Sport

INSTRUCTION MANUAL

WINGSPAN ◄
60.2 in [1529 mm]

LENGTH ◄
48.7 in [1237 mm]

WING LOADING ◄
17.49 – 18.46 oz/ft² [53 – 56 g/dm²]

RADIO ◄
4 – 5 channel
4 – 5 servos

WING AREA ◄
592.8 sq in [38.24 dm²]

POWER ◄
.46 – .55 cu in [7.5 – 9.0 cc] 2-stroke glow,
.70 cu in [11.5 cc] 4-stroke glow,
Motor: 1.65" [42 mm] 925W,
Castle Creations Edge Lite 75 ESC (not included)
ESC: 60A - 4S (not included)

WEIGHT ◄
72 – 76 oz. [2041 – 2155 g]

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

WARRANTY

Tower Hobbies® 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 Tower Hobbies' liability exceed the original cost of the purchased kit. Further, Tower Hobbies reserves the right to change or modify this warranty without notice.

In that Tower Hobbies has no control over the final assembly or material used for final assembly, no liability shall be assumed nor accepted for any damage or injury 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: (Visit hobbyservices.com for more information.)

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.

TOWER HOBBIES
Champaign, Illinois
(217) 398-8970 ext. 6

airsupport@hobbico.com

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INTRODUCTION

Congratulations and thank you for purchasing the Tower Hobbies Sport .46/EP ARF. After you've mastered the basics with a high-wing trainer, the "Sport" is a great 1st low-wing model, or an every day, all-around sport model for experienced flyers too!

For the latest technical updates or manual corrections, find the Sport .46/EP ARF on the Tower Hobbies web site at towerhobbies.com. If there is new technical information or changes to this model a "tech notice" box will appear on the page.

ADDITIONAL ITEMS REQUIRED

Radio/Servos

A minimum of 4-channels is required to fly the Sport .46/EP ARF. The Tactic TTX650 is recommended because of its simple, flexible computer programming and multiple model memory:

- ❍ Tactic TTX650 6-channel programmable radio (TACJ2650)
- ❍ Tactic TR625 6-channel receiver (TACJ0625)
- ❍ Hobbico 2S 6.6V 1300mAh LiFe battery (HCAM6411)*
- ❍ On-off receiver switch (TACM2000)*

Servos nowadays are smaller and stronger, so we've designed the servo mounts in the *Sport* to accommodate mini servos, but full-size servos may still be used simply by enlarging the opening in the servo mounts with a hobby knife. Four or 5 channels are required depending on whether you connect the aileron servos to separate channels and mix them with programmable mixing in your transmitter, or if you use a Y-harness to connect the aileron servos to the same channel.

- ❍ Tactic TSX25 mini digital high-speed 2 ball bearing servo (TACM0225)
- ❍ Tactic TSX20 mini high-speed 2 ball bearing servo (TACM0220)

OR

- ❍ Tactic TSX35 standard sport servo (TACM0235)
- ❍ (2) 12" [300mm] universal servo extensions (TACM2130)

If mixing the aileron servos electronically with programmable mixing in the transmitter:

- ❍ (2) 6" [150mm] universal servo extensions (TACM2092)

If connecting the servos with a Y-harness:

- ❍ Futaba dual servo extension (FUTM4130)

*If powering your Sport .46/EP with a brushless electric motor the BEC in the ESC may be used to power your receiver and servos, so no receiver battery or on/off receiver switch will be required. If using servos or an ESC different than those recommended in the instruction manual, be certain the servos do not overload the BEC or voltage regulator.

Glow Engine

The *Sport* is suited for a .45 - .55 2-stroke or .70 4-stroke. The O.S. Max .46AXII (OSMG0548) is illustrated in this manual.

Other Accessories for a Glow Engine

- ❍ 1/4" [6.4mm] R/C foam rubber (HCAQ1000)
- ❍ Great Planes Dead Center Hole Locator (GPMR8130)
- ❍ 4-40 (DUBR0505) or 3mm (DUBR0560) tap and drill set (see step 6, page 10)
- ❍ Suitable propeller for your engine

Brushless Electric Motor

The electric setup for the Sport is straightforward: a Great Planes Electrifly RimFire .32 on a 13 x 8 E prop with a minimum 60A ESC powered by a 4S battery in the 3300 mAh – 4000 mAh range. A Castle Creations Edge Lite 75 was selected and is illustrated in the instruction manual because it is compact, easily programmable and features data logging.

- ❍ 42-50-800 RimFire .32 (GPMG4700)
- ❍ APC 13 x 8 thin E prop (APCQ3080)
- ❍ Castle Creations Edge Lite 75 (CSEM1200)
- ❍ FPWP2234 FlightPower 4S 3300mAh 25C
- ❍ FPWP2404 FlightPower 4S 4000mAh 25C
- ❍ 3/16" heat shrink tubing (GPMM1056)
- ❍ T-style Star connector (HCAM4001)

If your servos draw more current than the BEC in your ESC is rated for, one option is to use a voltage regulator with a higher Amp rating that draws power from the 4S LiPo motor battery. The Castle Creations 10A BEC is suitable (CSEM0005). Another option is to use a receiver battery.

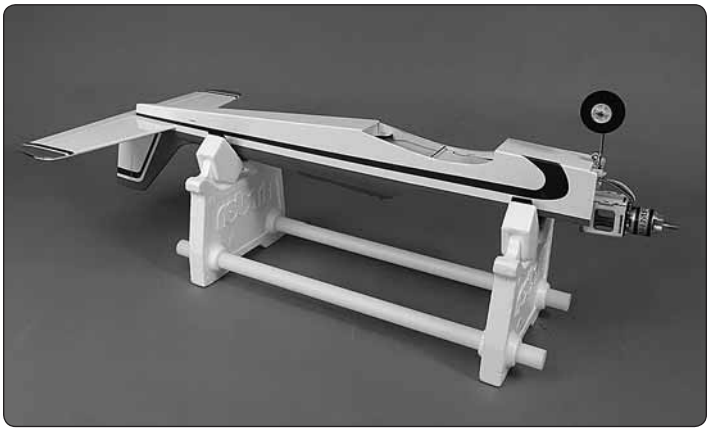
LiPo Battery Charger

To charge a 4S 4000mAh LiPo at 1C, a charger capable of at least 70 Watts is required (4S x 4.2V/cell = 16.8V x 4A = 67 Watts). The Triton EQ2 (GPMM3156) is more than enough charger with 100W output AC and 120W output DC.

ADHESIVES, HARDWARE AND OTHER ACCESSORIES

Other than common hobby tools here is a list of the rest of the items required:

- ❍ 30-minute epoxy (GPMR6043)
- ❍ Epoxy brushes (GPMR8060)
- ❍ Mixing cups (GPMR8056)
- ❍ Mixing sticks (GPMR8055)
- ❍ Threadlocker thread locking cement (GPMR6060)
- ❍ Thin CA (GPMR6001)
- ❍ Medium CA (GPMR6007)
- ❍ CA applicator tips (HCAR3780)
- ❍ CA accelerator (GPMR6035)



A Robart Super Stand II (ROBP1402) is also indispensable for working on your Sport.

