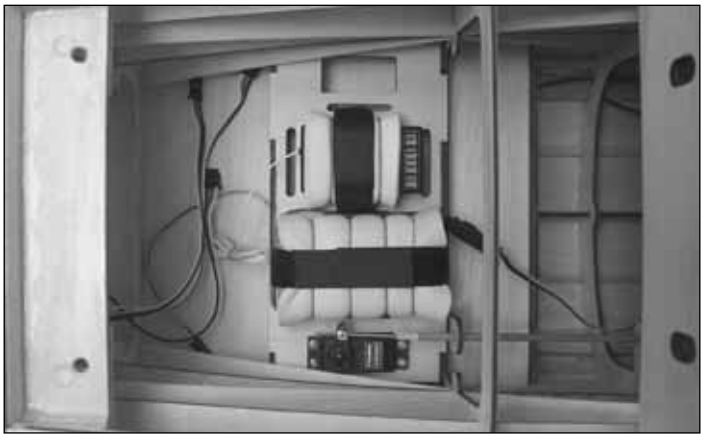
The method for connecting all four aileron servos to the receiver is to connect the two Y-connectors in the wings to a longer Y-connector (such as the Hobbico 24" [610mm] Y-connector, HCAM2751) in the fuselage. The Y-connector in the fuselage is then connected to the receiver.

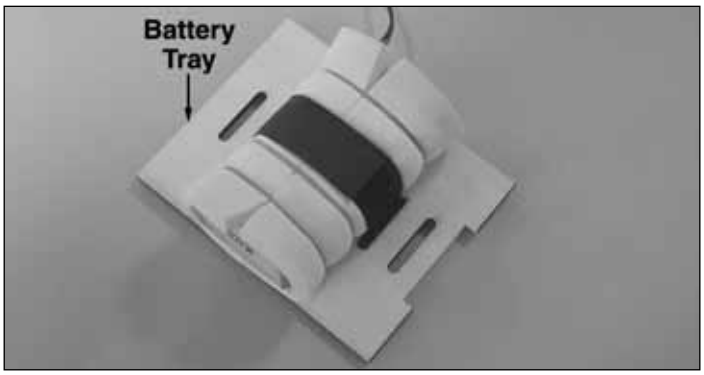


❏ 1. Carefully cut a small hole in the fuselage sheeting near one of the rear cabane struts for the Y-connector in the fuselage. Guide the Y-connector through the hole.

❏ 2. Use RTV silicone or a couple drops of medium CA to glue the plug to the underside of the cabane. Hold the servo wire to the cabane with a few wraps of white striping tape. Now it will be easy to connect and disconnect the ailerons in the top wing from the Y-connector in the fuselage.

Complete the Radio Installation





❏ 1. Determine where the receiver and battery pack will be mounted. The most convenient location for the receiver is on the servo tray, cushioned with R/C foam, using the supplied Velcro strips. Depending upon whether the model was nose-heavy or tail-heavy during the initial C.G. test, the battery could be mounted either on the servo tray or on the optional plywood **battery tray** in front of or behind the cockpit. Should you decide to mount the battery pack behind the cockpit, note the notches in the formers for the tray. Should you decide to mount the battery tray forward, it could be glued in any convenient location to the front of the fuselage. Be certain the battery does not interfere with installation or removal of the fuel tank.

❏ 2. Mount the on/off switch and charge jack. For our model a Great Planes Switch & Charge Jack Mounting Set (GPMM1000) was used so the battery pack could be easily charged and monitored from outside the fuselage without having to remove the wings. Connect all the servos/servo extensions to the receiver.

❏ 3. Route the receiver antenna down through the antenna tube inside the fuselage. Drill a small hole in the back of the fuselage for the antenna to exit. Use a small plastic pushrod tube or a piece of wire to guide the antenna through the hole.

Apply the Decals

The decals may be cut from the sheet and applied directly to the model, or they may be applied "wet" using the soap and water method described below. Applying the decals with soap and water allows for perfect positioning and eliminates ugly air bubbles that can be trapped under the decal.

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. Peel the backing from the decal while holding it under the solution.

3. Position the 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

Balance the Model (C.G.)

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

At this stage the model should be in ready-to-fly condition with all of the systems in place including the engine, landing gear, wheels and pants and the complete radio system.

❏ 1. If you have not already done so, accurately mark the **recommended C.G. location** and the **forward** and **aft** C.G. limits on the **bottom** of the **top wing** as described in step 1 on page 35 and below.

