ULTRA SPORT 46

INSTRUCTION MANUAL

SPECIFICATIONS

Wingspan: 55 in [1395 mm]
Length: 49.5 in [1255mm]
Weight: 5.5–6.5 lb [2493–2947 g]
Wing Area: 564 in^2 [36.4 dm^2]
Wing Loading: 22–26 oz/ft^2 [67–79 g/dm^2]
Radio: 5 channel radio
Engine: .46-.55 [7-9 cc] 2-stroke glow engine, .70 (11.5 cc) 4-stroke glow engine
Motor: Great Planes RimFire .55 (42-60-480) Outrunner Brushless

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

In 1989 the very successful Great Planes Ultra Sport .40 kit was introduced. Many modelers learned to fly aerobatics with this plane. We are proud to bring you the great flying Ultra Sport .46/EP in the ARF version. It has been updated to use an electric motor or a glow engine. Unlike the kit, the ARF version will have you enjoying the smooth aerobatic performance in just a few hours.

For the latest technical updates or manual corrections to the Ultra Sport .46/EP visit the Great Planes web site at www.greatplanes.com. Open the "Airplanes" link, then select Ultra Sport .46/EP. If there is new technical information or changes to this model a "tech notice" box will appear on the page.

Academy of Model Aeronautics

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

Academy of Model Aeronautics
5151 East Memorial Drive
Muncie, IN 47302-9252

Tele. (800) 435-9262
Fax (765) 741-0057

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

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

FAA INFO
As a new owner of an unmanned aircraft system (UAS), you are required to place your FAA number on or in your plane. It is your responsibility to operate this vehicle safely following the FAA rules. Please contact your local authorities to find out the latest rules and regulations.

KNOW BEFORE YOU FLY

Federal Aviation Administration

In the United States, please visit:
knowbeforeyoufly.org faa.gov/uas

SAFETY PRECAUTIONS

Protect Your Model, Yourself & Others…
Follow These Important Safety Precautions

1. Your Ultra Sport .46/EP should not be considered a toy, but rather a sophisticated, working model that functions very much like a full-size airplane. Because of its performance capabilities, the Ultra Sport .46/EP, if not assembled and operated correctly, could possibly cause injury to yourself or spectators and damage to property.

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

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

4. You must use an R/C radio system that is in good condition, a correctly sized engine, and other components as specified in this instruction manual. All components must be correctly installed so that the model operates correctly on the ground and in the air. You must check the operation of the model and all components before **every** flight.

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

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

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

We, as the kit manufacturer, provide you with a top quality, thoroughly tested product 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.

NOTE: Some technically-minded modelers who wish to check the wing, stab and motor thrust angles may do so by visiting the web site at www.greatplanes.com and clicking on "Technical Data."

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

Glow Engine

The Ultra Sport .46/EP is suited for a .46 – .55 2-stroke or .70 4-stroke glow engine. The O.S. Max .55AX (OSMG0557) is illustrated in this manual with the stock muffler.

Other Accessories for a Glow Engine

- ❍ ¼" [6mm] R/C Foam Rubber (HCAQ1000)
- ❍ Great Planes Dead Center Hole Locator (GPMR8130)
- ❍ 6-32 Tap and Drill Set (DUBR0510)
- ❍ Suitable propeller for your engine

Brushless Electric Motor

- ❍ Great Planes RimFire .55 [42-60-480] Outrunner Brushless Motor (GPMG4715)
- ❍ Castle Creations Phoenix Edge Light 75 (CSEM1200)
- ❍ FlightPower LiPo FP30 6S 22.2V 3,800mAh or FP50 5,000mAh 22.2V 3,600 LiPo Batteries (FPWP3386 or FPWP5366)
- ❍ 15x8 E Propeller (XOAQ4055) (APCQ4013)

Radio Equipment

The Ultra Sport .46/EP can be flown with a minimum of a 5-channel radio. One channel each is used for the throttle, elevator, rudder, ailerons and retracts.

- ❍ Futaba 6J 6-Channel S-FHSS System (FUTK6000)

OR

- ❍ Tactic TTX650 6-channel programmable radio (TACJ2650)

RECOMMENDED SERVOS

All control surfaces require the use of a high-quality servo of at least 54 oz-in of torque and a retract servo.

- ❍ Futaba S9001 Aircraft Coreless BB Servo (FUTM0075)

OR

- ❍ Tactic TSX40 Standard High-Speed Metal Gear 2BB Servo (TACM0240)

and

- ❍ Futaba S3170G Digital Retract Servo w/Planetary Gear (FUTM0671)

OR

- ❍ Tower Hobbies TS-63 Low-Profile Retract BB Servo (TOWM5230)

- ❍ (1) Y-harness (FUTM4135) (TACM2751) (for ailerons)

ADDITIONAL ITEMS REQUIRED FOR ELECTRIC MOTOR INSTALLATION

❍ (1) 8" Servo extension (FUTM4140) (for ESC)

OR

❍ (1) 6" Servo extension (TACM2701) (for ESC)

ADDITIONAL ITEMS REQUIRED FOR GLOW ENGINE INSTALLATION

❍ (1) Heavy duty on/off switch (FUTM4385) (TACM2761)

❍ (1) Ernst Charge Receptacle (ERNM3001)

❍ (1) 1300mAh LiFe receiver battery (HCAM6411)

ADDITIONAL ITEMS REQUIRED

Adhesive and Building Supplies

This is the list of Adhesives and Building Supplies that are required to finish the Ultra Sport .46/EP.

❍ 1/2 oz. [15g] Thin Pro CA (GPMR6001)
❍ Pro 30-minute epoxy (GPMR6047)
❍ Pro 6-minute epoxy (GPMR6045)
❍ Threadlocker thread locking cement (GPMR6060)
❍ Mixing sticks (50, GPMR8055)
❍ Mixing cups (GPMR8056)
❍ Epoxy brushes (6, GPMR8060)
❍ Denatured alcohol (for epoxy clean up)
❍ Masking tape
❍ Drill
❍ Drill bits: 1/16" [1.5mm], 5/64" [2mm], 3/32" [2.5mm], 11/64" (4.5mm), 3/16" [5mm]
❍ Small metal file
❍ Stick-on segmented lead weights (GPMQ4485)
❍ #1 Hobby knife (RMXR6903)
❍ #11 blades (5-pack, RMXR6930)
❍ Rotary tool such as Dremel
❍ Rotary tool reinforced cut-off wheel (GPMR8200)
❍ Great Planes Dead Center hole locator (GPMR8130)
❍ #64 Rubber Bands (HCAQ2020)

Covering Tools

❍ Top Flite MonoKote Sealing Iron (TOPR2100)
❍ Top Flite Hot Sock Iron Cover (TOPR2175)
❍ Top Flite MonoKote Trim Seal Iron (TOPR2200)
❍ Top Flite MonoKote Heat Gun (TOPR2000)
❍ Coverite 21st Century Sealing Iron (COVR2700)
❍ Coverite 21st Century Cover Sock (COVR2702)
❍ Coverite 21st Century Trim Sealing Iron (COVR2750)

Optional Supplies and Tools

Here is a list of optional tools mentioned in the manual that will help you build the Ultra Sport .46/EP.

❍ 2 oz. [57g] spray CA activator (GPMR6035)
❍ CA applicator tips (HCAR3780)
❍ CA debonder (GPMR6039)
❍ 36" metal ruler
❍ Pliers with wire cutter (HCAR0625)
❍ Robart Super Stand II (ROBP1402)
❍ Servo horn drill (HCAR0698)
❍ AccuThrow Deflection Gauge (GPMR2405)
❍ CG Machine™ (GPMR2400)
❍ Precision Magnetic Prop Balancer™ (TOPQ5700)

IMPORTANT BUILDING NOTES

- Anytime thin CA glue is recommended you will see this symbol. When threading screws into wood, we recommend that first the screw be installed. Then, remove the screw and apply a couple of drops of thin CA in the hole to harden the threads. After the CA has hardened, reinstall the screw.

- Anytime threadlocker is recommended you will see this symbol. We recommend that anytime a threaded screw or nut is installed, a drop of medium threadlocker be applied to the threads. An exception: Do not use threadlocker on screws installed in the nylon control horns.

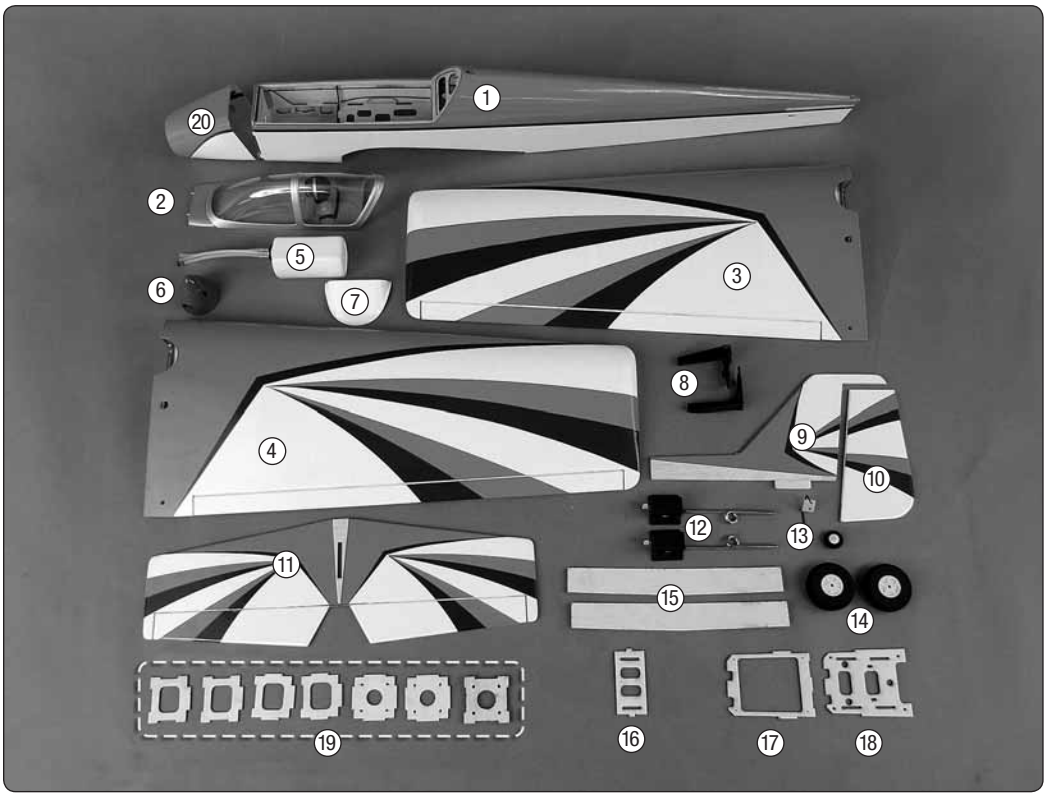
- Anytime epoxy is recommended you will see this symbol. 6-minute epoxy can be used most of the time, but if a step will require time to assemble, 30-minute epoxy is recommended.

- Anytime a hole needs to be drilled you will see this symbol with the recommended size drill bit.

- Denatured alcohol is great for cleaning epoxy from surfaces before the epoxy cures.

- When connecting servo extensions to servos, we recommend that the connection be secured with heat shrink or tape (not included).

KIT CONTENTS



1. Fuselage
2. Canopy/Hatch
3. Left Wing
4. Right Wing
5. Fuel Tank
6. Spinner
7. Belly Pan
8. Engine Mount
9. Vertical Fin
10. Rudder
11. Horizontal Stabilizer
12. Retracts
13. Tail Wheel
14. Main Wheels
15. Wing Joiner
16. Fuel Tank Tray
17. Forward Sub Tray
18. Forward Battery Tray
19. EP Motor Box Parts Set
20. Cowl

MODEL INSPECTION

Before starting to build, 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 instruction manual.

Great Planes Product Support
3002 N Apollo Drive, Suite 1 Ph: (217) 398-8970, ext. 6
Champaign, IL 61822 Fax: (217) 398-7721

E-mail: airsupport@greatplanes.com

ORDERING REPLACEMENT PARTS

Replacement parts for the Great Planes Ultra Sport .46/EP 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. Not all parts are available separately (an aileron cannot be purchased separately, but is only available with the wing kit). Replacement parts are not available from Product Support, but can be purchased from hobby shops or mail order/Internet order firms. Hardware items (screws, nuts, bolts) are also available from these outlets.

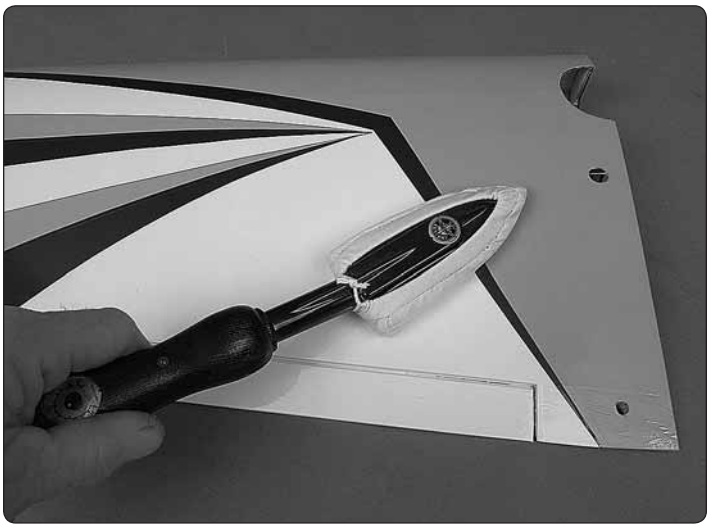
To locate a hobby dealer, visit www.greatplanes.com and click on “Where to Buy”. Follow the instructions provided on the page to locate a U.S., Canadian or International dealer.

REPLACEMENT PARTS LIST

Order No.	Description
GPMA2015	Wing
GPMA2016	Fuselage
GPMA2017	Tail Surface Set
GPMA2018	Canopy/Hatch
GPMA2019	Cowl
GPMA2020	Landing Gear Leg Set L/R
GPMA2021	Retracts Only Set
GPMA2022	Retractable Landing Gear Set
GPMA2023	Spinner
GPMA2024	Tailwheel Set
GPMA2025	Axle Set
GPMA2026	Fuel Tank
GPMA2027	EP Motor Mount Set
GPMA2028	Decals

PREPARATIONS

❏ 1. Firmly pull on each of the control surfaces to confirm they are securely glued. If they are not, apply a few drops of thin CA to each side of the hinge.

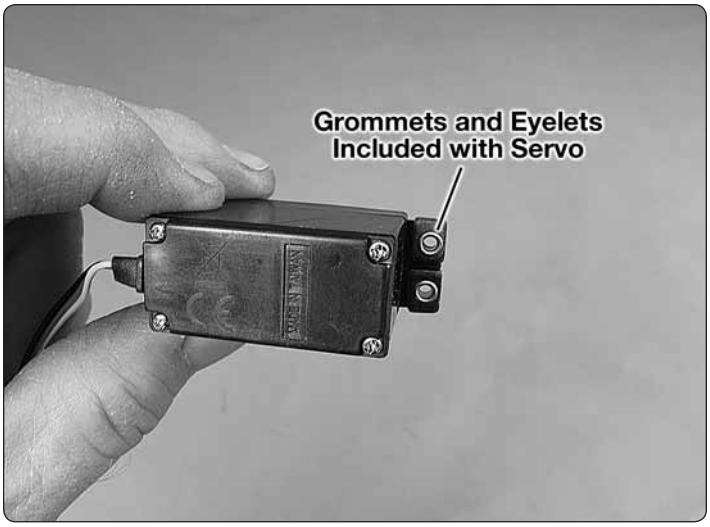


❏ 2. Tighten the covering with a covering iron set on **low** temperature as needed.

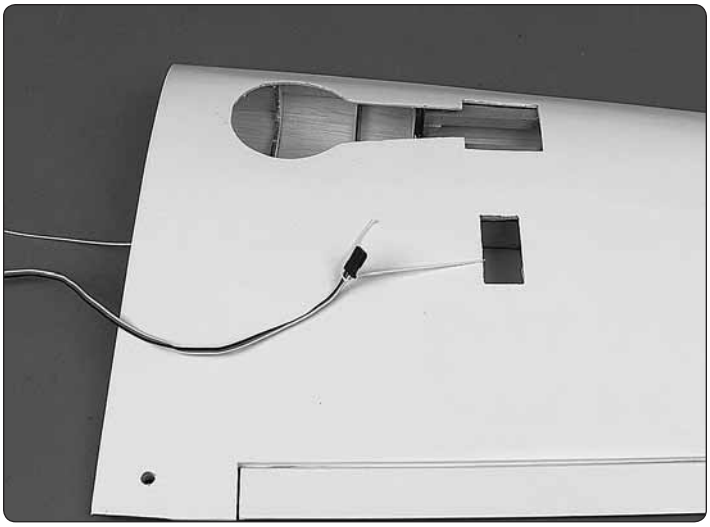
ASSEMBLE THE WING

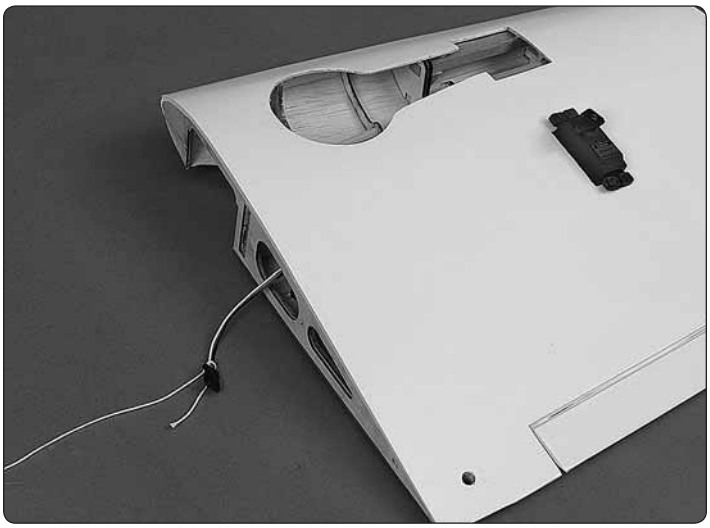
Aileron Servo Installation

Begin with the left wing panel.

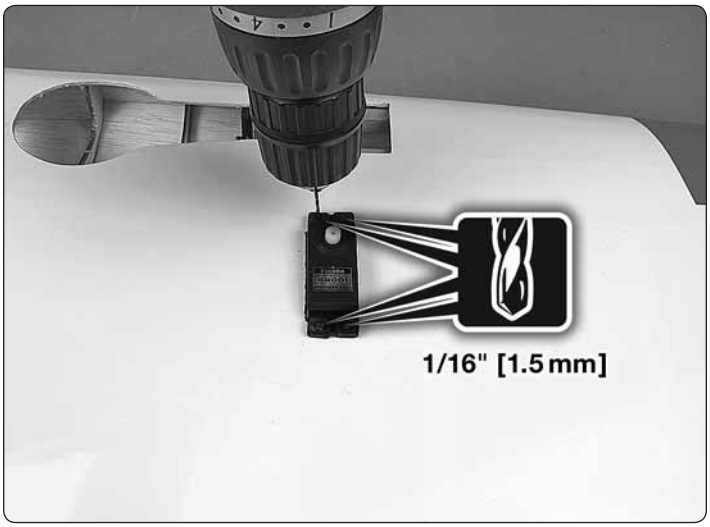


❏ 1. Install grommets and eyelets.