A covering iron with a cover sock may be required for tightening and re-bonding covering to the model that may have loosened between the time the plane was manufactured and the time the model was removed from the box. The 21st Century iron is preferred because of its long cord, contoured shoe and precisely adjustable temperature range:

- ❍ Coverite 21st Century Sealing Iron (COVR2700)
- ❍ Coverite 21st Century Cover Sock (COVR2702)

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.

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

E-mail: *airsupport@hobbico.com*

REPLACEMENT PARTS LIST

Order No.	Description
TOWA4070	Wing Set
TOWA4071	Fuselage
TOWA4072	Tail Surface Set
TOWA4073	Cowl
TOWA4074	Hatch/Canopy
TOWA4075	Landing Gear Set
TOWA4076	EP Motor Mount Parts Set
TOWA4077	10-24 x 2 Nylon Wing Bolts (2 pcs.)
TOWA4078	2" Spinner
TOWA4079	Fuel Tank 260cc
TOWA4080	Decals

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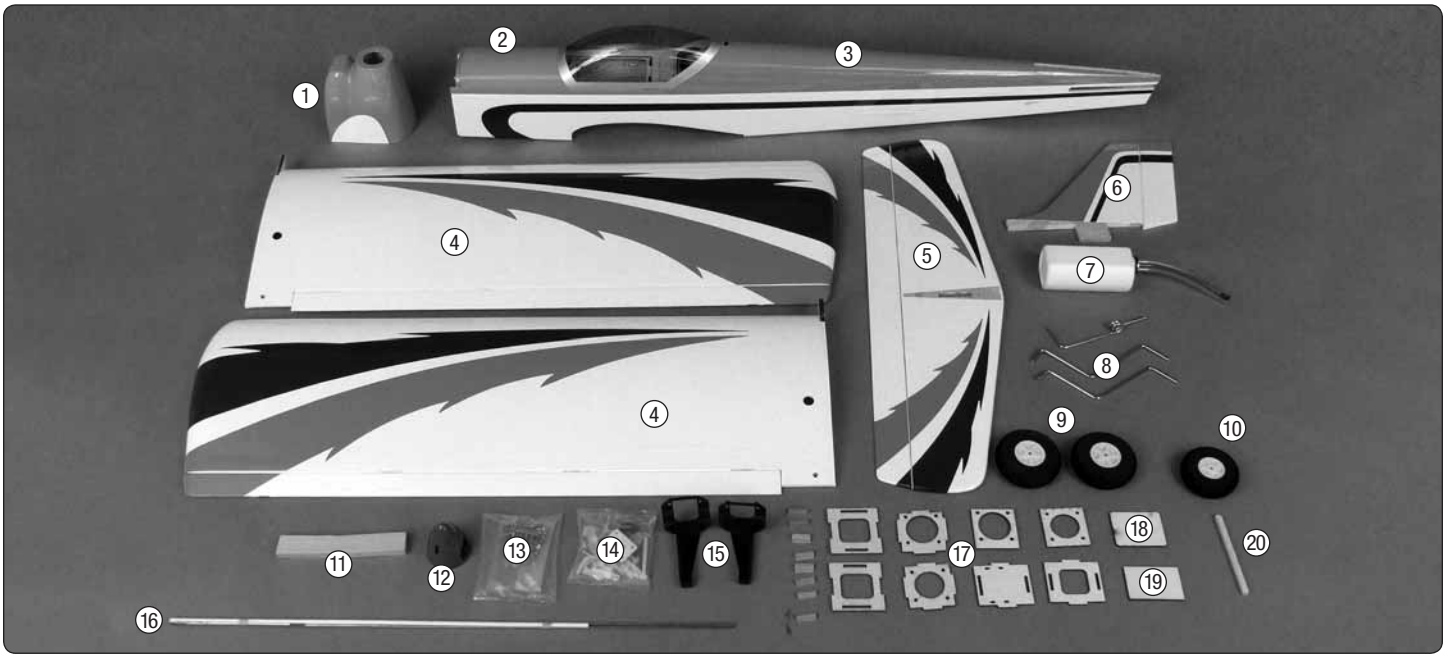
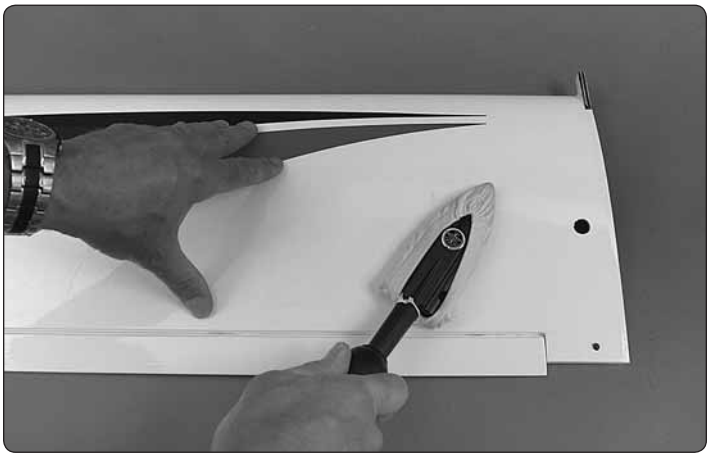


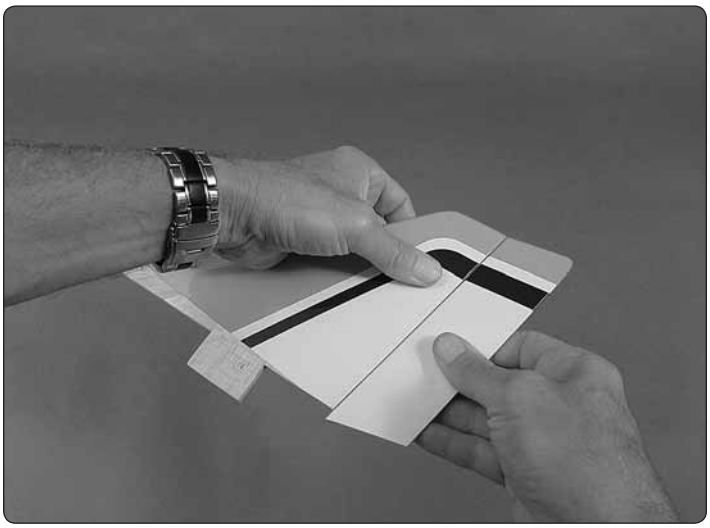
1. Cowl
2. Canopy Hatch
3. Fuselage
4. Wing
5. Horizontal Stabilizer
6. Vertical Stabilizer
7. Fuel Tank
8. Landing Gear Wires
9. 75mm Main Wheels
10. 65mm Nose Wheel
11. Wing Joiner
12. 2” Spinner
13. Metal Hardware
14. Nylon Hardware
15. L&R Engine Mount
16. Pushrods
17. EP Motor Mount Box
18. Hatch Cover
19. Pilot Mount Plate
20. Balsa Stick

