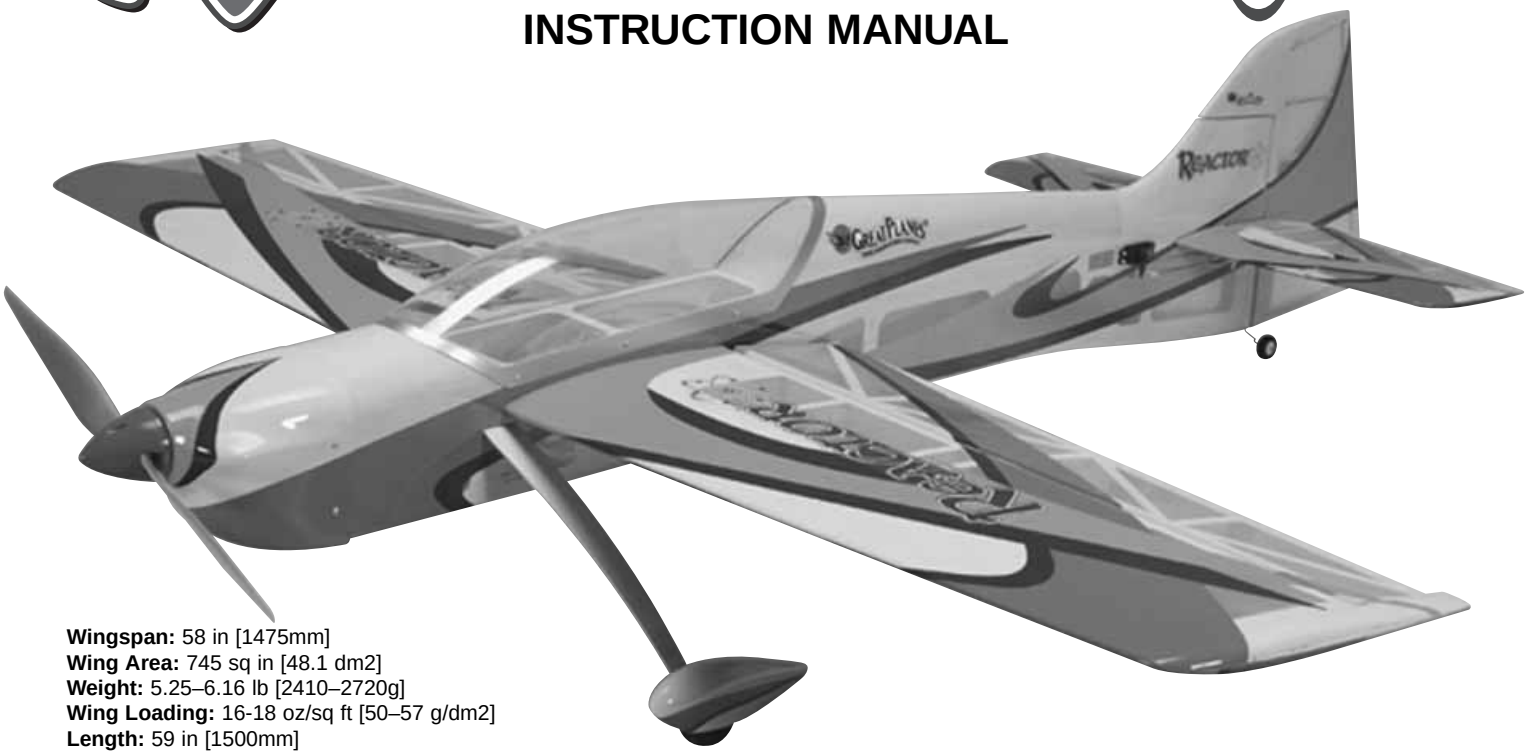
REACTOR

INSTRUCTION MANUAL



Wingspan: 58 in [1475mm]
Wing Area: 745 sq in [48.1 dm2]
Weight: 5.25–6.16 lb [2410–2720g]
Wing Loading: 16-18 oz/sq ft [50–57 g/dm2]
Length: 59 in [1500mm]
Radio: 4-channel minimum with (5) 50 oz/in high-torque standard/mini servos
Power System: RimFire™ 42-60-480kV Out-runner brushless motor with 60A brushless ESC and two 11.1V, 3200mAh LiPo batteries (in series), or .46-.51 cu in [7.5cc] two-stroke, or .70 cu in [11.5cc] four-stroke

WARRANTY

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

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

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

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

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

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

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

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

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INTRODUCTION

Stepping up in size from its smaller counterpart, the Reactor EP, is the Reactor .46 3D ARF. Full accommodations for brushless and glow engine power plants make this plane builder-friendly for both types of modelers. Using either recommended engine/motor system, the Reactor .46 3D ARF has all the power needed to fly virtually any aerobatic maneuver with authority. Then turn the control throws down for some smooth pattern flying. The semi-transparent covering with bold, contrasting accent stripes will draw onlookers before you even get in the air!

For the latest technical updates or manual corrections to the Reactor .46 3D ARF visit the Great Planes web site at www.greatplanes.com. Open the “Airplanes” link, then select the Reactor ARF. If there is new technical information or changes to this model a “tech notice” box will appear in the upper left corner of the page.

AMA

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

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

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

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

1. Your Reactor .46 3D ARF should not be considered a toy, but rather a sophisticated, working model that functions very much like a full-size airplane. Because of its performance capabilities, the Reactor, 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 an experienced pilot or have not flown this type of model before, we recommend that you get the assistance of an experienced pilot in your R/C club for your first flights. If you're not a member of a club, your local hobby shop has information about clubs in your area whose membership includes experienced pilots.

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

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

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

DECISIONS YOU MUST MAKE

This is a partial list of items required to finish the Reactor .46 3D ARF that may require planning or decision making before starting to build. Order numbers are provided in parentheses.

Radio Equipment

The Reactor .46 3D ARF requires a minimum 4-channel radio system with two 50 oz.-in. [3.6 kg-cm] minimum **mini** servos for the ailerons, and three 50 oz.-in. [3.6 kg-cm] minimum **mini** or **standard** servos for the elevators and rudder. If you are installing a glow engine, one standard torque servo (**mini** or **standard** size) is required for the throttle. Extensive flight testing has determined that optimum performance is achieved by using Futaba S9650 digital high-torque mini servos for all control surfaces. Digital servos are highly recommended for the Reactor. Depending on the model servos being used, the servo bays may need to be enlarged. An Illustration is provided in the building section as a guide to enlarging the bays. A variety of servo models and their order numbers that would be suitable for the Reactor are listed below.

In addition, three 24" [610mm] servo extensions, two 12" [305mm] servo extensions, and two 6" [152mm] are required for the aileron, elevator, and rudder servos. If you are using a radio system that does not support mixing functions, two Y-harnesses (one reversing) will also be required to connect the aileron servos and elevator servos to the receiver.

The following are suitable servos for the elevators and rudder (3 required):

- ❏ Futaba® S9650 Digital Mini Servo (FUTM0260)
- ❏ Futaba S9001 Servo Aircraft Coreless BB (FUTM0075)
- ❏ Futaba S3010 Standard High-Torque Servo (FUTM0043)
- ❏ Futaba S3152 Servo Digital Std Hi-Torque (FUTM0311)
- ❏ Hobbico® CS-35MG High-Power Metal Gear Mini Servo (HCAM0121)
- ❏ Hobbico CS-35 Servo High-Power Mini BB (HCAM0120)
- ❏ Hobbico CS-64 Servo High-Torque Standard 2BB (HCAM0165)
- ❏ Hobbico CS-70MG Servo Super-Torque 2BB (HCAM0191)

The following are suitable servos for ailerons (2 required):

- ❏ Futaba S9650 Digital Mini Servo (FUTM0260)
- ❏ Hobbico CS-35MG High-Power Metal Gear Mini Servo (HCAM0121)
- ❏ Hobbico CS-35 Servo High-Power Mini BB (HCAM0120)

Any of the servos listed above can be used as a throttle servo for glow engine installations, also including the Futaba S3101 Servo Micro Precision (FUTM0033).

The following extensions are required:

- ❏ (3) Hobbico Pro™ HD Extension 24" Futaba J (HCAM2721)
- ❏ (2) Hobbico Pro HD Extension 12" Futaba J (HCAM2711)
- ❏ (2) Hobbico Pro HD Extension 6" Futaba J (HCAM2701)

If your radio is not capable of mixing, you will also need:

- ❏ (1) Hobbico Y-Harness Futaba J (HCAM2500)
- ❏ (1) EMS Servo Reverser, Futaba J (EMOM0027)

Power System Recommendations

The recommended engine/motor size for the Reactor .46 3D ARF is a .46-.51 two-stroke, .70 four-stroke, or a RimFire C42-60-480kV brushless out-runner motor. Engine and motor order numbers are provided below:

- ❑ O.S.® .46 AX 2-Stroke ABL w/Muffler (OSMG0547)

- ❑ O.S. FS-70 II Surpass™ 4-Stroke (OSMG0872)
- ❑ O.S. Exhaust Manifold Inside FS-70/FS-91 (OSMG2624) *This manifold is optional and will route the muffler along the bottom of the fuselage to avoid having to cut a muffler hole in the cowl.*

- ❑ Great Planes RimFire 42-60-480 Brushless Motor (GPMG4715)
- ❑ Great Planes Brushless Motor Mount Medium Motors (GPMG1255)
- ❑ Great Planes Silver Series 60 (SS-60) ESC (GPMM1850)

Batteries and Charger

For a brushless motor installation, two 3200mAh 11.1V Lithium Polymer battery packs connected in series are recommended. Order numbers for the battery packs and a series connector adapter are provided below:

- ❑ (2) Great Planes LiPo 3200mAh 11.1V 20C Discharge w/Balance (GPMP0623)
- ❑ Series adapter Deans Ultra Plugs (GPMM3143)

A cell balancer is required for the battery pack listed above:
- ❑ Great Planes ElectriFly Equinox LiPo Cell Balancer 1-5 (GPMM3160)

A suitable LiPo charger is also required:
- ❑ Great Planes PolyCharge4 DC Only 4 Output LiPo Charger (GPMM3015), or
- ❑ Great Planes ElectriFly Triton DC Comp Peak Charger (GPMM3150)

ADDITIONAL ITEMS REQUIRED

Hardware and Accessories

This is the list of hardware and accessories required to finish the Reactor .46 3D ARF. Order numbers are provided in parentheses:

- ❑ R/C foam rubber (1/4" [6mm] – HCAQ1000, or 1/2" [13mm] – HCAQ1050)
- ❑ 3' [900mm] standard silicone fuel tubing (GPMQ4131)

Adhesives and Building Supplies

This is the list of Adhesives and Building Supplies that are required to finish the Reactor .46 3D ARF:

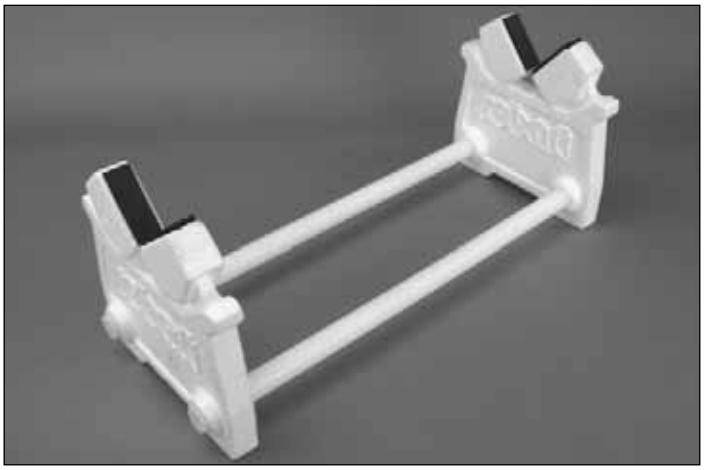
- ❑ 1/2 oz. [15g] Thin Pro CA (GPMR6001)
- ❑ 1/2 oz. [15g] Medium Pro CA+ (GPMR6007)
- ❑ Pro 30-minute epoxy (GPMR6047)
- ❑ Masking tape (TOPR8018)
- ❑ Threadlocker thread locking cement (GPMR6060)
- ❑ Denatured alcohol (for epoxy clean up)
- ❑ Drill bits: 1/16" [1.6mm], 5/64" [2mm], 3/32" [2.4mm], 3/16" [4.8mm]
- ❑ 6-32 tap and drill set (GPMR8102) (Glow Engine)
- ❑ Tap handle (GPMR8120) (Glow Engine)
- ❑ Small metal file
- ❑ #1 Hobby knife (HCAR0105)
- ❑ #11 blades (5-pack, HCAR0211)
- ❑ Medium T-pins (100, HCAR5150)
- ❑ Top Flite® MonoKote® sealing iron (TOPR2100)
- ❑ Top Flite Hot Sock™ iron cover (TOPR2175)

Optional Supplies and Tools

Here is a list of optional tools that will help you build the Reactor .46 3D ARF:

- ❑ 2 oz. [57g] spray CA activator (GPMR6035)
- ❑ 4 oz. [113g] aerosol CA activator (GPMR6034)
- ❑ CA applicator tips (HCAR3780)
- ❑ CA debonder (GPMR6039)
- ❑ Epoxy brushes 6, (GPMR8060)
- ❑ Mixing sticks (GPMR8055)
- ❑ Mixing cups (GPMR8056)
- ❑ Pliers with wire cutter (HCAR0630)
- ❑ Hobbico Duster™ can of compressed air (HCAR5500)
- ❑ Ernst Charge Receptacle Futaba J (ERNM3001)
- ❑ Panel Line Pen (TOPQ2510)
- ❑ Rotary tool such as Dremel®
- ❑ Rotary tool reinforced cut-off wheel (GPMR8200)
- ❑ Servo horn drill (HCAR0698)
- ❑ Hobby Heat™ micro torch (HCAR0755)
- ❑ Dead Center™ Engine Mount Hole Locator (GPMR8130)
- ❑ AccuThrow™ Deflection Gauge (GPMR2405)
- ❑ CG Machine™ (GPMR2400)
- ❑ Precision Magnetic Prop Balancer (TOPQ5700)
- ❑ Hobbico Flexible 18" Ruler Stainless Steel (HCAR0460)
- ❑ Top Flite MonoKote trim seal iron (TOPR2200)
- ❑ Top Flite MonoKote heat gun (TOPR2000)
- ❑ Hobbico Pin Vise 1/16 Collet w/6 Bits (HCAR0696)
- ❑ Hobbico 8-Piece Ball Tip Hex L Wrench SAE (HCAR0520)
- ❑ Great Planes Precision Prop Reamer Standard (GPMQ5006)
- ❑ Great Planes Precision Prop Reamer Metric (GPMQ5007)

Building Stand



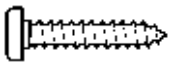
A building stand or cradle comes in handy during the build. We use the Robart Super Stand II (ROBP1402) for all our projects and it can be seen in pictures throughout this manual.

IMPORTANT BUILDING NOTES

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

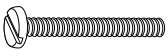
Sheet metal screws are designated by a number and a length. For example #6 x 3/4" [19mm]

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



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

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



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

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

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

• Whenever the term ***glue*** is written you should rely upon your experience to decide what type of glue to use. When a specific type of adhesive works best for that step, the instructions will make a recommendation.

• Whenever just ***epoxy*** is specified you may use ***either*** 30-minute (or 45-minute) epoxy ***or*** 6-minute epoxy. When 30-minute epoxy is specified it is **highly** recommended that you use only 30-minute (or 45-minute) epoxy, because you will need the working time and/or the additional strength.

• **Photos** and **sketches** are placed **before** the step they refer to. Frequently you can study photos in following steps to get another view of the same parts.

• The stabilizer and wing incidences and engine thrust angles have been factory-built into this model. However, some technically-minded modelers may wish to check these measurements anyway. To view this information visit the web site at **www.greatplanes.com** and click on "Technical Data." Due to manufacturing tolerances which will have little or no effect on the way your model will fly, please expect slight deviations between your model and the published values.

ORDERING REPLACEMENT PARTS

Replacement parts for the Great Planes Reactor .46 3D ARF are available using the order numbers in the **Replacement Parts List** that follows. The fastest, most economical service can be provided by your hobby dealer or mail-order company.

To locate a hobby dealer, visit the Hobbico web site at **www.hobbico.com**. Choose "Where to Buy" at the bottom of the menu on the left side of the page. Follow the instructions provided on the page to locate a U.S., Canadian or International dealer.

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

Mail parts orders and payments by personal check to:

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

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

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

Replacement Parts List

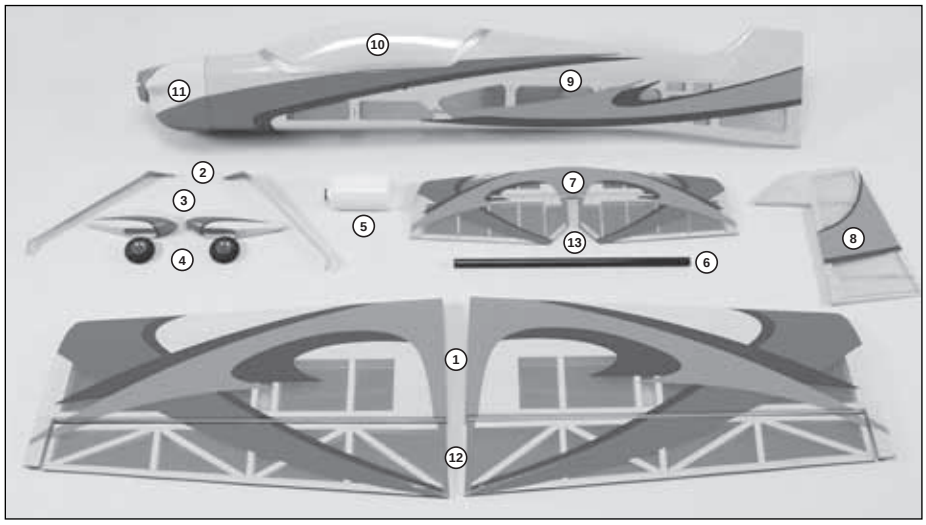
Order Number	Description	How to Purchase
	Missing pieces	Contact Product Support
	Instruction manual	Contact Product Support
	Full-size plans	Not available
GPMA2956	Wing Set w/o Joiner Tube	
GPMA2957	Fuselage	
GPMA2958	Tail Surface Set	
GPMA2959	Wing Joiner Tube	
GPMA2960	Cowl	
GPMA2961	Canopy	
GPMA2962	Landing Gear Set (L&R)	
GPMA2963	Wheelpants Set (L&R)	
GPMA2964	Decal Sheet	
GPMA2965	Battery/ Radio Hatch	

KIT INSPECTION

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

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

KIT CONTENTS



Kit Contents

1. Wing Halves (Left & Right)
2. Main Landing Gear (Left & Right)
3. Wheel Pants (Left & Right)
4. Main Wheels (2)
5. Fuel Tank
6. Aluminum Wing Tube
7. Horizontal Stabilizer
8. Rudder
9. Fuselage
10. Canopy
11. Cowl
12. Ailerons (Left & Right)
13. Elevators (Left & Right)

Kit Contents (Not Photographed)

- Tail Wheel Assembly
- 2-1/4" [57mm] Red Spinner Assembly
- Wood Anti-Rotation Dowels (4)
- Plywood Throttle Servo Tray
- Plywood Throttle Servo Adapter Plates (2)
- Plywood Outer Pushrod Tube Clip
- 1/4"x1/4"x12" [6x6x305mm] Balsa Stick
- Battery Hatch Door
- 6mm Diameter Magnets (8)
- 2-5/64"x2-3/4"x5/64" [53x71.5x2mm] Cooling Hole Coverplate
- 18" [457mm] Hook & Loop Strap
- 6" [150mm] Adhesive-Backed Hook & Loop Material
- 3x8mm Round Head Machine Screws (4)
- Large Control Horns (5)
- 12" [305mm] 2-56 Threaded One-End Pushrods (5)
- 2-56 Faslinks (5)
- #2x1/2" [13mm] Phillips Screws (10)
- Silicone Clevis Retainers (6)
- Nylon Clevises 2-56 (6)
- 6-32x1/2" [13mm] SHCS (4)
- .40-.70 Nylon Engine Mount Halves (2)
- #6 Flat Washers (12)
- #6 Lock Washers (12)
- 6-32 Blind Nuts (4)
- 4-40x1/2" [13mm] SHCS (4)
- #4 Flat Washers (4)
- 6-32x3/4" [19mm] SHCS (8)
- #2 x 3/8" [9.5mm] Phillips Screws (10)
- #2 Flat Washers (10)
- 2x9" [51x229mm] CA Hinge Strip
- 5/32"x1-1/4" [4x32mm] Axles (2)
- Large Axle Nuts 5/16"–24 (2)
- 5/32" [4mm] Wheel Collars (4)
- 6-32 Set Screws (4)
- 4-40x3/8" [9.5mm] Machine Screws (4)
- #4 Lock Washers (4)
- Aluminum Fuel Line Plug
- 36" [914mm] 2-56 Threaded One-End Pushrod
- 3/8" [9.5mm] Black Heat Shrink Tubing (3)
- Brass Screw-Lock Connector
- Brass Screw-Lock Connector Retainer
- 4-40x1/8" [3mm] SHCS
- Outer Pushrod Tube 36" [914mm]

PREPARATIONS

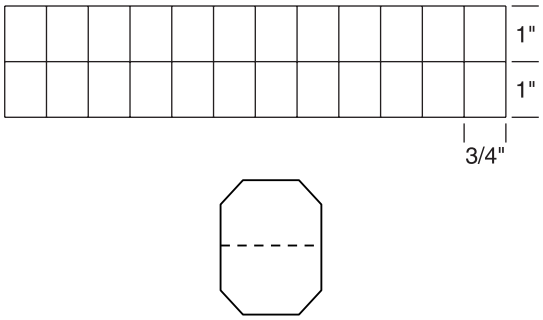
❏ 1. If you have not done so already, remove the major parts of the kit from the box and inspect for damage. If any parts are damaged or missing, contact Product Support at the address or telephone number listed in the “Kit Inspection” section on page 6.