The recommended C.G. for the Christen Eagle II ARF is **6-1/8" [156mm]** back from the leading edge of the center section of the top wing. Your model should be balanced at the **recommended C.G. location** for the first flights. Later, you may wish to experiment by shifting the C.G. up to 3/4" [19mm] forward or 3/4" [19mm] 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 more 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.

When balancing a larger model such as this it is helpful to have an assistant. One person can lift the model and the other can view it from the side to determine whether or not it is level.

❏ 2. With the wings attached to the fuselage, all parts of the model installed (ready to fly) and an empty fuel tank, place one fingertip from each hand on the recommended balance point near both ends of the center panel and lift the model.

❏ 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. Usually, it is desirable to relocate the battery pack and receiver to minimize or eliminate any additional ballast required. But if only minimal weight is required to achieve the correct balance, a few extra ounces of ballast will not be noticed with a model of this size. 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. Never attach weight to the cowl—it is not intended to support weight. Begin by placing incrementally increasing amounts of weight on the cowl over the firewall or on the stab until the model balances. Once you have determined the amount of weight required, it can be permanently attached with wood screws and/or epoxy. If tail weight is required it could be permanently glued to the balsa tail block inside the bottom of the fuselage.

Note: Do not rely upon the adhesive on the back of the lead weight to permanently hold it in place. Over time, fuel and exhaust residue may soften the adhesive and cause the weight to fall off. Use #2 sheet metal screws, RTV silicone 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.

Check the Control Directions

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

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

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

Set the Control Throws

Use a Great Planes AccuThrow or a ruler to accurately measure and set the control throw of each control surface as indicated in the chart. **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
ELEVATOR:	1-7/8" [48mm] up 1-5/8" [41mm] down	1-3/8" [35mm] up 1" [25mm] down
RUDDER:	2-1/2" [64mm] right 2-1/2" [64mm] left	1-1/2" [38mm] right 1-1/2" [38mm] left
AILERONS:	1-1/8" [29mm] up 1-1/8" [29mm] down	5/8" [16mm] up 5/8" [16mm] down

IMPORTANT: The Great Planes Christen Eagle II ARF has been **extensively** flown and tested to arrive at the throws at which it flies best. Flying your model at these throws will provide you with the greatest chance for successful first flights. If, after you have become accustomed to the way the “Eagle” flies, you would like to change the throws to suit your taste, that is fine. However, too much control throw could make the model difficult to control, so remember, “more is not always better.”

Once the control throws have been set, be certain to tighten all the 4-40 nuts against the clevises on the pushrods.

Balance the Model Laterally

❑ 1. With the wings level, have an assistant help you lift the model by the engine propeller shaft and the bottom of the fuselage under the trailing edge 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 bottom wing tip on the other side of the model. **An airplane that has been laterally balanced will track better in loops and other maneuvers.**

PREFLIGHT

Identify Your Model

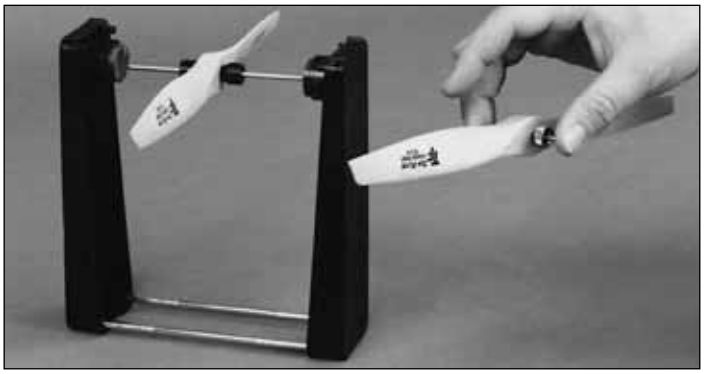
No matter if you fly at an AMA sanctioned R/C club site or if you fly somewhere on your own, you should always have your name, address, telephone number and AMA number on or inside your model. It is **required** at all AMA R/C club flying sites and AMA sanctioned flying events. Fill out the identification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

Charge the Batteries

You should always charge your transmitter and receiver batteries the night before you go flying and at other times as recommended by the radio manufacturer.