PREPARATION

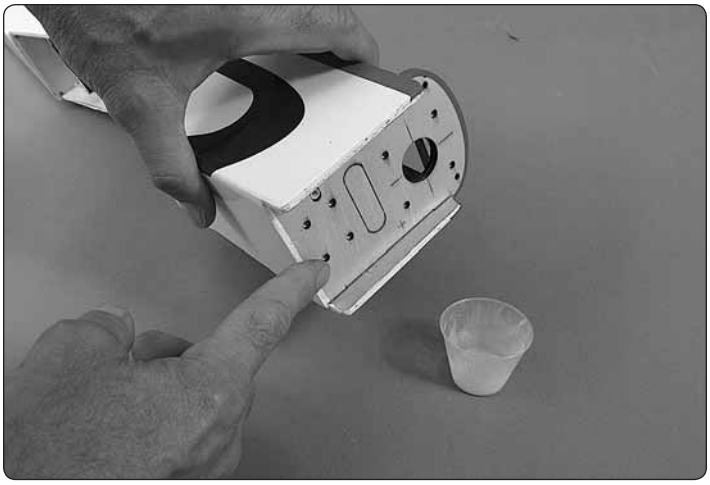
NOTE: The covering on your Sport requires less heat than you may be used to if you’re already familiar with iron-on coverings – too much heat causes seams and edges to pull and draw away from each other causing wavy, uneven edges or exposed balsa. Follow the instructions below to tighten the covering on your model.



❏ 1. Use a covering iron with a cover sock to tighten any loose covering and thoroughly bond it to the wood structure. The optimum temperature measured on the surface of a covering iron with a protective cover sock is about 280°F [140°C] which requires a dial setting of about 300°F [150°C] or “medium” heat on most covering irons. Wherever the covering is over wood (especially on the sheet balsa tail surfaces) press down on the iron to thoroughly bond the covering to the balsa underneath. If the covering blisters up over balsa and cannot be pressed back down, the iron may be too hot or you are leaving it in one location for too long—try reducing the heat or moving the iron a little faster.



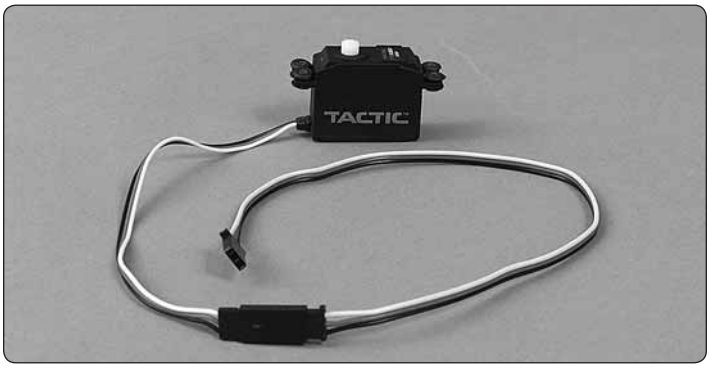
❏ 2. Give a generous tug on all control surfaces to check the hinges. Add thin CA where necessary to any loose hinges. Residual CA or CA “fog” is removable with a paper towel square dampened with CA debonder.



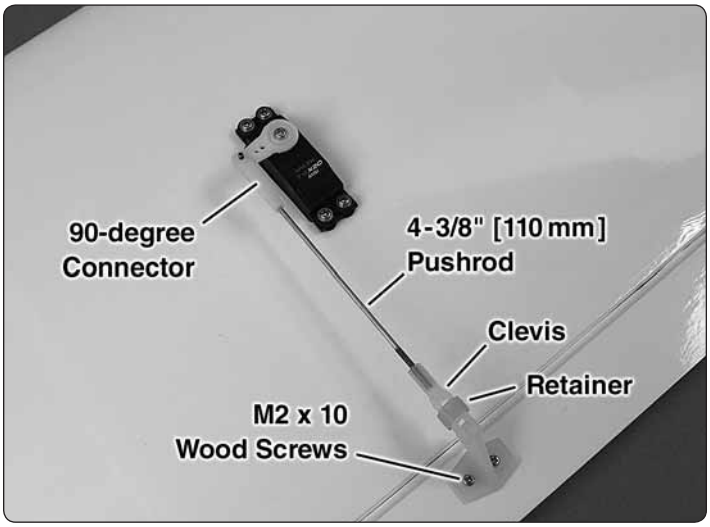
❏ 3. If powering your Sport with a glow engine, apply a film of epoxy or CA to edges of the covering around the nose and firewall to seal from fuel and exhaust residue. It would also be a good idea to use an epoxy brush to fuelproof the back of the firewall and the fuel tank area as well.

ASSEMBLE THE WING

Hook Up the Ailerons

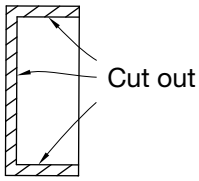


❏ 1. Attach a 12" [300mm] servo extension to each aileron servo. Use 1/2" [13mm] heat shrink tubing, tape or a dab of glue to secure the connections.



Refer to this image while mounting the aileron servos and hooking up the ailerons.

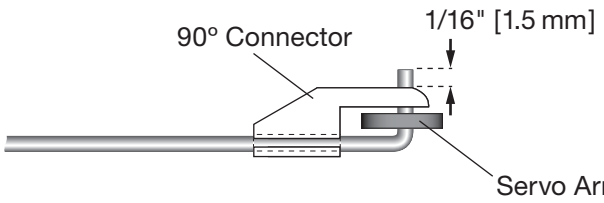
Do the left wing first…



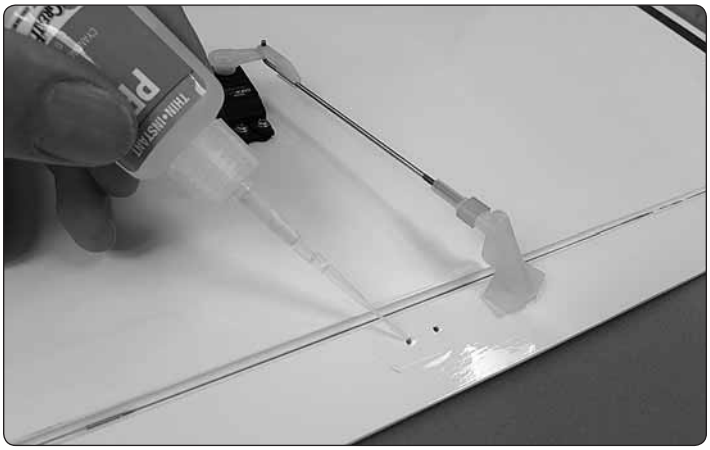
❏ 2. If necessary, enlarge the servo cutout to fit your servo.