❏ 2. Carefully remove the tape and separate all the control surfaces. Use a covering iron with a covering sock on medium/high heat to tighten the covering if necessary. Apply pressure over sheeted areas to **thoroughly** bond the covering to the wood.

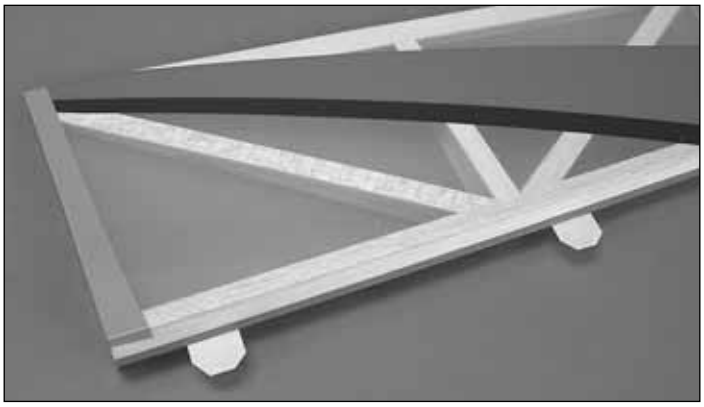
ASSEMBLE THE WING

Install the Ailerons

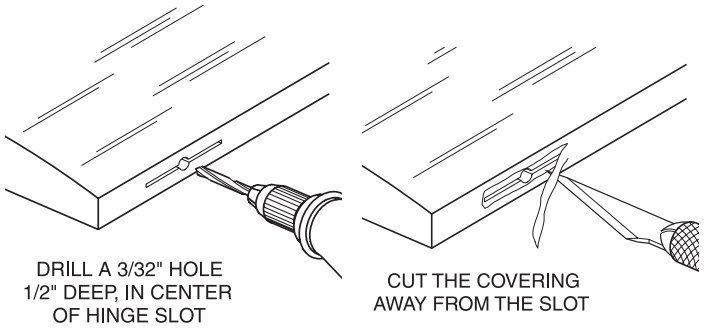
Do the left wing first so your work matches the photos the first time through. You can do one wing at a time, or work on them together.



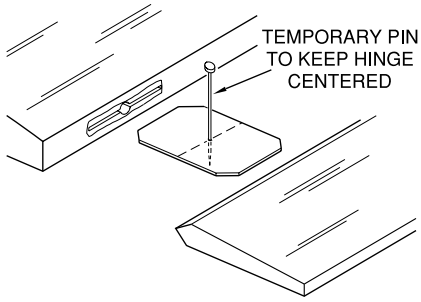
❏ ❏ 1. Cut the included 2 x 9" [51 x 229mm] CA hinge strip into 3/4" x 1" [19 x 25mm] pieces. Trim the corners as shown in the sketch.



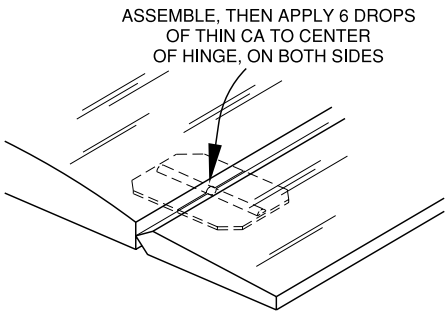
❏ ❏ 2. Test fit the hinges into the **aileron** and **wing panel**. If the hinges are difficult to insert, enlarge the hinge slots with a sharp hobby knife.

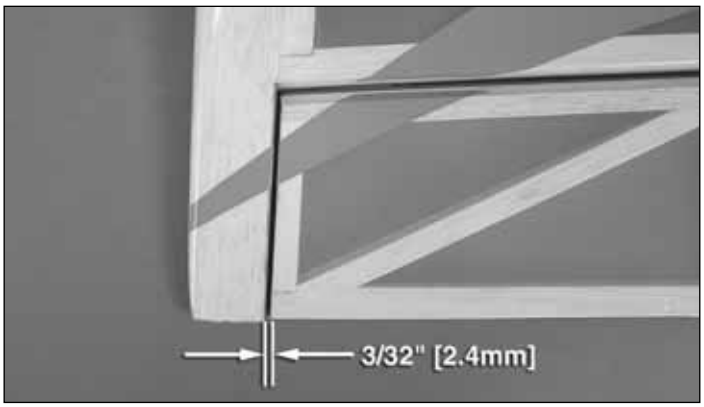


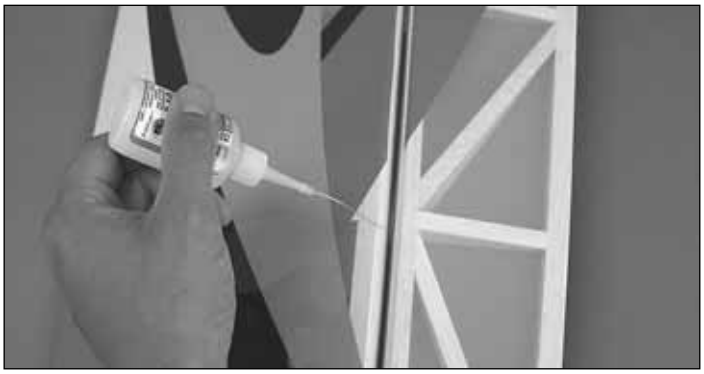
❏ ❏ 3. Using a 3/32" [2.4mm] drill bit, drill a 1/2" [13mm] deep hole in the center of each hinge slot. Cut away the covering from just around each hinge slot with a sharp hobby knife as shown.



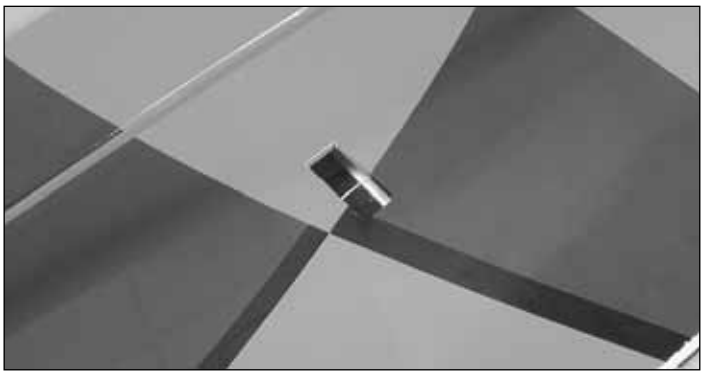
❏ ❏ 4. Reinsert the hinges half way into the aileron hinge slots. Stick a T-pin through the middle of each hinge in order to keep them centered. Join the aileron to the wing panel and remove the T-pins. Push the aileron against the wing hinge line.







❏ ❏ 5. Confirm that there is a 3/32" [2.4mm] gap between the outside end of the aileron and the wing tip. If not, adjust the aileron as necessary for the proper gap. When satisfied, deflect the aileron down far enough to obtain the 3D throws recommended on page 28 and apply 6 drops of thin CA glue to the center of each hinge. Flip the wing panel over and apply 6 more drops to the underside of each hinge.

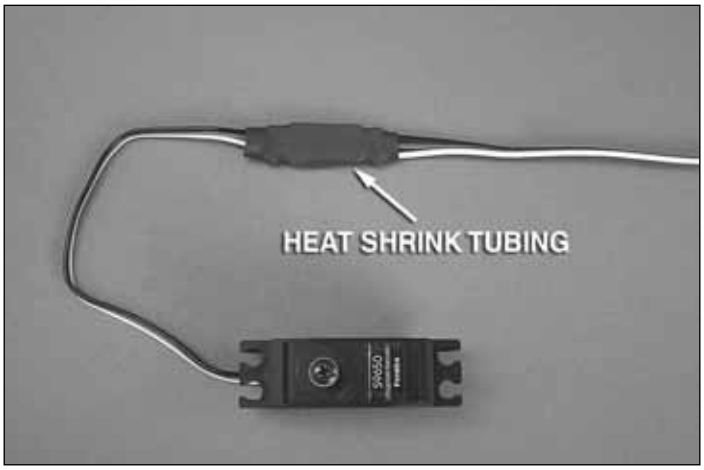


❏ ❏ 6. Cut the covering 1/8" [3mm] inside the opening in the wing for the aileron servo. Use a covering iron or trim iron to seal the covering to the inner edges of the opening.

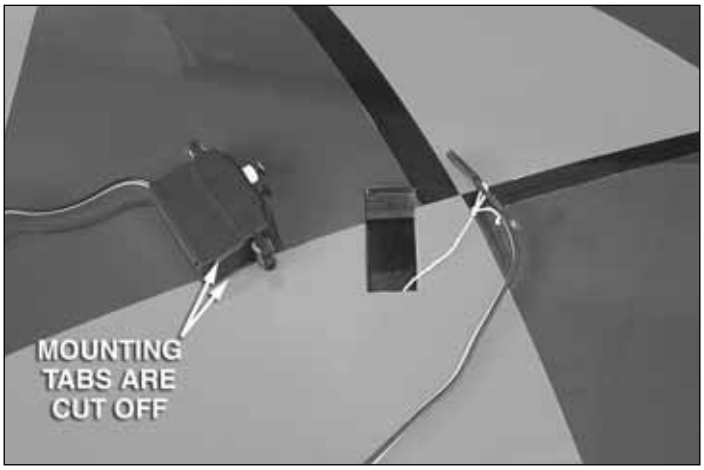
❏ 7. Repeat these steps for the right wing panel.

Install the Aileron Servos and Pushrods

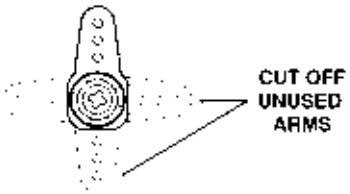
❏ ❏ 1. Installing the servos in the wing will require the use of one 12" [305 mm] servo extension for each aileron servo. One Y-harness connector is required and is used to allow the aileron servos to plug into one slot in your receiver. You may have a computer radio that allows you to plug the servos into separate slots and then mix them together with the radio transmitter. If you choose to mix them together with the radio rather than a Y-harness, refer to the manual for your particular model radio system.



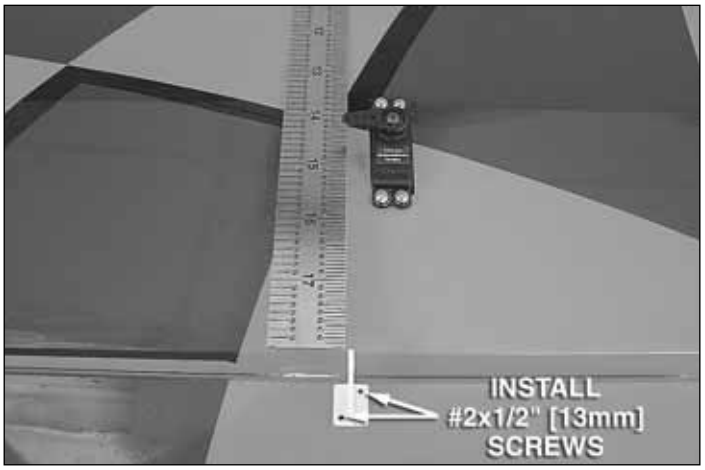
❏ ❏ 2. Attach the 12" [305 mm] servo extension to the aileron servo and secure it with a piece of the included large heat shrink tubing. The tubing can be shrunk around the connector with a heat gun or micro torch. Only 1-1/2" [38 mm] of heat shrink tubing is required for each connector. If your aileron servo has tabs molded into the case for mounting the servo on its side, they must be cut off in order for the servo to fit into the servo bay in the wing panel. Follow the instructions included with the servo for cutting the tabs. Install the eyelets and grommets included with the servo.

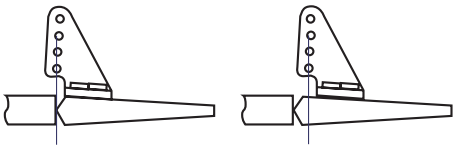


❏ ❏ 3. Securely tie the string from inside the opening for the aileron servo to the end of the servo extension. Remove the tape holding the other end of the string to the wing root rib and pull the servo wire and extension through the wing.

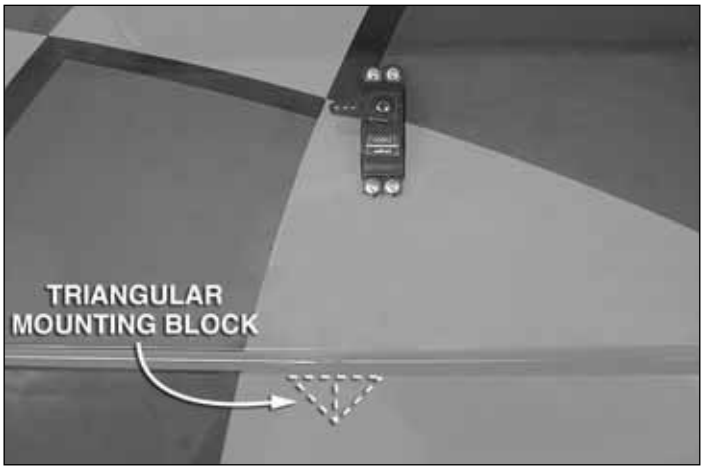


❏ ❏ 4. Temporarily position the aileron servo into the servo bay with the servo spline towards the leading edge of the wing. Drill a 1/16" [1.6 mm] hole through the four mounting holes of the servo, drilling through the plywood mounting plate in the wing. Install and remove a servo mounting screw into each of the four holes. Apply a drop of thin CA into the holes to harden the wood. After the glue has hardened, install the servo into the opening. Cut three arms from a four-armed servo arm (arms may need to be purchased separately). Center the servo with your radio system and install a servo arm parallel to the aileron hinge line as shown.

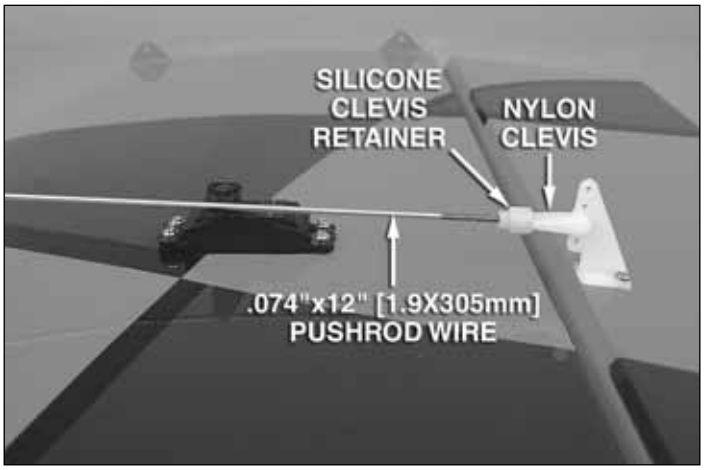




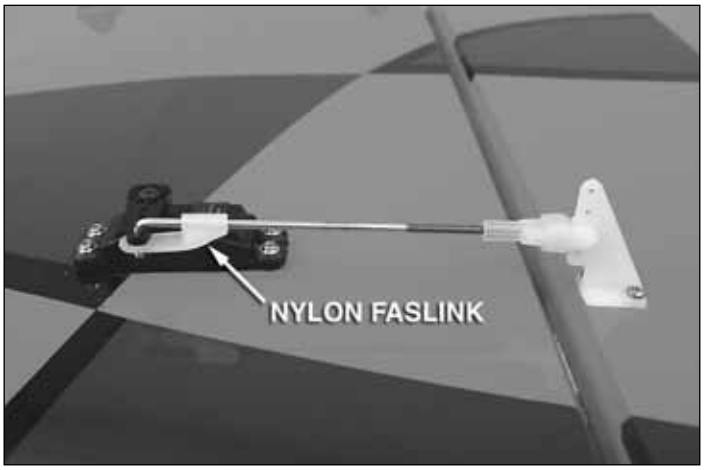
❏ ❏ 6. Place a large nylon control horn on the aileron, positioning it as shown in the sketch and aligning it with the servo arm using a straight edge as a guide. Mark the location for the screw holes. Using a 1/16" [2.4mm] drill bit, drill a 1/2" [13mm] deep hole at the marks you made. (Be sure you are drilling into the triangular mounting block on the bottom of the aileron. **Do not drill all the way through the aileron!**). Install and remove a #2 x 1/2" [13mm] sheet metal screw into each of the holes. Harden the holes with a drop of thin CA. After the glue has hardened completely, install the control horn with two #2 x 1/2" [13mm] sheet metal screws.

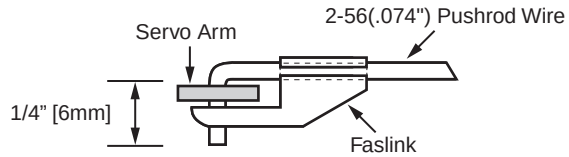


❏ ❏ 5. The aileron has a triangular block for mounting the control horn. You can see the outline of it underneath the covering by looking at the aileron at a shallow angle. If you cannot see it, use your finger to lightly push in on the covering until you find the edges of the mounting block.



❏ ❏ 7. Locate a .074" x 12" [1.9 x 305mm] pushrod wire threaded on one end. Screw a nylon clevis onto the rod 20 complete turns. Slide a silicone clevis retainer onto the base of the clevis. Connect the clevis to the second hole from the bottom in the control horn.

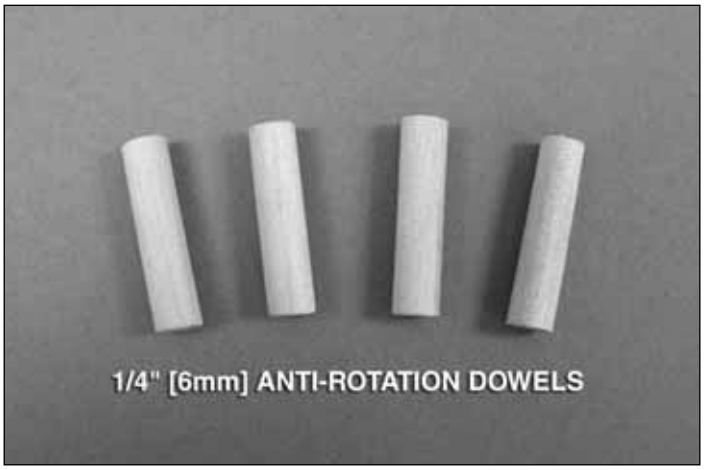




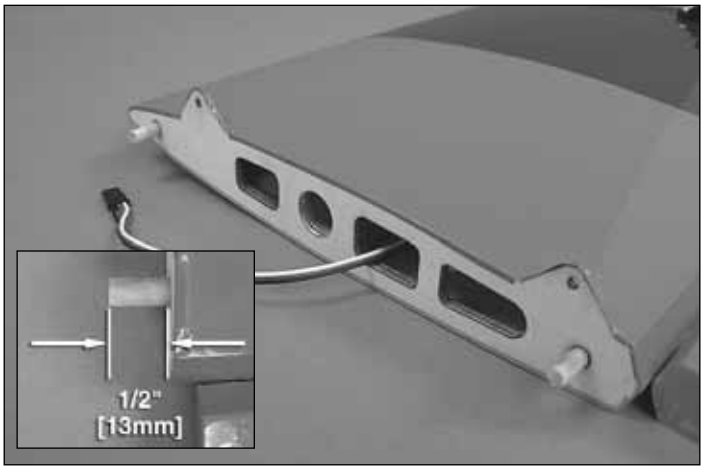
❏ ❏ 8. Use tape or a small clamp to hold the aileron in the neutral position. With the servo arm still parallel to the hinge line, make a mark on the pushrod where it crosses the outer hole in the servo arm. Remove the pushrod and clevis from the control horn and make a 90 degree bend at your mark. Cut off the excess pushrod wire 1/4" [6mm] beyond the bend. Enlarge the outer hole in the servo arm using a 5/64" [2mm] drill bit. Connect the pushrod to the servo arm using a nylon FasLink. Slide the silicone clevis retainer up to the end of the clevis.

❏ 9. Repeat these steps for the right wing panel.