NOTE: Checking the condition of your receiver battery pack is **highly recommended**. All battery packs, whether it's a trusty pack taken out of another model, or a new battery pack recently purchased, should be cycled, noting the discharge capacity. Oftentimes, a weak battery pack can be identified (and a valuable model saved!) by comparing its actual capacity to its rated capacity. Refer to the instructions and recommendations that come with your cycler. If you don't own a battery cycler, perhaps you can have a friend cycle your pack and note the capacity for you. Should you wish to purchase a battery cycler, the **Great Planes *Triton*™ (GPMM3150)** charger/discharger/cycler is highly recommended as it will work with just about any type of battery used in 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 engine mounting screws and bolts loosen, possibly with disastrous effect, but vibration may also damage your radio receiver and battery. Vibration can also cause your fuel to foam, which will, in turn, cause your engine to run hot or quit.

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.

Don't forget to ream out your props to fit your engine before putting spares in your field box!

Ground Check

If the engine is new, follow the engine manufacturer's instructions to break-in the engine. After break-in, confirm that the engine idles reliably, transitions smoothly and rapidly to full power and maintains full power—indefinitely. After you run the engine on the model, inspect the model closely to make sure all screws remained tight, the hinges are secure, the prop is secure and all pushrods and connectors are secure. It may be a good idea to do initial engine runs without the cowl in place. For most installations, this will allow for easier needle valve adjustment and facilitate trouble-shooting if necessary. The plane could even be flown without the cowl until satisfied with engine performance. (But if test flying without the cowl, make sure your model still balances at the recommended C.G.)

Range Check

Ground check the operational range of your radio before the first flight of the day. With the transmitter antenna collapsed and the receiver and transmitter on, you should be able to walk at least 100 feet away from the model and still have control—but always refer to the manufacturer's instructions that came with your radio. Have an assistant stand by your model and, while you work the controls, tell you what the control surfaces are doing. Repeat this test **with the engine running** at various speeds with an assistant holding the model, using hand signals to show you what is happening. If the control surfaces do not respond correctly, **do not fly!** Find and correct the problem first. Look for loose servo connections or broken wires, corroded wires on old servo connectors, poor solder joints in your battery pack or a defective cell, or a damaged receiver crystal from a previous crash.

ENGINE SAFETY PRECAUTIONS

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

Keep all engine fuel in a safe place, away from high heat, sparks or flames, as fuel is very flammable. Do not smoke near the engine or fuel; and remember that engine exhaust gives off a great deal of deadly carbon monoxide. Therefore **do not run the engine in a closed room or garage**.

Get help from an experienced pilot when learning to operate engines.

Use safety glasses when starting or running engines.

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

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

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

Use a “chicken stick” or electric starter to start the engine. Do not use your fingers to flip the propeller. Make certain the glow plug clip or connector is secure so that it will not pop off or otherwise get into the running propeller.

Make all engine adjustments from behind the rotating propeller.

The engine gets hot! Do not touch it during or right after operation. Make sure fuel lines are in good condition so fuel will not leak onto a hot engine, causing a fire.

To stop a glow engine, cut off the fuel supply by closing off the fuel line or following the engine manufacturer's recommendations. Do not use hands, fingers or any other body part to try to stop the engine. To stop a gasoline powered engine an on/off switch should be connected to the engine coil. Do not throw anything into the propeller of a running engine.

AMA SAFETY CODE (EXCERPT)

Read and abide by the following Academy of Model Aeronautics Official Safety Code:

General

1. I will not fly my model aircraft in sanctioned events, air shows, or model flying demonstrations until it has been proven to be airworthy by having been previously successfully flight tested.

2. I will not fly my model aircraft higher than approximately 400 feet within 3 miles of an airport without notifying the airport operator. I will give right of way to and avoid flying in the proximity of full scale aircraft. Where necessary an observer shall be used 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.

7. I will not fly my model unless it is identified with my name and address or AMA number, on or in the model.

9. 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. I will perform my initial turn after takeoff away from the pit or spectator areas and I will not thereafter fly over pit or spectator areas, unless beyond my control.

4. I will operate my model using only radio control frequencies currently allowed by the Federal Communications Commission.

IMAA SAFETY CODE (EXCERPT)

Definition:

For the purpose of the following IMAA Safety Code, the term Giant Scale shall refer to radio controlled model aircraft, either scale or non-scale, which have a wingspan of 80 inches or more for monoplanes and 60 inches or more for multi-winged model aircraft and have a ramp weight (fueled and ready to fly) of 55 lbs. or less.

Section 1.0: SAFETY STANDARD

1.1 Adherence to Code: This safety code is to be strictly followed.

1.2 The most current AMA Safety Code in effect is to be observed. However, the competition sections of the code may be disregarded.

Section 3.0: Safety Check

3.4 Flight Testing: All Giant Scale R/C aircraft are to have been flight tested and flight trimmed with a minimum of six flights before the model is allowed to fly at an IMAA Sanctioned event.