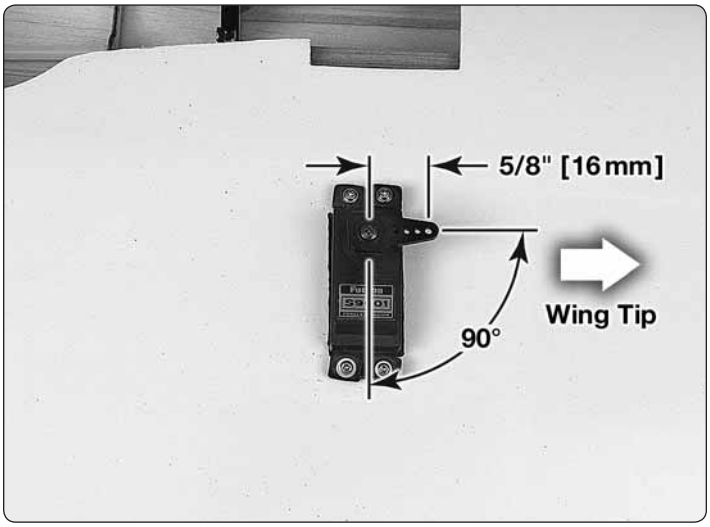


❏ 2. Route the servo lead through the wing.

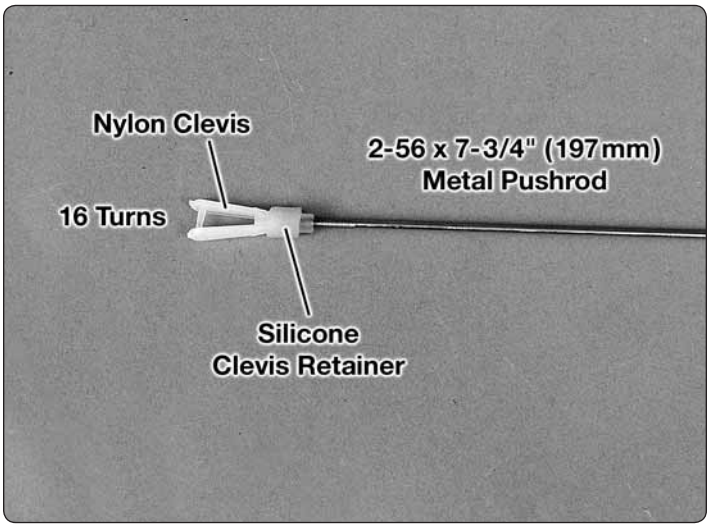


❏ 3. Drill servo screw mounting holes.

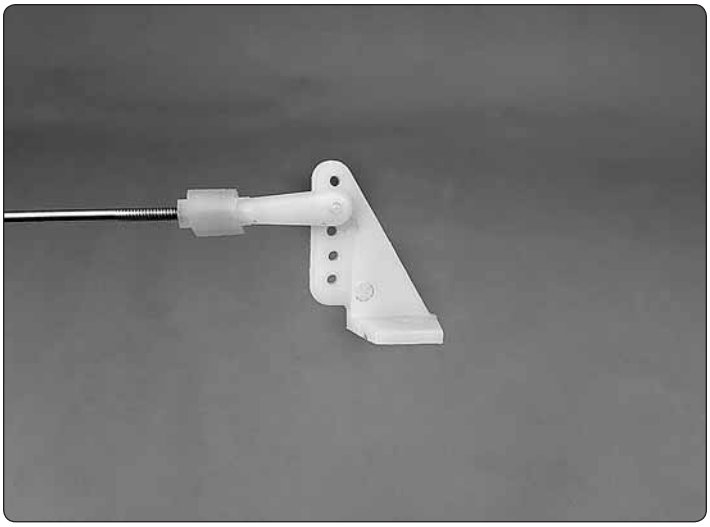
❏ 4. Install servo screws.



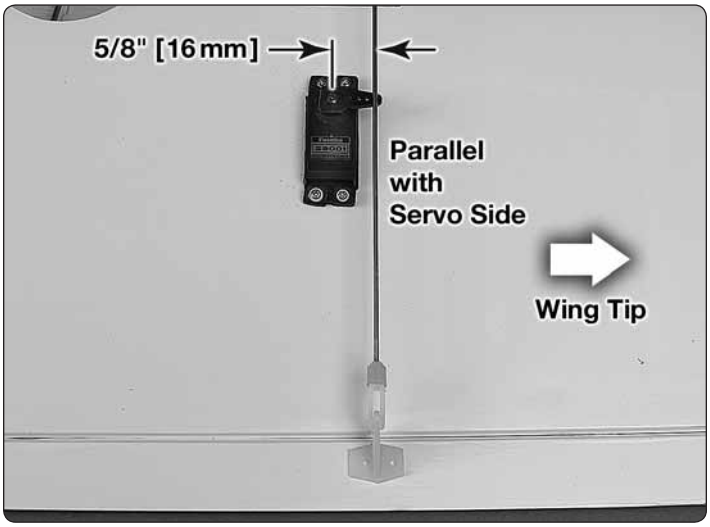
❏ 5. Plug the servo into the receiver. Switch on the transmitter and connect a receiver battery to the receiver. Center the aileron servo trim. Install the servo horn.

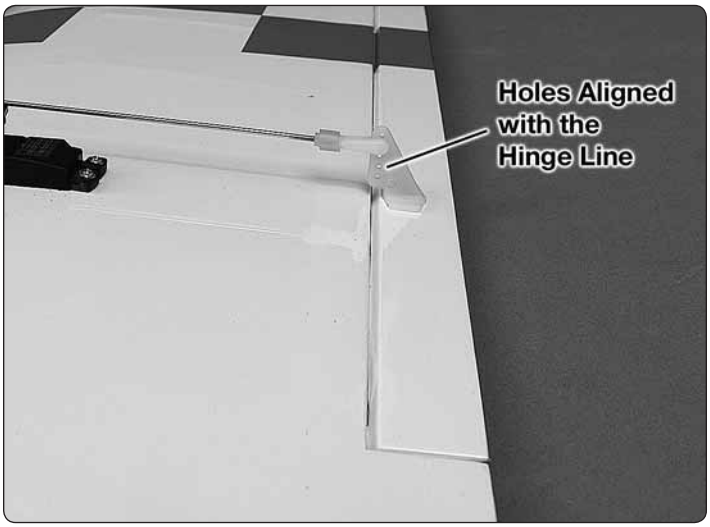


❏ 6. Install the nylon clevis.

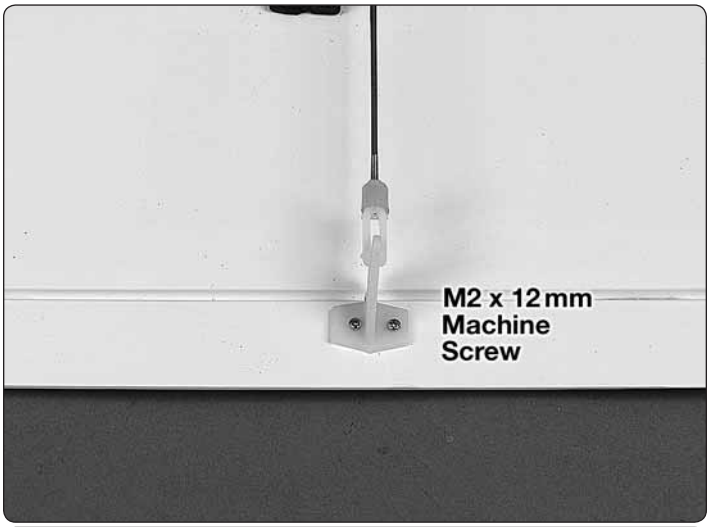


❏ 7. Attach clevis to control horn.

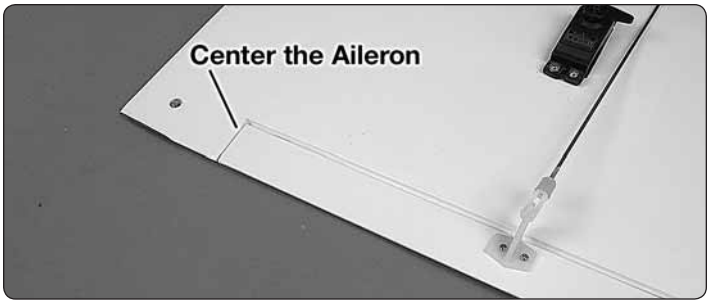


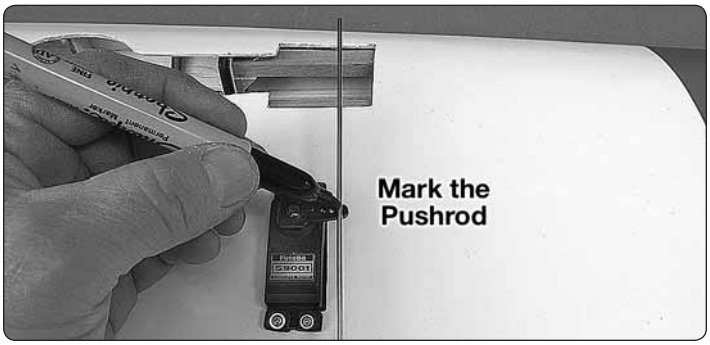


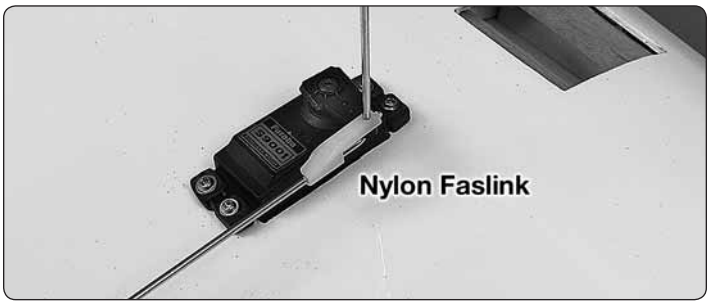
❏ 8. Position control horn on aileron.

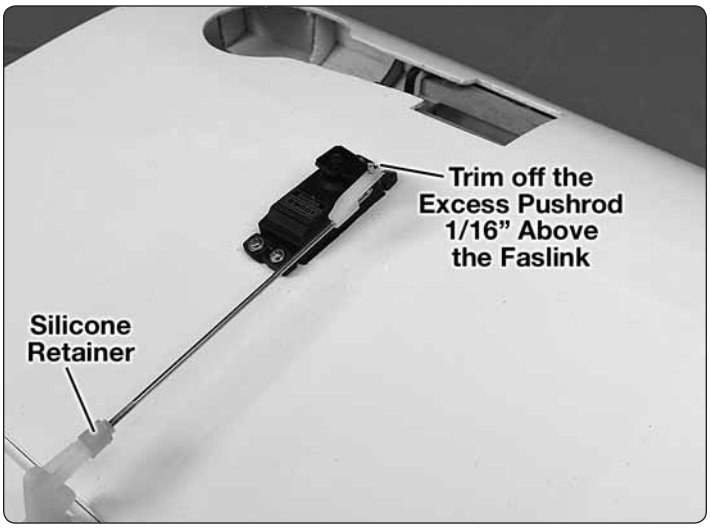


❏ 9. Mount control horn.







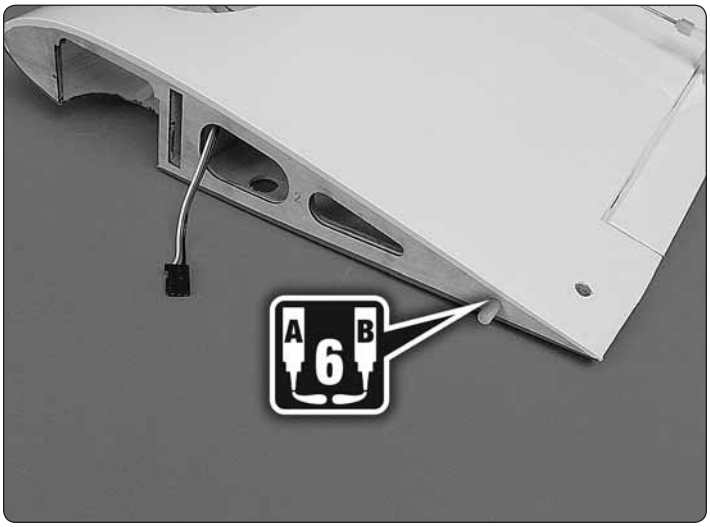


❏ 10. Install the Faslink.

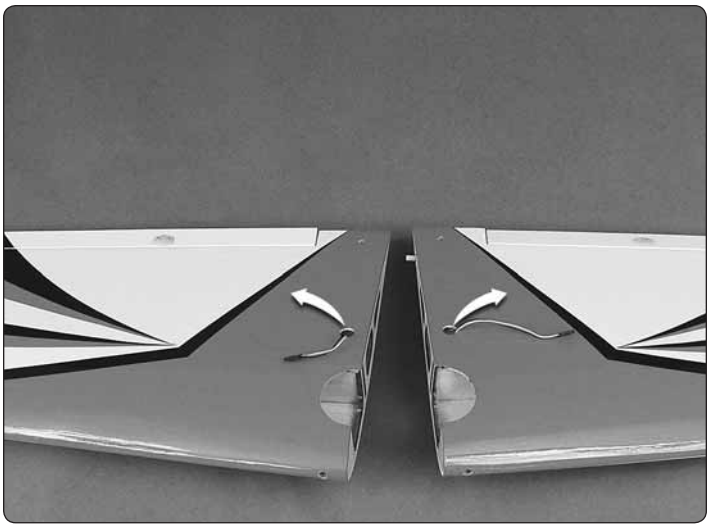
❏ 11. Repeat steps 1 – 10 to install the aileron servo in the right wing.

Join the Wing Panels

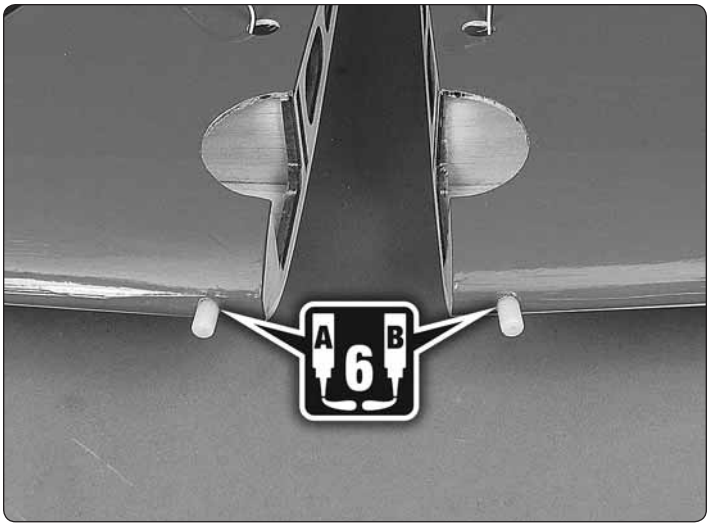
❏ 1. Glue the two plywood wing joiners together.



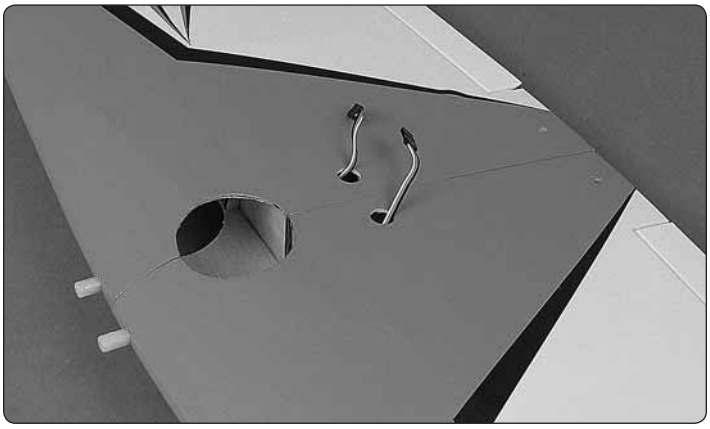
❏ 2. Install the 5 x 25mm nylon alignment pin.



❏ 3. Route the servo leads out the two holes in the top of the wings.

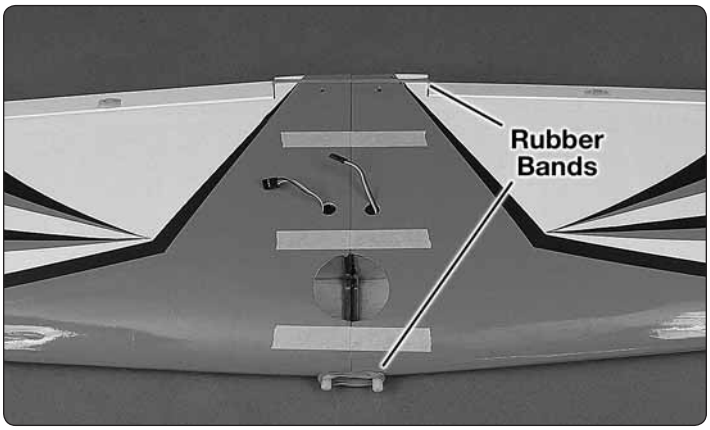


❏ 4. Install the two 8 x 30mm nylon wing dowels.



❏ 5. Without glue, insert the plywood wing joiner in one wing half and test fit the wing halves together to check the fit. Make sure both wing halves fit together at the root without any gaps.

❏ 6. Gather everything needed to glue the two wing halves together including 30-minute epoxy, mixing sticks, mixing cup, epoxy brush, #64 rubberbands, masking tape, 12" (305mm) long wire or small diameter dowel, denatured alcohol and paper towels.

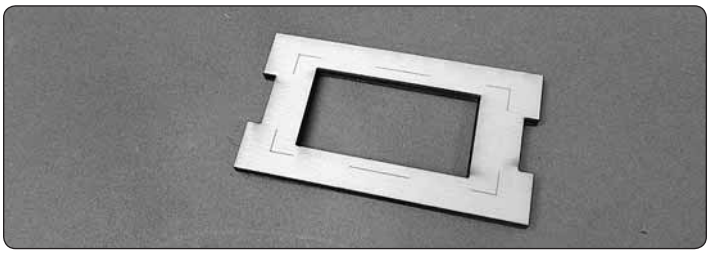


❏ 7. Mix 2 oz. (59.1cc) of 30-minute epoxy. Working quickly, pour a generous amount into the joiner pocket of one wing half. Use the wire or dowel to thoroughly distribute the epoxy,

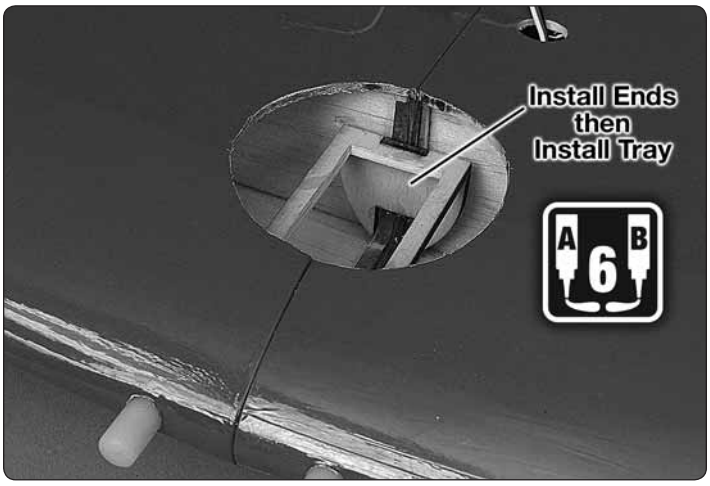
coating all surfaces inside the joiner pocket. Coat the root rib and one half of the wing joiner. Insert the wing joiner in the wing. Coat the joiner pocket in the other wing half and the other end of the wing joiner. Join the wing halves together. Use the rubberbands to hold the leading and trailing edges of the wing together. Stand the wing up on end and use paper towels dampened with denatured alcohol to remove the excess epoxy that squeezes out. Use masking tape to hold the wing halves in alignment if necessary.

❏ 8. After the epoxy cures, remove the rubberbands and masking tape.