❏ 3. Use the string to pull the aileron servo wire through the wing and fit the servo into the servo openings.

❏ 4. Drill 1/16" [1.6mm] holes for the servo mounting screws in the wing and in the aileron for the control horn screws **(use care not to drill through the top of the aileron).**



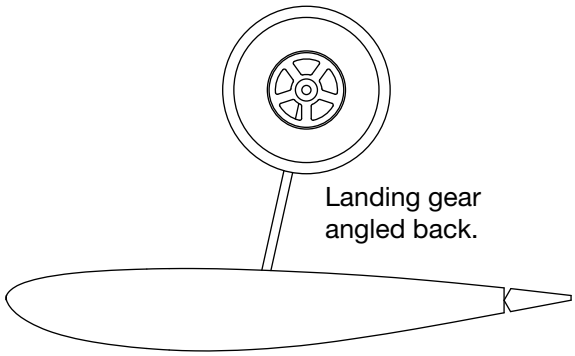
❏ 5. Enlarge the holes in the servo arm with a #50 [.070"] drill. Mount the servo and horn, make the pushrod and hook up the aileron using the hardware shown for servo arms for pushrods.

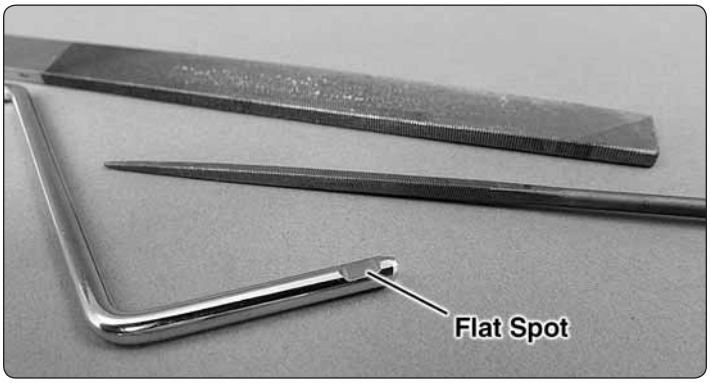


❏ 6. After mounting the aileron horns, remove the screws, harden the holes with a few drops of thin CA, allow to harden, and then reinstall the screws.

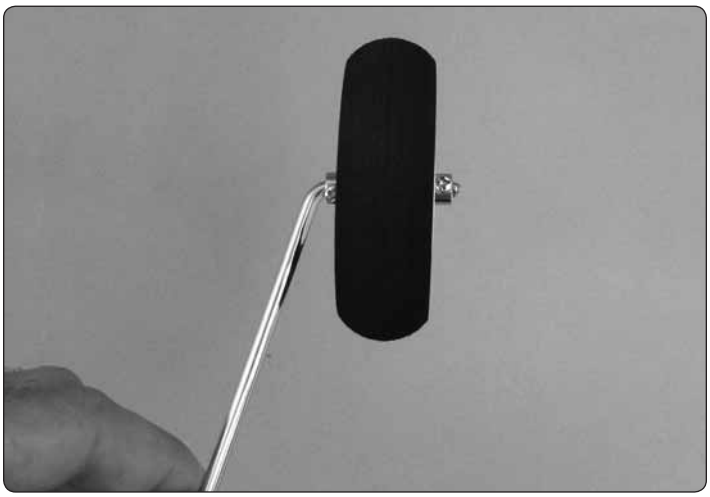
❏ 7. Install the aileron servo and linkage in the right wing the same way.

Mount the Landing Gear

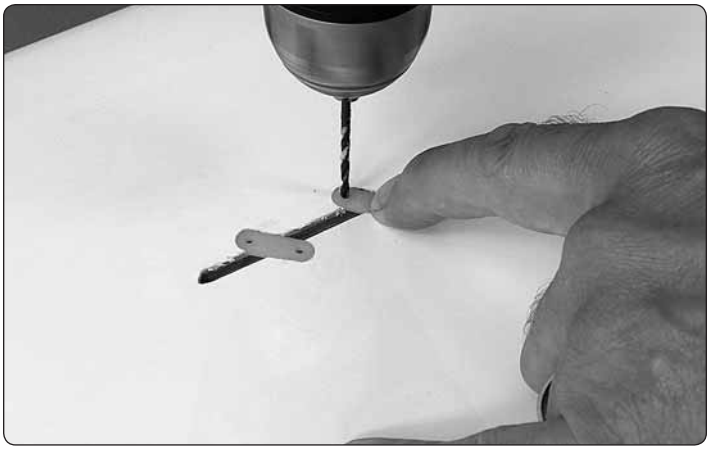




❏ 1. Use a metal file to grind a flat spot in the back of one of the main landing gear wires. **Note:** The landing gear wires angle ***back*** toward the wing trailing edge.

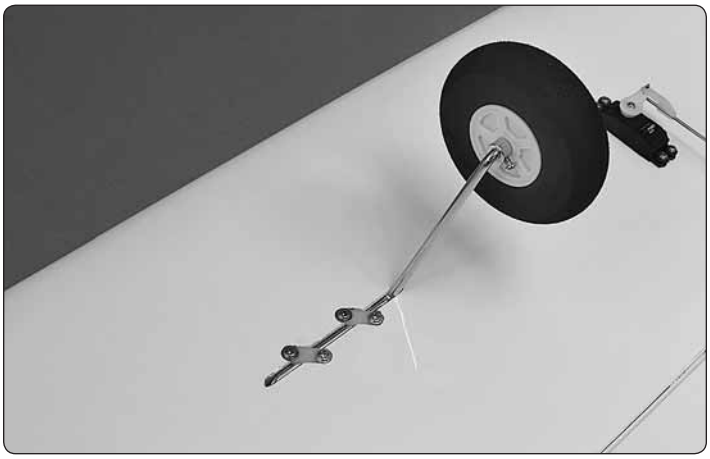


❏ 2. Mount a 3" [75mm] main wheel to the landing gear wire with two wheel collars and two M3 x 5 Phillips screws and threadlocker.



❏ 3. Use two flat landing gear straps as a guide to drill 3/32" [2.4mm] holes into the landing gear block in the left wing.