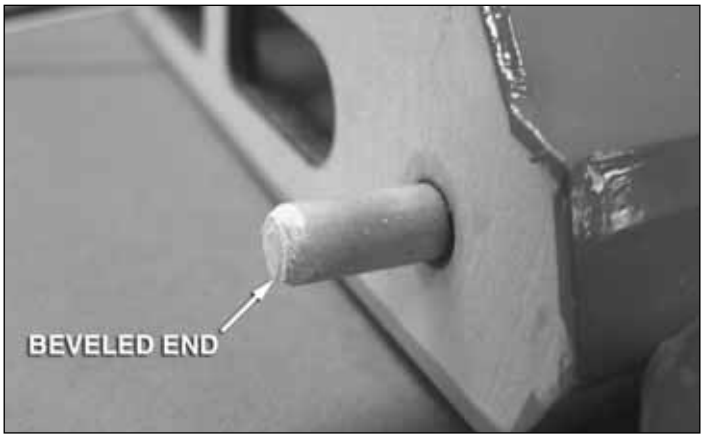
Finish the Wing



❏ 1. Locate the four 1/4" [6mm] diameter **anti-rotation dowels**.



❏ ❏ 2. Coat half of two anti-rotation dowels with epoxy and insert them into the forward and aft holes in the wing panel root rib. It may be necessary to carefully tap them into place with a mallet. The dowels should extend out approximately 1/2" [13mm]. Wipe away any excess epoxy with denatured alcohol before the epoxy cures.

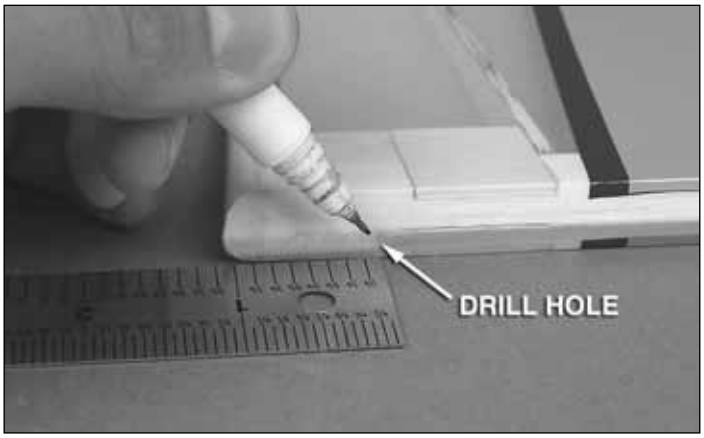


❏ ❏ 3. Use sandpaper to bevel the ends of the anti-rotation dowels to ease their insertion into the fuselage.

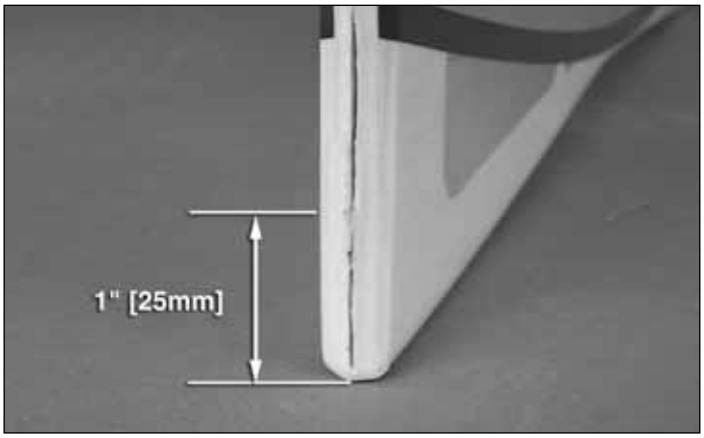
❏ 4. Repeat steps 2 and 3 for the right wing panel.

ASSEMBLE THE FUSELAGE

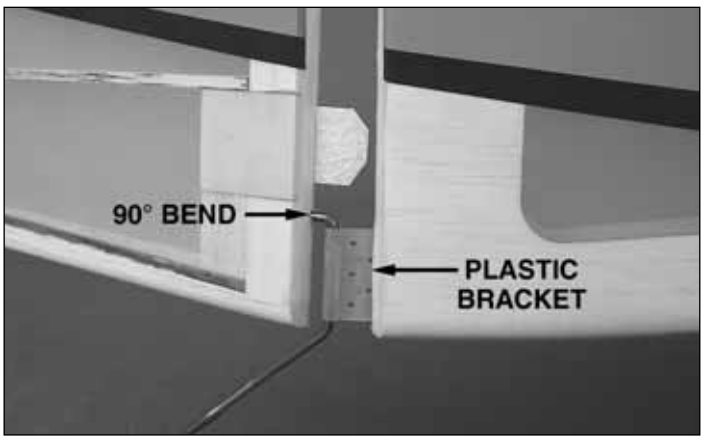
Install the Rudder and Tail Gear

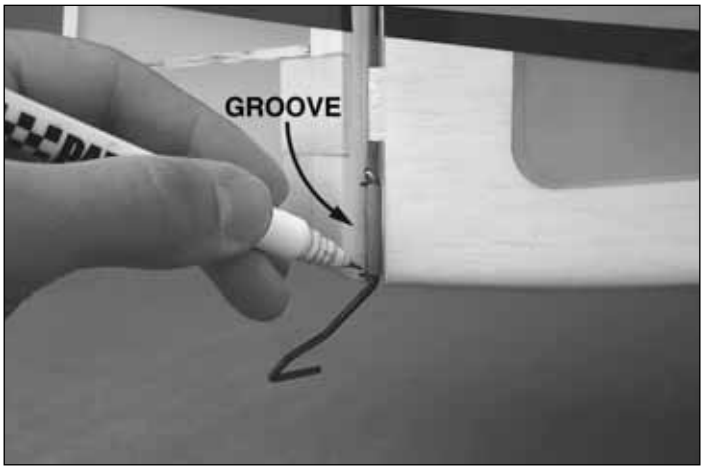


❏ 1. Make a mark 1-1/8" [28.4mm] from the bottom edge of the **rudder** at the center of the hinge line. Carefully drill a 3/32" [2.4mm] diameter hole 1" [25mm] deep at the mark perpendicular to the hinge line. Be sure that your hole is drilled straight into the rudder.

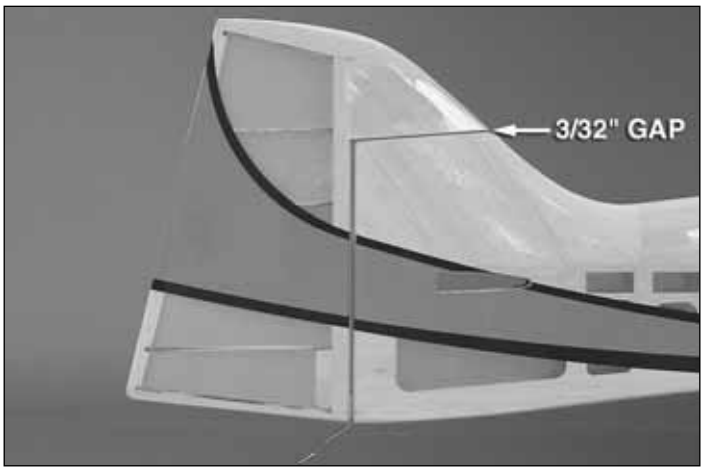


❏ 2. Make a mark 1" [25mm] from the bottom edge of the **fuselage** at the center of the rudder hinge line. Draw a line down from that mark to just above the bottom of the fuse. Use a hobby knife to cut a slot 1/32" [0.8mm] wide and 1/2" [13mm] deep along the line you drew.





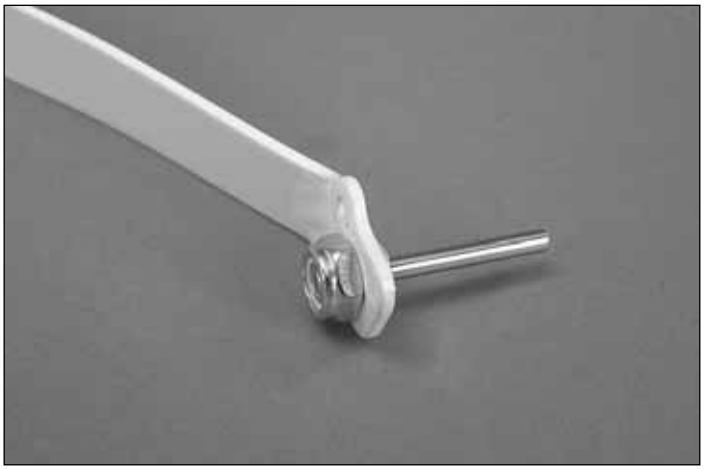
❏ 3. Test fit the plastic bracket of the **tail gear assembly** into the slot in the fuselage. **Temporarily** install CA hinges into the rudder. Guide the 90 degree bend in the tail gear wire into the hole you drilled in the rudder and fit the rudder into place with CA hinges as far as it will go (do not glue the hinges yet). Mark the location on the rudder where a groove will need to be carved to accommodate the plastic bracket.



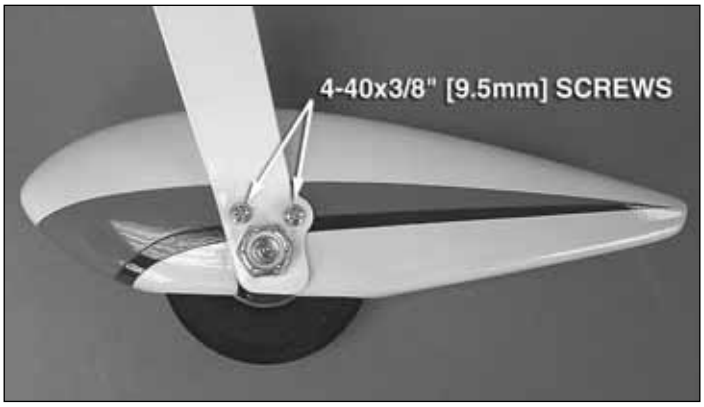
❏ 4. Carve a groove at your marks until the rudder can fit up against the fuselage. When satisfied with the fit, prepare the hinge slots in the rudder and fuselage by enlarging them as necessary with a sharp hobby knife. Drill a 3/32" [2.4mm] diameter hole 1/2" [13mm] deep in the center of each hinge slot. Using a hobby knife, cut away the covering around each hinge slot. Apply a couple drops of oil or petroleum jelly to the wire near the plastic bracket. Coat the 90 degree bend in the tail gear wire and the plastic bracket with medium CA glue and join the rudder to the fuse with CA hinges. As you did with the ailerons, apply thin CA to the rudder hinges, being sure that you can obtain the 3D throws listed on page 28. Leave a 3/32" [2.4mm] gap between the top of the fuselage fin and the rudder.

❑ 5. Install the tail wheel onto the tail wheel wire followed by the wheel collar and set screw. Spin the tail wheel and confirm that it rotates freely. Oil the tail wheel as necessary for it to spin smoothly.

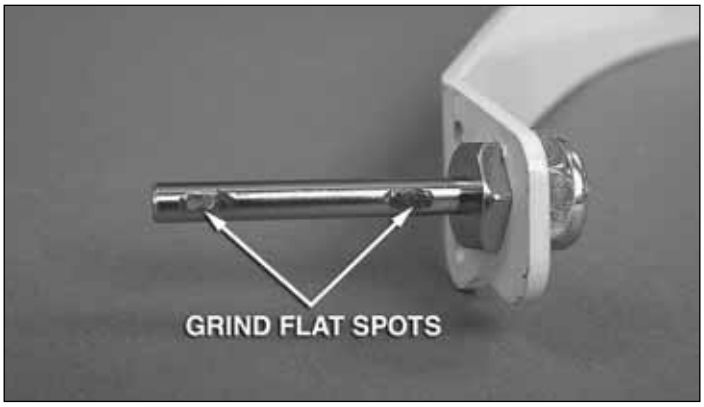
Assemble and Install the Main Gear



❑ 1. Attach the 5/32" [4mm] axles to the **main landing gear** using 5/16"-24 axle nuts. Slide a 5/32" [4mm] wheel collar onto each axle followed by a 2-1/4" [57mm] foam wheel and another 5/32" [4mm] wheel collar. Loosely screw a 6-32 set screw into each wheel collar using a 1/16" [1.6mm] allen key.



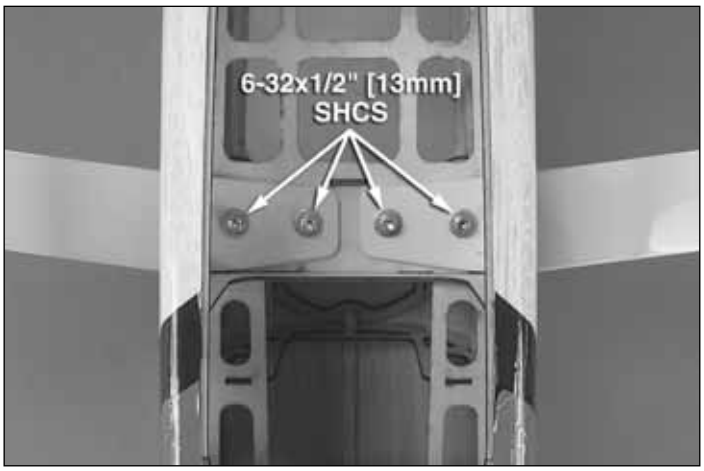
❑ 2. Slide the **wheel pants** over the axles into position and temporarily attach them to the landing gear using four 4-40 x 3/8" [9.5mm] phillips screws. Position the wheel in the center of the wheel cutout in the wheel pants and tighten the wheel collars against the axles.

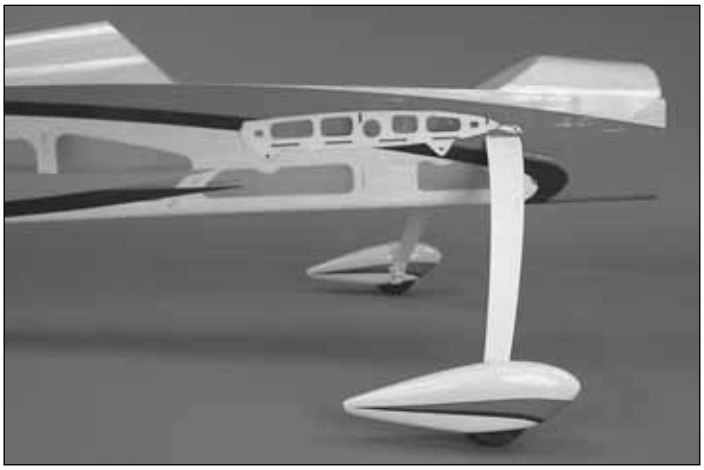


❑ 3. Remove the wheel pants from the landing gear and remove the wheel collars and wheels from the axles. Locate the indentations on the axles made by tightening the set screws. Use a metal file or rotary tool such as a Dremel to grind flat spots on the axles at the indentations.

❑ 4. Reassemble the wheel collars and wheels onto the axles. Apply threadlocking compound to the set screws. Attach the wheel pants to the main landing gear using the four 4-40 x 3/8" [9.5mm] screws and four #4 lock washers. Apply threadlocking compound to the screws before tightening. Center the wheels in the wheel pants and tighten the set screws in the wheel collars. Oil the wheels as necessary for them to spin smoothly.

❏ 5. Trim the covering from the landing gear slots in the fuselage using a sharp hobby knife.





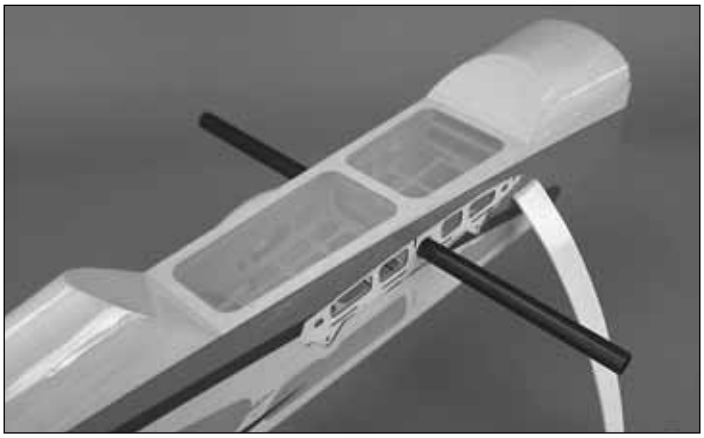
❏ 6. Install the landing gear into the fuselage using four 6-32 x 1/2" [13mm] SHCS, four #6 flat washers, four #6 lock washers and threadlocking compound.

Install the Elevators and Horizontal Stab

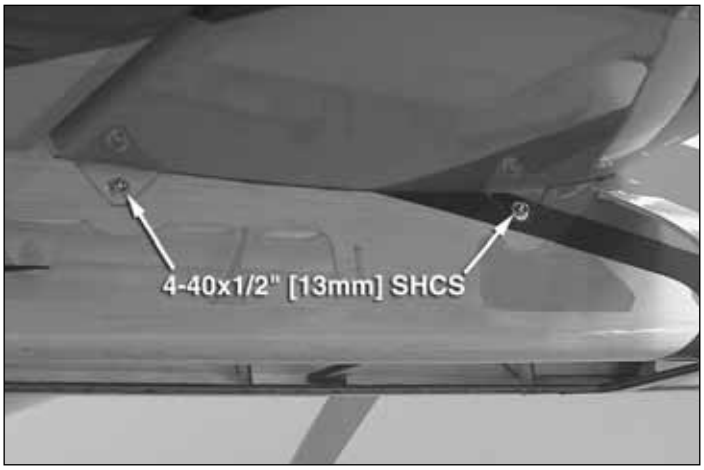
❏ 1. Just as you did with the ailerons and rudder, prepare the hinge slots in the **horizontal stabilizer** and **elevators** by enlarging the slots as necessary, drilling a 3/32" [2.4mm] hole at the center of each slot and trimming away the covering from around each slot.

❏ 2. Locate the stabilizer slots near the aft end of the fuselage and carefully trim away the covering.

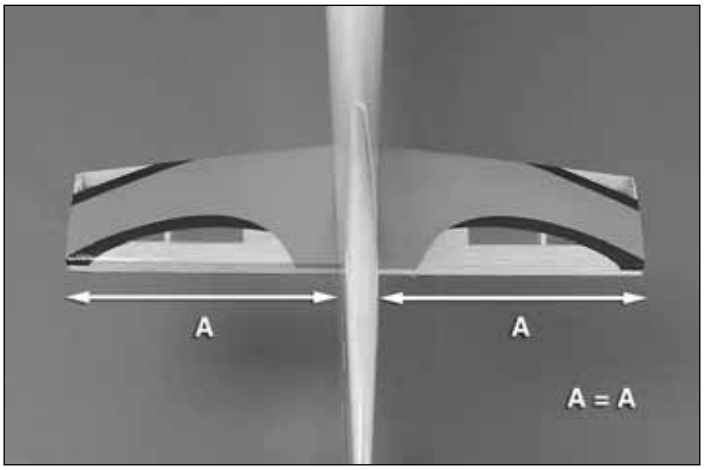
❏ 3. In order to align the stab in the fuselage, the wing panels will need to be temporarily installed. Trim the covering from the screw holes in the wing panel root ribs.

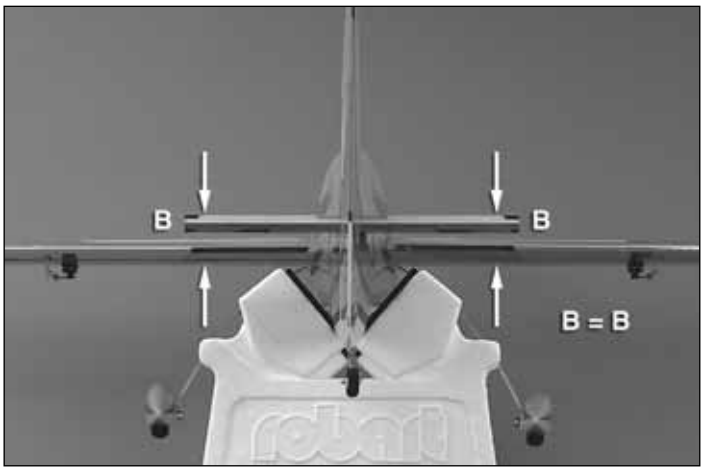


❏ 4. Slide the black **aluminum wing tube** into the fiberglass joiner tube inside the fuselage and center its position. Install the wing panels onto the tube and slide them into the wing pockets in the fuselage.

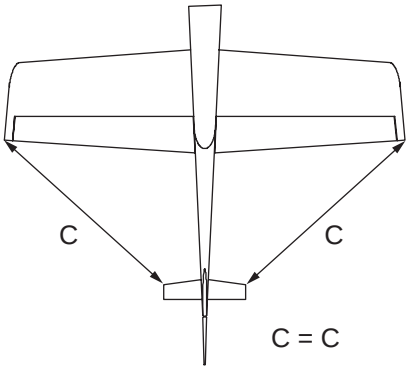


❏ 5. Secure the wings to the fuse using four 4-40 x 1/2" [13mm] SHCS and four #4 flat washers.