3.5 Proof of Flight: The completing and signing of the Declaration section of the Safety Inspection form by the pilot (or owner) shall document as fact that each aircraft has been successfully flight-tested and proven airworthy prior to an IMAA event.

Section 5.0: EMERGENCY ENGINE SHUT OFF (kill switch)

5.1 All magneto spark ignition engines must have a coil grounding switch on the aircraft to stop the engine. This will also prevent accidental starting of the engine. This switch shall be readily available to both pilot and helper. This switch is to be operated manually and without the use of the radio system.

5.2 Engines with battery power ignition systems must have a switch to turn off the power from the battery pack to disable the engine from firing. This will also prevent accidental starting of the engine. This switch shall be readily available to both pilot and helper. This switch shall be operated manually and without the use of the Radio System.

5.3 There must also be a means to stop the engine from the transmitter. The most common method is to close the carburetor throat completely using throttle trim, however, other methods are acceptable. This requirement applies to all glow/gas ignition engines regardless of size.

Section 6.0: RADIO REQUIREMENTS

6.1 All transmitters must be FCC type certified.

6.2 FCC Technician or higher-class license required for 6 meter band operation only.

Additional IMAA General Recommendations

The following recommendations are included in the Safety Code not to police such items, but rather to offer basic suggestions for enhanced safety.

Servos need to be of a rating capable to handle the loads that the control surfaces impose upon the servos. Standard servos are not recommended for control surfaces. Servos should be rated heavy-duty. For flight-critical control functions a minimum of 45 inch/ounces of torque should be considered. This should be considered a minimum for smaller aircraft and higher torque servos are strongly encouraged for larger aircraft. The use of one servo for each aileron and one for each elevator half is strongly recommended. Use of dual servos is also recommended for larger aircraft.

On-board batteries shall be 1000 mAh up to 20 lbs., 1200 mAh to 30 lbs., 1800 mAh to 40 lbs. and 2000 mAh over 40 lbs. flying weight. The number and size of servos, size and loads on control surfaces and added features should be considered as an increase to these minimums. Batteries should be able to sustain power to the onboard radio components for a minimum of one hour total flying time before recharging.

Redundant and fail-safe battery systems are recommended.

The use of anti-glitch devices for long leads are recommended.

There is no maximum engine displacement limit, as it is the position of this body that an underpowered aircraft presents a greater danger than an overpowered aircraft. However, the selection of engine size relative to airframe strength and power loading mandates good discretionary judgment by the designer and builder. Current AMA maximums for engine displacement are 6.0 cu. in. for two-stroke and 9.6 cu. in. for four-stroke engines. These maximums apply only to AMA Sanctions concerning competition events (such as 511, 512, 515 and 520) and, as such, the maximums apply. All IMAA (non competition) events should be sanctioned as Class “C” events, in which these engine size maximums do not apply.

Generally, it is recommended that no attempt should be made to fly a radio controlled model aircraft with a gasoline engine in which the model aircraft weight would exceed twelve (12) pounds (underpowered) per cubic inch of engine displacement, or be less than five (5) pounds (overpowered) per cubic inch of engine displacement. Example: Using a 3 cu. in. engine, a model would likely be underpowered at an aircraft weight greater than 36 pounds. With the same engine, an aircraft weighing less than 15 pounds would likely be overpowered.

Servo arms and wheels should be rated heavy duty. Glass-filled servo arms and control horns are highly recommended. Control surfaces linkages are listed in order of preference:

1. Cable system (pull-pull). A tiller bar is highly recommended along with necessary bracing.

2. Arrow Shaft, fiberglass or aluminum, 1/4" or 5/16" O.D. bracing every six (6) to ten (10) inches is highly recommended.

3. Tube-in-tube (nyrod). Bracing every few inches is highly recommended. Inner tube should be totally enclosed in outer tube.

4. Hardwood dowel, 3/8" O.D. bracing every six (6) to ten (10) inches is highly recommended.

Hinges should be rated heavy duty and manufactured for Giant Scale use primarily. Homemade and original design hinges are acceptable if determined to be adequate for the intended use.

Clevis (steel, excluding heavy-duty ball links) and attachment hardware should be heavy duty 4-40 threaded rod type. 2-56 threaded size rod is acceptable for some applications (e.g. throttle). Clevis is to have lock nuts and sleeve or spring keepers.

Propeller tips should be painted or colored in a visible and contrasting manner so as to increase the visibility of the propeller tip arc.