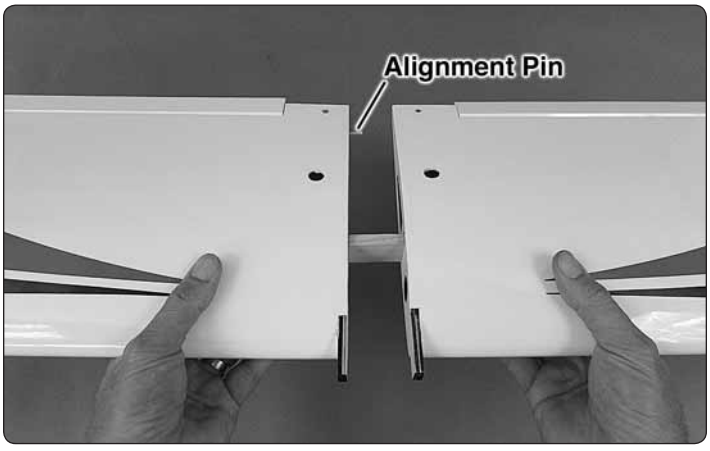
❏ 4. Enlarge the holes in the two landing gear straps with a 1/8" [3.2mm] drill.



❏ 5. Mount the main landing gear to the rail in the wing with two straps and four M3 x 10 screws. Trim the slots as needed so the wires fit flush.

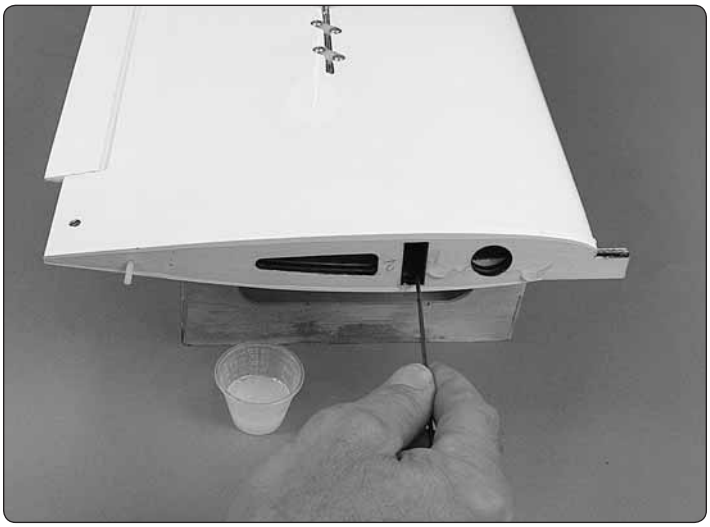
❏ 6. Mount the other landing gear and wheel to the other wing the same way.

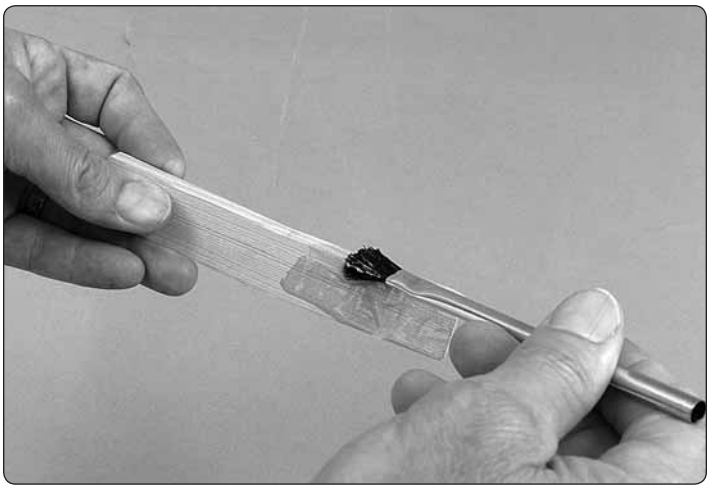
Join the Wing Halves



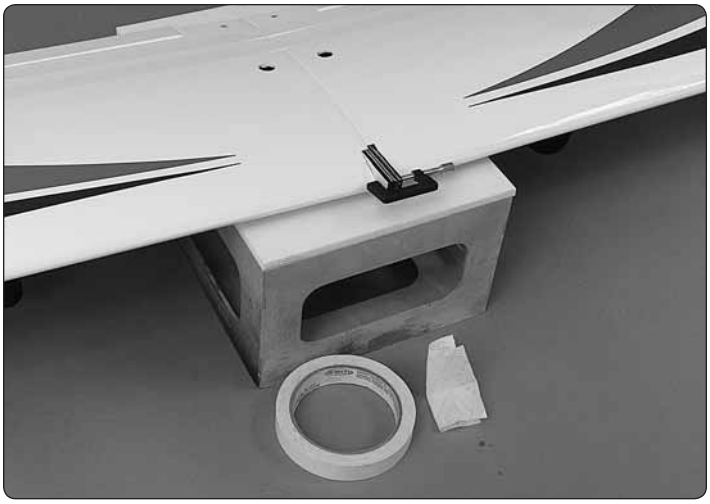
❏ 1. Test-fit both wing halves together with the nylon alignment pin and the hardwood wing joiner. Make any adjustments for a good fit.

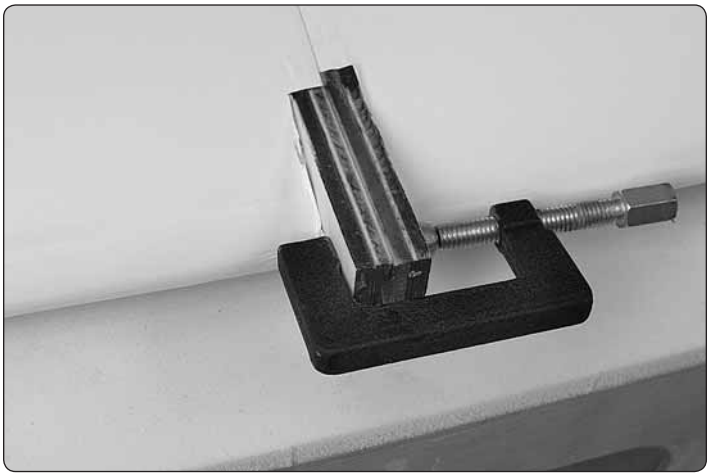
❏ 2. Stack two or three paper towels over each other and cut them into small squares. Have the paper towel squares and denatured alcohol ready for epoxy clean up while joining the wing in the next few steps.





❏ 3. Mix approximately 1-1/2 to 2 oz. of 30-minute epoxy. Working quickly, pour some epoxy into the spar cavities in both wings and distribute with a wire or small dowel. Coat one end of the joiner and insert it into one of the wing halves. Coat the protruding end of the joiner and both ends of both wing halves. Insert the nylon alignment pin and join the wing half, removing excess epoxy as it squeezes out.

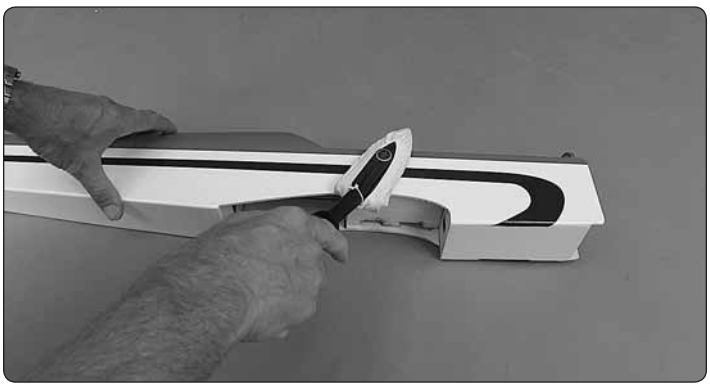




❏ 4. Use plenty of masking tape to tightly clamp the wing halves together and use a small clamp to clamp the front of the wing together at the leading edge tab. Use the paper towel squares dampened with denatured alcohol to wipe away excess epoxy as you proceed. Allow the epoxy to fully harden before removing the clamps and tape.