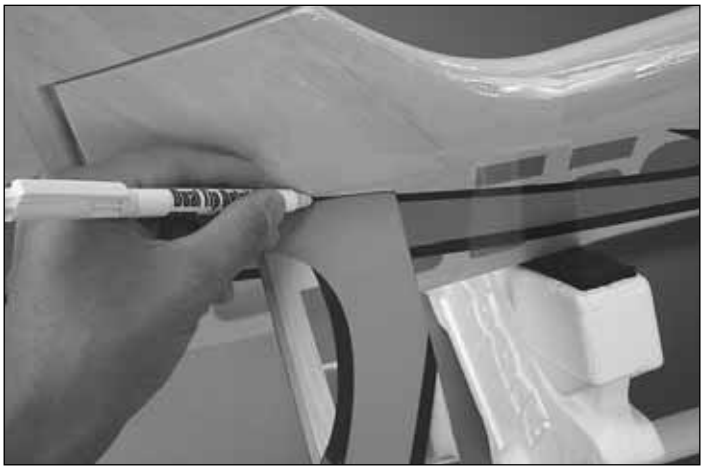




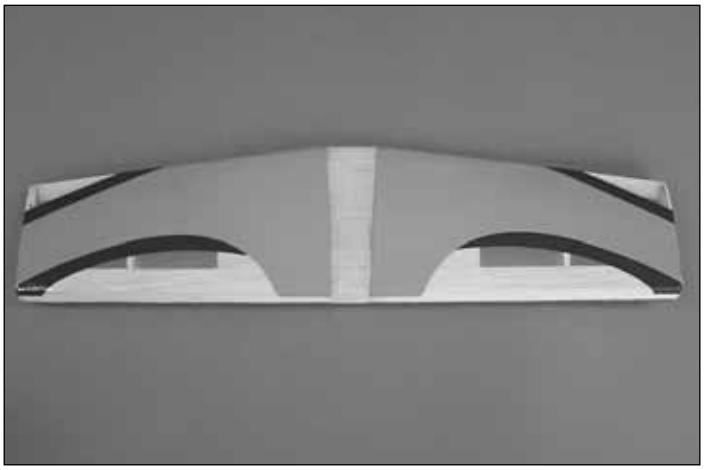
❏ 6. Test fit the stabilizer in the fuselage. Center the stab left and right in the fuselage. Stand back several feet behind the model and check to be sure the stab is parallel to the wing. Adjust the stab saddle as needed until the stab and wing are parallel. Weight can be added to one side of the stabilizer to bring the stab parallel to the wing. When the stab is glued in place permanently, the same amount of weight should be added while the glue hardens.



❏ 7. Measure the distance from the tip of each wing to the tip of the stab. Adjust the stab until the distance from the tip of the stab to the tip of the wing is equal on both sides.



❏ 8. Use a felt tip marker to mark the outline of the fuselage onto the top and bottom of the stab.

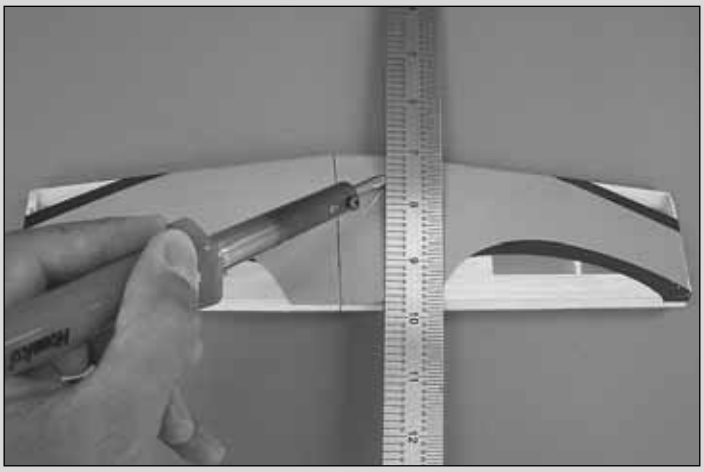


❏ 9. Remove the stab from the fuse. Use a sharp #11 hobby knife or use the following **Expert Tip** to cut the covering 1/16" [1.6mm] inside of the lines you marked. Use care to cut **only in the covering** and **not into the wood**.

EXPERT TIP

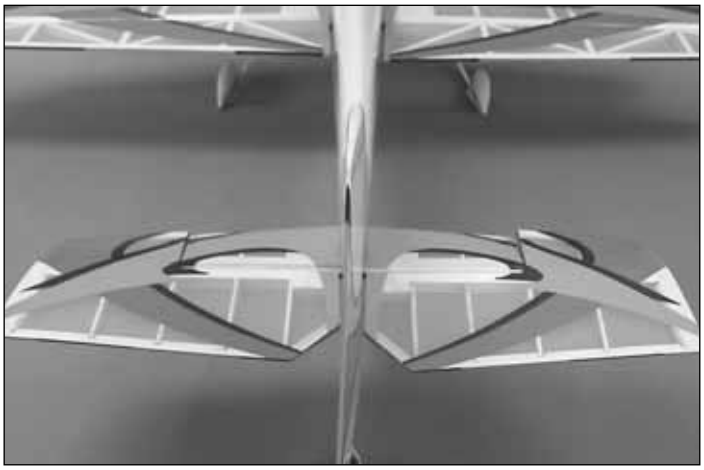
HOW TO CUT COVERING FROM BALSA

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



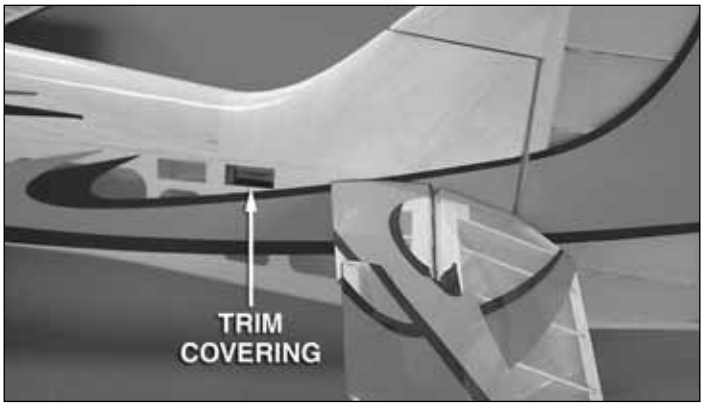
Use a straightedge to guide the soldering iron at a rate that will just melt the covering and not burn into the wood. The hotter the soldering iron, the faster it must travel to melt a fine cut. Peel off the covering

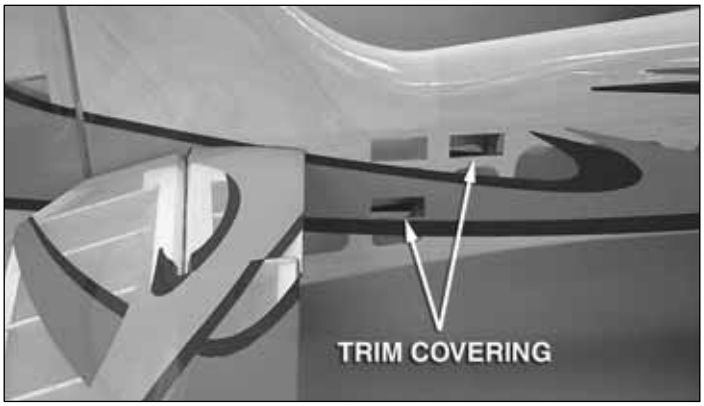
❏ 10. Use 30-minute epoxy to glue the stab into the fuselage. For the most strength, apply epoxy to both sides of the stab and inside the fuse where the stab fits. Slide the stab into position and confirm that the stab is still properly aligned. Wipe away any excess epoxy and the marks you made with a paper towel and denatured alcohol. Do not disturb the model until the epoxy has fully hardened.



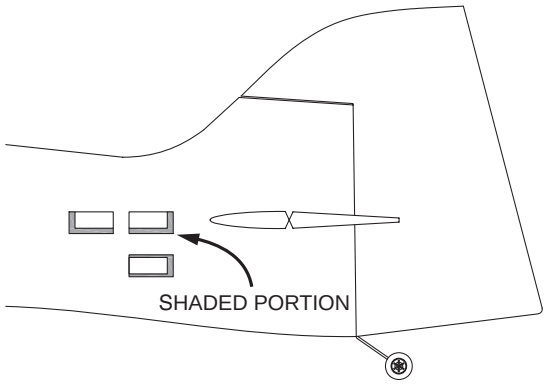
❏ 11. As you did with the ailerons and rudder, attach the **elevator halves** to the horizontal stabilizer with CA hinges. Refer to the 3D control throws on page 28 when gluing the CA hinges. Be sure to leave a 3/32" [2.4mm] gap between the ends of the stab and the elevator halves.

Install the Tail Servos and Pushrods





❏ 1. Locate the six servo bays beneath the covering in front of the horizontal stabilizer (three per side) in the fuselage. Only three of these will be used (two for the elevator, one for the rudder). Cut the covering from the top-aft bay from the left side of the fuse and cut the covering from the top-forward bay as well as the bottom bay on the right side as shown. Make your cuts 1/8" [3mm] inside the openings and use an iron to seal the covering over the edges.

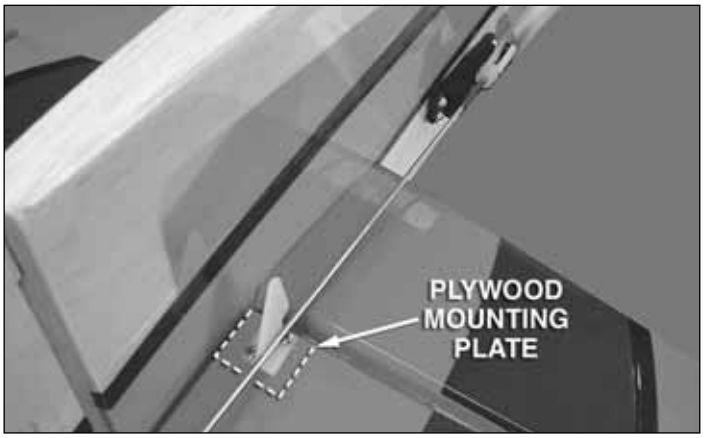


❏ 2. If you are installing servos that are larger than the servo bays, use the sketch as a guide to enlarge the openings. Cutting the shaded portions as needed will ensure that you will have adequate plywood remaining along side the openings to secure the servos in the fuselage.

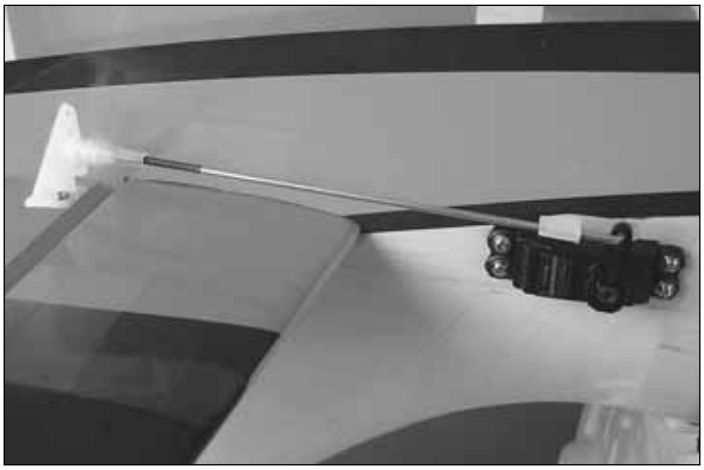
❏ 3. Attach 24" [610mm] servo extensions to the two elevator servos and rudder servo. Use heat shrink tubing to secure the connectors.

❏ 4. Feed the servo extensions through the fuselage formers to the fuselage hatch and mount the servos into the servo bays with the servo splines facing forward using the hardware included with the servos. Be sure to reinforce the servo screw holes with thin CA.

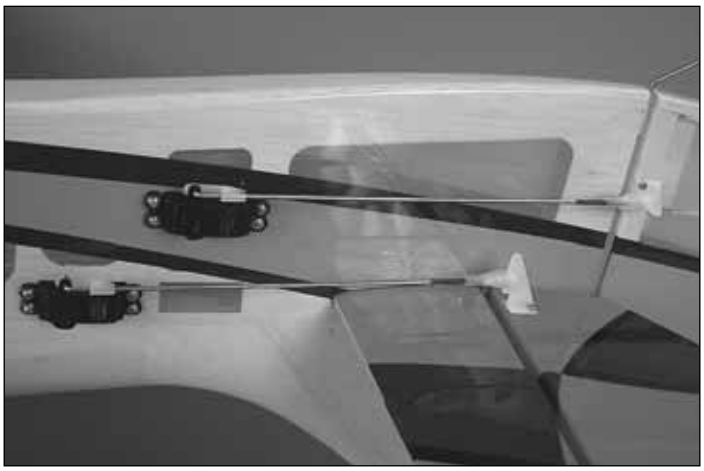
❏ ❏ 5. Center the servos with your radio system and attach servo arms pointing down. Using the same procedure as the ailerons, make up three pushrods using three 12" [305mm] rods, three nylon clevises and three silicone clevis retainers. Attach the clevises from two of the pushrods to the outer holes in the elevator servo arms in order to use the pushrods as a straight edge.



❏ ❏ 6. Align the elevator pushrods parallel with the fuselage over the elevator halves. Use the position of the pushrods to mark the locations for the elevator control horns. The elevator control horns should be positioned over the plywood mounting plate. The plate is visible from the top of the elevators. Using a 1/16" [2.4mm] drill bit, make a 1/2" [13mm] deep hole at the marks you made, being sure not to drill completely through the elevators. Install and remove a #2 x 1/2" [13mm] sheet metal screw into each of the holes. Harden the holes with a drop of thin CA. After the glue has hardened completely, install the control horns with four #2 x 1/2" [13mm] sheet metal screws.



❏ ❏ 7. As you did with the ailerons, enlarge the outer holes in the elevator servo arms using a 5/64" [2mm] bit. Connect the clevises to the second from the bottom holes in the control horns and mark the location where the elevator pushrods cross the outer holes in the servo arms with the elevators in the neutral position. Bend the pushrods at a 90 degree angle and cut off the excess rod leaving 1/4" [6mm]. Attach the pushrods to the servo arms with nylon Faslinks.



❏ 8. Repeat steps 5-7 for the rudder pushrod. Be careful when drilling the holes for the rudder control horn as the rudder is approximately 1/2" [13mm] thick at the control horn mounting plate. To avoid accidentally drilling completely through the rudder, drill the holes for the control horn only 3/8" [9.5mm] deep. The thickness of the control horn will prevent the #2 x 1/2" [13mm] screws from passing through the other side of the rudder.

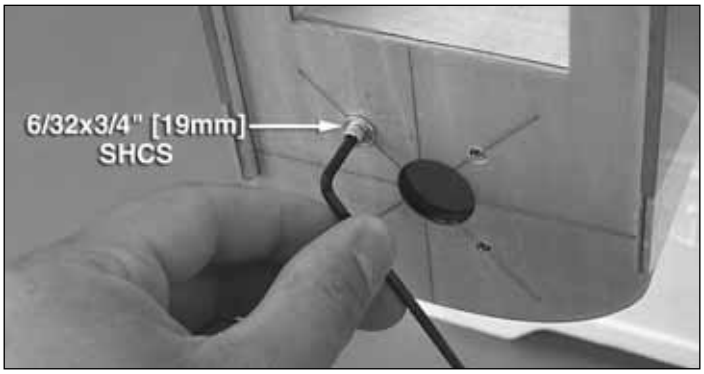
ENGINE INSTALLATION

Detailed installation instructions are provided in this manual for both the Great Planes C42-60-480kV RimFire brushless motor and the O.S. FS-70 Surpass II four-stroke glow engine. A two-stroke engine can also be installed, but detailed instructions are not included. Use the four-stroke instructions as a guide for a 2-stroke installation.

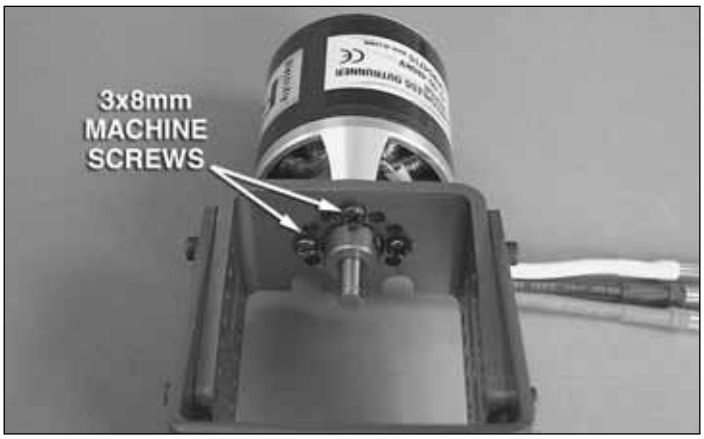
The Reactor .46 ARF can be changed from a glow engine setup to a brushless motor or vice-versa with little difficulty, so your power plant choice during original assembly does not have to be permanent. To switch from one to the other, simply remove the components installed specifically for the original power plant and follow the instructions in this manual for the other type. The mounting pattern for the electric motor mount recommended for the Great Planes C42-60-480kV RimFire motor is the same as the included .40-.70 nylon engine mount, so new holes don't need to be drilled into the firewall when making the switch.

Brushless Motor Installation

❏ 1. Cut out the mounting template from the back of this manual. Before using the template to mark your holes on the firewall, consider now if you may install a two-stroke or four-stroke engine in the future. If you prefer using a four-stroke engine, align the mounting template over the vertical and horizontal lines on the firewall and use clear tape to hold it in place. If you prefer a two-stroke, position the template over the lines on the firewall set at a 45 degree angle (making this choice now will prevent you from having to drill new mounting holes when switching to a glow engine). Push a sharp T-pin into each of the four mounting hole locations on the template marking their position on the firewall.

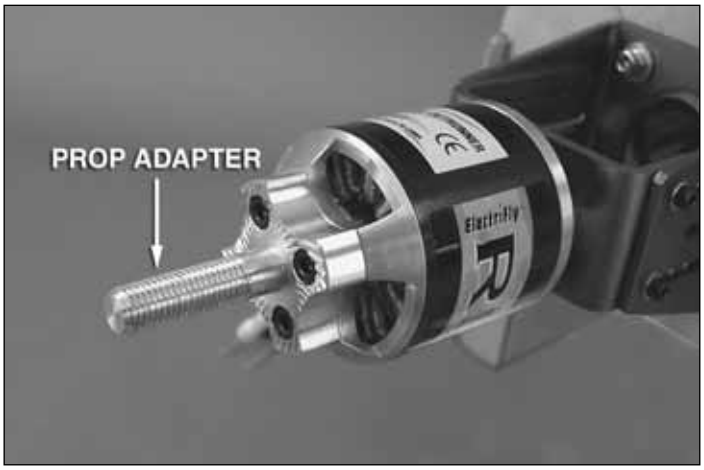


❏ 2. Drill 3/16" [4.8mm] holes at the marks you made. To reduce tear-out from the back of the holes and to ensure accuracy, drill smaller pilot holes at the marks first, then enlarge the holes to 3/16" [4.8mm]. Insert a 6-32 blind nut into each of the four holes and draw them tight into the firewall using a 6-32 x 3/4" [19mm] SHCS and #6 flat washer.



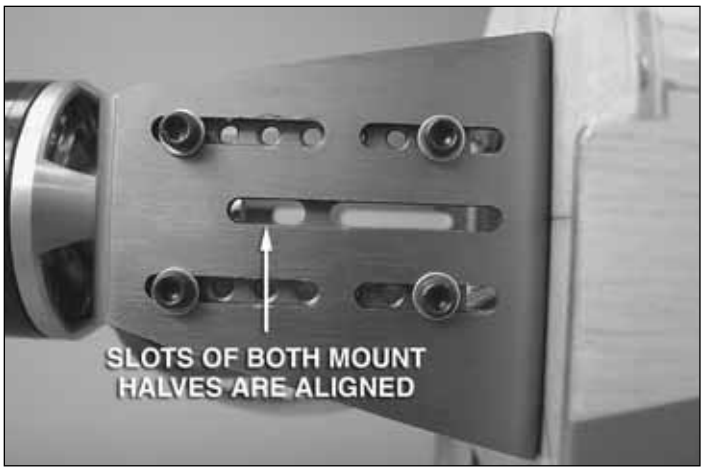
❏ 3. Using the four 3 x 8mm machine screws included with the kit and threadlocking compound, secure the motor to the motor mount as shown.

❏ 4. Attach the motor mount to the firewall using four 6-32 x 3/4" [19mm] SHCS, four #6 flat washers, four #6 lock washers, and threadlocking compound.

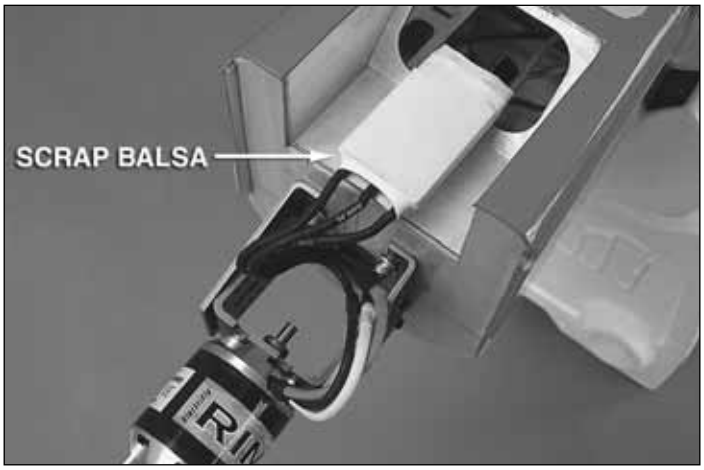


❏ 5. Attach the prop adapter with the screws included with the motor. Be sure to use threadlocking compound.