End of IMAA Safety Code

CHECKLIST

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 checklist 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. Fuelproof all areas exposed to fuel or exhaust residue such as the cowl ring, wing saddle area, etc.
❏ 2. Check the C.G. according to the measurements provided in the manual.
❏ 3. Be certain the battery and receiver are securely mounted in the fuse. Simply stuffing them into place with foam rubber is not sufficient.
❏ 4. Extend the receiver antenna. Make sure the antenna has a strain relief inside the fuselage to keep tension off the solder joint inside the receiver.
❏ 5. Balance the model *laterally* as explained in the instructions.
❏ 6. Use thread locking compound to secure critical

fasteners such as the screws that hold the wheel collars on, screws that hold the carburetor arm (if applicable), screw-lock pushrod connectors, etc.

❏ 7. Add a drop of oil to the axles so the wheels will turn freely.

❏ 8. Make sure all hinges are **securely** glued in place by pulling hard on the control surfaces.

❏ 9. Reinforce holes for wood screws with thin CA where appropriate (servo mounting screws, metal bracket mounting screws, etc.).

❏ 10. Confirm that all controls operate in the correct direction and the throws are set up according to the manual.

❏ 11. Make sure there are silicone retainers on all the clevises and that all servo arms are secured to the servos with the screws included with your radio.

❏ 12. Secure connections between servo wires and Y-connectors or servo extensions and the connection between the battery pack and the on/off switch with vinyl tape, heat shrink tubing or special clips suitable for that purpose.

❏ 13. Make sure any servo extension cords used do not interfere with other systems (servo arms, pushrods, etc.).

❏ 14. Secure the pressure tap (if used) to the muffler with high temp RTV silicone, thread locking compound or J.B. Weld.

❏ 15. Make sure the fuel lines are connected and are not kinked.

❏ 16. Balance your propeller (and spare propellers). Use a prop reamer to enlarge the mounting hole so the propellers fit on your engine.

❏ 17. Tighten the propeller nut and spinner.

❏ 18. Place your name, address, AMA number and telephone number on or inside the model.

❏ 19. Cycle the receiver battery pack (if necessary) and make sure it is fully charged.

❏ 20. If you wish to photograph your model, do so before the first flight.

❏ 21. Range check the radio when you get to the flying field.

FLYING

The Christen Eagle II ARF is a great-flying model that flies smoothly and predictably. It is, however, an aerobatic biplane and does not possess the self-recovery characteristics of a primary R/C trainer and should be flown only by experienced R/C pilots.

Fuel Mixture Adjustments

Fuel Mixture Adjustments

Fully-cowled engines often run at higher temperatures than un-cowled engines. For this reason, the fuel mixture should be richened so the engine runs at about 200 rpm below peak speed. By running the engine slightly rich, you will help prevent dead-stick landings caused by overheating.

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.

If flying with the optional flying wires, make sure the retainers have been installed on all the flying wire clevises.

Takeoff

Before taking off, see how the model handles on the ground by doing a few practice runs at **low speeds** on the runway. Hold "up" elevator to keep the tail wheel on the ground. If necessary, adjust the tail wheel pushrod so the model will roll straight down the runway. If you need to "regroup" before the first takeoff, shut the engine down and bring the model back into the pits. Top off the fuel, then check all fasteners and control linkages for peace of mind.

Remember to takeoff into the wind. When ready, point the model straight down the runway, hold a bit of up elevator to keep the tail on the ground to maintain tail wheel steering, then rapidly, but **smoothly** advance the throttle (but also, don't ***slam*** it!). As the model gains speed decrease up elevator allowing the tail to come off the ground. One of the most important things to remember with a tail dragger is to always be ready to apply **right** rudder to counteract engine torque. Gain as much speed as your runway and flying site will practically allow before gently applying up elevator, lifting the model into the air. At this moment more right rudder may be required to counteract engine torque. Be smooth on the elevator stick, allowing the model to establish a **gentle** climb to a safe altitude before turning into the traffic pattern. Stay alert but rest assured that if your Eagle has been balanced and otherwise setup correctly, it will fly quite predictably.

Flight

For reassurance and to keep an eye on other traffic, it is a good idea to have an assistant on the flight line with you. Tell him to remind you to throttle back a little once the plane gets to a comfortable altitude. While full throttle is usually desirable for takeoff, full throttle is usually not required for straight-and-level flight.