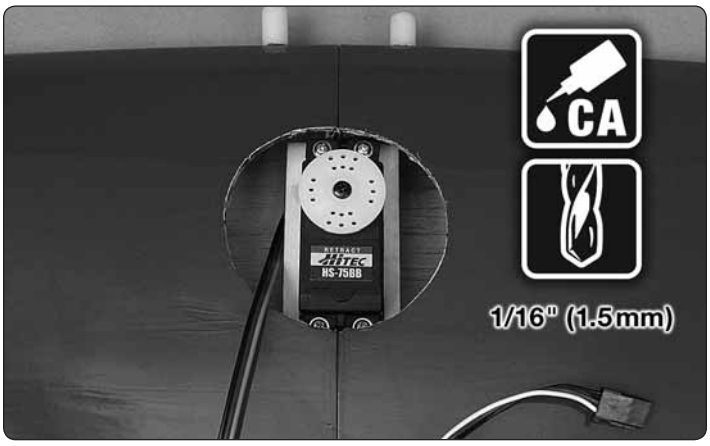
Install the Retracts



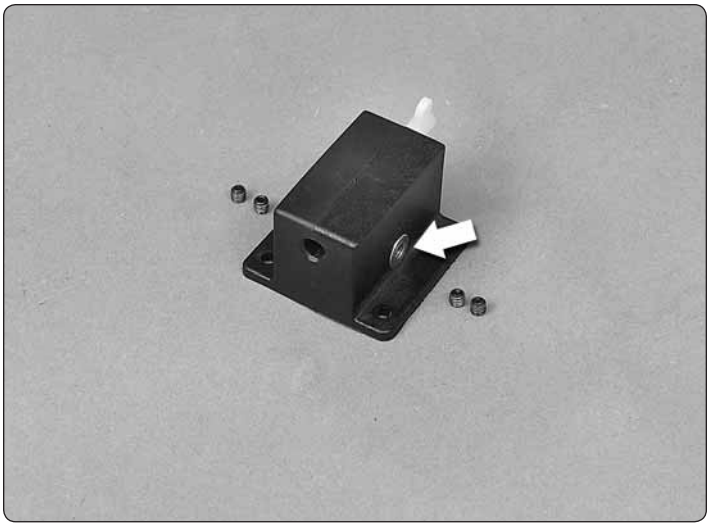
❏ 1. The retract servo tray is cut to fit the Futaba S3170G retract servo. If the Tower Hobbies TS-63 retract servo is used, the tray can be trimmed with a hobby knife along the embossed lines.



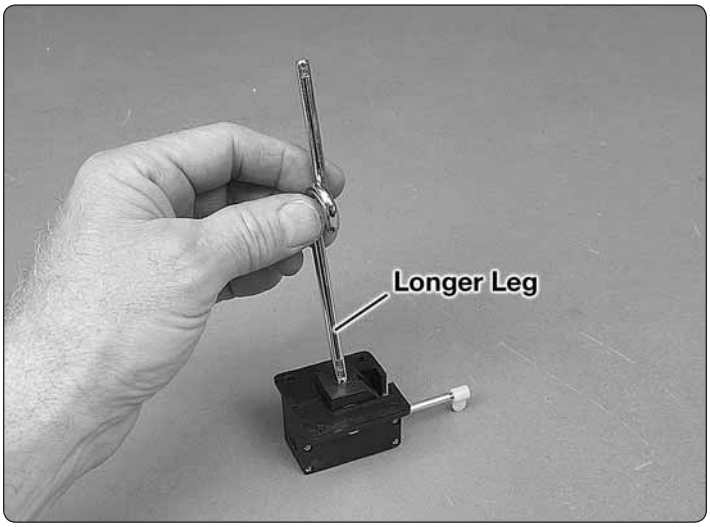
❏ 2. Install the retract servo tray.

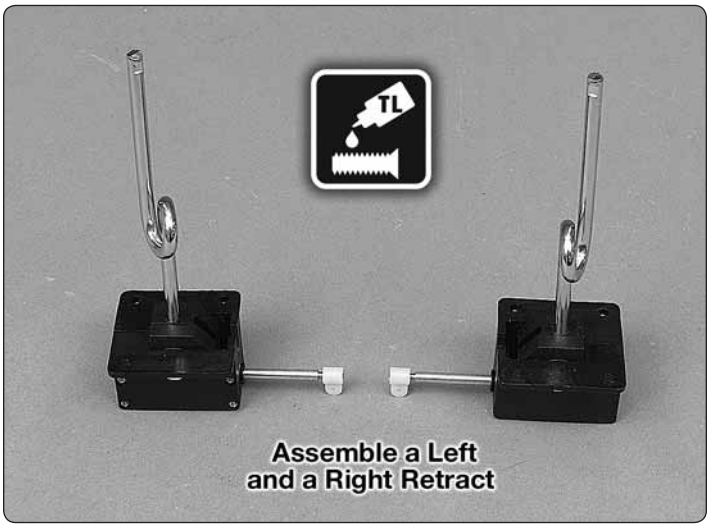


❏ 3. Install the retract servo.

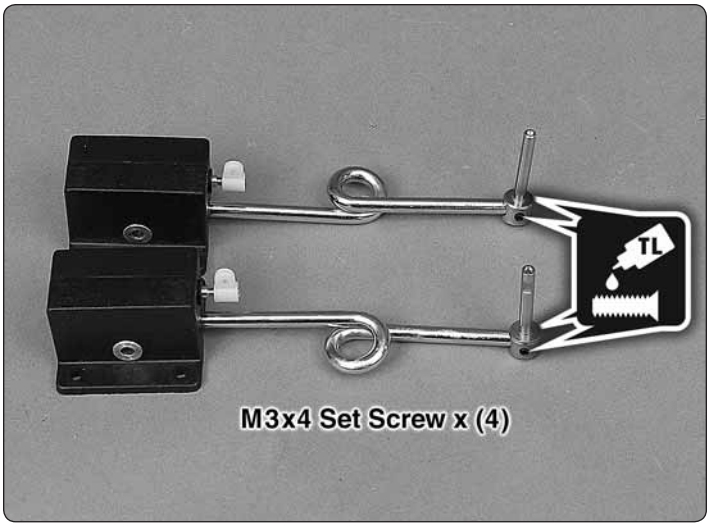


❏ 4. Remove the four set screws from each retract.

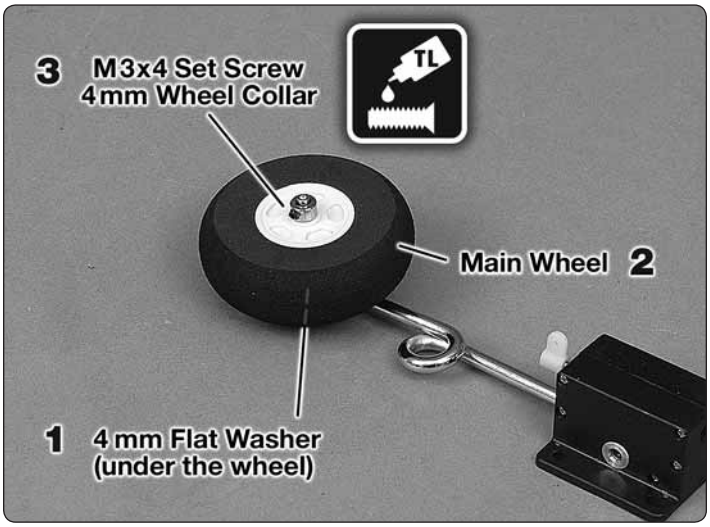




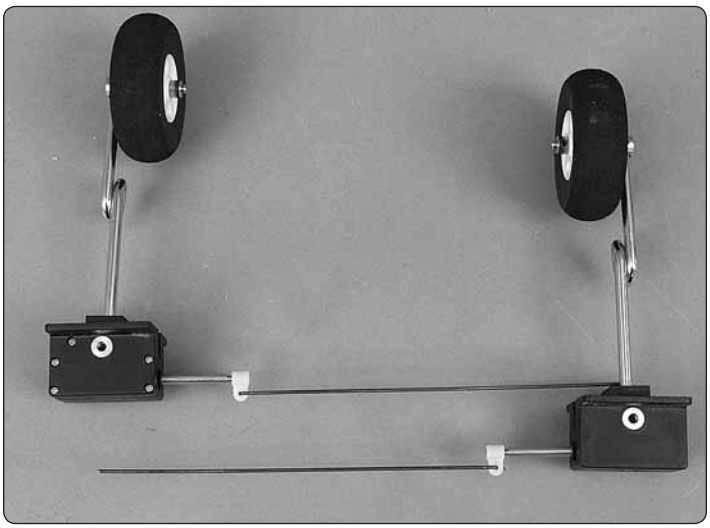
❏ 5. Install the gear legs so that the coil is toward the trailing edge. Tighten a set screw onto the flat of the gear leg from each side. Then tighten the second set screw against the first.



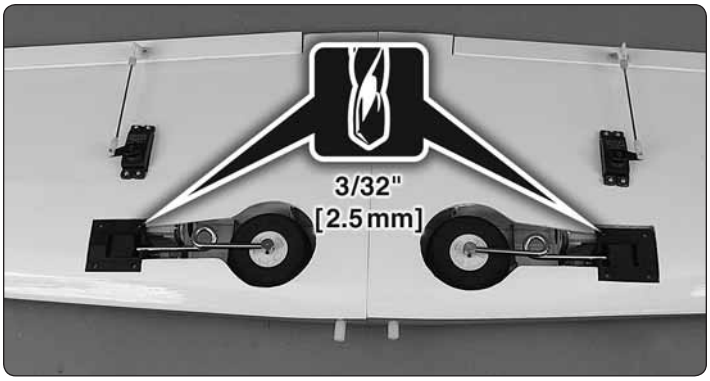
❑ 6. Install the axles.



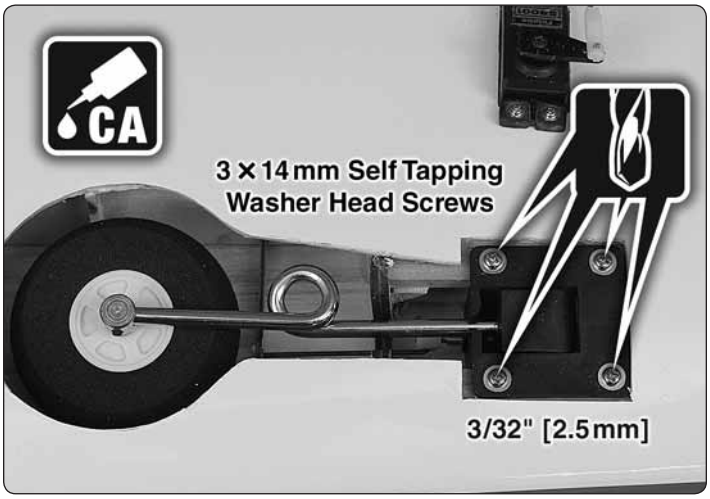
❑ 7. Install the wheels.



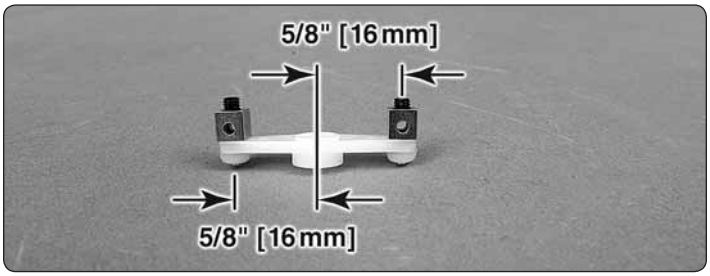
❑ 8. Install the 1/16" x 15-1/2" (1.5 x 163mm) retract pushrods.

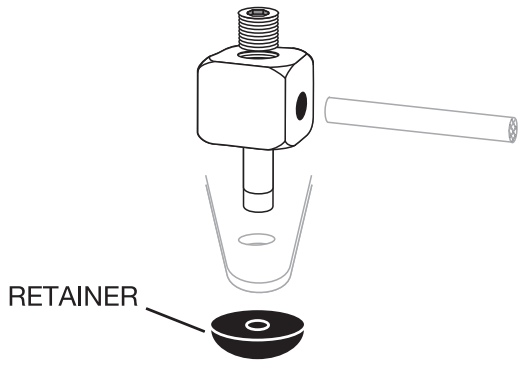


❑ 9. Insert the retract pushrod into the outer pushrod tube and position the retracts in the wheel wells. Move the wheels up and down, making adjustments so that the wheels do not hit the wing sheeting. **NOTE:** If using a glow engine, coat the inside of the wheel wells with 30 minute epoxy thinned 50:50 with denatured alcohol before installing the retracts.



❑ 10. Mount the retracts.





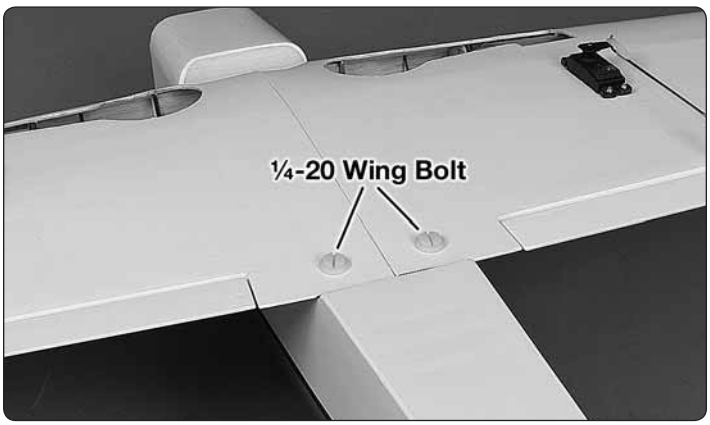
❑ 11. Install the screw lock connectors on a servo arm.

❏ 12. Insert the wires into the screw lock connectors, switch on the transmitter, plug the servo into the receiver into the channel you prefer for the retracts and switch on the receiver.

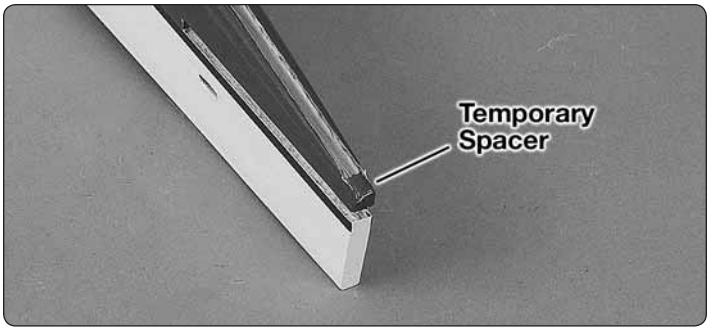
❏ 13. Position the servo arm so that the retracts are retracted and secure the servo arm on the servo. Tighten the two set screws in the screw lock connectors. Check that the retracts lock in the up and the down positions with no binding of the servo.

ASSEMBLE THE FUSELAGE

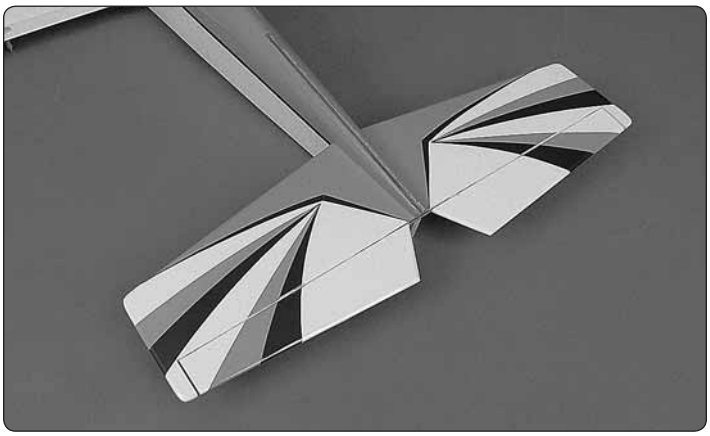
Install the Tail



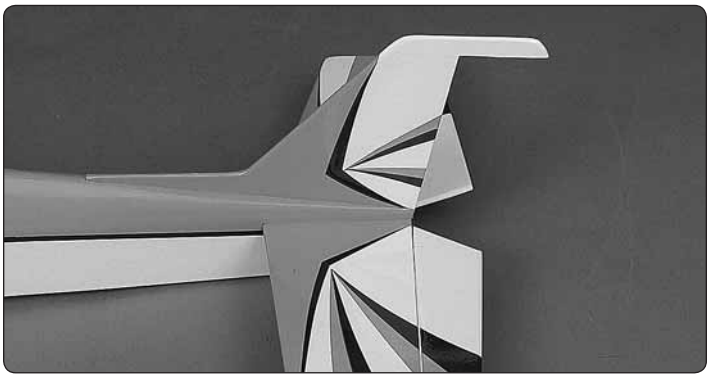
❏ 1. Install the wing.



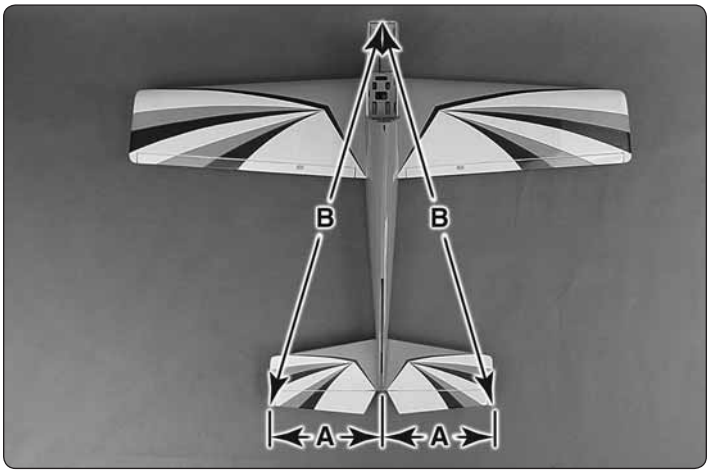
❏ 2. Remove the temporary vertical fin spacer.



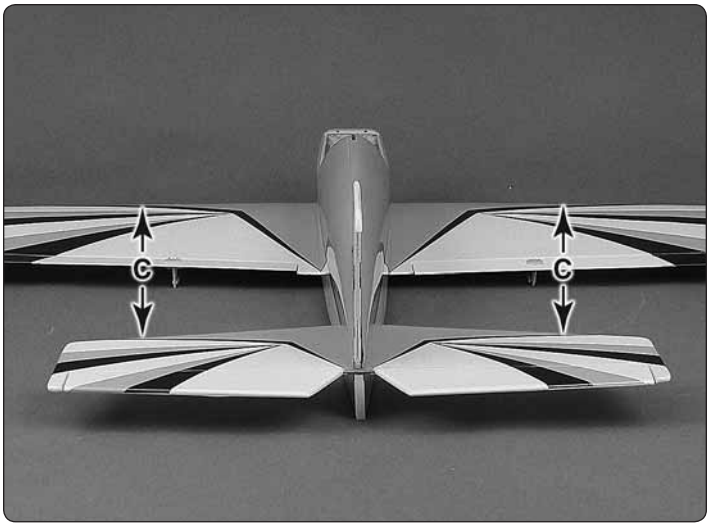
❏ 3. Temporarily install the horizontal stabilizer.



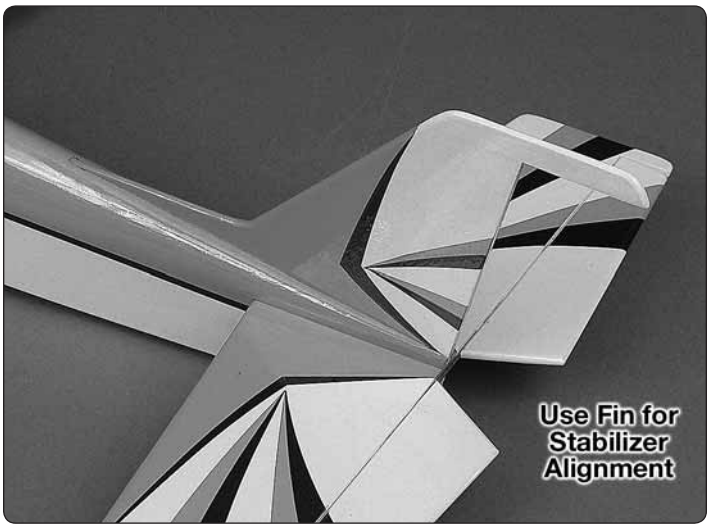
❏ 4. Temporarily install the vertical fin.