❏ 6. Loosen the screws that connect the two halves of the motor mount together. Adjust the mount so that the front of the prop adapter is 4-15/16" [125mm] from the firewall.



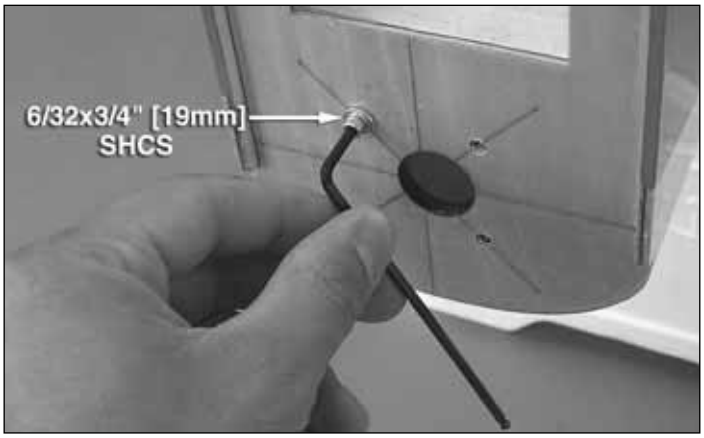
❏ 7. When tightening the screws, be sure that you do not inadvertently create any up or down thrust for the motor. The motor should be parallel with the horizontal stabilizer (zero degrees down thrust). Use an incidence meter to check the thrust angle of the motor against the stab. If you do not have an incidence meter, align the slots in the center of the two motor mount halves when tightening the screws. Be sure to use threadlocking compound.



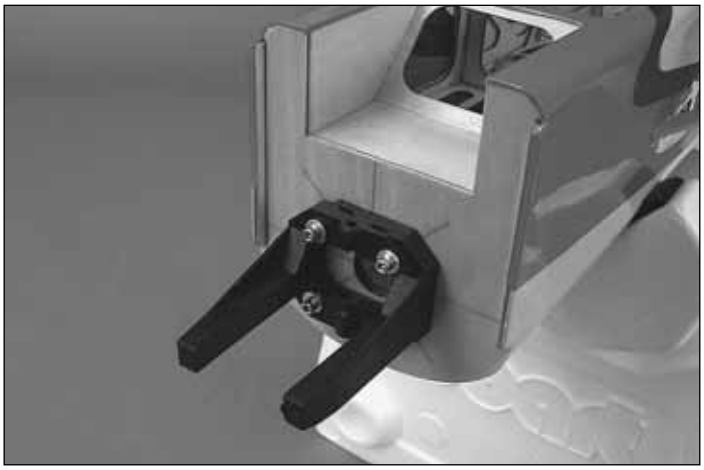
❏ 8. Secure the ESC to the plane in the location shown and connect it to the motor. You may need to use a scrap piece of balsa to lower the ESC in order for it to fit part way through the cooling hole cutout. We used foam servo tape (not included) to secure the ESC. ***Note:*** *The ESC shown may be different in size and shape than the ESC suggested in this manual.*

Four-Stroke Glow Engine Installation

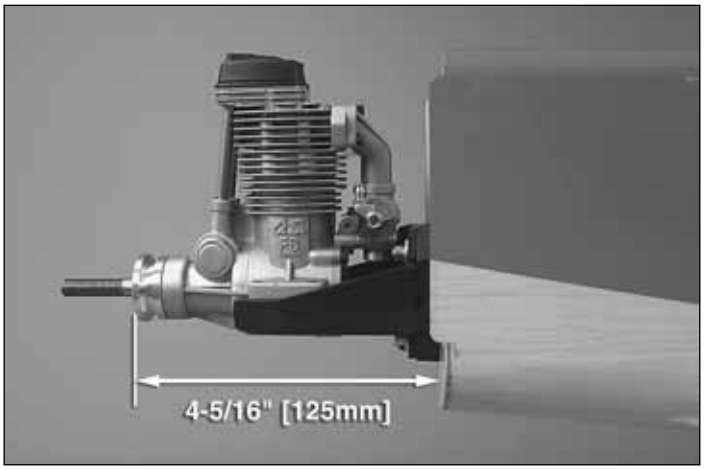
❏ 1. Cut out the mounting template from the back of this manual. Align the mounting template over the vertical and horizontal lines on the firewall and use clear tape to hold it in place. If you are installing a two-stroke engine, position the template over the lines on the firewall set at a 45 degree angle. Push a sharp T-pin into each of the four mounting hole locations on the template, marking their position on the firewall.



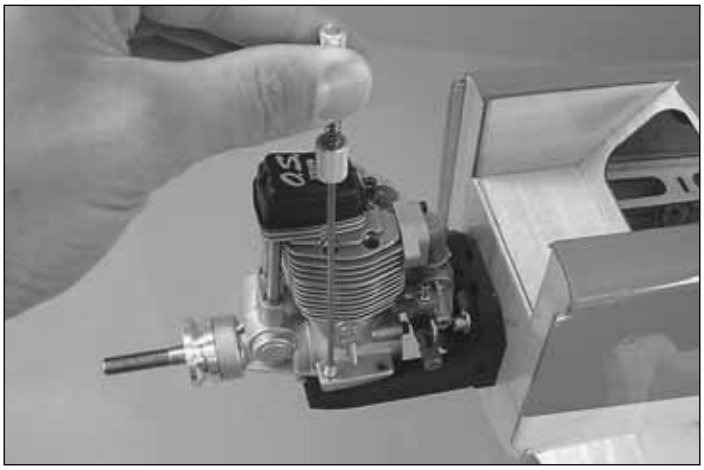
❏ 2. Drill 3/16" [4.8mm] holes at the marks you made. To reduce tear-out from the back of the holes and to ensure accuracy, drill smaller pilot holes at the marks first, then enlarge the holes to 3/16" [4.8mm]. Insert a 6-32 blind nut into each of the four holes and draw them tight into the firewall using a 6-32 x 3/4" [19mm] SHCS and #6 flat washer.



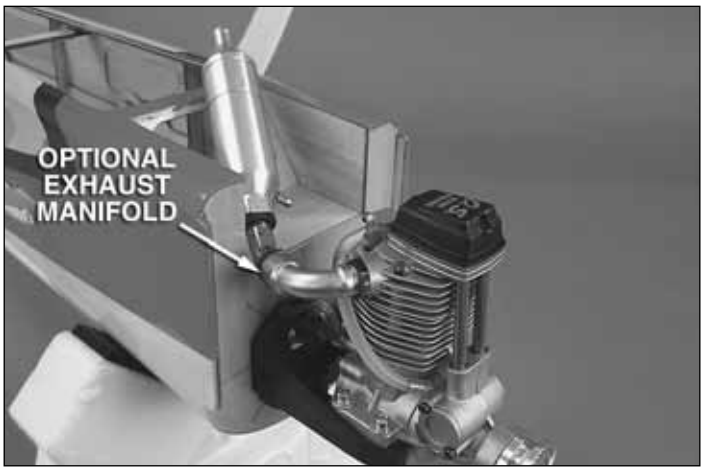
❏ 3. Loosely attach the **nylon engine mount** inverted to the firewall using four 6-32 x 3/4" [19mm] SHCS, four #6 flat washers and four #6 lock washers.



❏ 4. Fit your engine between the engine mount rails, slide the rails against the engine crankcase, remove the engine and tighten down the engine mount screws. Place the engine back onto the mount and position it so that the front of the drive washer is 4-15/16" [125mm] from the firewall.



❏ 5. Use the Great Planes Dead Center™ Hole Locator to mark the engine mounting holes onto the engine mount.



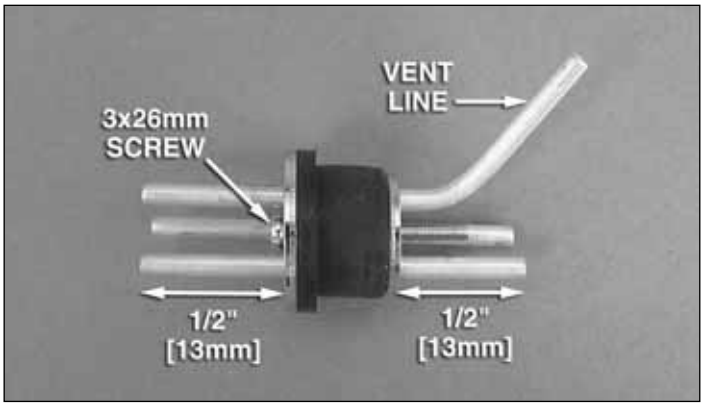
❏ 6. Drill and tap 6-32 holes for the engine mount screws at the marks you made. Secure the muffler to the engine. In order to route the muffler along the bottom of the fuselage, we used an optional O.S. Inside Exhaust Manifold, part number OSMG2624. Without the manifold, the muffler will exit the along the side of the fuselage and a portion of the cowl will need to be cut away for the muffler to pass through. Attach the engine to the mount using four 6-32 x 3/4" [19mm] SHCS, four #6 flat washers and four #6 lock washers.

Install the Fuel Tank and Throttle Servo

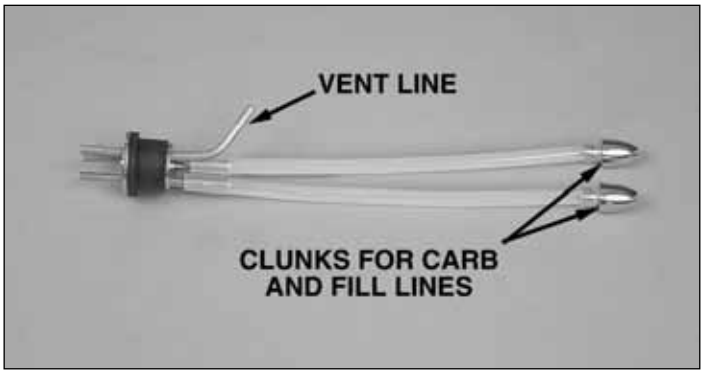
❏ 1. Locate the **fuel tank.** The hardware needed for the fuel tank assembly is inside of the tank. Remove the stopper and shake out the contents.

❏ 2. The fuel tank for the Reactor utilizes a three line system. There is a **fill line, carb line, and vent line (to muffler)**. The fill line will allow fueling and defueling without unhooking any fuel lines. The fill line is optional and may be omitted if desired, or a fuel fill valve may be installed (not included).

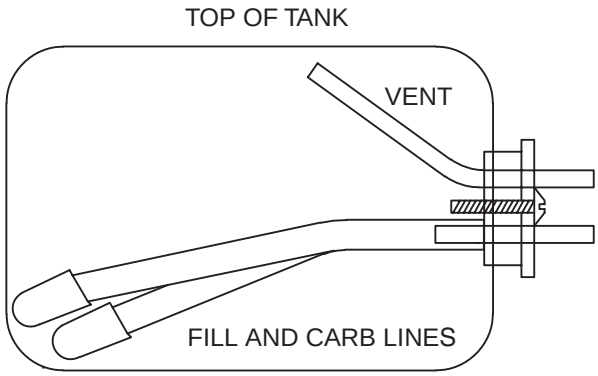
❏ 3. Slide the **three aluminum fuel tubes** into the **rubber stopper**.



❑ 4. Cut the fill line and carb line tubes such that the tubes extend 1/2" [13mm] out from both ends of the stopper. Install the metal plates on the front and back of the stopper and loosely thread the 3 x 26mm phillips machine screw through the plates. The vent line should be bent upward and left uncut.

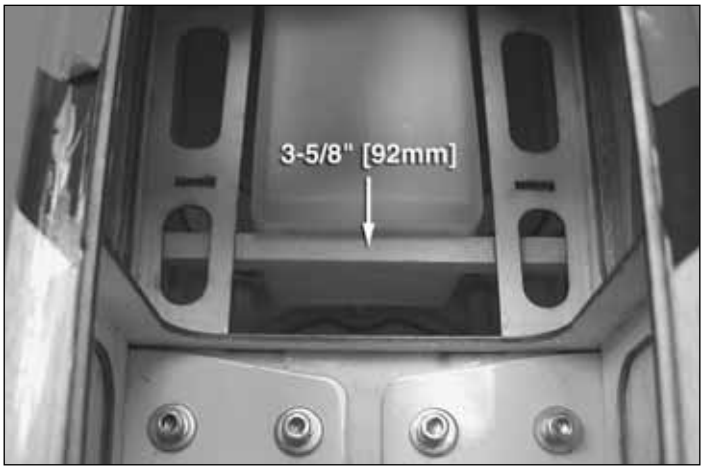


❑ 5. Attach a **silicone fuel line** 6" [152mm] in length to the carb line tube and fill line tube in the stopper. Install the included fuel clunks onto these lines.

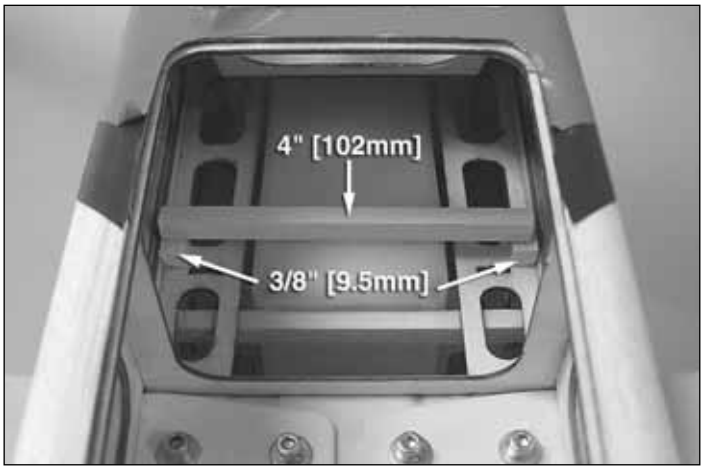


❑ 6. Insert the stopper into the tank and check the length of the carb line and fill lines. The clunks should almost rest against the back of the tank when the stopper is in place but move freely and the vent line should point towards (but not touch) the top of the tank. Adjust the length of the fuel lines until the proper length has been reached. Also check that the vent line is bent upward enough to reach the top of the fuel tank. Once you are satisfied with the fit, secure the stopper to the tank using the Phillips head screw in the stopper assembly. Be careful not to over tighten as the fuel tank could split. Now would be a good time to mark the lines on the tank, as well as which side of the tank should face up.

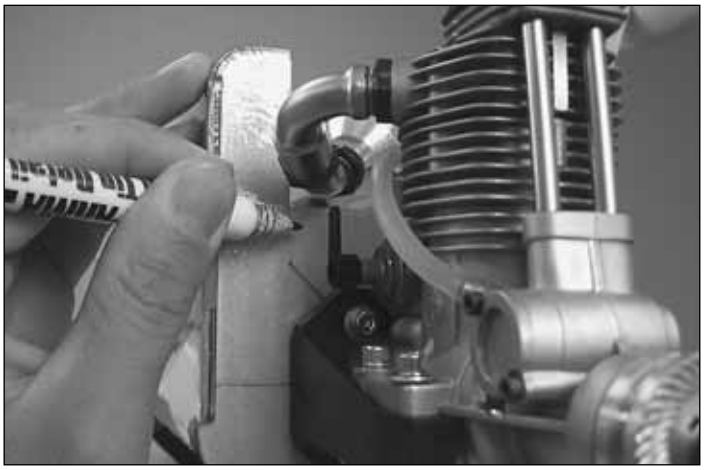
❑ 7. Slide 6" [152mm] of fuel tubing onto each of the tubes in the fuel tank. Feed the fuel tubing through the hole in the firewall from the inside of the fuselage. Insert the fuel tank into position, being sure that the neck of the fuel tank is fully inserted through the hole in the firewall and the correct side is facing up.



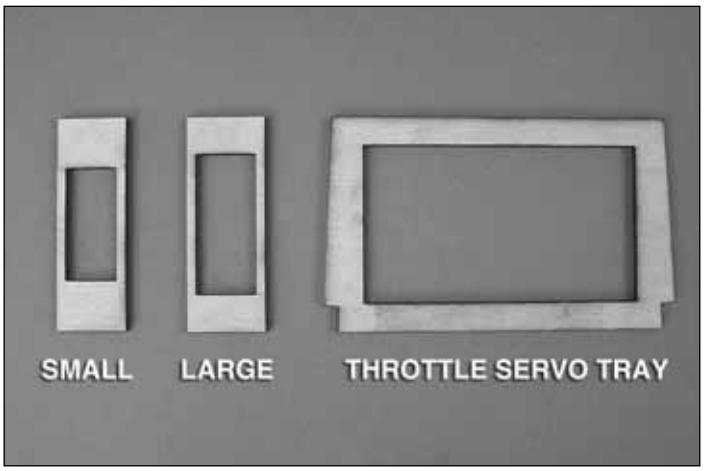
❑ 8. Locate the 1/4" x 1/4" x 12" [6 x 6 x 305mm] balsa stick and cut a piece 3-5/8" [92mm] long. Glue the piece tightly behind the fuel tank as shown.

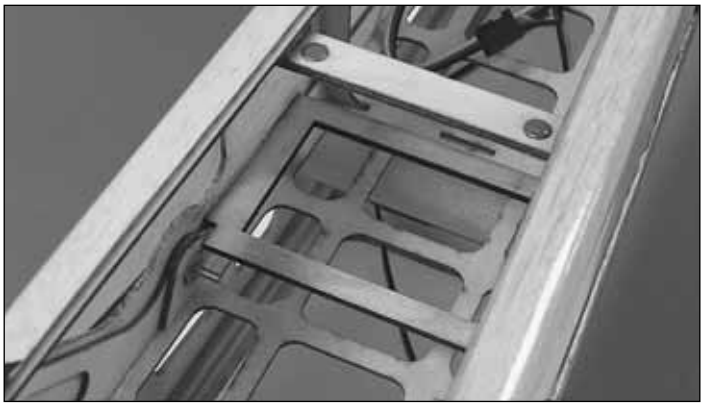


❏ 9. Cut another piece 4" [102mm] long and two pieces 3/8" [9.5mm] long. Glue the small pieces in the location shown. Glue the 4" [102mm] piece to the small pieces across the fuel tank. Confirm that the fuel tank is held securely in place.

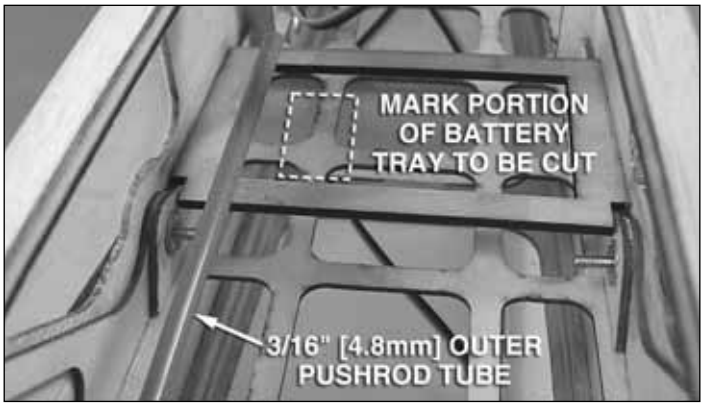


❏ 10. Make a mark on the firewall in line with the throttle arm on the carburetor. Use a 3/16" [4.8mm] bit to drill a hole through the firewall at the mark you made. Be sure that you are not drilling through the fuel tank! If necessary, move your mark below or to the side of the fuel tank. The throttle pushrod can be bent after installation to reach the throttle arm.



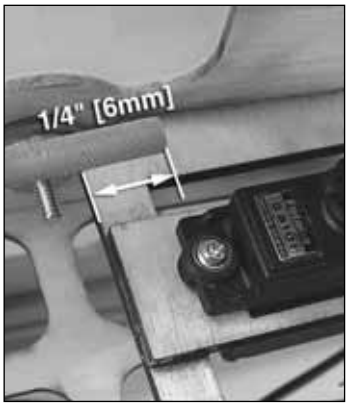


❏ 11. A **throttle servo tray** and two **servo adapter plates** are included in the kit. The small adapter plate will hold a 1.1" x 0.5" [28 x 13mm] micro servo such as the Futaba S3101. The large adapter plate will hold a 1.4" x 0.6" [36 x 15mm] servo such as the Futaba S9650. The throttle servo tray will hold a standard size servo (1.6" [40.5mm] long) such as the Futaba S3003. Glue the throttle servo tray into position as shown.