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

Landing

One of the keys to landing a giant-scale model is to maintain sufficient airspeed throughout the landing approach. An unusually high airspeed is not necessary, but those unfamiliar with landing giant-scale models are sometimes deceived by the model's larger size. Larger models often appear to be closer than they actually are. Additionally, most giant-scale models slow down rapidly, thus causing the uninitiated to land short. To avoid this initial illusion, make your landing pattern closer than you normally might for a .40-size sport model. Also, don't pull the throttle all the way back and leave it there the way you normally would. Instead, momentarily pull the throttle all the way back, but then advance it a "click" or two to keep the engine RPM up and maintain airspeed. Once over the runway you can cut the throttle the rest of the way and the model will slow for the landing flare.

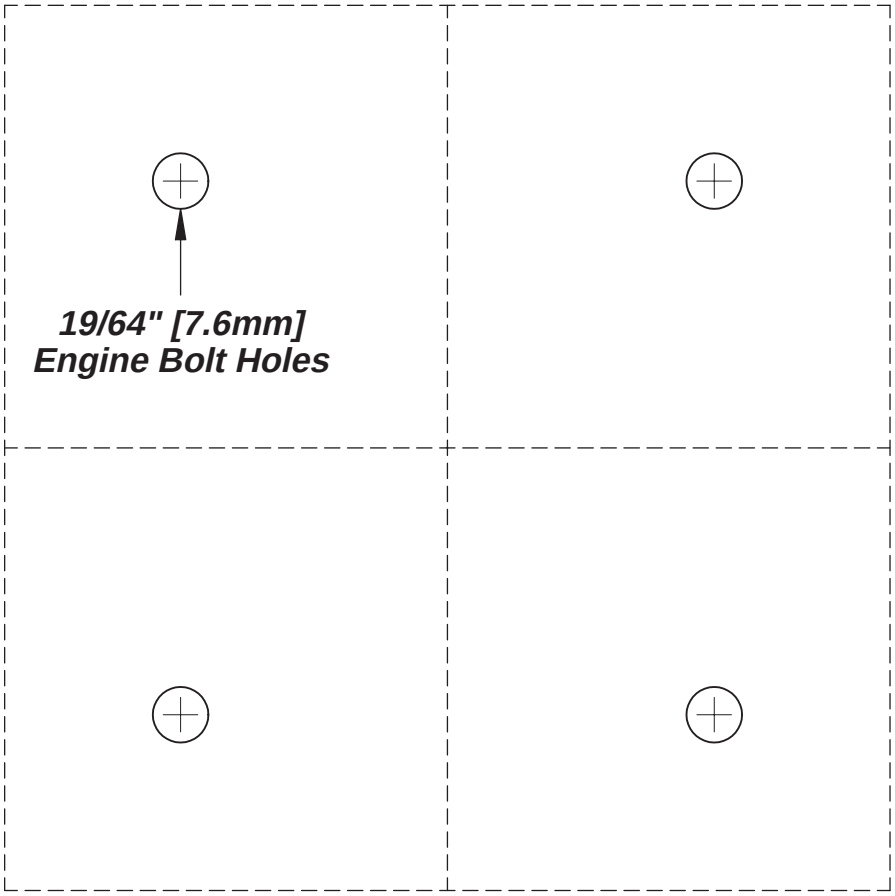
To initiate a landing approach, lower the throttle while on the downwind leg. Allow the nose of the model to pitch downward, simultaneously losing altitude while maintaining airspeed. Continue to lose altitude and keep the nose down as you turn onto the crosswind leg. Make your final turn toward the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

One final note about flying your Christen Eagle. Have a goal or flight plan in mind for **every** flight. The goal could be learning a new maneuver, perfecting known maneuvers, 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 without any planning. Every maneuver should be deliberate. For example, if you're going to do a loop, plan it out—check your altitude, mind the wind direction (anticipating rudder corrections that will be required to maintain heading), remember to throttle back on the down side and make certain you are on the desired rates (high/low rates). A flight plan greatly reduces the chances of crashing just because of poor planning and impulsive moves. **Remember to think!**

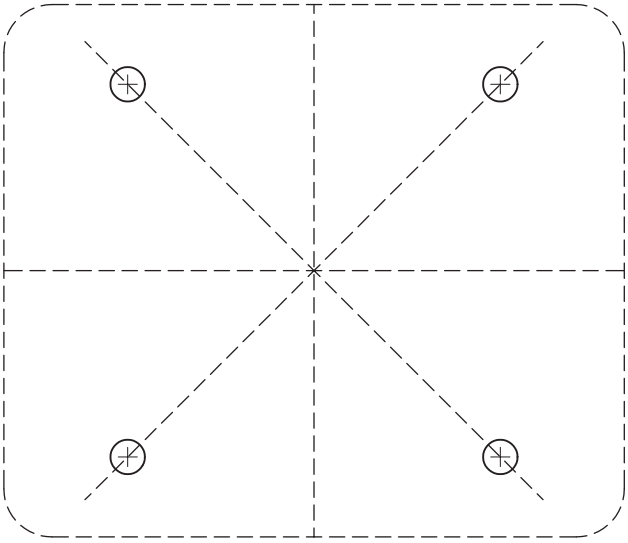
Have a ball!
But always stay in control and fly in a safe manner.