❏ 5. Residual tape adhesive may be cleaned with naptha (lighter fluid). Areas of the covering that may have lifted from removing the tape should be retightened with your covering iron.

ASSEMBLE THE FUSELAGE

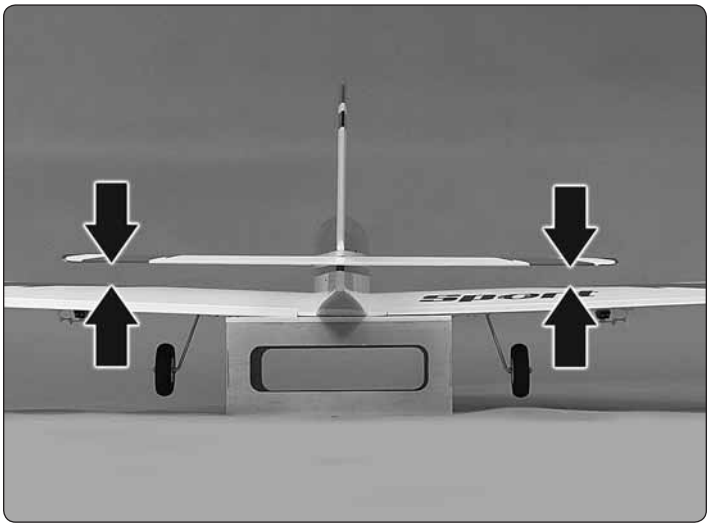


❏ 1. If you haven't yet done so, use a covering iron with a cover sock to tighten the covering over the fuselage and horizontal and vertical stabilizer.

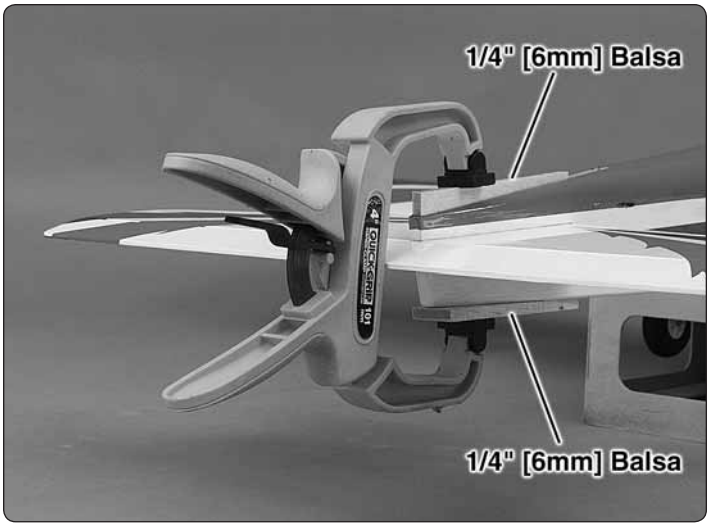
❏ 2. If powering your Sport with a brushless motor, cut the covering from the air exit vents in the bottom of the fuselage. For a better finish, cut the covering about 1/32" [1mm] inside the edges of each opening and use a trim iron with a rounded tip to seal the covering neatly down around the edges.

❏ 3. Mount the wing to the fuselage with two 10-24 x 2" [50mm] nylon wing bolts (for convenience, you may shorten the wing bolts by cutting off up to 5/8" [15mm]).

❏ 4. Test fit the horizontal and vertical stabilizers (*stab* and *fin*) into the fuselage.



❏ 5. View the model from behind and check the alignment of the stab to the wing. If necessary, adjust the slot in the fuselage to get the stab horizontally aligned with the wing—in most cases, all that will be required is a small amount of weight on the high side of the stab. If necessary, the stab saddle can be sanded slightly to get the stab to align.



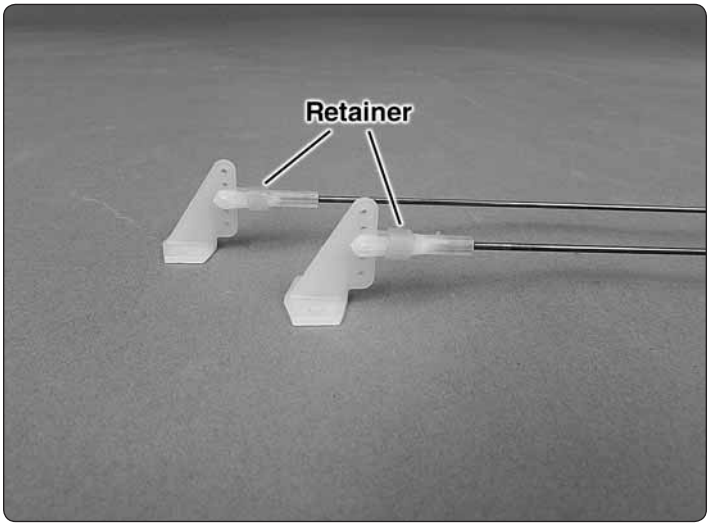
❏ 6. Remove the stab and fin and prepare for gluing into the fuselage. Typically, the fin and stab are glued into the fuselage together. An alternate method is to glue in the stab first, clamping the fin fairing to the top of the stab with 1/4" [6mm] balsa (not included) for a perfectly tight glue joint. If done this way, be certain to **temporarily** position the fin to center the stab laterally. After the epoxy has hardened glue in the fin.

If gluing in the stab and fin together, apply 30-minute epoxy to all joining areas, fit them into position and wipe away excess epoxy before it hardens. If any weight was required to level the stab don't forget to reposition the weight and double-check the alignment before the epoxy hardens.

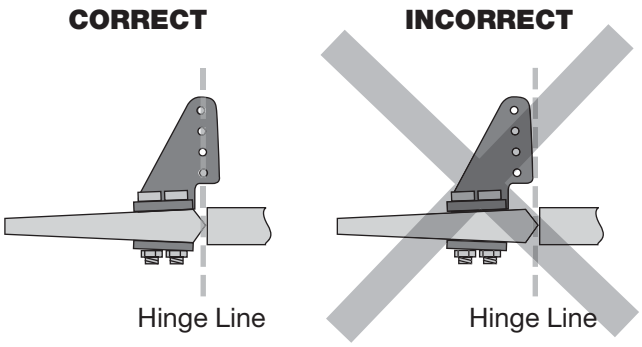
❏ 7. After the epoxy gluing the stab and fin to the fuselage has hardened remove the wing.