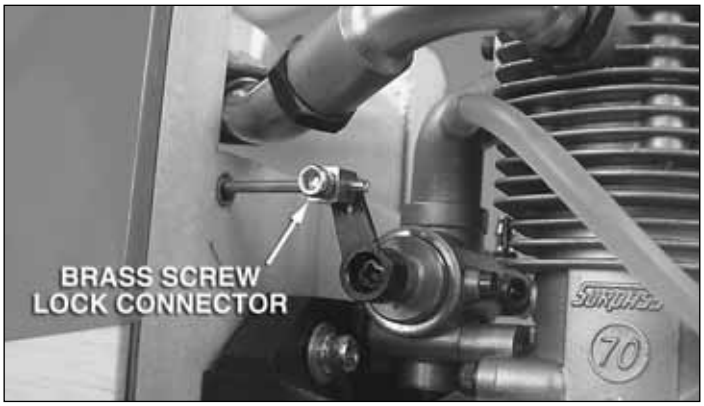


❏ 12. Temporarily insert the 3/16" [4.8mm] outer pushrod tube through the hole in the firewall and slide it back to the throttle servo tray. With the outer pushrod tube straight, determine where your throttle servo will need to be installed. Mark the portion of the battery tray above the location of the throttle servo that will need to be cut away in order to make room for it.

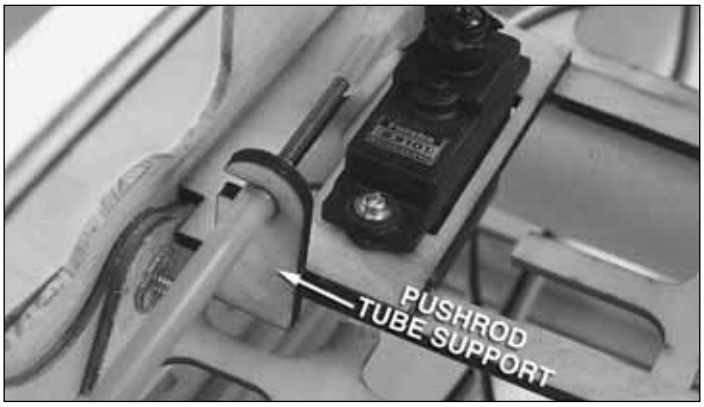
❏ 13. Cut away the battery tray at the marks you made using a Dremel tool or a hobby knife and test fit your servo into the throttle servo tray. When satisfied, secure the throttle servo to the servo tray using the hardware included with the servo. If you are using an adapter plate, glue it to the servo tray using medium CA glue.



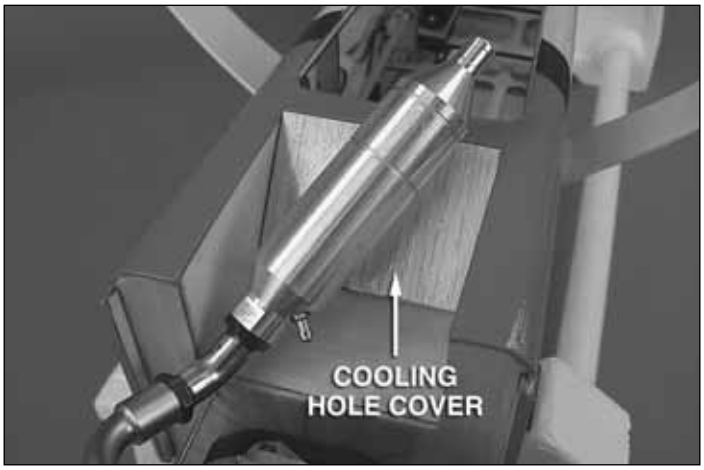
❏ 14. Position the outer pushrod tube so that the aft end is approximately 1/4" [6mm] behind the front edge of the throttle servo tray. Mark the tube at the firewall, remove it from the plane and cut it to length at the mark you made. Use sandpaper to roughen the ends of the pushrod tube, reinstall it into the plane and glue the front end to the firewall.



❏ 15. Attach a nylon clevis and a silicone clevis retainer to a 36" [914mm] pushrod. Install a brass screw-lock connector onto the throttle servo arm and secure it using a nylon retainer. Thread a 4-40 x 1/8" [3mm] SHCS loosely into the screw-lock connector. Slide the pushrod through the aft end of the outer pushrod tube and through the screw-lock connector on the throttle arm. Connect the clevis to your throttle servo and adjust the positions of the throttle arm on the carb and throttle servo arm. Use your radio to ensure complete carb barrel rotation. When satisfied, cut off the excess pushrod beyond the screw-lock connector.



❏ 16. Clip the **pushrod tube support** onto the outer pushrod tube near the throttle servo. Glue it to the pushrod tube and to the throttle servo tray.



❏ 17. Glue the **cooling hole cover** in place as shown.

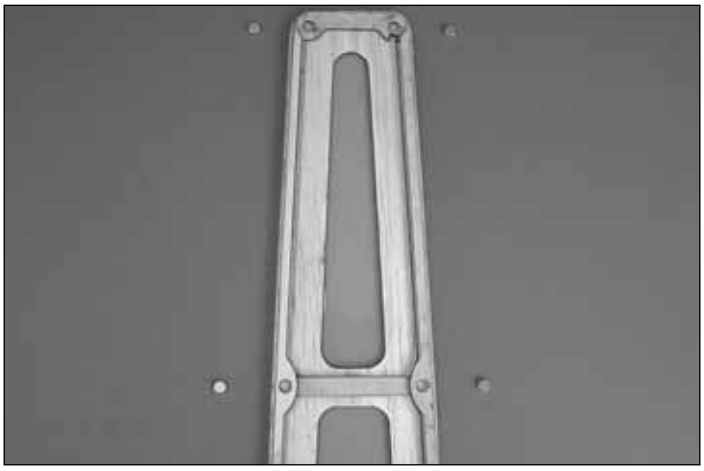
❏ 18. Finish the engine installation by connecting the fuel lines to the muffler and carburetor. Use the included fuel line plug for your fill line when not in use.

❏ 19. Two-stroke insatallation is similar.

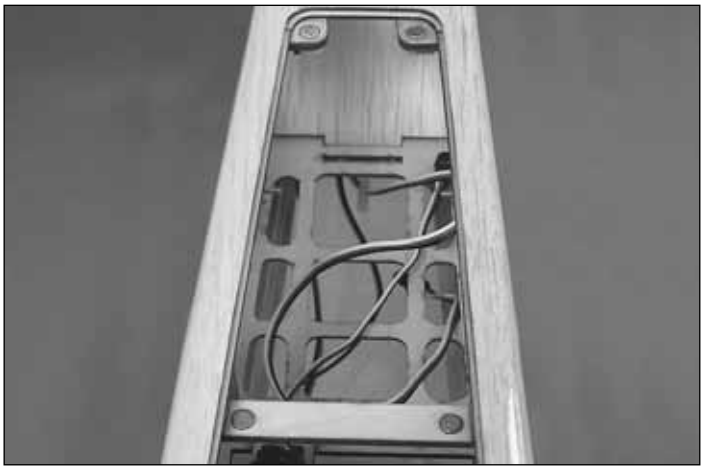
FINISH THE MODEL

Assemble the Fuselage Hatch

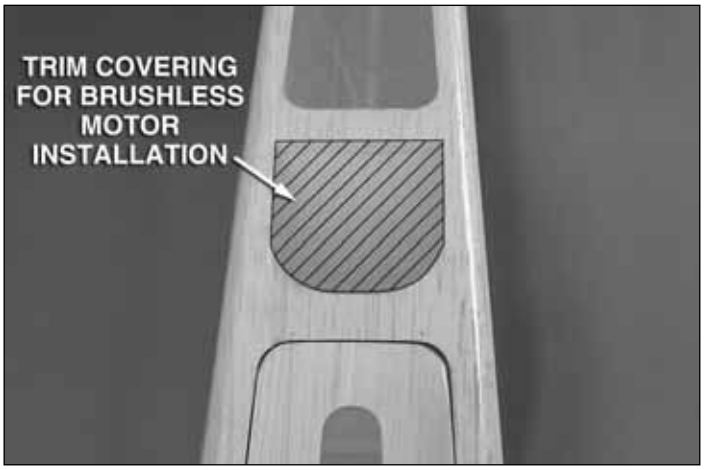
*The **fuselage hatch** has been designed to be easily removable to allow you access to your radio equipment and flight packs (if you have installed a brushless motor).*



❏ 1. Glue four **magnets** into the fuselage hatch as shown with CA glue. Be sure that the magnets are securely glued in place. Roughing up the magnets with sandpaper before installation will improve adhesion. Apply a thin coating of medium CA glue into each magnet hole. Put the magnets in place and apply a skin coating of thin CA across the top of the magnets overlapping onto the wood just around the holes. Allow the CA glue to dry undisturbed without accelerator.

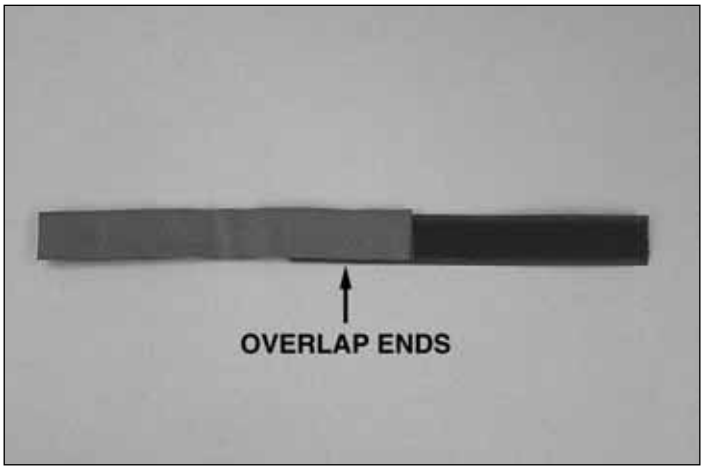


❏ 2. Install four magnets into the magnet holes in the fuselage in the same manner as you did with the hatch. **Be sure to install the magnets with the polarity in the correct direction!** The magnets in the hatch must be attracted to the magnets in the fuselage when installed. To avoid confusion, put a magnet over each one that is glued in the hatch. Make a mark on the magnet so you will know which side faces down in relation to the battery hatch when gluing them into the fuselage. Also, make note of each fuselage magnet and which hole it will be glued into when marking it.

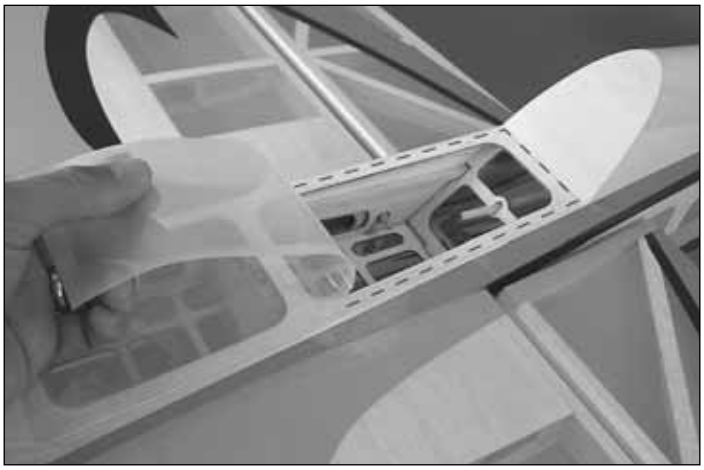


❏ 3. If you have installed a brushless motor, trim the covering from the cooling hole exit behind the fuselage hatch. This will also allow you to reach your finger through the exit hole and pop the fuselage hatch open in order to remove and replace your flight packs. If you have a glow engine installed, use a small screwdriver to pry the hatch open when occasional access to your radio equipment is needed.

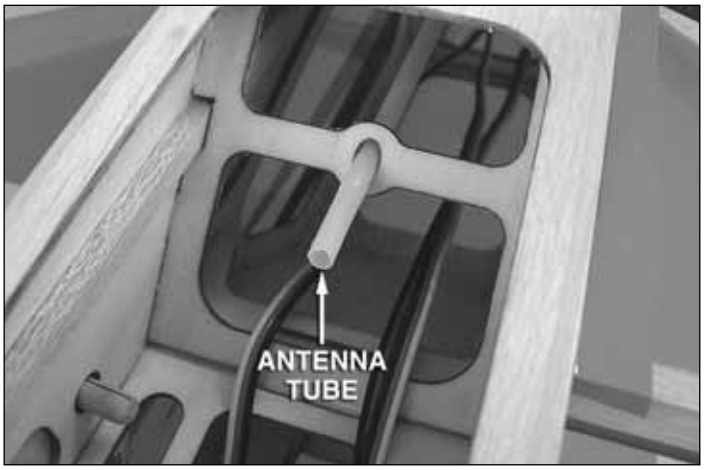
Install the Radio System (Brushless Motor)

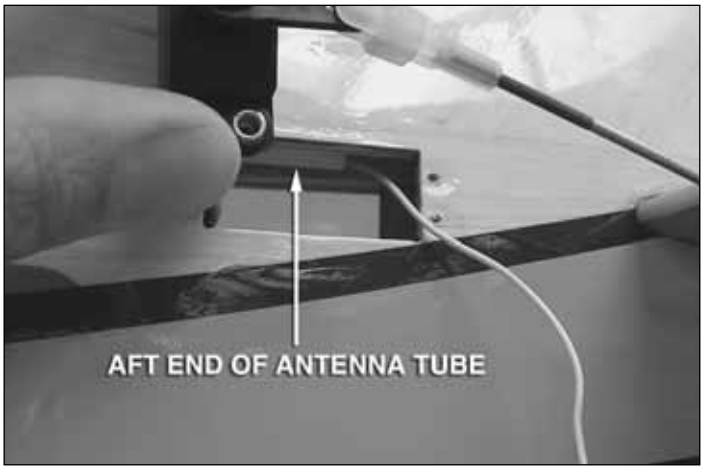


❏ 1. Make up two hook and loop straps for your receiver and receiver battery pack by cutting the included **hook and loop material** to length (use the size of your radio equipment as a guide) and overlapping the ends together as shown.

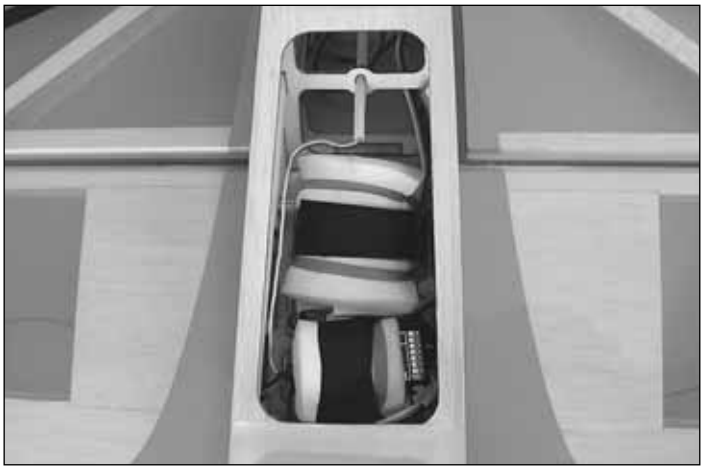


❏ 2. In order to make room for the main flight packs, the receiver and receiver battery must be installed on the top side of the battery tray. You have some options to access the top of the battery tray. For our model, we carefully trimmed the covering 3/16" [4.8mm] outside the lightening hole cutout as shown on three sides and peeled it back to expose the top of the battery tray. You can also trim the covering away from the lightening hole, then cover it up using a trim sheet after the radio system is installed. Another option would be to create a removable cockpit base (material not included) that could be unscrewed to allow access to the radio system should repair or replacement be necessary.

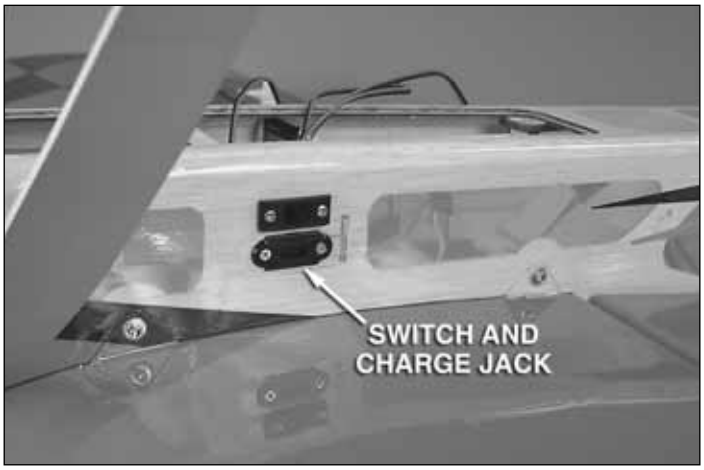




❏ 3. Feed the receiver antenna through the antenna tube installed in the fuselage. Temporarily remove the left elevator servo from the fuselage to expose the aft end of the antenna tube. Use needle nose pliers to pull the rest of the antenna when you get it far enough through to come out of the aft end of the antenna tube. Guide the end of the antenna wire into the cavity in the rear of the fuselage.

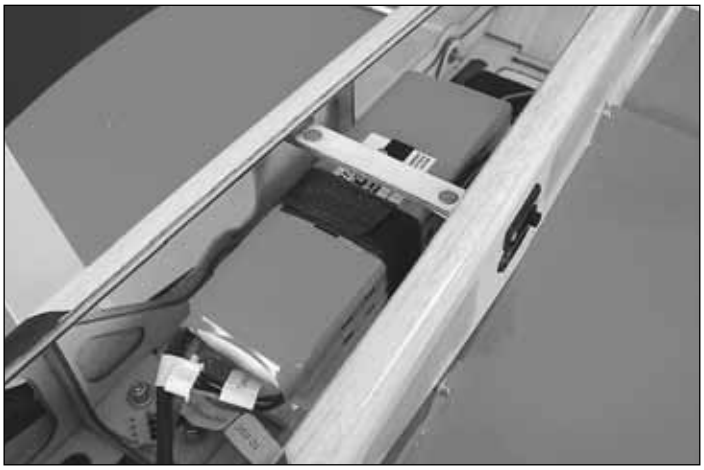


❏ 4. Wrap the receiver and receiver battery pack with foam rubber (not included). Use the hook and loop straps you made to secure them in the fuselage in the location shown.



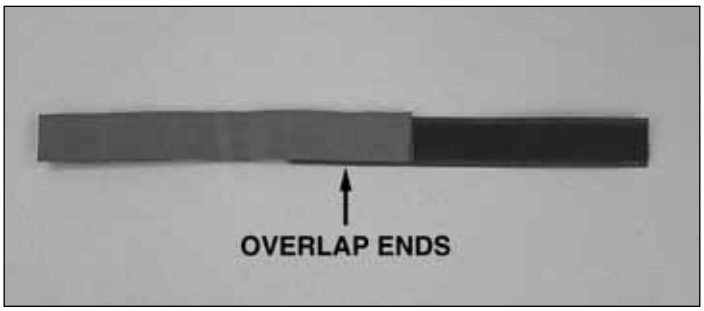
❏ 5. Attach your receiver switch and charge jack receptacle (not included) to the side of the fuselage. Be sure that the receptacle you are installing will not interfere with the flight packs. The Great Planes switch and charge jack receptacle is too large for this plane. We used an Ernst charge receptacle, part number ERNM3001. Hook your tail surface servos and battery harness to the receiver. Confirm that your aileron Y-harness is long enough for the ends to reach through the sides of the fuselage to connect to the aileron servo extensions. If not, you may need to install additional 6" [152mm] servo extensions onto the harness. If you have a computerized radio and will not be using a Y-harness, 6" [152mm] servo extensions will be needed for the aileron channels on your receiver.

❏ 6. Double check the radio system to be sure that everything is in order and the radio system is working properly. If you peeled back the covering like shown in step #2, use a covering iron on low heat to seal it back down.

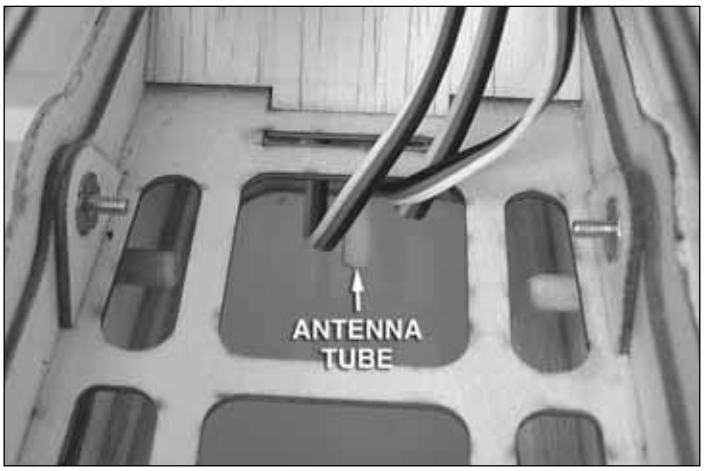


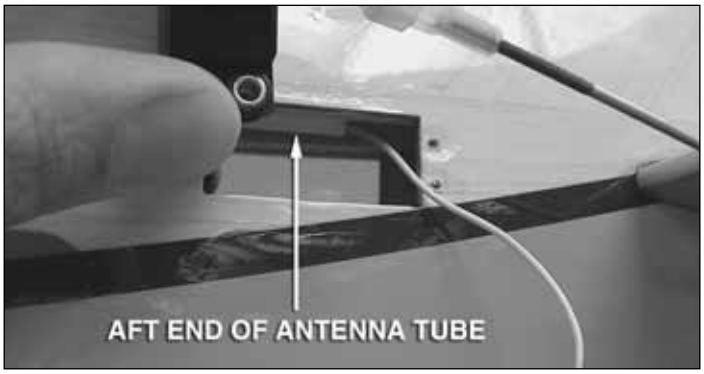
❏ 7. Make a strap out of the remaining hook and loop material for the flight packs. We have included adhesive-backed hook and loop material for added security for the packs. However, you will want to check your C.G. position (after the model is complete) before adhering the material to the battery tray. The C.G. position can be changed by moving the flight packs forward or aft inside the fuselage. When satisfied with the battery position by confirming the C.G., we suggest gluing the hook and loop strap to the battery tray to prevent it from falling inside the fuselage when changing flight packs.