GOOD LUCK AND GREAT FLYING!

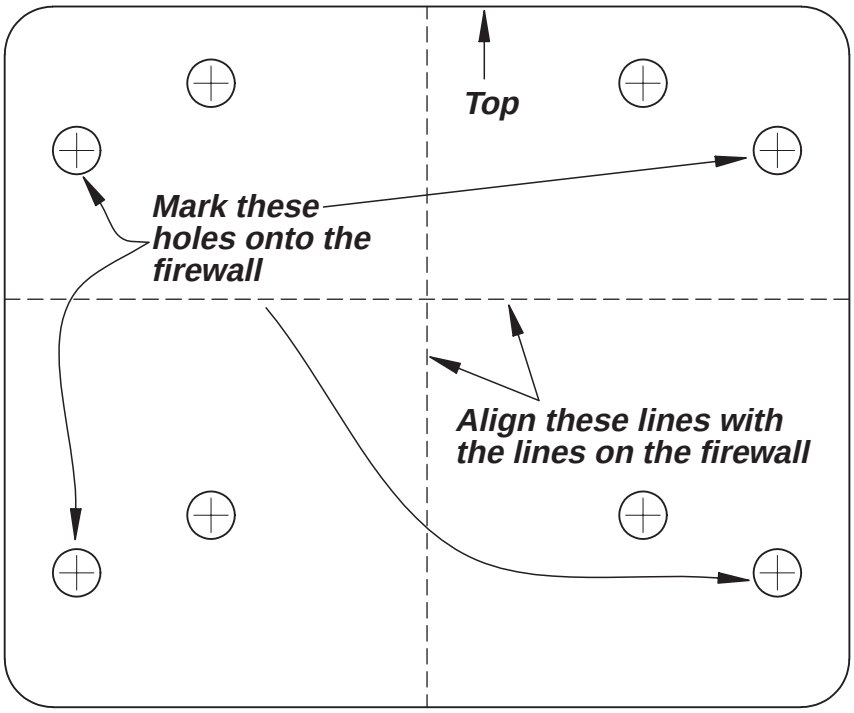
Fuji BT-50SA Engine Mounting Bolt Pattern



Glow Engine Mounting Bolt Pattern



US Engines 41cc Engine Mount Template
All holes are 1/4" [6.4mm] diameter.



OTHER ITEMS AVAILABLE FROM GREAT PLANES

Fuji BT-50SB Gasoline Engine

A gasoline engine designed specifically for model airplanes, the BT-50SB has all of the performance features that Fuji engines are known for - with upgrades for effortless starting! The included Walbro carb has a butterfly choke valve that s easier to use than a slide-valve carb. A direct linkage throttle setup provides faster, more accurate response than a bell crank system. Powerful Mighty Mag magnets on the flywheel work with the Automatic Timing Module (ATM) to provide extra-easy hand starting by starting with low timing that eliminates kickbacks. Timing increase automatically as rpm increase for more in-flight power. The result? A power plant that s superior to any other comparably sized gasoline engine in dependability and smooth operation! **FJIG0047**

Includes: Walbro butterfly carburetor, Champion RCJ6Y resistor spark plug, muffler, mount for (optional) spring starter

Recommended Prop: 21 x 10 carbon @ 7000 rpm; 20 x 10 wood @ 7000 rpm; 20 x 10 carbon @ 7400 rpm

Displacement: 3.0 cu in (46.5cc)
Total rpm range: 1200-10,000
Output: 5.2 hp @ 10,000 rpm
Weight w/muffler: 4.2 lb

Top Flite® Power Point® Propellers

Top Flite Power Point Propellers give you a visible power boost, no matter what your aircraft application may be. Strict manufacturing quality controls and tight tolerances in design and tooling give Power Point props true, constant pitch throughout the entire blade diameter. This, combined with lower rotational mass, provides greater thrust at any rpm and less overall engine wear. Stiffer than nylon, lighter than maple, these fuelproofed beechwood props also feature a swept tip design which reduces prop howl for quieter flying. **TOPQ5000-5720**