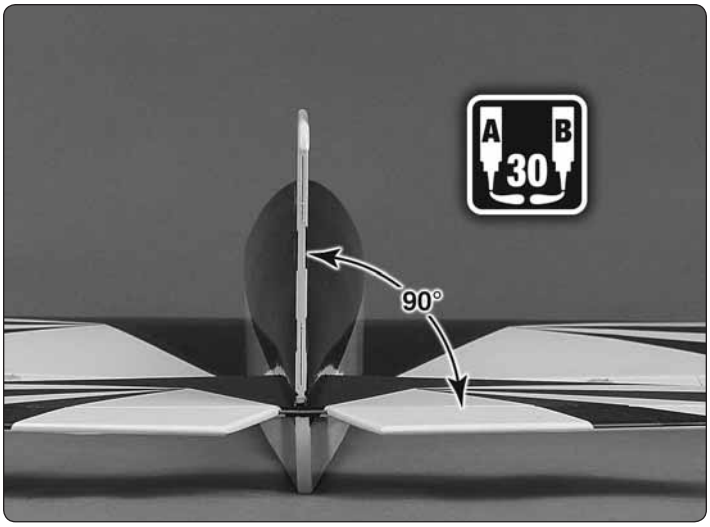
❏ 5. Check the alignment of the horizontal stabilizer. The distance from the center of the nose of the fuselage to the tips of the horizontal stabilizer should be equal.



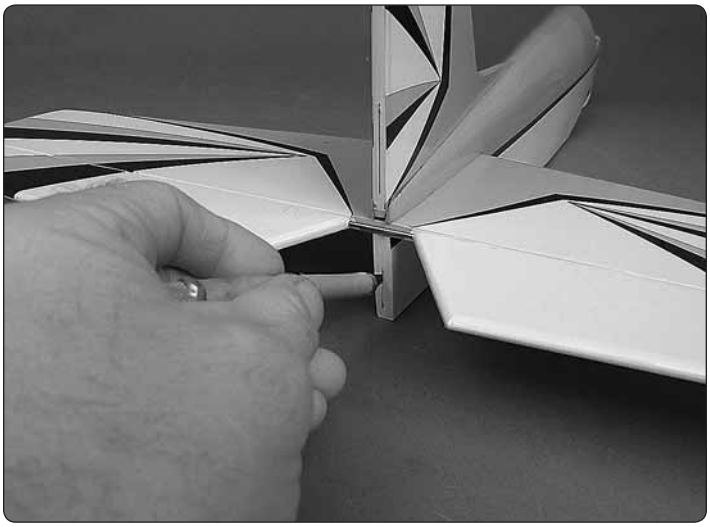
❏ 6. The wing and stabilizer should be parallel. If they are not, lightly sand the stabilizer slot of the fuselage.



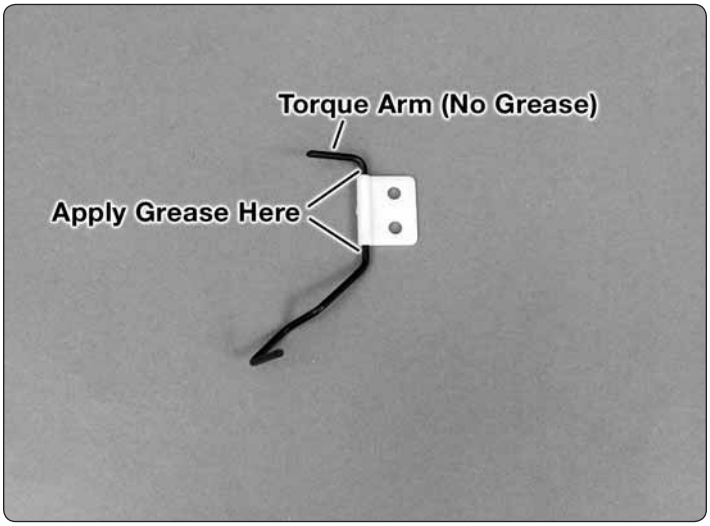
❏ 7. Install the horizontal stabilizer.



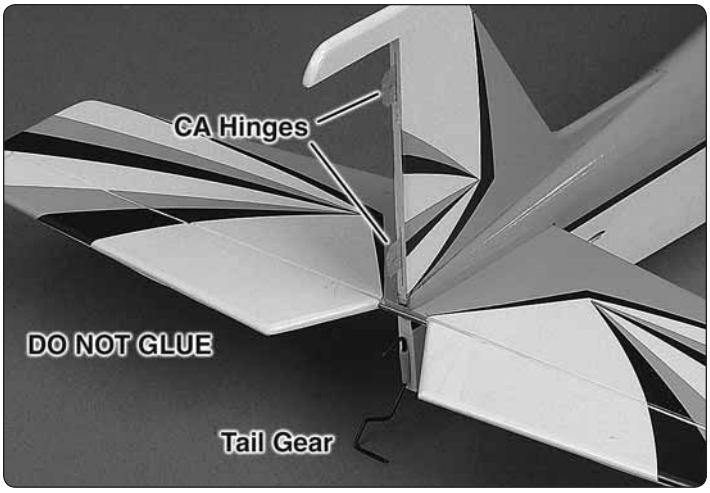
❏ 8. Install the vertical fin.

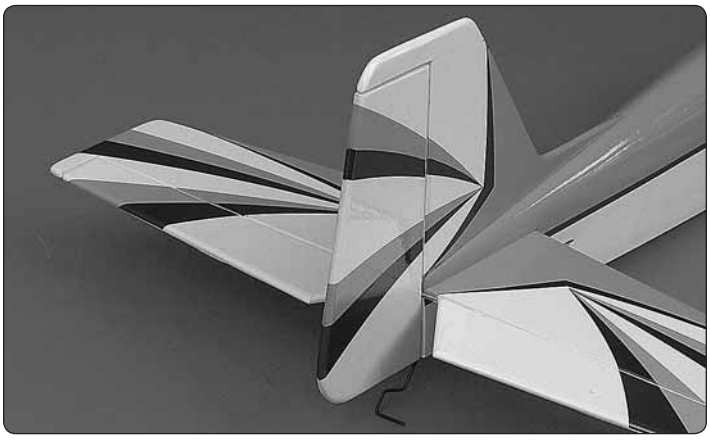


❏ 9. Cut the covering from over the tail gear bushing slot.



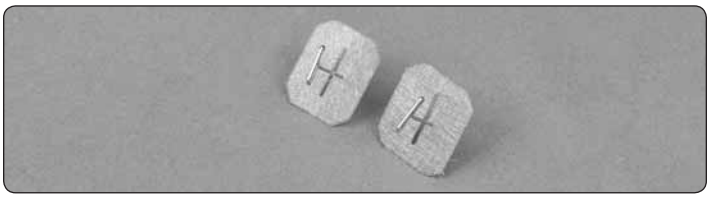
❏ 10. Apply a dab of grease to prevent epoxy from adhering.



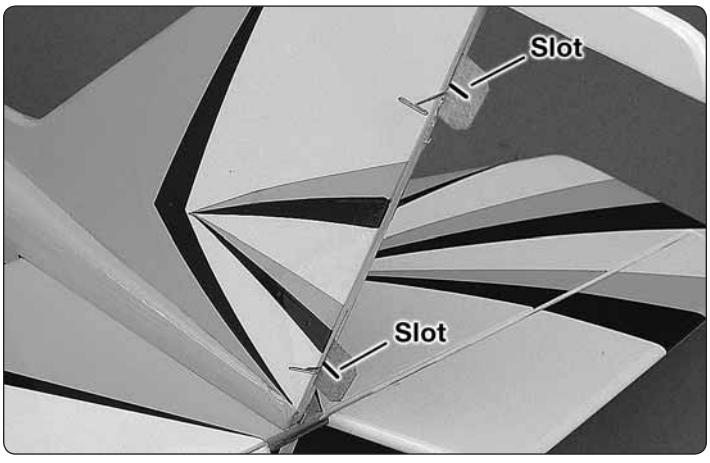


❏ 11. Test fit the rudder, checking that it moves without binding.

❏ 12. Use 6-minute epoxy to glue the tail gear bearing **in the fuselage**.

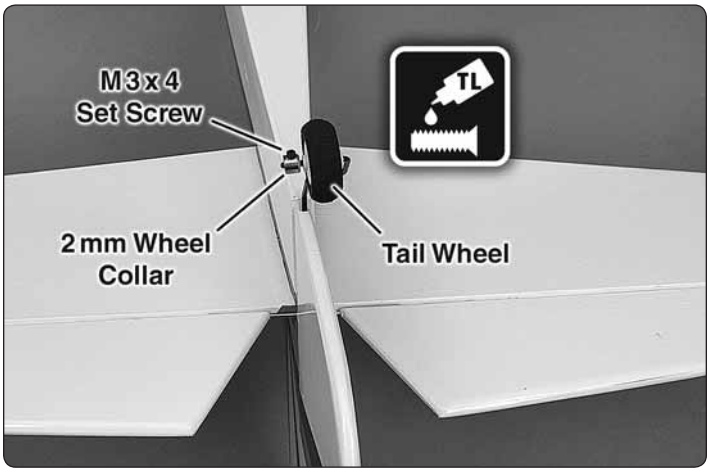


❏ 13. Insert a T-pin into the center of both CA hinges.



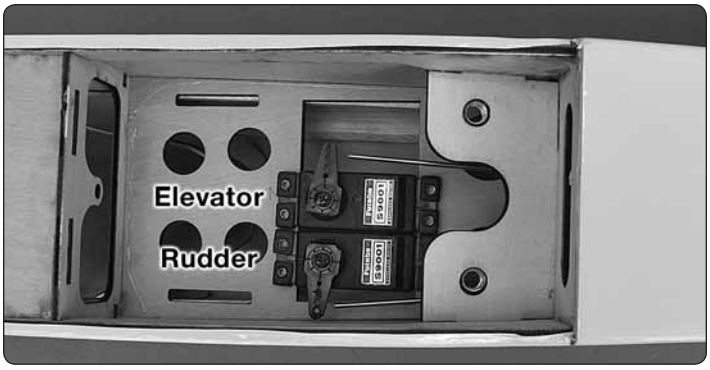
❏ 14. Insert the hinges into the trailing edge of the vertical fin, up to the T-pin. Note the direction of the slot.

❏ 15. Apply 6-minute epoxy to the torque arm of the tail gear and slide the rudder onto the CA hinges and torque arm. Remove the T-pins and apply 6 drops of thin CA to both sides of each CA hinge. Test pull the rudder to make sure the hinges are secure.



❏ 16. Install the tail wheel and wheel collar.

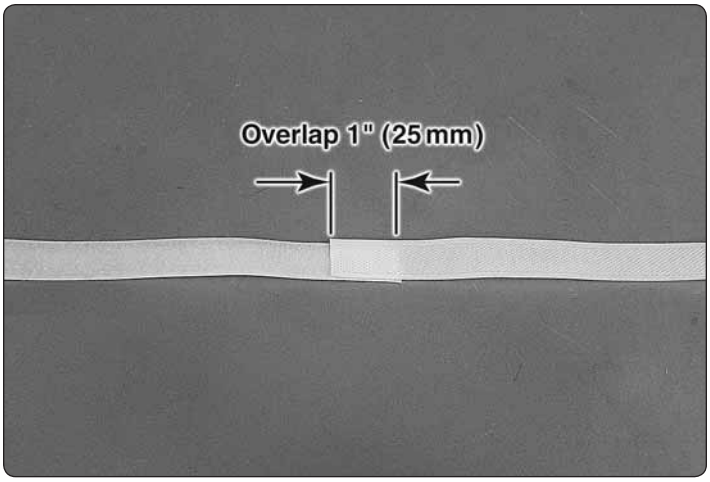
Install the Rudder and Elevator Servo



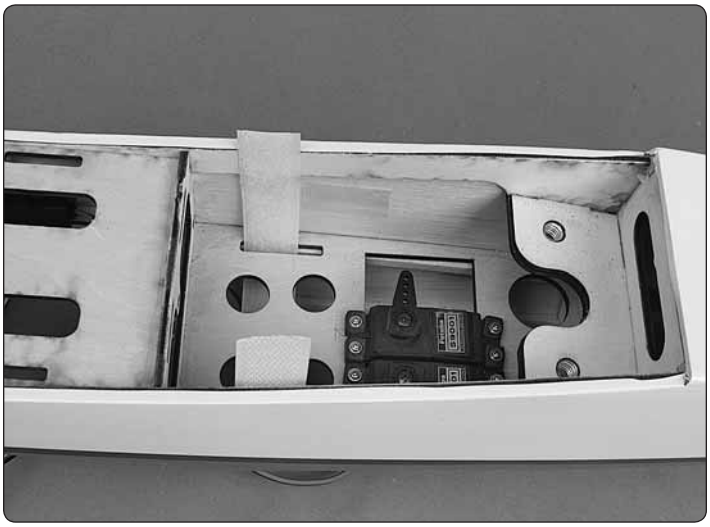
❏ 1. Insert the rudder and elevator pushrods. Use the pushrods to position the rudder and elevator servos.

❏ 2. Mount the two servos using the screws included with the servos. Harden the screw holes with thin CA

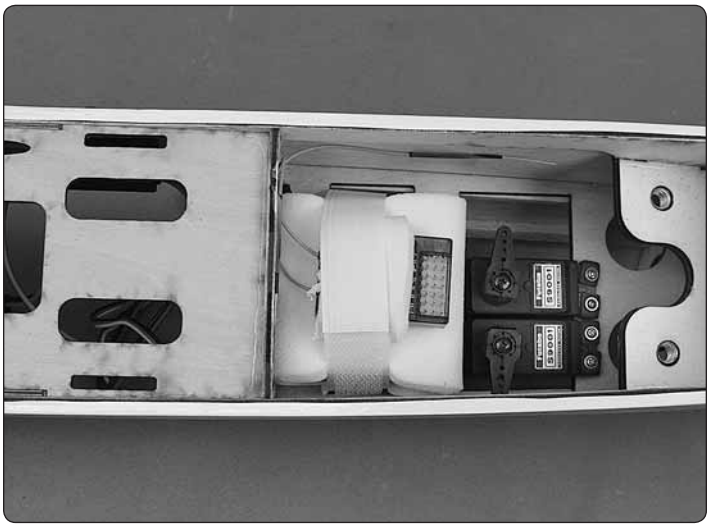
❏ 3. Install the on/off switch and the charge receptacle. **Note:** If the plane is to be flown as electric and the recommended ESC is used, the on/off switch, receiver battery and charge receptacle are not needed.



❏ 4. Make a hook and loop strap.

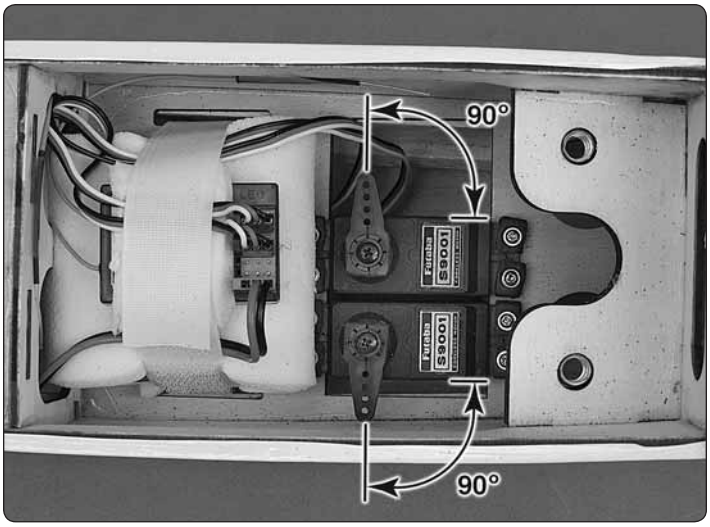


❏ 5. Install the strap.

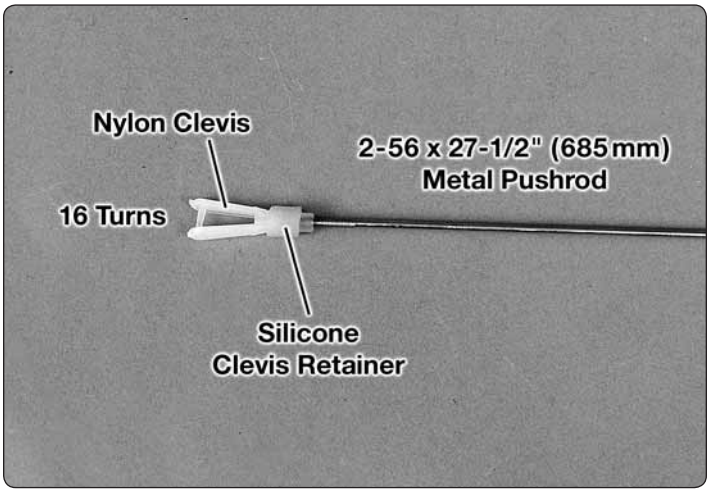


❏ 6. Wrap the receiver and receiver battery in foam and secure them to the radio tray with the hook and loop strap and cut off the excess strap.

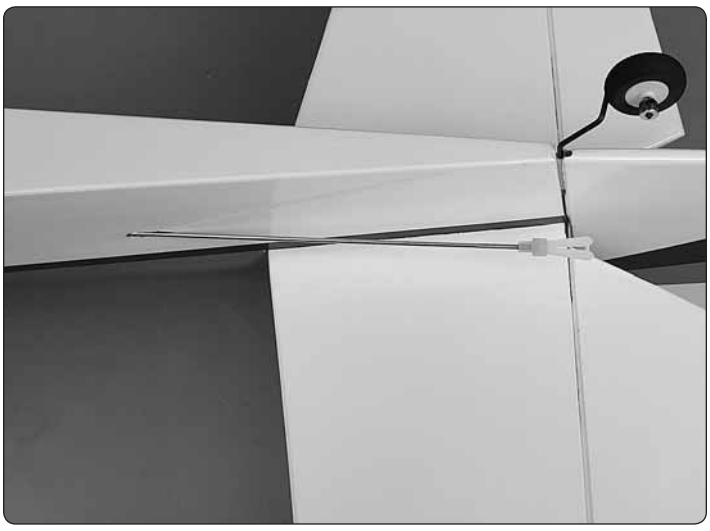
❏ 7. Connect the receiver battery to the receiver switch. Plug in the receiver switch, rudder servo and elevator servo into the receiver.



❏ 8. Switch on the transmitter, then the receiver. Center the rudder and elevator trims on the transmitter. Position the servo arms so they are perpendicular to the centerline of the servos.

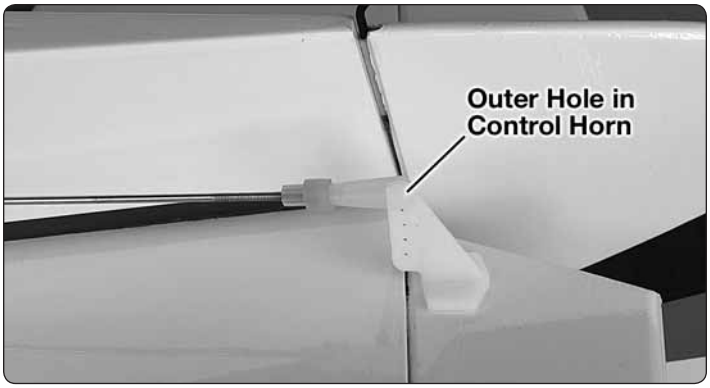


❏ 9. Assemble a rudder and an elevator pushrod.