Install the Radio System (Glow Engine)

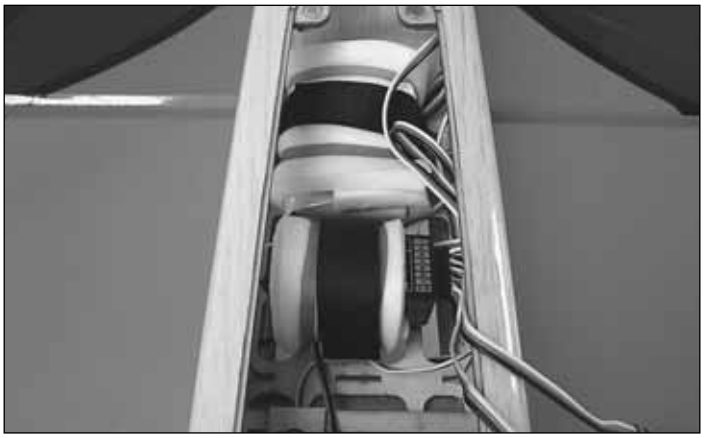


❏ 1. Make up two hook and loop straps for your receiver and receiver battery pack by overlapping the ends together as shown.

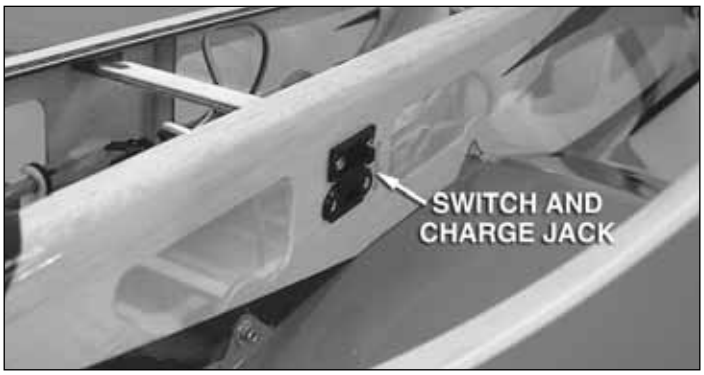




❏ 2. Feed the receiver antenna through the antenna tube installed in the fuselage. Temporarily remove the left elevator servo from the fuselage to expose the aft end of the antenna tube. Use needle nose pliers to pull the rest of the antenna when you get it far enough in to come out of the aft end of the antenna tube. Guide the antenna wire into the cavity in the rear of the fuselage.

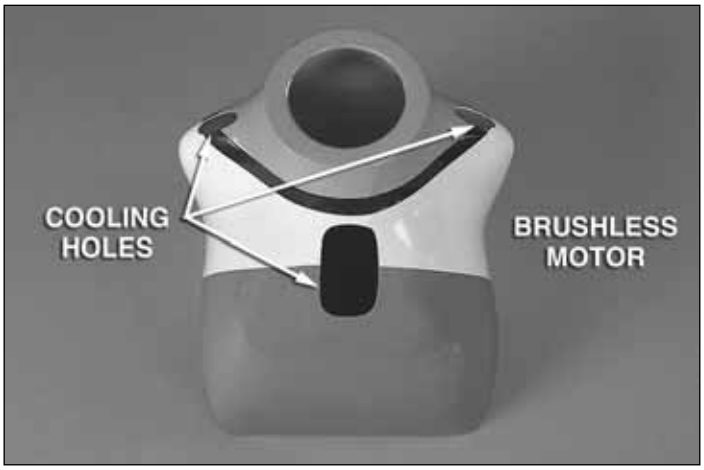


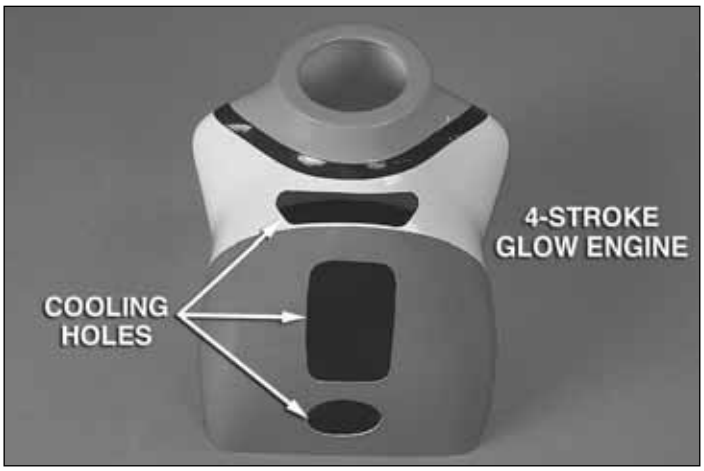
❏ 3. Wrap the receiver and receiver battery pack with foam rubber (not included). Use the hook and loop straps you made to secure them in the fuselage in the location shown. Confirm that your aileron Y-harness is long enough for the ends to reach through the sides of the fuselage to connect to the aileron servo extensions. If not, you may need to install additional 6" [152mm] servo extensions onto the harness. If you have a computerized radio and will not be using a Y-harness, 6" [152mm] servo extensions will be needed for the aileron channels on your receiver.



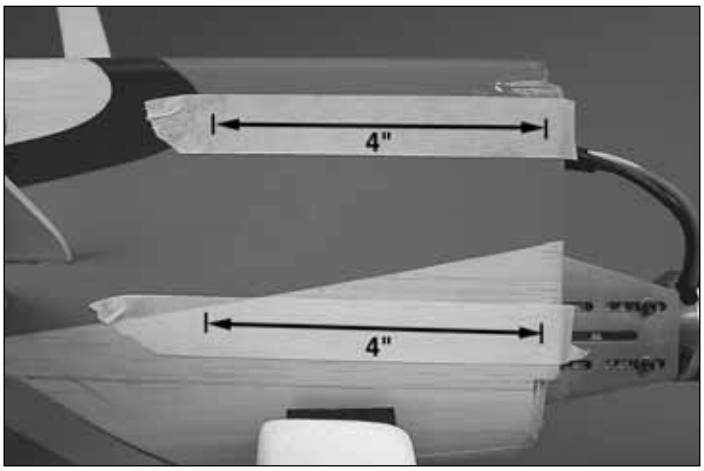
❏ 4. Attach your receiver switch and charge jack receptacle (not included) to the side of the fuselage across from the throttle servo.

Install the Cowl, Canopy and Spinner

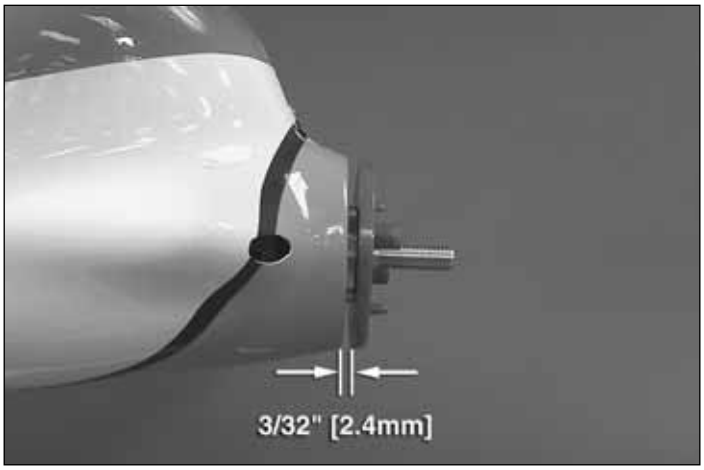




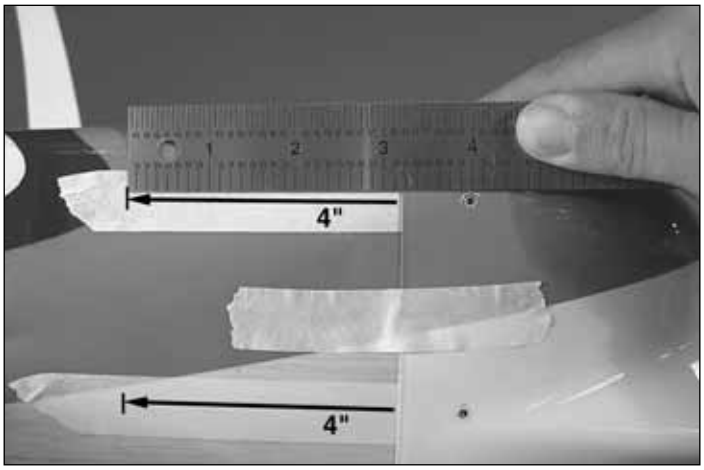
❏ 1. Use a rotary tool such as a Dremel to cut cooling holes in the cowl to match your power system. If you are installing a glow engine, you will need a hole for the engine head, cool air inlet and an access hole for your needle valve.



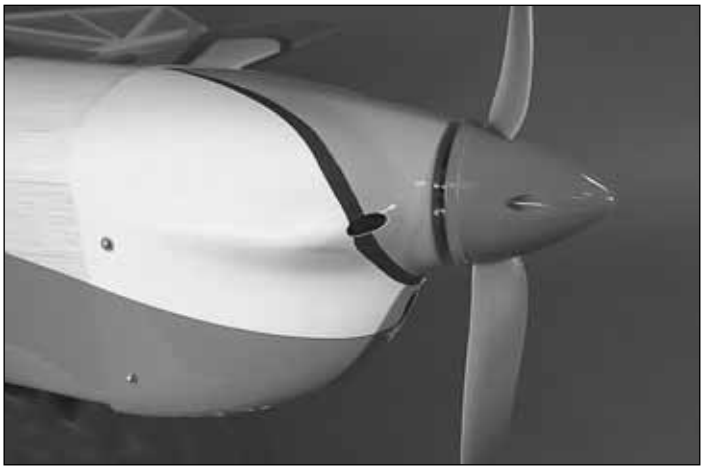
❏ 2. Put four strips of masking tape approximately 5" [127mm] long (two pieces per side) onto the fuselage, in line with the cowl mounting tabs as shown. Place a mark in the middle of each piece of tape, centered over the cowl mounting tabs. Measure 4" [102mm] back from those marks and make another mark. Draw a line connecting your marks with a straight edge.



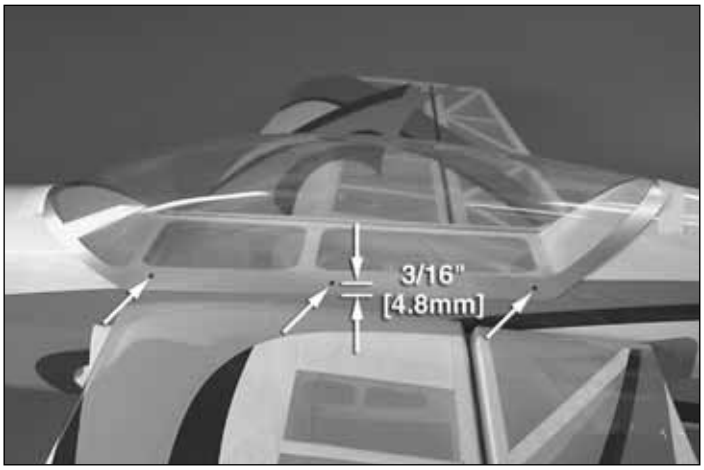
❏ 3. Fit the cowl onto the fuselage and temporarily secure the spinner backplate onto the prop shaft. You may need to drill out the hole in the backplate or use a prop reamer to match the diameter of your prop shaft (6mm diameter for the C42-60-480kV RimFire, 5/16" [7.9mm] for the O.S. .70 Surpass four-stroke engine). Align the colors on the cowl with the covering on the fuselage and position the cowl allowing a 3/32" [2.4mm] gap between the front of the cowl and the spinner backplate. When satisfied, tape the cowl into position.

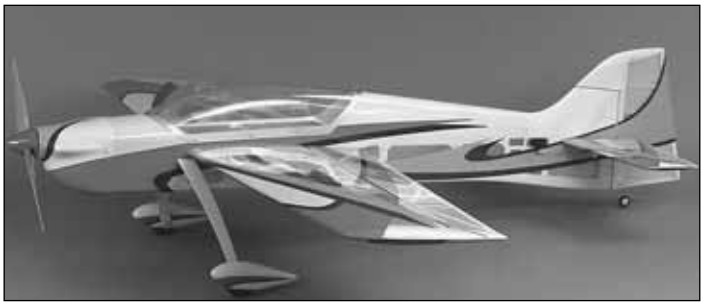


❏ 4. Measure 4" [102mm] from the aft marks you made on the masking tape to determine the locations for the cowl mounting screws. Using the straight lines on the tape as a guide, mark the locations on the cowl for the four mounting screws. Drill through the cowl and cowl mounting tabs at the marks using a 1/16" [1.6mm] drill bit. Remove the cowl from the fuselage (and the masking tape) and thread a #2 x 3/8" [9.5mm] sheet metal screw into each hole in the cowl mounting tabs and remove it. Add a drop of thin CA to each hole to harden them.



❏ 5. Attach the cowl with four #2 x 3/8" [9.5mm] screws and four #2 flat washers. Install the propeller and spinner onto the prop shaft using the hardware that came with the engine or motor.





❏ 6. Align the canopy on the fuselage and use tape to hold it in place. Drill six 1/16" [1.6mm] holes (three per side) along the bottom edges of the canopy 3/16" [4.8mm] below the cockpit base of the fuselage. Thread a #2 x 3/8" [9.5mm] screw into each hole and back it out. Remove the canopy and add a drop of thin CA glue to each hole. After the glue has hardened, install the canopy using six #2 x 3/8" [9.5mm] screws and six #2 flat washers.

Apply the Decals

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

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

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

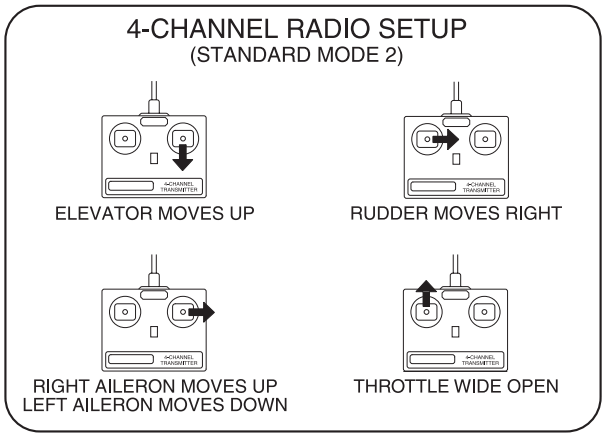
4. Use a piece of soft balsa or something similar to squeegee remaining water from under the decal. Apply the rest of the decals the same way.

GET THE MODEL READY TO FLY

Check the Control Directions

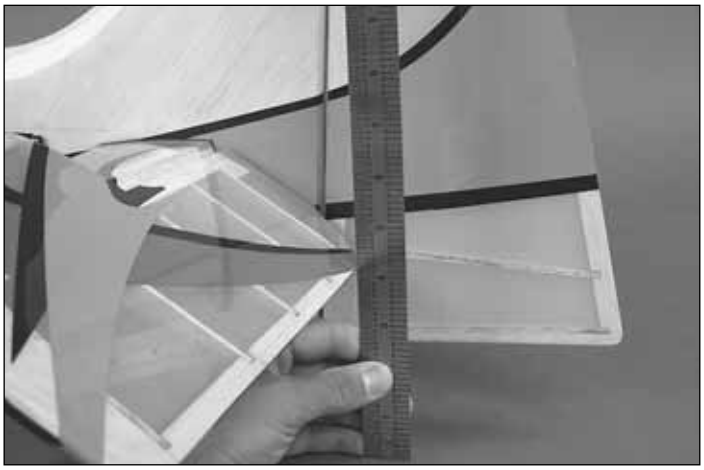
❏ 1. Turn on the transmitter and receiver and center the trims. If necessary, remove the servo arms from the servos and reposition them so they are centered. Reinstall the screws that hold on the servo arms.

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



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

Set the Control Throws



Use a ruler to accurately measure and set the control throw of each control surface as indicated in the chart that follows. If your radio does not have dual rates, we recommend setting the throws at the **low** rate setting for the first few flights.

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:	7/8" [22mm] up 7/8" [22mm] down	7/16" [11mm] up 7/16" [11mm] down
RUDDER:	4" [102mm] right 4" [102mm] left	1" [25mm] right 1" [25mm] left
AILERONS:	2" [51mm] up 2" [51mm] down	1" [25mm] up 1" [25mm] down
	3D RATES	
3D ELEVATOR:	2" [51mm] up 2" [51mm] down	
3D RUDDER:	4" [102mm] right 4" [102mm] left	
3D AILERONS:	3" [76mm] up 3" [76mm] down	

IMPORTANT: The Reactor .46 3D 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 Reactor 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 for less experienced fliers, so remember, "more is not always better."

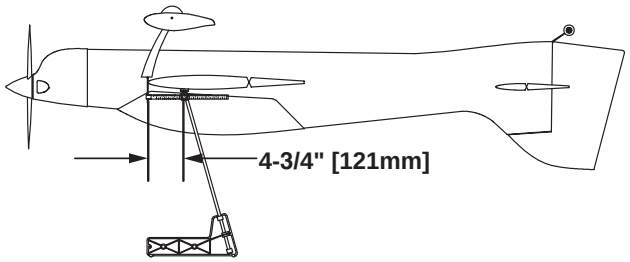
Balance the Model (C.G.)

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

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

❏ 1. Use a felt-tip pen or 1/8" [3mm]-wide tape to accurately mark the C.G. on the top of the wing on both sides of the fuselage. The C.G. is located 4-3/4" [121mm] back from the leading edge of the wing.

This is where your model should balance for the first flights. Later, you may wish to experiment by shifting the C.G. up to 1/8" [3mm] forward or 1/4" [6mm] back to change the flying characteristics. Moving the C.G. forward may improve the smoothness and stability, but the model may then require more speed for takeoff and make it more difficult to slow for landing. Moving the C.G. aft makes the model more maneuverable, but could also cause it to become too difficult to control. In any case, **start at the recommended balance point** and do not at any time balance the model outside the specified range.



❏ 2. With the wing attached to the fuselage, all parts of the model installed (ready to fly) and an empty fuel tank, place the model upside-down on a Great Planes CG Machine, or lift it upside-down at the balance point you marked.

❏ 3. If the tail drops, the model is "tail heavy" and the battery pack(s) 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 (a glow engine installation will most likely require 2 to 5 ounces of tail weight to balance). If possible, relocate the battery pack and receiver to minimize or eliminate any additional ballast required. If additional weight is required, nose weight may be easily added by using a "spinner weight" (GPMQ4645 for the 1 oz. [28g] weight, or GPMQ4646 for the 2 oz. [57g] weight). If spinner weight is not practical or is not enough, use Great Planes (GPMQ4485) "stick-on" lead. A good place to add stick-

on nose weight is to the firewall (don't attach weight to the cowl—it is not intended to support weight). Begin by placing incrementally increasing amounts of weight on the bottom of the fuse over the firewall until the model balances. Once you have determined the amount of weight required, it can be permanently attached. If required, tail weight may be added by cutting open the fuse and gluing it permanently inside. **Note:** Do not rely upon the adhesive on the back of the lead weight to permanently hold it in place. 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.

Balance the Model Laterally

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

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

PREFLIGHT

Identify Your Model

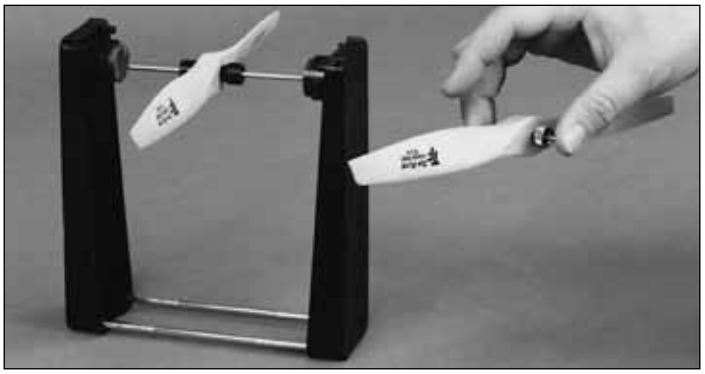
No matter if you fly at an AMA sanctioned R/C club site or if you fly somewhere on your own, you should always have your name, address, telephone number and AMA number on or inside your model. It is **required** at all AMA R/C club flying sites and AMA sanctioned flying events. Fill out the identification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

Charge the Batteries

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

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

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.