OTHER ITEMS AVAILABLE FROM GREAT PLANES

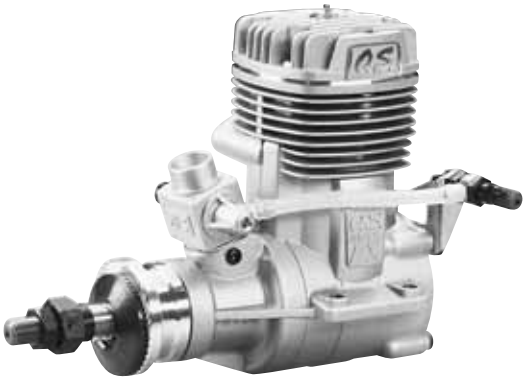
Stock #	**FUTJ85****
Tx	**9CAF**
Rx	**R148DF**
Servos	**(4) S3004**
Tx NiCd	**700mAh**
Rx NiCd	**600mAh**
Band	**50, 72**
Modulation	**FM**

Stock #	**FUTJ87****
Tx	**9CAP**
Rx	**R149DP**
Servos	**(4) S3001**
Tx NiCd	**700mAh**
Rx NiCd	**600mAh**
Band	**50, 72**
Modulation	**PCM**

Futaba® 9C 9-Channel Radio Systems

The 9C radios include such popular Futaba system features as governor mixing (a Futaba exclusive), switch assignability, factory programming for airplanes, helis and sailplanes, Mode 1-4 selection and expandable CAMPac model memory...PLUS 8-character model naming, improved graphics displays, 2 slider switches, a larger LCD and Futaba s most user-friendly programming ever! The top left button pulls up the home page, basic and expanded menus; the bottom button finalizes settings. Right buttons move the cursor up and down to the values you want...and the dial does the rest. Rotate the dial to find functions; press to select. Your choices appear on the LCD. 700mAh Tx and 600mAh Rx NiCds add value. 1-year warranty.

Weight w/o Muffler: 32.6 oz
Practical RPM Range: 1,800-10,000
BHP @ RPM: 3.7 @ 9,000



O.S. Engines® 1.60 FX Ringed Engines

OSMG0660 1.60 FX Ringed with Muffler
OSMG0661 1.60 FX Ringed without Muffler

The 1.60 FX features dual ball bearings for durability and smooth operation, plus a low crankcase profile that allows for a proportionally taller, semi-squared head - a design refinement that increases cooling fin area and improves heat dispersion. The threaded portion of the crankshaft is extra-long for more secure prop and spinner nut engagement, and the needle valve is remotely mounted for safety during adjustments. The high-speed needle can also be mounted horizontally, vertically, or separate from the engine for more installation options! Both styles include glow plug and 2-year warranty.

Weight w/o Headers: 64.5 oz
Practical RPM Range: 1,800-9,000
BHP @ RPM: 4.0 @ 7,000

O.S. Engines® FT-300 Twin 4-Stroke Engine

The advantages of the FT-300 go well beyond its incredibly realistic looks and sound. Ringed piston construction boosts durability, while ball bearings minimize friction and wear. Efficient carburetion adds reliability and fuel economy. Low vibration levels protect your airframe. This is O.S. Engines largest horizontally opposed, flat twin, and it includes mount, glow plugs, glow plug extension cables, locking prop nut assemblies, headers, AND a 2-year warranty! **OSMG1250**

Computer-controlled for the ultimate in charging versatility and precision.

ElectriFly by Great Planes® Triton Peak Charger

Imagine a charger so versatile it can be used with lithium-ion and lead-acid batteries as effectively as NiCd and NiMH cells. A unit that can peak charge tiny park flyer packs and 24V car batteries alike. A charger that can discharge as well as charge, cycle packs from 1 to 10 times automatically, memorize peak and average battery voltages for each cycle - and constantly display battery capacity, voltage, current and time as each cycle progresses. Then, imagine that the charger, which can do all this, is about the size of a thick paperback book, and weighs just over a pound. The advanced computer technology in the Triton Peak Charger makes it possible to accomplish all this and more, through controls and menus so simple that programming is a breeze. For more information, log on at www.electrifly.com - and be amazed. 1-year warranty. **GPMM3150**

BUILDING NOTES

Kit Purchased Date: _____

Where Purchased:_____

Date Construction Started: _____

Date Construction Finished: _____

Finished Weight: _____

Date of First Flight: _____

FLIGHT LOG