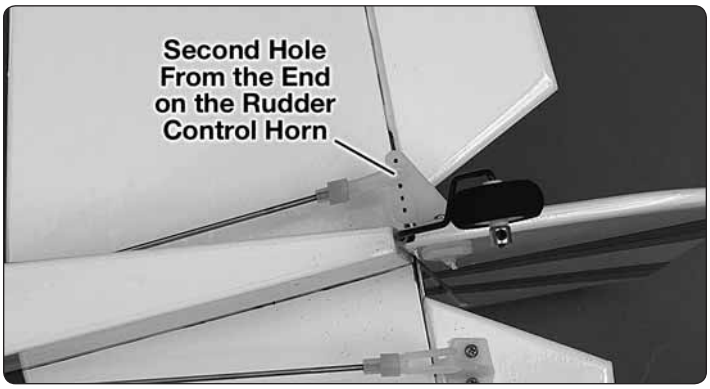


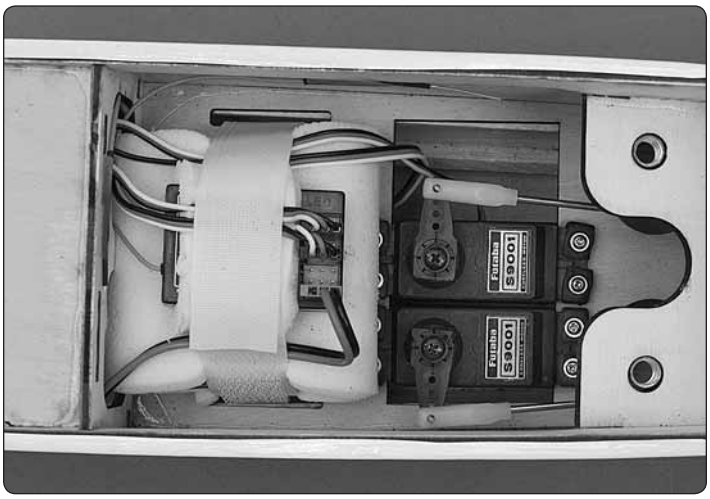
❏ 10. Insert one of the pushrods in the fuselage for the elevator.

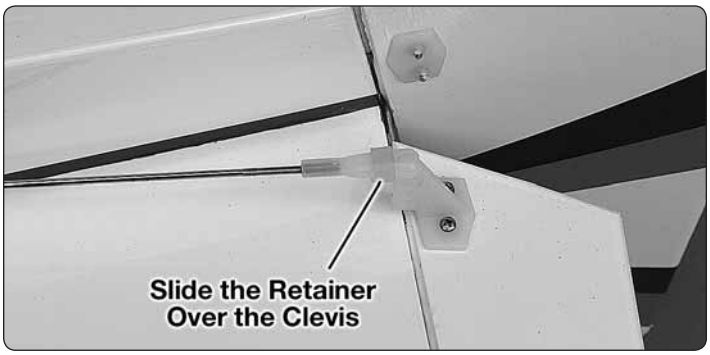
❏ 11. Attach a clevis to the control horn.



❏ 12. Align the control horn clevis holes with the elevator hinge line and mark the two screw holes. Install the control horn following the same procedure used to install the aileron control horns.



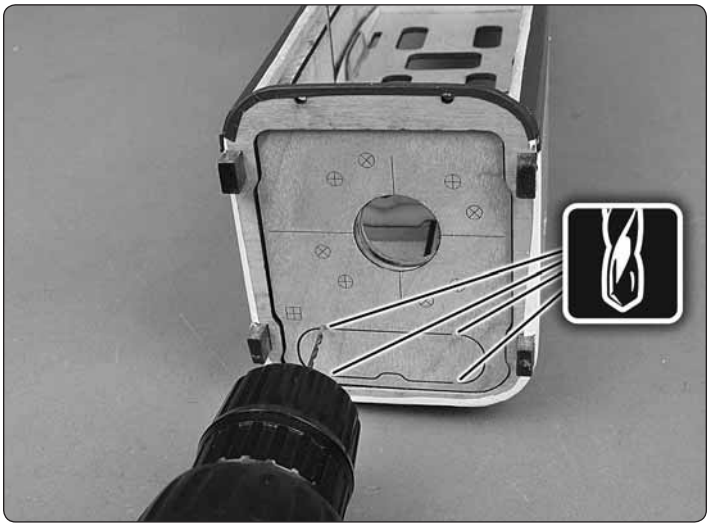




❏ 13. Follow the same procedure used to install the aileron pushrods to complete the elevator and rudder pushrod installation.

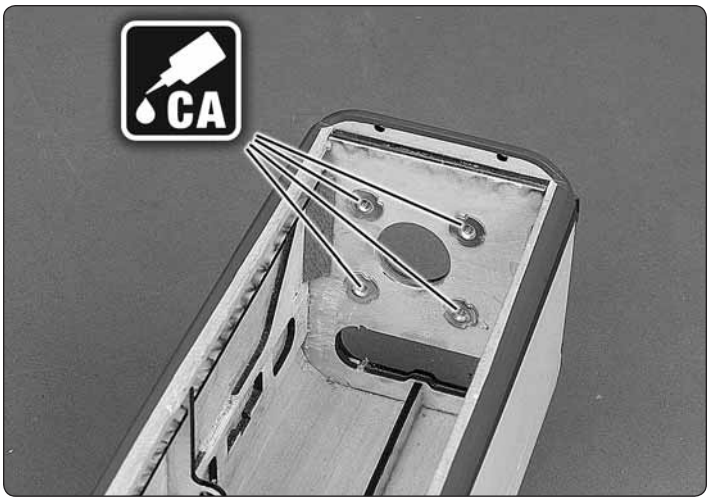
Electric Motor Installation

If installing the glow engine skip ahead to **Glow Engine Installation.**

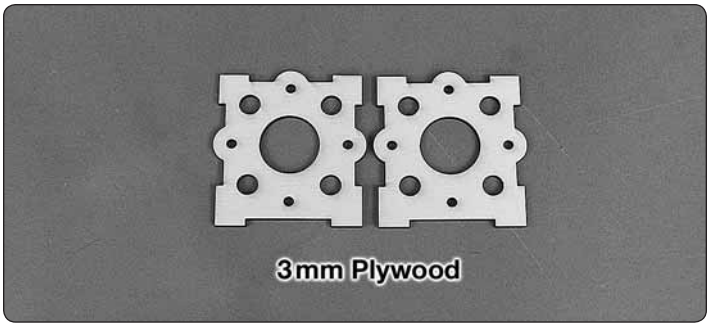


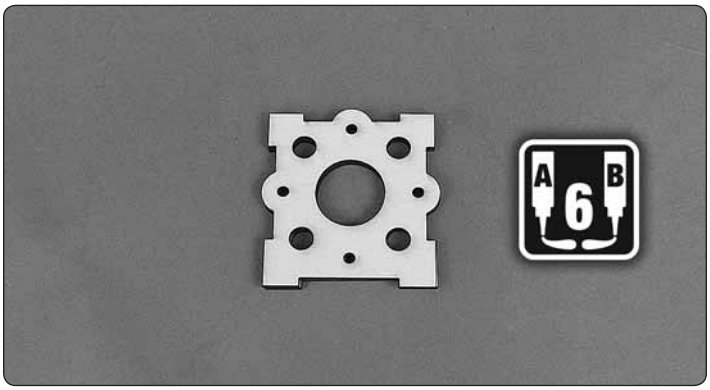
❏ 1. Open the cooling hole by drilling out the tabs.

❏ 2. Drill through the firewall at each “+” mark.

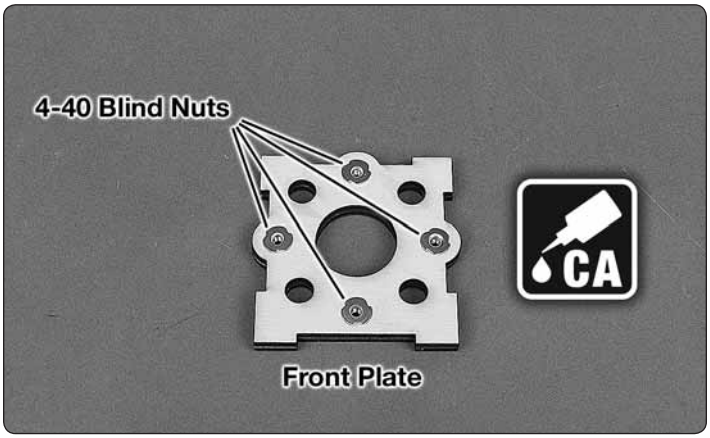


❏ 3. Install the 6-32 blind nuts in the back of the firewall and press them flush.

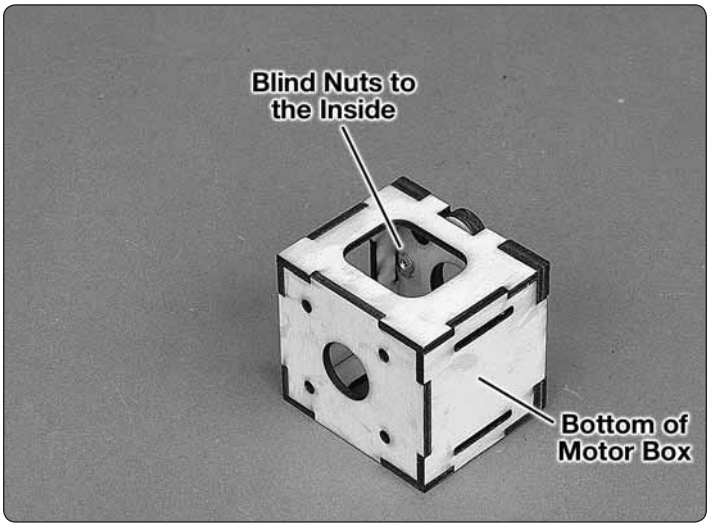




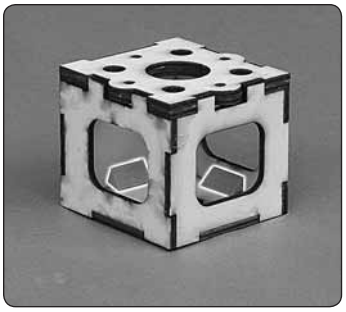
❏ 4. Use epoxy to glue the front plates of the motor box together.

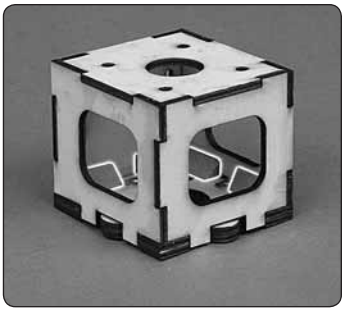


❏ 5. Install the 4-40 blind nuts in the front plate and press them flush.

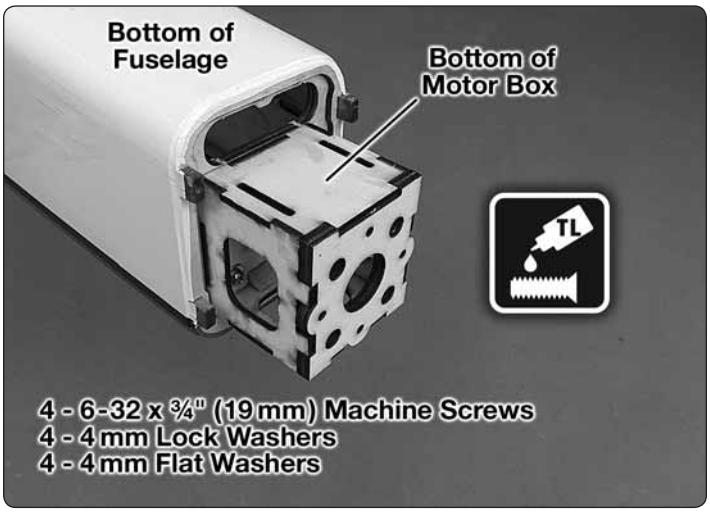


❏ 6. Glue the front and sides together with epoxy.

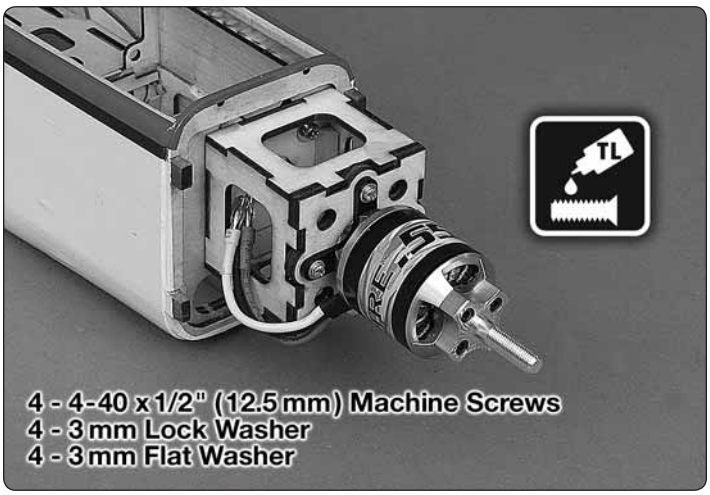




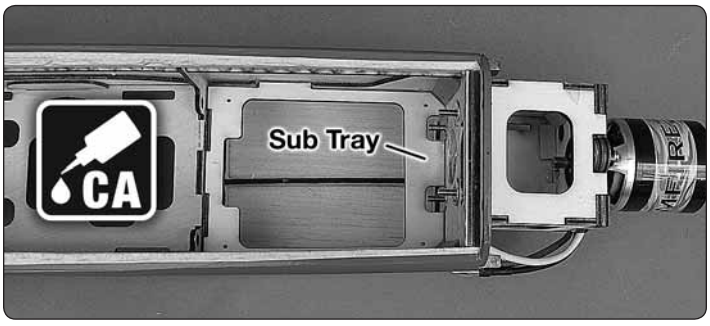
❏ 7. Securely epoxy the (12) triangle stock between the front plate and the sides and the back plate and the sides.



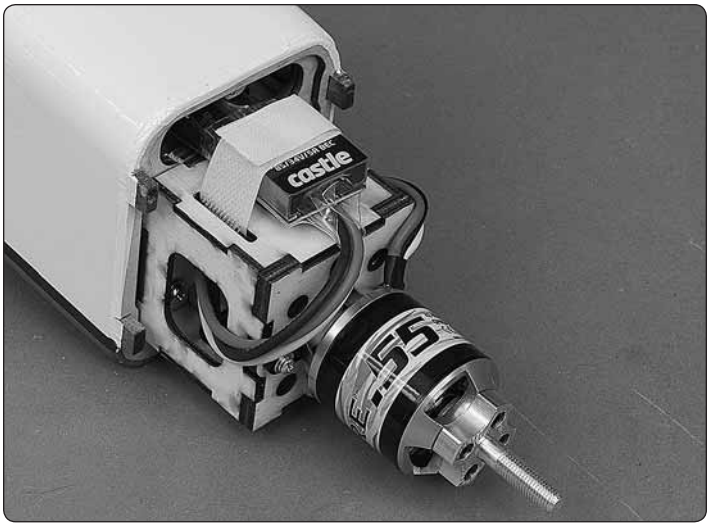
❏ 8. Install the motor box.



❏ 9. Install the motor. **DO NOT** install the propeller.



❏ 10. Glue the forward sub tray in the fuselage.

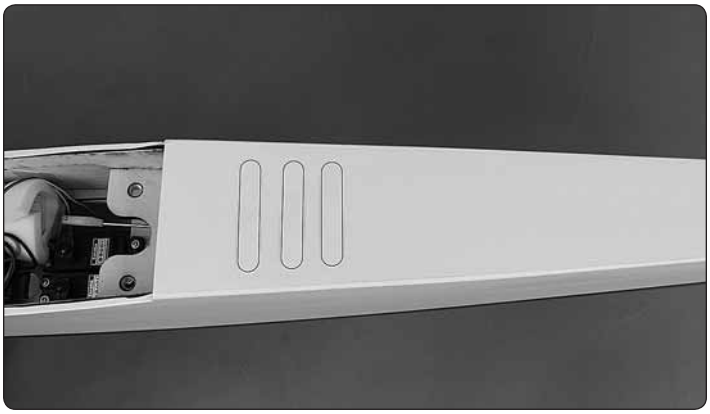


❏ 11. Attach the ESC to the bottom of the motor box with a piece of **adhesive backed** hook and loop material. Make a hook and loop strap and secure the ESC to the motor box. Connect the motor wires to the motor.

❏ 12. Route the ESC lead out of the forward battery tray and attach the tray.

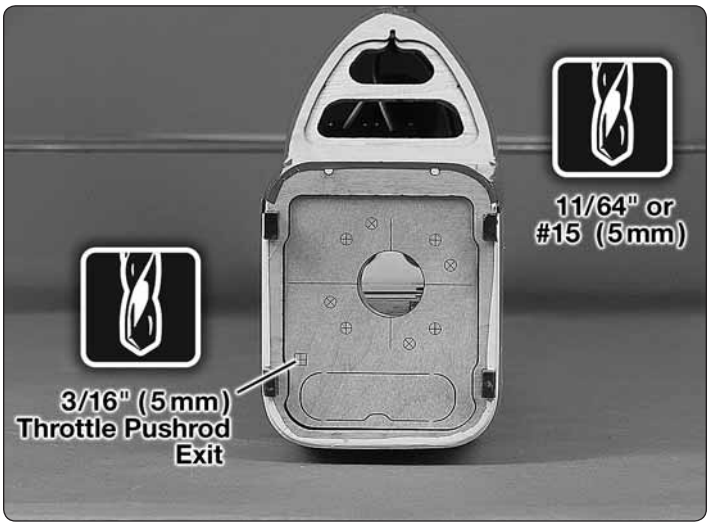
❏ 13. Connect the motor battery and check that the motor is rotating the correct direction.

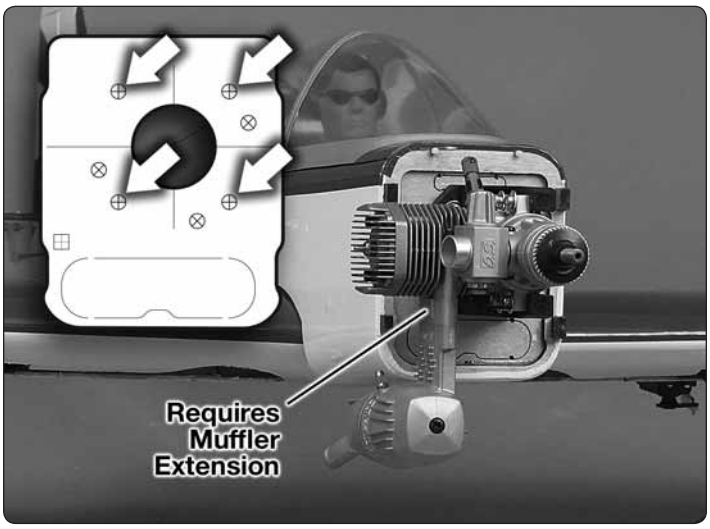
DO NOT INSTALL THE PROPELLER.