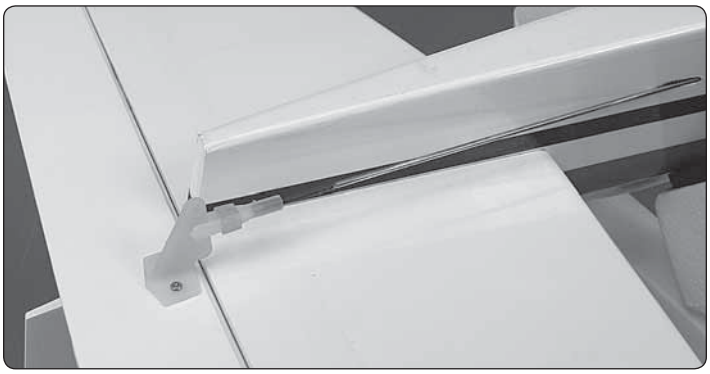
Install the Pushrods and Mount the Nose Gear

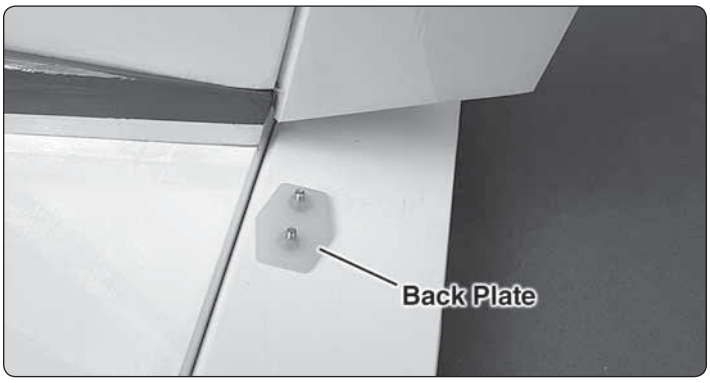
❏ 1. Cut two of the long wire pushrods including the threaded end to a length of 27" [685mm].



❏ 2. Prepare the two pushrods as shown with control horns, clevises and silicone tube retainers.



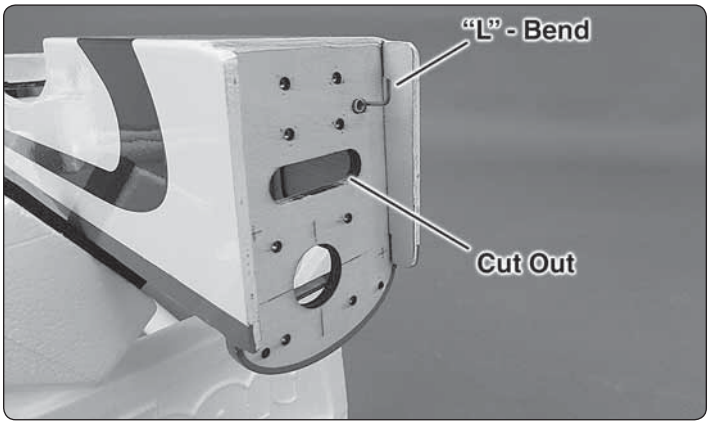




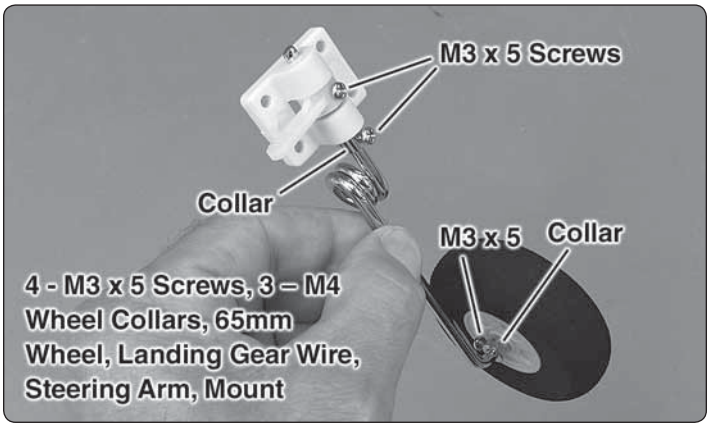
❏ 3. Slide one of the pushrods into the elevator tube in the fuselage. Position the horn on the elevator as shown in the sketch, then mark and drill 5/64" [2.5mm] holes through the elevator for the horn mounting screws. Mount the horn with two M2 x 14 Phillips machine-thread screws and the back plate on the top of the elevator – don't over tighten the screws so much that you squish the balsa.

❏ 4. Install the other pushrod and mount the horn to the rudder the same way.

❏ 5. If installing a brushless motor, cut the rest of the way through the partially cut air inlet in the firewall and remove the piece as shown in the photo in the following step.



❏ 6. Cut the threaded end off another pushrod to a length of 16" [400mm]. Make an "L" bend in one end of the pushrod and insert it into the guide tube for the nose steering.



❏ 7. Assemble the nose gear as shown with the hardware indicated– use threadlocker on the screws.

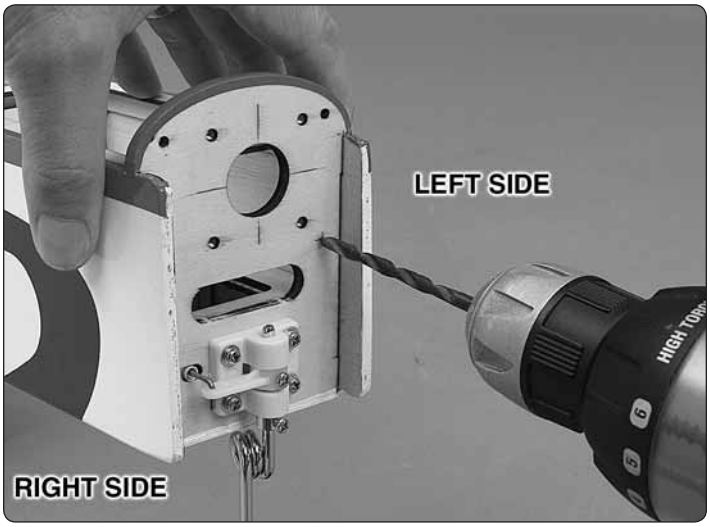
❏ 8. Fit the steering arm onto the pushrod and mount the nose gear to the firewall with four M3 x 12 Phillips machine screws and M3 flat washers and lock washers.

❏ 9. Rotate the nose gear from side-to-side to check for free movement. If necessary, make a slight bend in the nose gear pushrod to ease movement.

Mount a Glow Engine

If installing a brushless motor, skip to *Assemble the EP Motor Mount Box* on page 12.