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.

Range Check

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

MOTOR SAFETY PRECAUTIONS

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

- Use safety glasses when running the motor.
- Do not run the motor in an area of loose gravel or sand; the propeller may throw such material in your face or eyes.
- Keep your face and body as well as all spectators away from the plane of rotation of the propeller as you run the motor.
- Keep these items away from the prop: loose clothing, shirt sleeves, ties, scarfs, long hair or loose objects such as pencils or screwdrivers that may fall out of shirt or jacket pockets into the prop.
- Always remove the LiPo battery from the plane before charging.
- Always use a charger designed to charge LiPo batteries for charging the LiPo flight battery.
- Never leave the LiPo battery unattended while charging. If the battery becomes hot, discontinue charging.

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, scarves, 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.

LITHIUM BATTERY HANDLING AND USAGE

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

- ONLY use a LiPo approved charger. NEVER use a NiCd/NiMH peak charger!
- NEVER charge in excess of 4.20V per cell.
- ONLY charge through the “charge” lead. NEVER charge through the “discharge” lead.
- NEVER charge at currents greater than 1C.
- ALWAYS set charger’s output volts to match battery volts.
- ALWAYS charge in a fireproof location.
- NEVER trickle charge.
- NEVER allow the battery temperature to exceed 150°F (65°C).
- NEVER disassemble or modify pack wiring in any way or puncture cells.
- NEVER discharge below 2.5V per cell.
- NEVER place on combustible materials or leave unattended during charge or discharge.
- ALWAYS KEEP OUT OF REACH OF CHILDREN.

AMA SAFETY CODE (EXCERPTS)

Read and abide by the following excerpts from the Academy of Model Aeronautics Safety Code. For the complete Safety Code refer to Model Aviation magazine, the AMA web site or the Code that came with your AMA license.

General

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

2. I will not fly my model aircraft higher than approximately 400 feet within 3 miles of an airport without notifying the airport operator. I will give right of way 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.

CHECK LIST

- ❑ 1. Fuelproof all areas exposed to fuel or exhaust residue such as the cowl mounting blocks, 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 your receiver antenna and make sure it is in the antenna tube.
- ❑ 5. Balance your model laterally.
- ❑ 6. Use thread-locking compound to secure critical fasteners such as the set screws that hold the wheel axles to the struts, screws that hold the carburetor arm (if applicable), screw-lock pushrod connectors, etc.
- ❑ 7. Add a drop of oil to the wheel axles.
- ❑ 8. Make sure all hinges are **securely** glued in place.
- ❑ 9. Reinforce holes for wood screws with thin CA where appropriate (servo mounting screws, cowl 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 your 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 you may have 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 not kinked.
- ❑ 16. Balance your propeller (and spare propellers).
- ❑ 17. Tighten the propeller nut and spinner.
- ❑ 18. Place your name, address, AMA number and telephone number on or inside your model.
- ❑ 19. Cycle your receiver battery pack (if necessary) and make sure it is fully charged.
- ❑ 20. If you wish to photograph your model, do so before your first flight.
- ❑ 21. Range check your radio when you get to the flying field.
- ❑ 22. Make sure all wing attachment bolts and screws are securely tightened.

FLYING

The Reactor .46 3D ARF is a great-flying model that flies smoothly and predictably. The Reactor does not, however, possess the self-recovery characteristics of a primary R/C trainer and should be flown only by experienced R/C pilots.

Fuel Mixture Adjustment

A fully cowled engine may run at a higher temperature than an un-cowled engine. 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.

Takeoff

Before you get ready to takeoff, see how the model handles on the ground by doing a few practice runs at **low speeds** on the runway. Hold "up" elevator to keep the tail wheel on the ground. If necessary, adjust the tail wheel so the model will roll straight down the runway. If you need to calm your nerves before the maiden flight, 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 you're 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 gradually advance the throttle. 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 it is likely that you will need to apply more right rudder 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.

When you become accustom to the takeoff characteristics of the Reactor, as little as 10 feet is needed to get airborne. Building some speed on the runway and applying full up elevator will pull the Reactor into a climb with little effort.

Flight

For reassurance and to keep an eye on other traffic, it is a good idea to have an assistant on the flight line with you. Tell him to remind you to throttle back once the plane gets to a comfortable altitude. While full throttle is usually desirable for takeoff, most models fly more smoothly at reduced speeds. Take it easy with the Reactor for the first few flights, gradually getting acquainted with it as you gain confidence. Adjust the trims to maintain straight and level flight. After flying around for a while and while still at a safe altitude 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 your model before landing.

Landing

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

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

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

GOOD LUCK AND GREAT FLYING!

3D FLYING

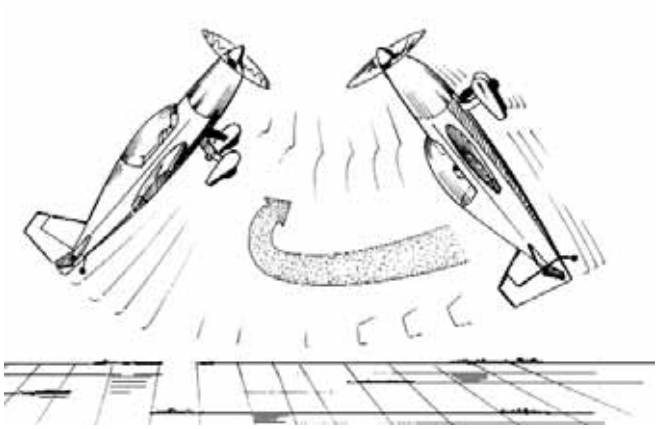
Because of the power to weight ratio on 3D planes, straight and level flight should be at a reduced throttle and full power should only be used when the airplane is "loaded" during a maneuver. Learn to manage the throttle and experiment while in the maneuver. The power needed will depend on the maneuver being performed. C.G. also plays a large role in the 3D capability of models as well. Experiment, but keep in mind that being tail heavy is not always the best way to go.

Propeller thrust and thrust vectoring need to be considered for 3D aerobatics. A large diameter prop with a low pitch will provide a lot of pull for the aircraft but will not offer enough air moving across the tail surfaces (thrust vectoring) for 3D. Due to the large number of factors involved, some experimentation will be necessary to find the right propeller pitch and diameter for your model.

Higher RPM engines such as a .46 two-stoke require a low pitch propeller and lower RPM motors such as a 1.60 will require a higher pitch propeller. If you feel that the effectiveness of the tail surfaces is not enough, try a smaller propeller with a higher pitch.

Another thing to remember is that maximum control throw is not necessary for all 3D maneuvers. Occasionally, too much throw can place the model too far into a stall causing the model to become uncontrollable. Practice your maneuvers at a higher altitude while you become accustom to your particular plane's stall characteristics.

WATERFALLS



With the model pointing straight up (almost in a hover), push full down elevator and full throttle. As the model rotates and begins to point downwards, reduce the throttle (to keep the model from being pulled downwards). As the model flattens out, add power back in to pull the model around. A lot of models will require a little bit of rudder correction (usually right rudder) during this maneuver. Some planes will require aileron correction to keep the wings level.

UPRIGHT FLAT SPINS

Pull the nose up slightly and slowly decrease power. As the model slows down to a few mph, slowly add in full left rudder and power. Next, start adding in up elevator as needed to keep the model flat in the spin. Most airplanes will require some aileron as well to keep the wings level. This is one of the maneuvers to experiment on; try different C.G. positions and different amounts of throw and power to see how flat the spin will go. It is possible to maintain altitude in the flat spin and in some cases it is also possible to climb during the spin.

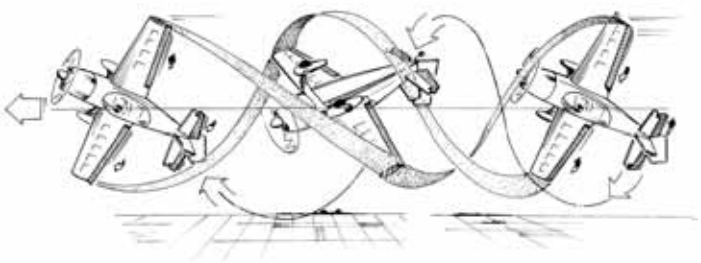
INVERTED FLAT SPINS

This is the same as the up-right flat spin except most planes like to spin in the opposite direction, for example: right rudder and down elevator.

THE WALL

Fly straight across the field at a moderate speed and simply pull full up until vertical. Adjust the power as necessary to maintain a hover.

KNIFE EDGE TUMBLE



This is an impressive looking maneuver that really isn't as difficult as it looks. (Before learning this maneuver you must be able to confidently Snap and Tumble your plane and stop the aircraft exactly, without over rotating.) Fly the model Knife Edge from the right at a moderate airspeed, using just enough

rudder to maintain Knife Edge, not climbing or diving. Perform one full right negative Tumble by maintaining your rudder setting while applying full throttle, full down elevator, and full right aileron, releasing in time to end again flying Knife Edge to the right. Note that you may need to use some positive elevator and/or left aileron to stop the Tumble at exactly Knife Edge. This maneuver is easier to the right because torque helps stop the Tumble and it can be done at varied airspeeds with proper throttle and rudder modulation.

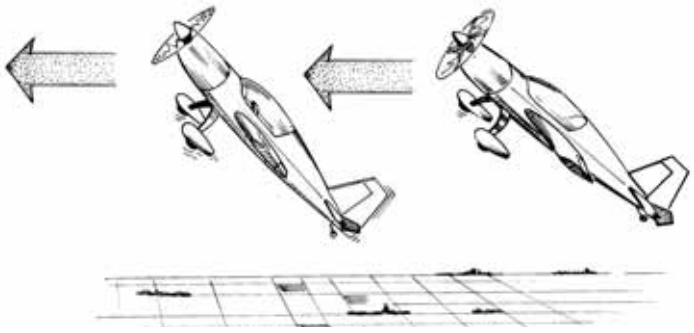
VERTICAL HOVER

Fly a straight pass across the field at 75ft high and 100ft out and pull the model vertical. Roll the model until the top of it is facing you and slowly begin to reduce power. As the model begins to slow down to 10mph or so, slowly add a little bit of power back in. You will have to adjust the throttle as needed, but make your adjustments smooth. Some right aileron may be needed to keep the model from torque rolling. Use the rudder and elevator to keep the nose pointing straight up. Be patient as this maneuver will take a while to learn.

TORQUE ROLL

This is the same as the vertical hover but without the use of right aileron to keep the model from rolling. If needed, you can use a little left aileron to speed the roll up. As the model rotates around, the controls will appear to be reversed to you but only the orientation of the model has changed.

HARRIER



The harrier is nothing more than a high angle of attack flying stall. Check the stall characteristics of your plane before proceeding with this maneuver. Bring your plane across the field at 75 ft high and 100 ft out away from yourself. Slowly pull back on the elevator while reducing throttle. The nose of the plane should come up. Depending on the plane/setup, you may have to make constant aileron (wing walking) and rudder corrections for this maneuver. As the nose of the plane comes up, start adding in a little bit of power to help maintain airspeed. The rudder is now used to turn the model. This maneuver will take some practice as there are a lot of small corrections made to keep most planes in the maneuver.

This is one maneuver where less control is needed. Too much elevator and the model goes into an uncontrollable stall. The C.G. of the plane will have a large effect on the stability of the model during this maneuver. Some planes perform better with more elevator deflection and a farther forward C.G. while other planes prefer a further aft C.G. and less elevator deflection. Elevator to flap mixing can be used on airplanes with marginal wing area, and some planes won't stall so elevator to spolieron mixing will be needed.

ROLLING HARRIER

Once you get comfortable with the up-right harrier, it's time to work rolls into the mix. From an up-right harrier, add in left aileron and change from up elevator to down elevator when inverted. If you are comfortable with four point rolls and slow rolls, inputting rudder on the knife edges can improve the maneuver considerably. To turn the model, simply input the elevator or rudder a little sooner or later in the rotation. It's all a matter of timing.

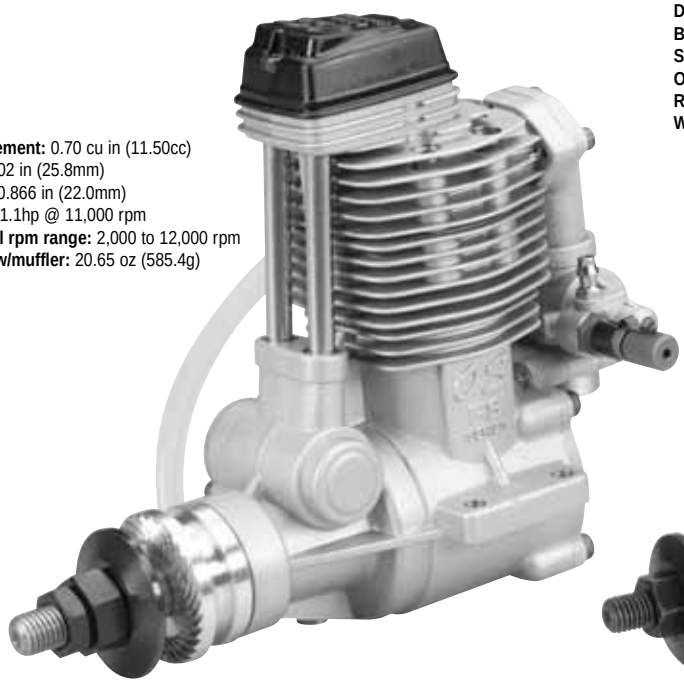
PINWHEEL

Climb vertically and bring the model to a vertical hover, but do not stop long enough to let the torque pull the model around (climbing or sliding slightly will not be noticeable to spectators but will keep air flowing over the ailerons and provide you roll authority to stop the torque). When the model is hanging, rock the plane left with rudder, then apply full throttle and full right rudder and hold both, completing 3/4s of a VERY tight Knife Edge Loop and flying out Knife Edge. When done correctly, the plane pivots around the wingtip in a very small area. This maneuver can be done either direction.

ALSO AVAILABLE FROM GREAT PLANES

O.S.® FS-70 Surpass™ II

Displacement: 0.70 cu in (11.50cc)
Bore: 1.02 in (25.8mm)
Stroke: 0.866 in (22.0mm)
Output: 1.1hp @ 11,000 rpm
Practical rpm range: 2,000 to 12,000 rpm
Weight w/muffler: 20.65 oz (585.4g)



Improve your fuel economy and increase your power with the FS-70 Surpass II. It puts out an impressive 1.1 horsepower at 11,000 rpm – with all the power you need to execute big maneuvers. Its Type 60R carb provides more precise fuel flow control and smoother throttle control than the original FS-70 Surpass. The FS-70 Surpass II also features easier installation, adjustment and maintenance. Muffler and glow plug included. Two-year warranty. (OSMG0872)

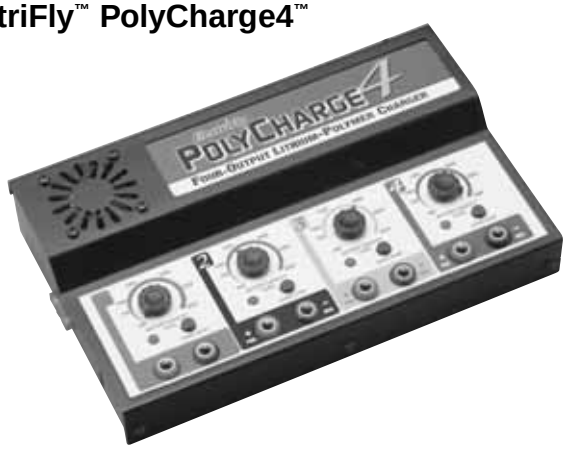
O.S.® .46 AX ABL

Displacement: 0.455 cu in (7.5cc)
Bore: 0.866 in (22.0mm)
Stroke: 0.772 in (19.6mm)
Output: 1.65 bhp @16,000 rpm
RPM Range: 2,000-17,000
Weight w/muffler: 17.2 oz (489g)

Includes: #A3 glow plug, E-3010 muffler
Requires: glow fuel, prop
Suggested prop sizes: 10.5x6, 11x6-8, 12x6-7

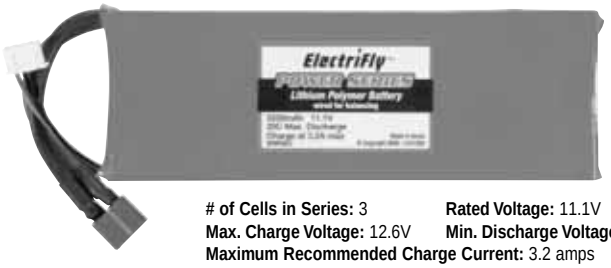
Ask the pilot who owns one, and the reasons to buy mount up fast. Start with 1.65 hp output from a 17.2 oz. engine. Add ABL (Advanced Bimetallic Liner) durability, a self-leveling and aligning head design, a tapered low-speed needle to eliminate transition “surge” and the.46 AX still has more to offer. There’s a simple rotor guide screw for low-end adjustment - and the high-speed needle includes both a ratchet spring and O-ring seal to lock settings in for the long haul. Includes A3 glow plug, E-3010 muffler, and 2-year warranty protection. (OSMG0547)

ElectriFly™ PolyCharge4™



For convenience with multiple LiPo packs, there's the DC PolyCharge4. Each of its four independent outputs can charge a one-to-four cell Lithium-Polymer pack. It's ideal if you don't have the time for one-at-a-time charging - and don't want the expense and hassle of multiple chargers. Each output can handle packs from 300 to 3000mAh. Set the capacity, and PolyCharge4 will automatically set the charge rate to get you started - and use light and sound cues to tell you when your pack is done. (GPMM3015)

ElectriFly™ 3200mAh Power Series LiPo Battery with Balance Connector



# of Cells in Series: 3 **Rated Voltage:** 11.1V
Max. Charge Voltage: 12.6V **Min. Discharge Voltage:** 7.5V
Maximum Recommended Charge Current: 3.2 amps
Continuous Discharge Current: 64 amps (20C)
Discharge Lead: 12 AWG 80mm long wire w/Deans Ultra Female plug
Charge Lead: 24 AWG 40mm long wire w/balance connector
Pack Dimensions: 144x48x24mm (5.66x1.88x0.94 inches)
Weight: 270g (9.52oz)

Ideal for scale aircraft, bigger sport aerobats, 3D planes, and larger electric models, the Power Series 3200mAh LiPo pack enables you to enjoy the benefits of balancing. The cells are conditioned to last longer, and can be fully charged to 4.20V, ensuring maximum power from the pack. A LiPo Cell Balancer (like ElectriFly's Equinox LiPo Balancer GPMM3160) or a Balancing Charger is required. (GPMP0623)

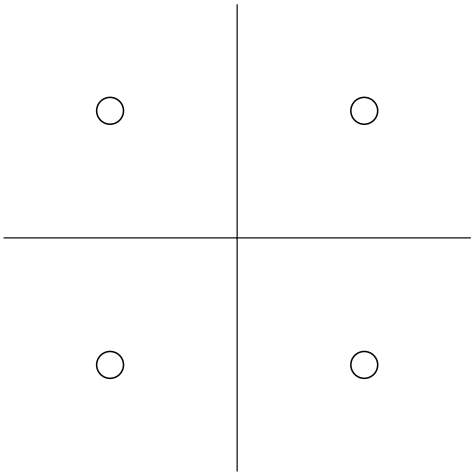
ALSO AVAILABLE FROM GREAT PLANES

Great Planes® 25% YAK 54 3D Glow/Gas ARF

Wingspan: 81 in (2055 mm)
Wing Area: 1138 sq in (73.4 dm²)
Weight RTF: 12.5-15.25 lb (5.67-6.86 kg)
Wing Loading: 25-30 oz/sq ft (77-93 g/dm²)
Length: 68 in (1727 mm)
Engine Required: 2-stroke 1.6-1.8 cu in (25-30 cc) or 4-stroke 1.8-2.1 cu in (30-36 cc) glow or 1.9-2.6 cu in (32-43 cc) gasoline
Radio Required: 6-channel w/7 servos (6 high-torque metal gear servos and one standard servo)

The YAK 54 is a favorite among 3D pilots, and this IMAA-legal, 25% ARF model captures every nuance of the Unlimited Class competitor. Put yourself at the controls and experience the thrills of performing precision maneuvers with ease and attitude! The perfect combination of light weight and "in-flight" durability, the YAK 54 is an excellent sport flyer - but also capable of any 3D and IMAC aerobatic maneuver you can think of. The YAK 54 also includes a complete package of well-made hardware that keeps it performing like a champion. (GPMA1411)

ENGINE MOUNT TEMPLATE



Futaba® S3152 Digital Servo

Dimensions: 1.5" x 0.8" x 1.5"
Weight: 1.5 oz.
Torque 4.8V (6.0V): 69oz-in (87oz-in)
Speed 4.8V (6.0V): 0.22 sec/60° (0.18 sec/60°)

The S3152 digital servo features one ball bearing and one metal bushing, and delivers 70% more torque than the S3151. It's an excellent hop-up for improving the performance of R/C airplanes, helis, RTR cars, trucks and boats. 1-year warranty. (FUTM0311)