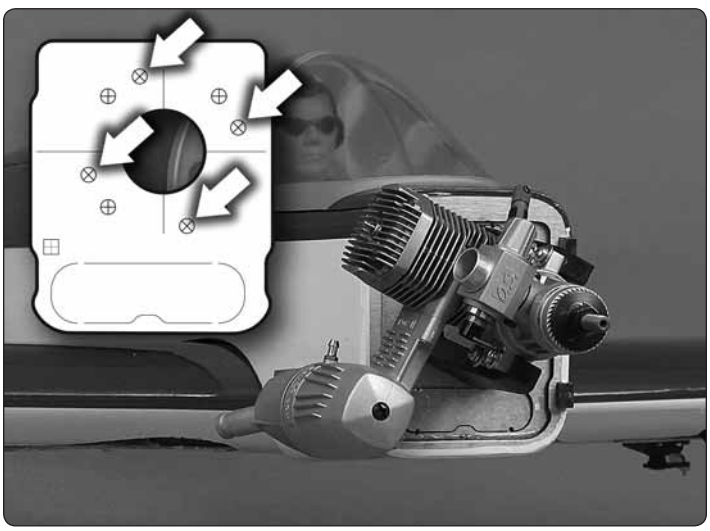


❏ 14. Trim the covering from over the three cooling air exit holes.

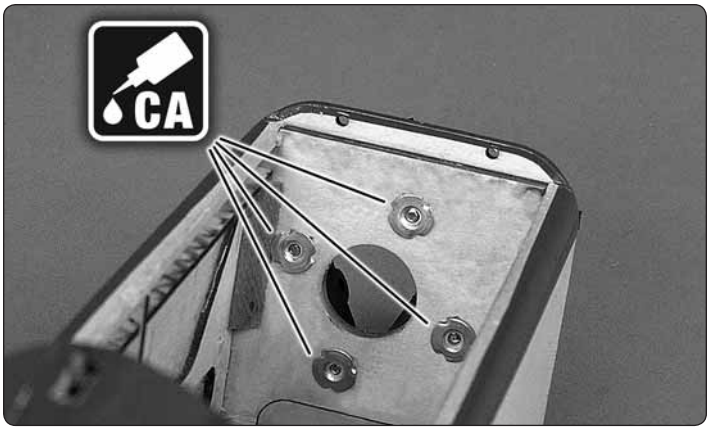
Glow Engine Installation



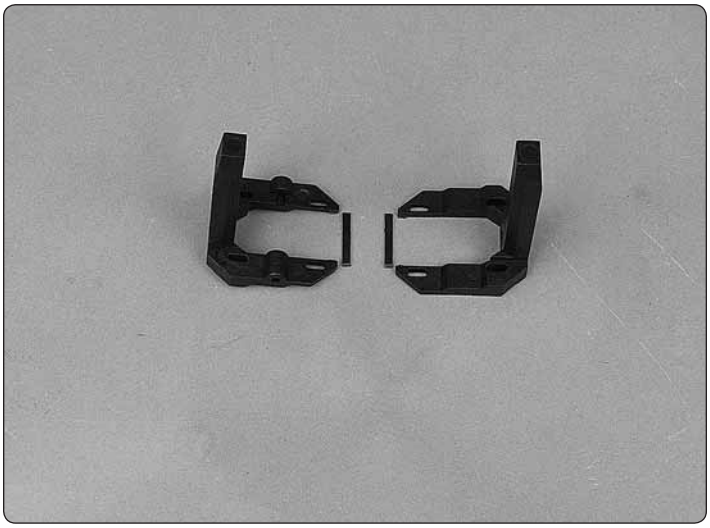




❏ 1. The glow engine can be installed in two different positions. Drill through the firewall at each appropriate mark. Both engine mounting positions use the same throttle pushrod exit hole.



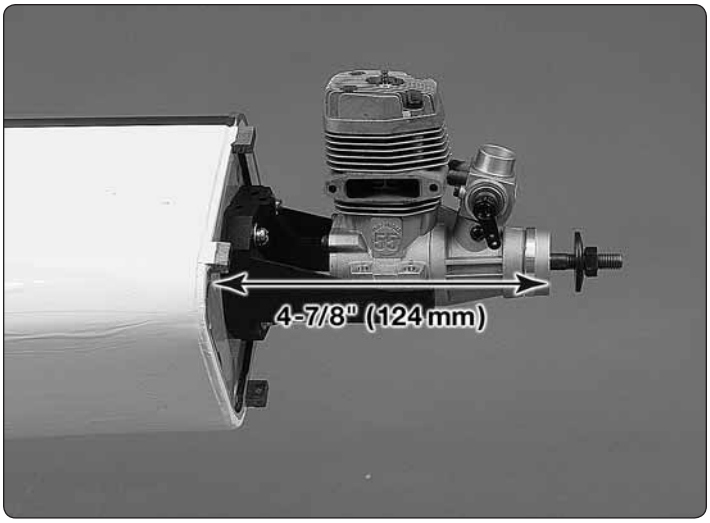
❏ 2. Install the 6-32 blind nuts in the back of the firewall and press flush.

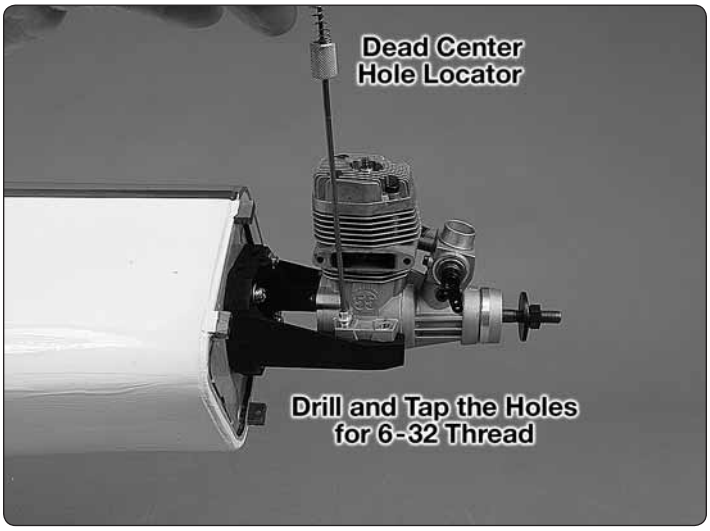


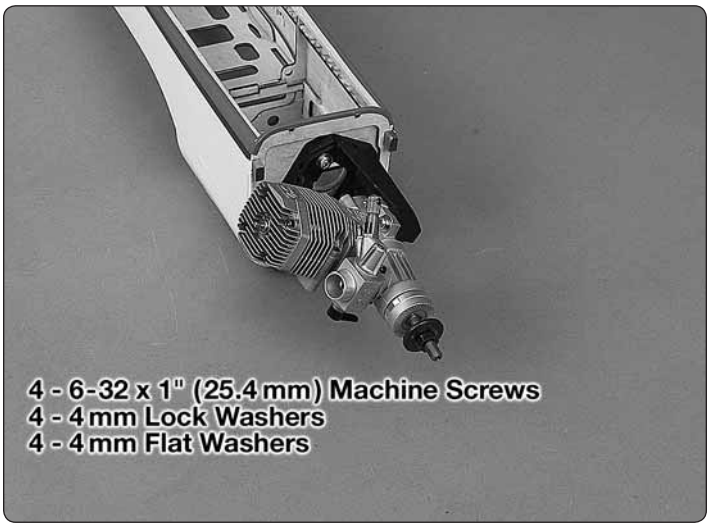
❏ 3. Cut and remove the plastic between the mounting arms.

❏ 4. Attach the engine mount to the firewall.

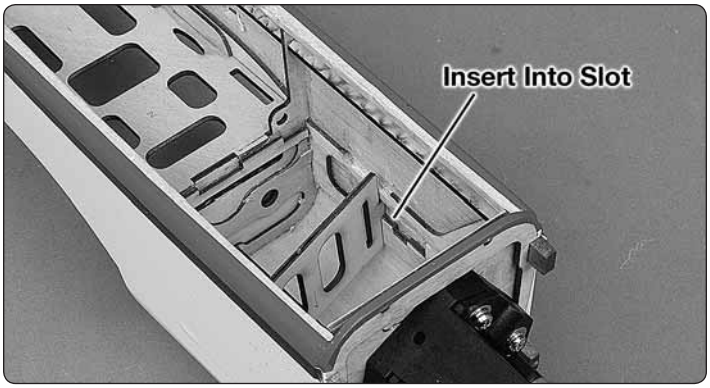
❏ 5. Test fit the engine on the engine mount. Slide the mount halves against the sides of the engine and finish tightening the mount screws.

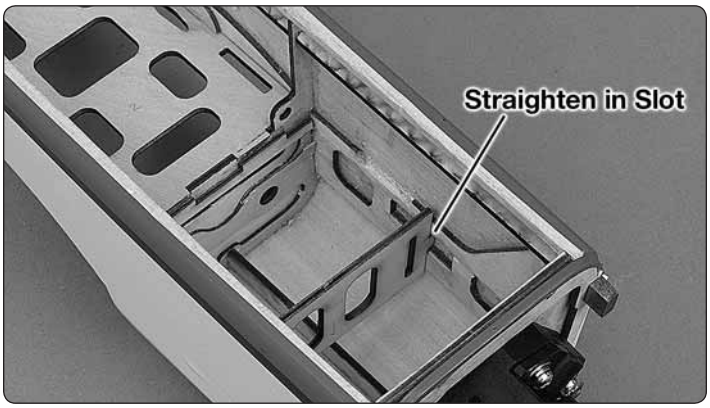


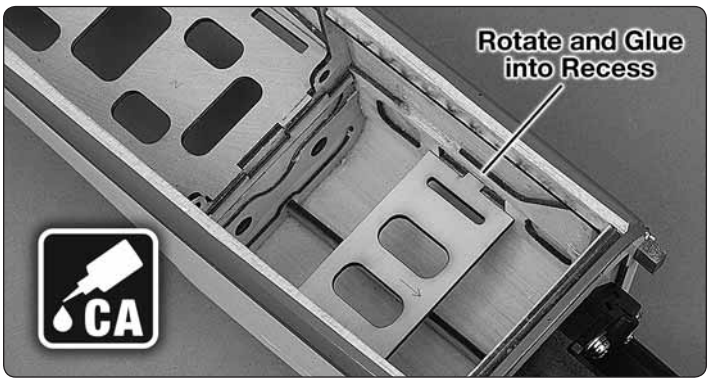




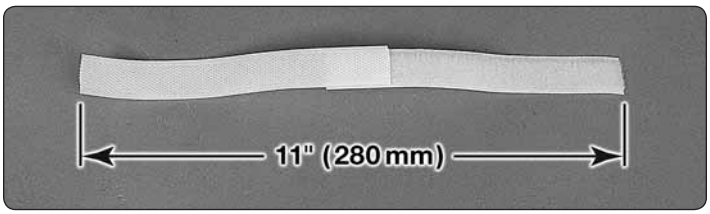
❏ 6. Mount the engine.



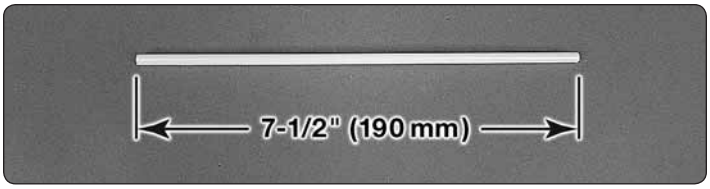




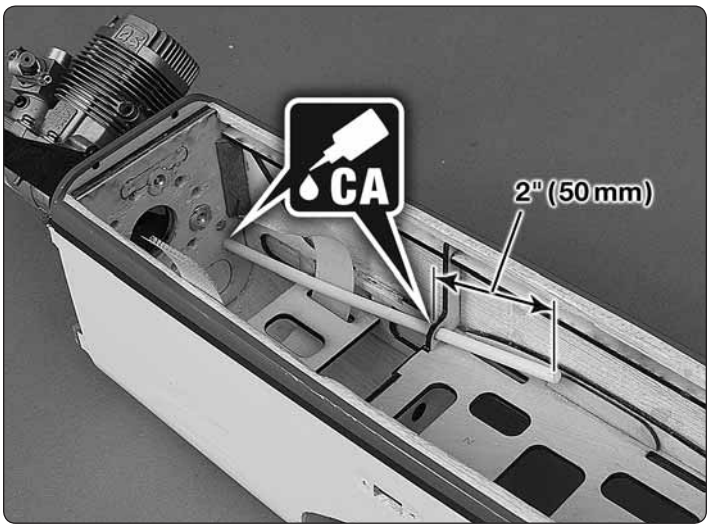
❏ 7. Install the fuel tank tray.



❏ 8. Make and install a hook and loop strap.

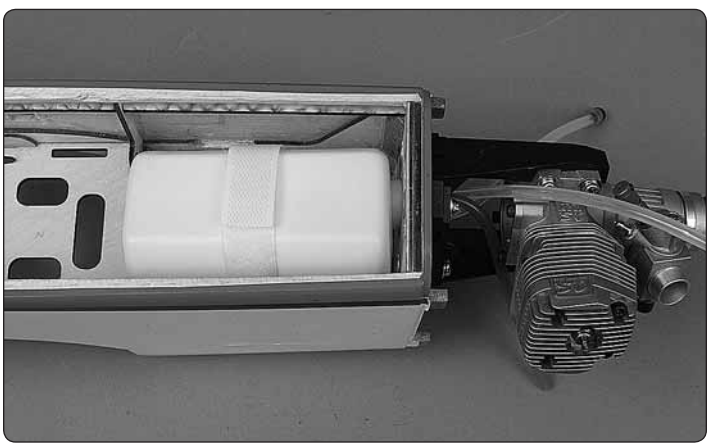


❏ 9. Cut the outer throttle pushrod tube and roughen it with sandpaper.

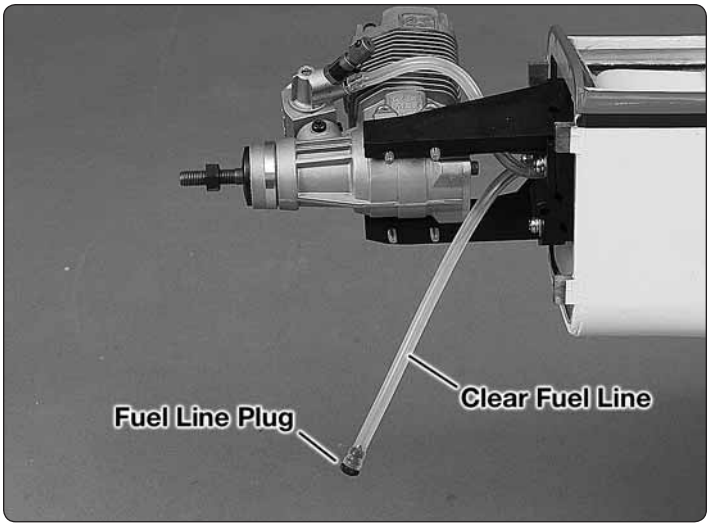


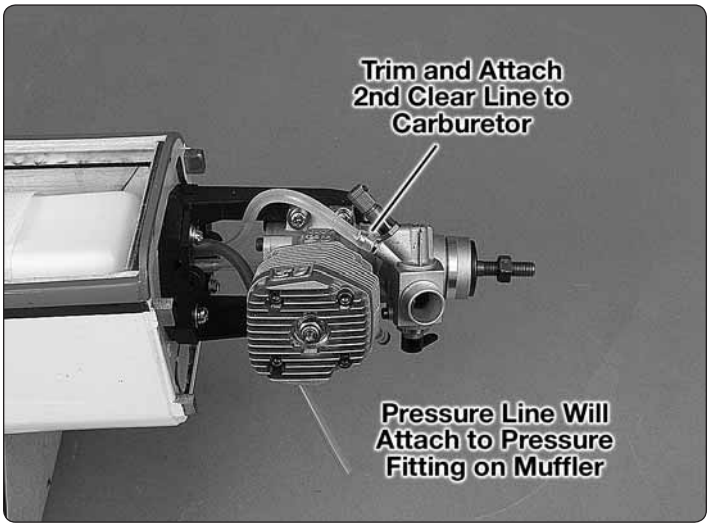
❏ 10. Insert the outer pushrod tube in the fuselage.

❏ 11. Place a piece of foam rubber on the fuel tank tray.

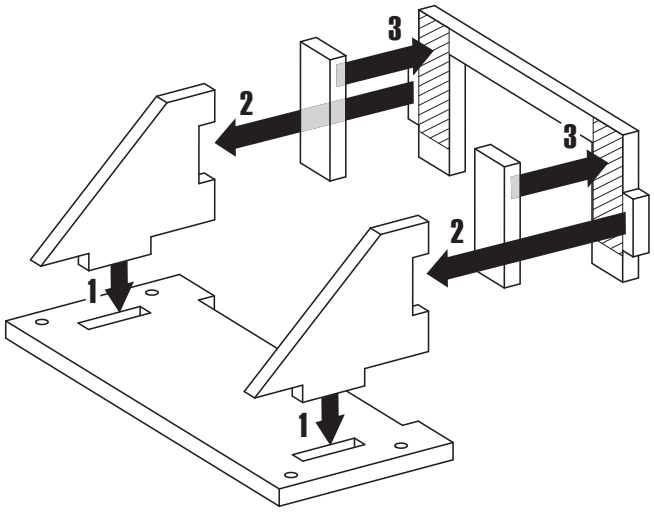


❏ 12. Install the fuel tank.



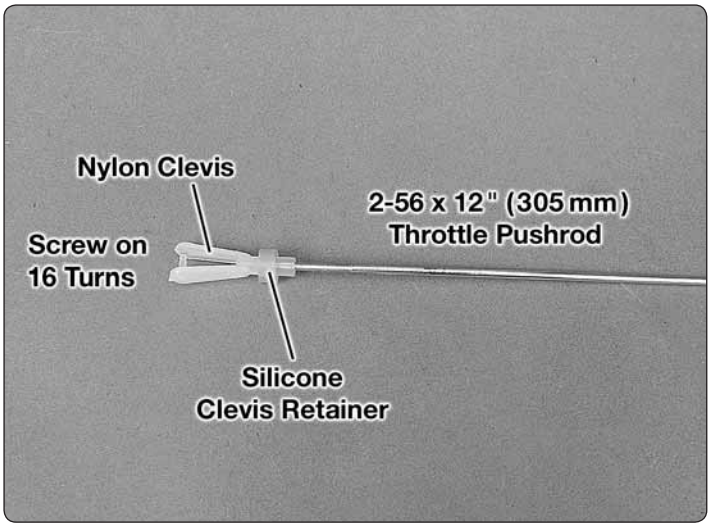


❏ 13. Route the fuel lines.

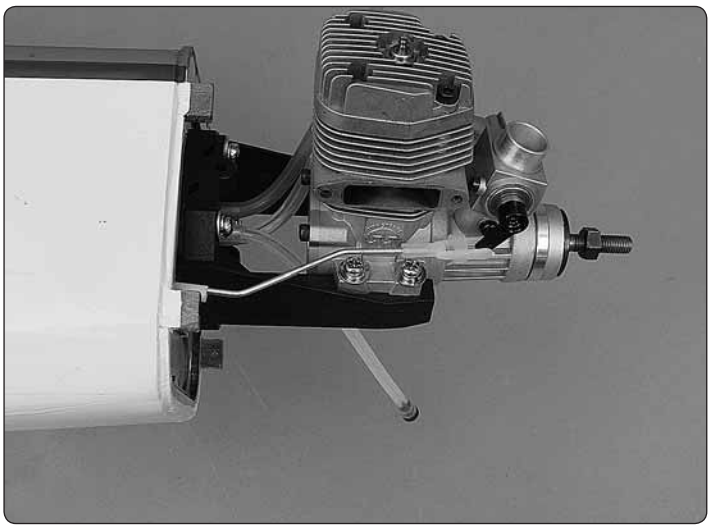


❏ 14. Assemble the throttle servo tray with epoxy.

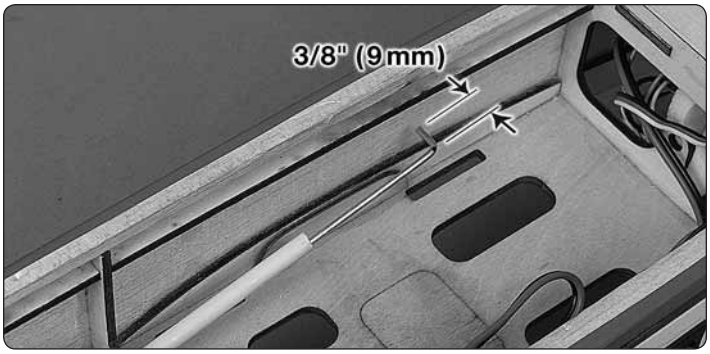
❏ 15. Install the throttle servo.



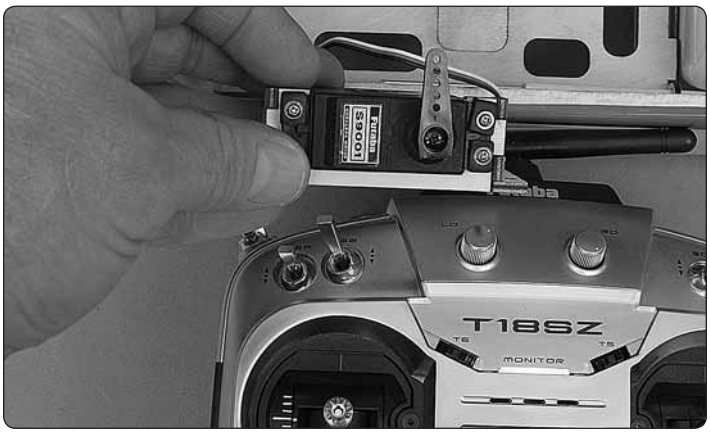
❏ 16. Assemble the throttle pushrod.



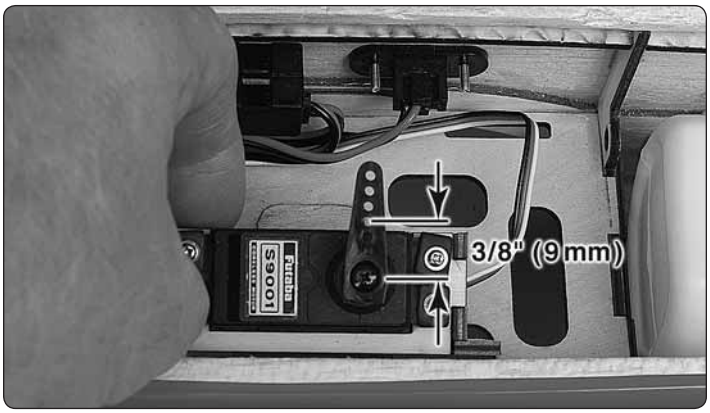
❏ 17. Insert the throttle pushrod into the throttle outer pushrod tube. Bend the pushrod so that the throttle arm rotates smoothly when the clevis is attached.

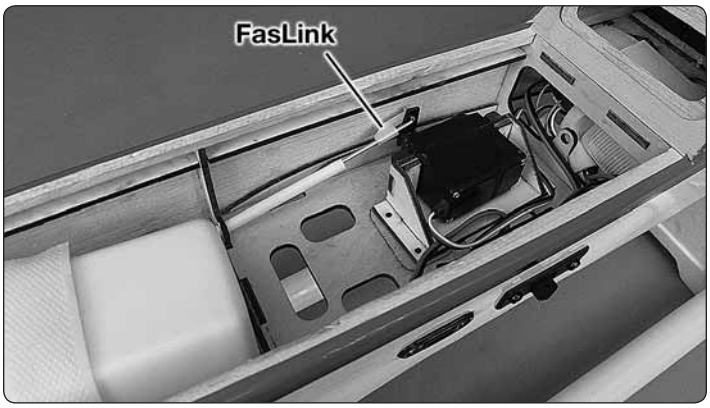


❏ 18. Make an L-bend in the end of the throttle pushrod.

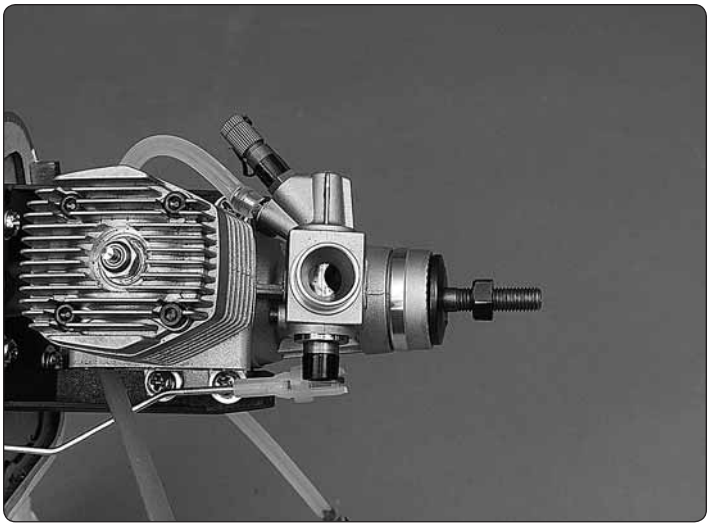


❏ 19. Plug the throttle servo into the receiver. Switch on the transmitter and then the receiver. Center the throttle stick and install a servo arm so that it is perpendicular to the centerline of the servo.





❏ 20. Insert the L-bend into the servo arm and secure with a FasLink.

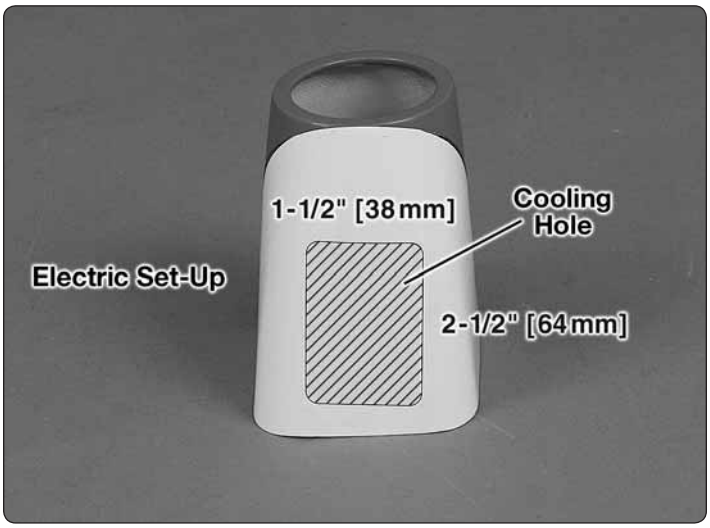


❏ 21. With the transmitter and receiver switched on and the throttle stick centered, position the throttle servo so that the throttle barrel is open approximately ½ way.

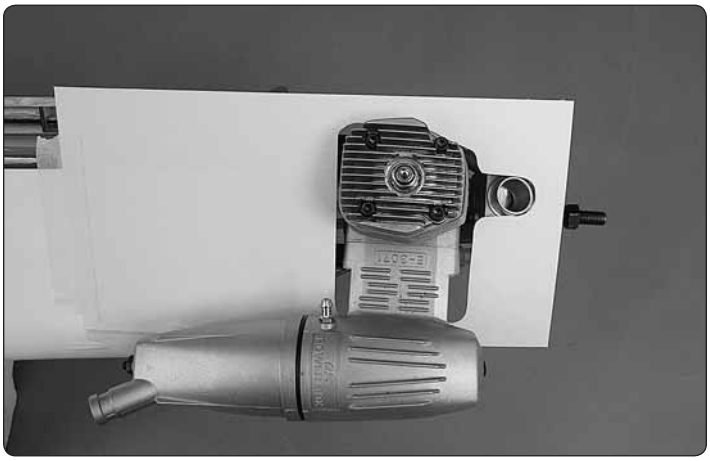
❏ 22. Mount the throttle servo tray.

❏ 23. Check that the throttle barrel opens and closes completely without binding. Use the end point adjustment on your transmitter, adjust the clevis or change the location of the FasLink on the servo arm to fine tune the throttle control. We recommend that a throttle cut be set up on the transmitter so that the engine can be stopped with a switch.

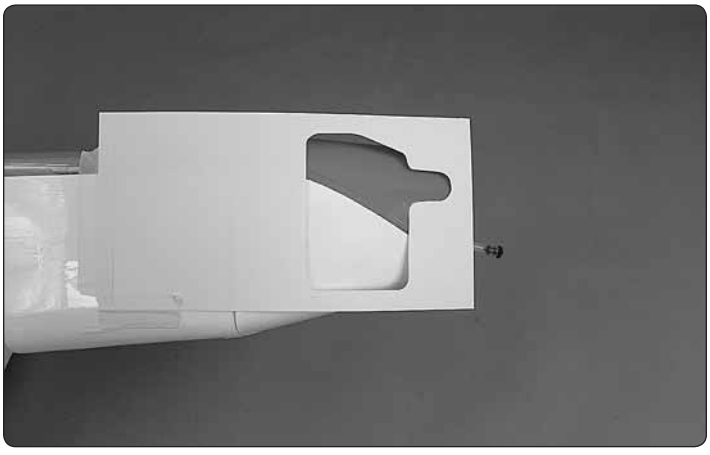
Install the Cowl



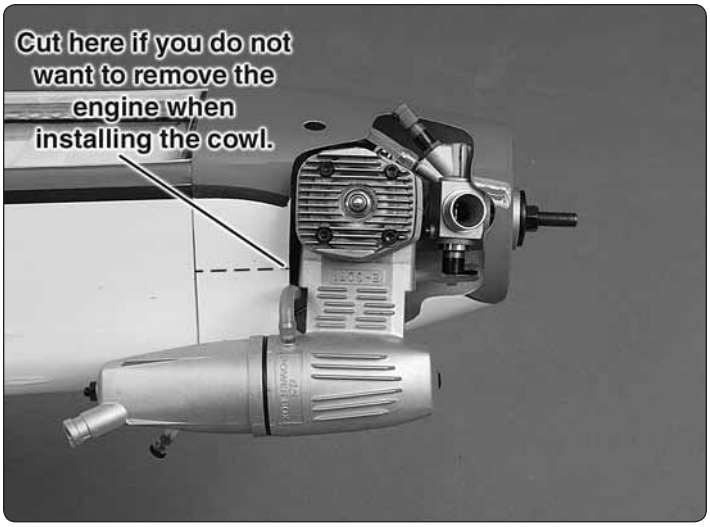
Skip to Step 4 to continue the electric installation.

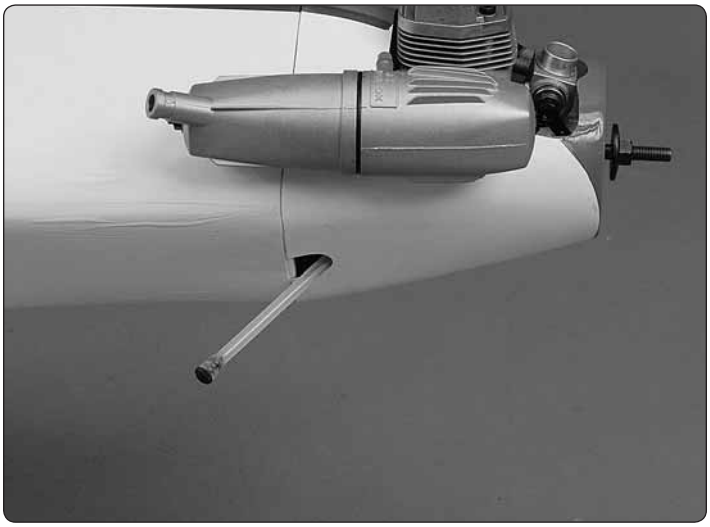


❑ 1. Trim the cowl to fit over the head of the engine and muffler. On the electric setup, trim a hole in the bottom to allow cooling air to flow over the ESC and into the fuselage. For the glow setup, if using the recommended O.S. engine, cut out the template on the back of the instruction manual and tape it in place around the cylinder head. This will provide a good starting point.

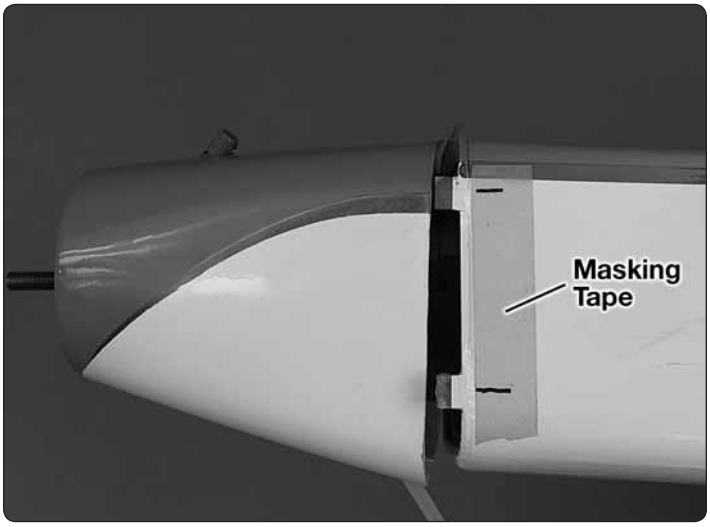


❑ 2. Remove the engine and position the cowl on the fuselage. Mark the cowl using the template as a guide.

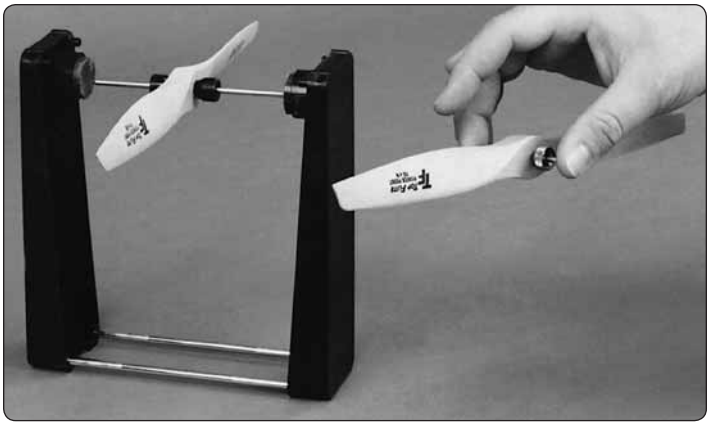




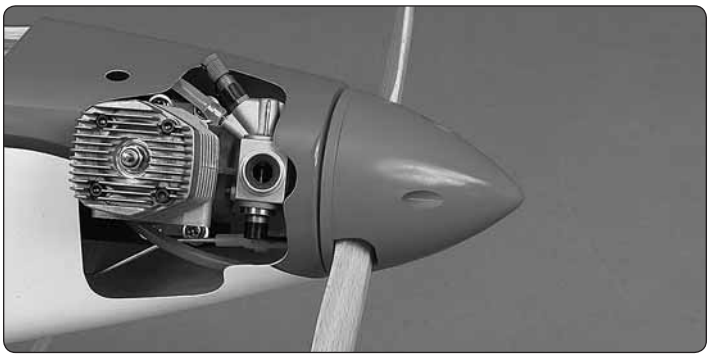
❑ 3. Trim the cowl to fit over the engine and muffler. The head of the engine sticks out which may require you to insert the engine in the cowl and then slide the engine and cowl over the engine mount.



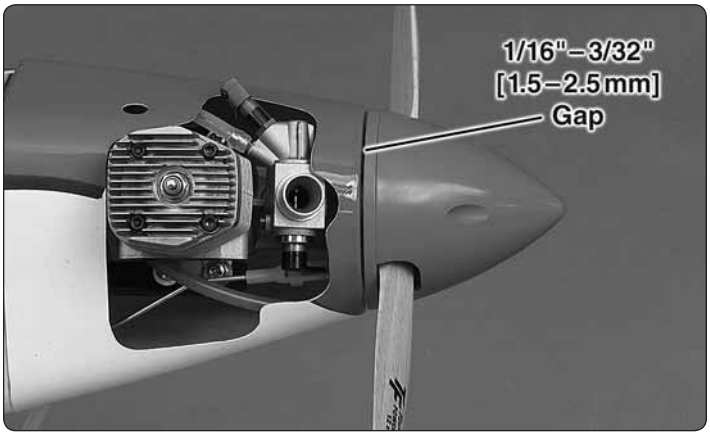
❑ 4. Mark the center of the cowl mounting block locations. Then, install the spinner.

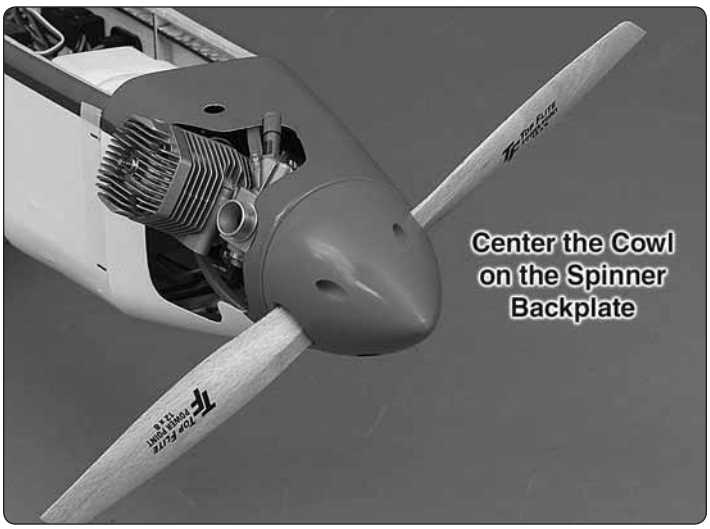


❏ 5. Balance the propeller.



❏ 6. Install the prop and spinner.





❏ 7. Position the cowl.

❏ 8. Attach the Cowl.

Apply the Decals

❏ 1. The decals are die-cut from the factory.

❏ 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 soap and warm water – ½ teaspoon of soap per gallon of water. Submerse one of the decals in the solution and peel off the paper backing. NOTE: Even though the decals have a "sticky-back" and are not the water transfer type, submersing them in soap and water allows accurate positioning and reduces air bubbles underneath.

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

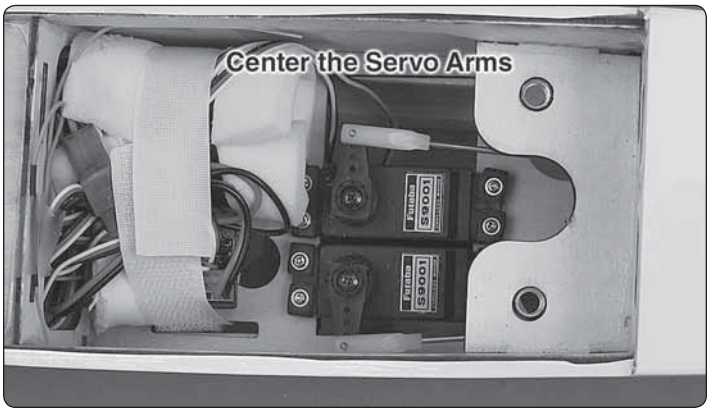
❏ 4. Use a piece of soft balsa or something similar to squeegee the remaining water from under the decal. Apply the rest of the decals using the same method and allow to dry.

Make sure the model is securely held whenever the battery is connected and the propeller installed.

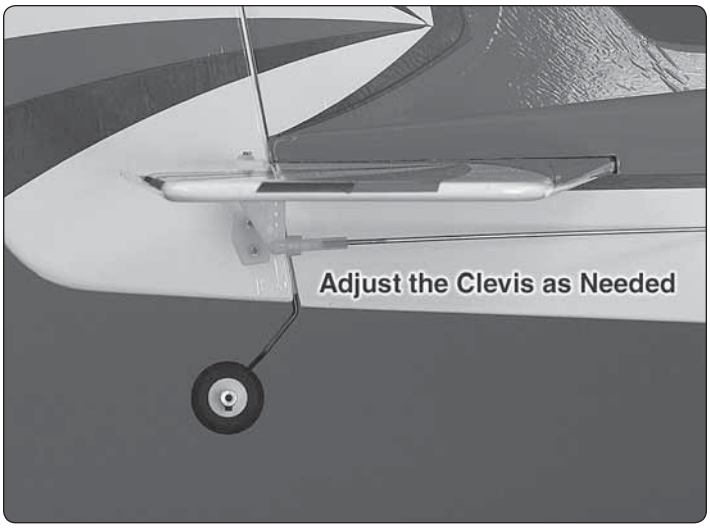
GET THE MODEL READY TO FLY

Check the Control Directions

DO NOT connect the motor battery to the ESC if an electric motor is installed. If a receiver battery is not used and the motor battery must be connected, **remove the prop before checking the control directions**.

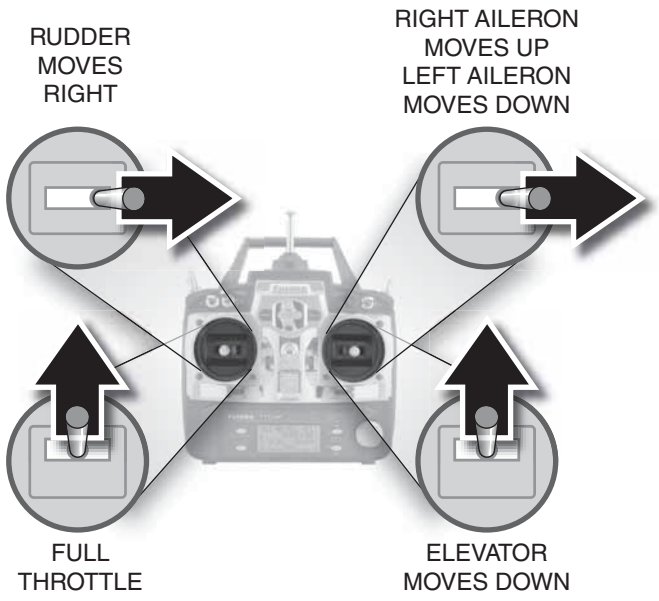


❏ 1. Switch on the transmitter and then the receiver.



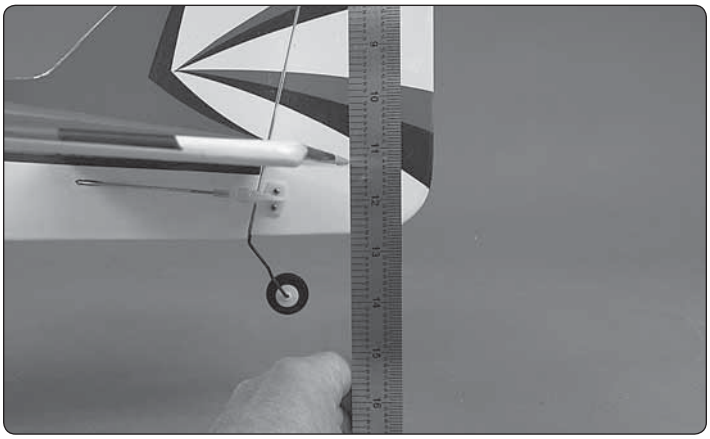
❏ 2. Center the control surfaces.

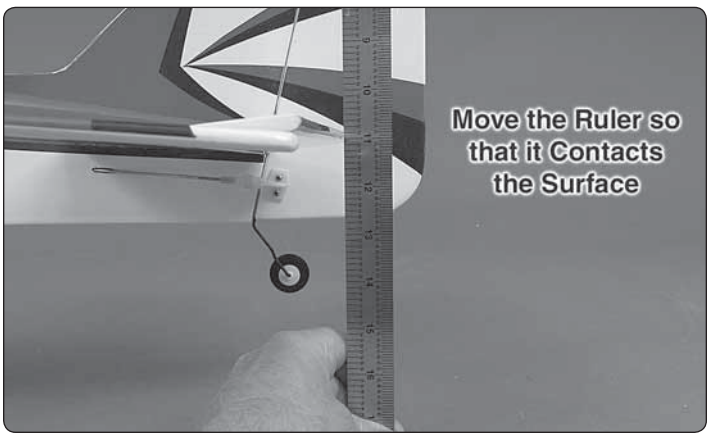
RADIO SET UP (STANDARD MODE 2)



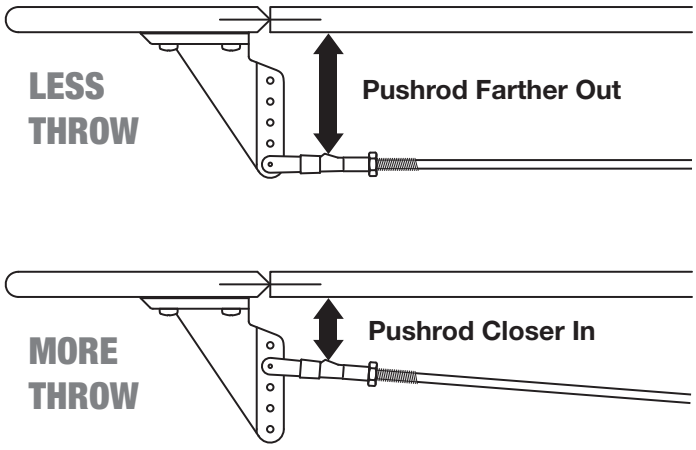
❏ 3. Make certain that the control surfaces and the carburetor respond in the correct direction as shown in the diagram. If any of the controls respond in the wrong direction, use the servo reversing in the transmitter to reverse the servos connected to those controls. Be certain the control surfaces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

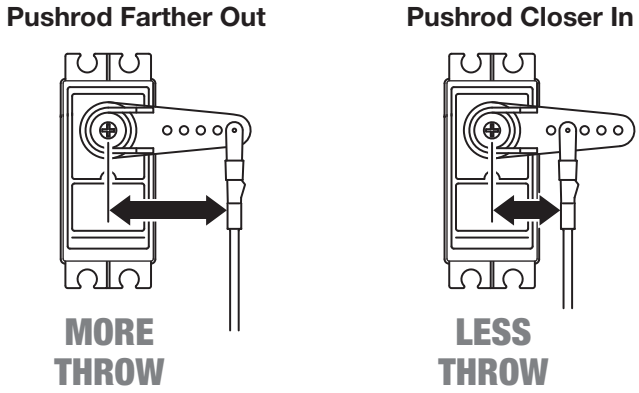
Set the Control Throws





❏ 1. Hold a ruler against the widest part of the control surface and measure the high rate throw first.





❏ 2. Adjust the location of the pushrod on the servo arm or on the control horn first. Then, use the endpoint adjustment in your transmitter or threaded clevis to fine tune the throws.

❏ 3. Measure and set the **low rate** throws. Measure and set the high and low rate throws for the rest of the control surfaces the same way.

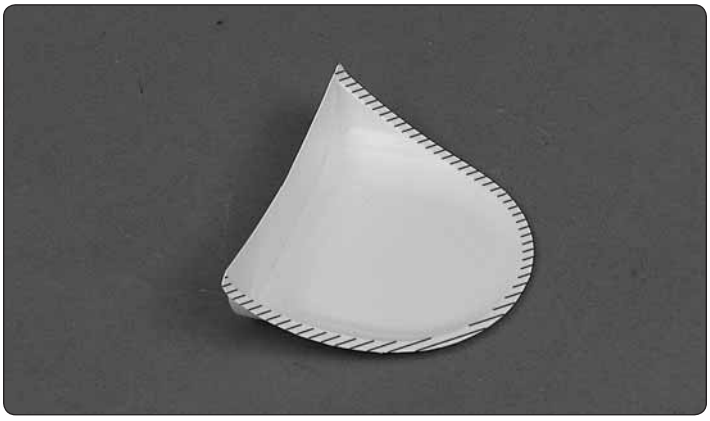
If your radio does not have dual rates, we recommend setting the throws at the high rate settings.

These are the recommended control surface throws:		
	LOW	**HIGH**
ELEVATOR **Up & Down**	1/4" [6mm] 7°	1/2" [13mm] 14°
RUDDER **Right & Left**	1" [25mm] 14°	1-5/8" [41mm] 24°
AILERONS **Up & Down**	5/16" [8mm] 16°	1/2" [13mm] 26°

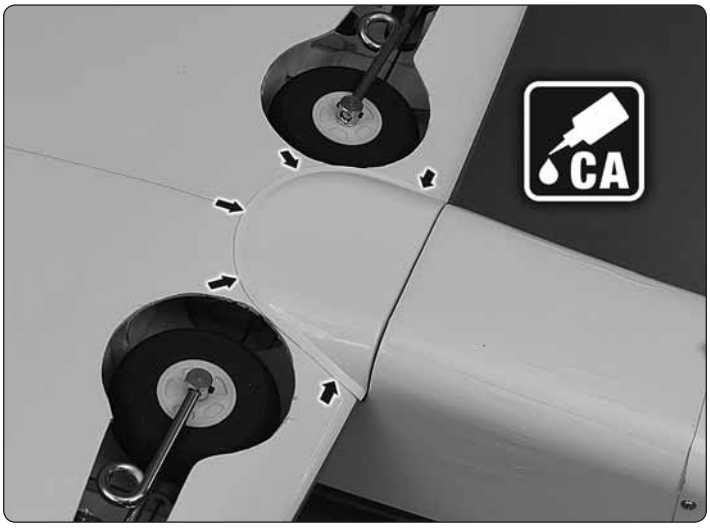
IMPORTANT: Now that the control throws have been set, be sure to set the failsafe on the radio.

Finish the Model

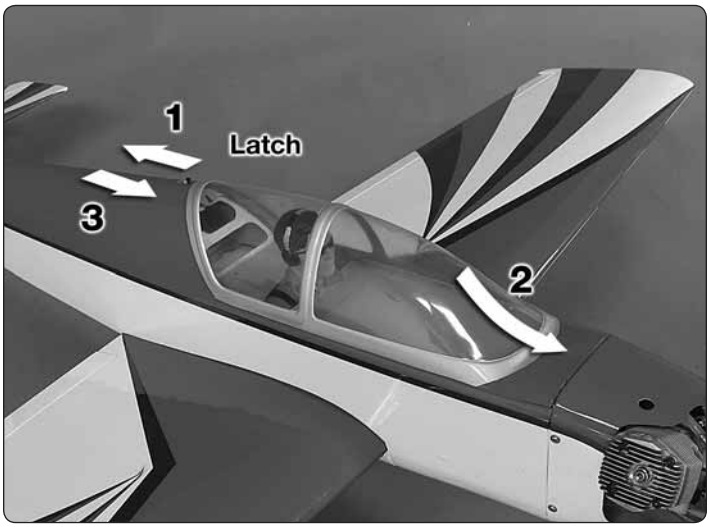
❏ 1. Reinstall the propeller and spinner if it was removed.



❏ 2. Roughen the edge of the belly pan with sandpaper and clean it with denatured alcohol.



❏ 3. Install the belly pan. Position the belly pan on the wing. Us a marker to outline the belly pan on the wing. Remove the belly pan and use a T-pin to poke holes in the covering inside the outline mark. Replace the belly pan and glue it with thin CA.



❏ 4. Install the canopy.

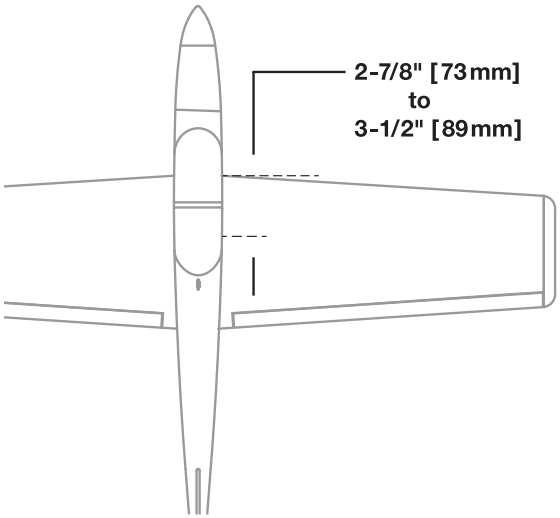
Balance the Model Laterally

❏ 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.**

Balance the Model (C.G.)

DO NOT OVERLOOK THIS IMPORTANT PROCEDURE. A model that is not properly balanced may be unstable and possibly unflyable.



❏ 1. Mark the C.G range location. 2-7/8" to 3-1/2" behind the leading edge measured at the fuselage.

❏ 2. With the plane **ready to fly**, with an empty fuel tank or motor batteries installed, use a Great Planes C.G. Machine or apply narrow (1/16" [2mm]) strips of tape at the front and rear C.G. locations so you will be able to feel them when lifting the model with your fingers to check the C.G. location. **Do not at any time balance the model outside this C.G. range**.

❏ 3. Use Great Planes "stick on" weight (GPMQ4485) to balance the plane. Place incrementally increasing amounts of weight on the bottom of the fuselage over the location where it would be mounted inside until the model balances. A good place to add stick-on nose weight is to the firewall. Do not attach weight to the cowl—this will cause stress on the cowl and could cause the cowl to crack at the screw holes. Once you have determined if additional weight needs to be installed, permanently attach the weight with glue or screws

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

PREFLIGHT

Identify Your Model

You should always have your name, address, telephone number and AMA number on or inside your model. It is **required** at all AMA R/C club flying sites and AMA sanctioned flying events. Fill out the identification tag on page 32 and place it on or inside your model. You must also have your FAA number on your plane and accessible without any tools.

Charge the Batteries

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.

Ground Check and Range Check

Make sure the engine idles reliably, transitions smoothly and maintains full power indefinitely. Shut the engine off and inspect the model closely, making sure all fasteners, pushrods and connections have remained tight and the hinges are secure. Follow the radio manufacturer's instructions to ground check the operational range of your radio, before the first flight of the day. This should be done once with the engine off and once with the engine running at various speeds. 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 battery cell.

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.
- Use an electric starter to start the engine. If you do flip the propeller with your fingers use a "chicken stick".
- Do not run the engine in an area of loose gravel or sand; the propeller may throw such material in your face or eyes.
- Keep your face and body as well as all spectators away from the plane of rotation of the propeller as you start and run the engine.
- Keep these items away from the prop: loose clothing, shirt sleeves, ties, scarfs, long hair or loose objects such as pencils or screwdrivers that may fall out of shirt or jacket pockets into the prop.
- The engine and muffler get hot! Do not touch them 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.

ELECTRIC MOTOR SAFETY PRECAUTIONS

- **WARNING:** Read the entire instruction sheet included with your motor batteries. Failure to follow the instructions could cause permanent damage to the battery and its surroundings and cause bodily harm!
- ***ALWAYS*** remove the propeller if the motor batteries will be connected while working on the plane.
- ***ALWAYS*** remove the motor batteries when charging.
- ***ALWAYS*** follow the charging instructions included with your charger for charging LiPo batteries. LiPo batteries can cause serious damage if misused.
- ***ALWAYS*** set the fail safe on your radio to prevent the motor from starting if the signal is lost. Once the motor batteries are connected the electric motor can start at any time.
- ***ALWAYS*** unplug the motor batteries first.
- ***ALWAYS*** set the charger's output volts to match the battery volts.
- ***ALWAYS*** charge a LiPo battery in a fireproof location.
- ***ALWAYS*** KEEP OUT OF THE REACH OF CHILDREN.
- ***ALWAYS*** remove the battery from the plane after a crash. Set it aside in a safe location for at least 20 minutes. If the battery is damaged in the crash it could catch fire.
- ***NEVER*** touch the motor during or right after operation. The motor gets hot.
- ***NEVER*** switch off the transmitter with the motor batteries plugged in.
- ***NEVER*** use a NiCd/NiMH peak charger to charge a LiPo battery.
- ***NEVER*** charge LiPo batteries in excess of 4.20V per cell unless stated on the battery.
- ***NEVER*** charge through the "discharge" lead.
- ***NEVER*** charge at currents greater than 1C unless the battery is rated for a higher charge rate.
- ***NEVER*** trickle charge a LiPo battery.
- ***NEVER*** allow the battery temperature to exceed 150 degrees F (65 degrees C).
- ***NEVER*** disassemble or modify the pack wiring in any way or puncture the cells.
- ***NEVER*** discharge a LiPo battery below 3.0V per cell.
- ***NEVER*** place the battery or charger on combustible materials or leave it unattended during charge or discharge.
- ***NEVER*** charge the battery in the plane.
- ***NEVER*** use water to try and put out a LiPo fire. If the battery starts to swell, quickly move the battery to a safe location, preferably outside. Place it in a bucket, covering the battery with sand.
- ***ONLY*** charge through the charge or balance lead.
- ***ONLY*** use a LiPo approved charger.

AMA SAFETY CODE (excerpts)

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

General

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

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

3) Where established, I will abide by the safety rules for the flying site I use, and I will not willfully and deliberately fly my models in a careless, reckless and/or dangerous manner.

5) I will not fly my model unless it is identified with my name and address or AMA number, on or in the model. Note: This does not apply to models while being flown indoors.

7) I will not operate models with pyrotechnics (any device that explodes, burns, or propels a projectile of any kind).

Radio Control

1) I will have completed a successful radio equipment ground check before the first flight of a new or repaired model.

2) I will not fly my model aircraft in the presence of spectators until I become a qualified flier, unless assisted by an experienced helper.

3) At all flying sites a straight or curved line(s) must be established in front of which all flying takes place with the other side for spectators. Only personnel involved with flying the aircraft are allowed at or in the front of the flight line. Intentional flying behind the flight line is prohibited.

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

5) **I will not knowingly operate my model within three miles of any pre-existing flying site except in accordance with the frequency sharing agreement listed** [in the complete AMA Safety Code].

9) Under no circumstances may a pilot or other person touch a powered model in flight; **nor should any part of the model other than the landing gear, intentionally touch the ground, except while landing.**

FLYING

The Ultra Sport .46/EP is a great-flying sport model that flies smoothly and predictably. However, it does not possess the self-recovery characteristics of a primary R/C trainer and should be flown only by experienced R/C pilots.

Fuel Mixture Adjustments

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. If flutter is detected, slow the model **immediately** and 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

It is a good idea to have a timer set on your transmitter, wrist watch or cell phone. We found that the plane can fly for 5-minutes or more on a 6S 3600mAh LiPo battery. Set the timer for 4-minutes for the first few flights. When recharging the battery note how much capacity was put back into the battery. To maintain the performance of LiPo batteries no more than 80% of the capacity should be drained from the battery on a flight. Adjust the timer as needed.

Before taking off, see how the model handles on the ground by doing a few practice runs at **low speeds** on the runway. Hold "up" elevator to keep the tail wheel on the ground. If necessary, adjust the tail wheel so the model will roll straight down the runway.

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. Retract the landing gear.

Flight

It is a good idea to have an assistant on the flight line with you to keep an eye on other traffic. Take it easy with the Ultra Sport .46/EP 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 or battery capacity, 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 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 or battery level, but use this first flight to become familiar with your model before landing.

Landing

To initiate a landing approach, lower the landing gear and lower the throttle while on the downwind leg. 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). Climb out to make another attempt. When 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.

FINAL NOTE: Have a goal or flight plan in mind each time you fly. This may be learning or improving a maneuver or learning how the model behaves at certain speeds and control rates. Every maneuver should be deliberate, not impulsive. A flight plan reduces the chances of crashing your model because of poor planning and impulsive moves.

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

GOOD LUCK AND GREAT FLYING!

Tape to underside of canopy as a reference.

These are the recommended control surface throws:		
	LOW	**HIGH**
ELEVATOR **Up & Down**	1/4" [6mm] 7°	1/2" [13mm] 14°
RUDDER **Right & Left**	1" [25mm] 14°	1-5/8" [41mm] 24°
AILERONS **Up & Down**	5/16" [8mm] 16°	1/2" [13mm] 26°

Notes

This model belongs to:

Name

Address

City, State, Zip

Phone Number

AMA Number

FAA Number

Cowl Template