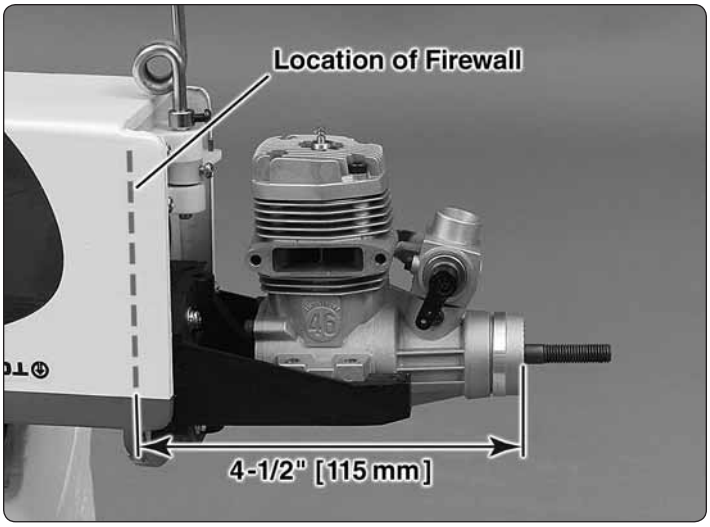
The engine illustrated in the instruction manual is mounted inverted. This is the easiest, most-convenient and most-streamlined way to mount the engine, but the exhaust is aimed directly at the wing. This presents no problems, but you should have plenty of paper towels and cleaner on-hand to wipe off exhaust residue after each flight. The engine could also be mounted upright, but much of the cowl will have to be cut away for the engine, and exhaust will still be deposited on the fuselage.



❏ 1. If mounting your engine inverted as shown, drill a 3/16" [4.8mm] hole through the firewall at the "+" mark in the left side of the fuselage (the same side of the fuselage as the throttle arm on the carburetor on the engine). If mounting your engine upright, drill the hole through the "+" mark through the firewall on the right side of the fuselage.

❏ 2. Temporarily fasten the engine mount halves to the firewall with four M3 x 25 Phillips machine-thread screws, M3 lock washes and flat washers, but do not fully tighten the screws yet.

❏ 3. Place your engine on the mount. Adjust the width of the mount halves to fit your engine, then temporarily tighten the screws.



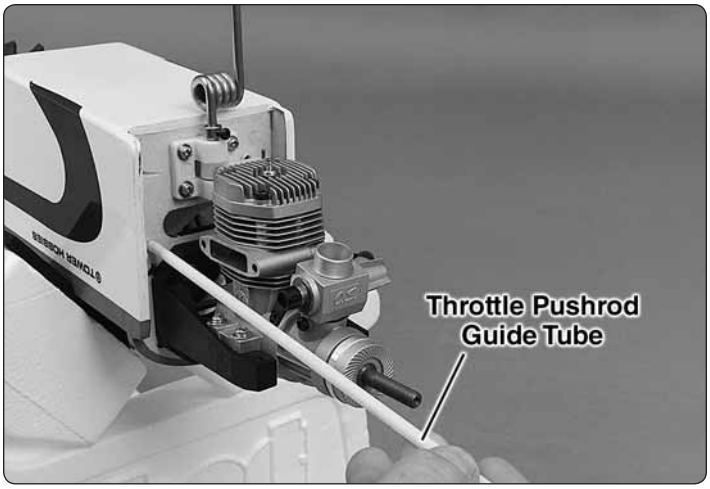
❏ 4. Slide the engine forward or back so the drive washer (or the back plate of your spinner) will be 4-1/2" [115mm] **from the firewall**.

❏ 5. Use a Great Planes *Dead-Center* Hole Locator or similar tool to mark the engine mount screw holes onto the engine mount. Remove the engine mount from the firewall.

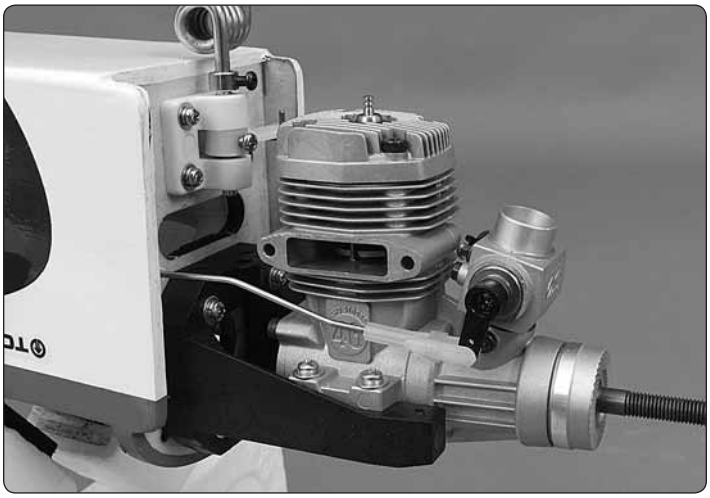
❏ 6. Decide what size screws you want to use to hold your engine to the mount. M3 x 12 Phillips machine-thread screws are supplied, but will require a M3 tap. If you already have a 4-40 tap, then 4-40 x 5/8" screws (not supplied) may be used instead. If using the supplied M3 x 12 screws, drill 2.4mm [.096" (#41)] holes through the marks made in the mount for the mounting screws. If using 4-40 screws, drill #43 or 3/32" holes through the marks made in the mount for the mounting screws.

❏ 7. Tap the threads into the holes—this may be easily and quickly done with a drill.

❏ 8. Mount the engine mount to the firewall and mount the engine to the mount.



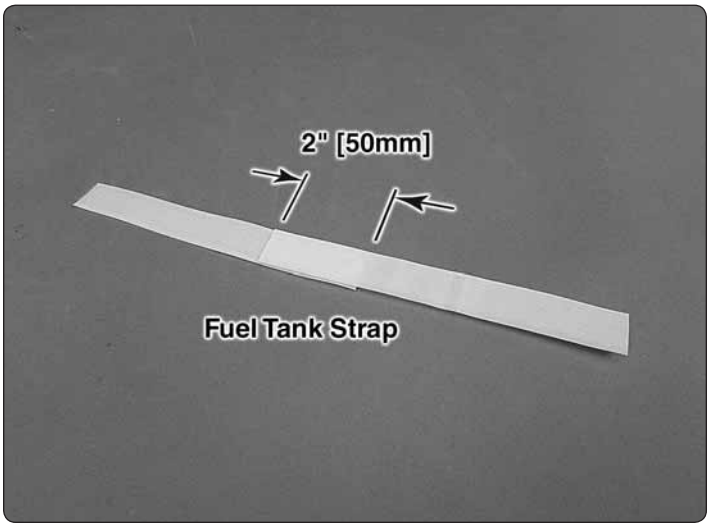
❏ 9. Cut the 17-3/4" [450mm] pushrod guide tube to a length of 11-1/2" [290mm]. Guide the tube through the hole you drilled in the firewall down through the holes in the formers for the throttle pushrod guide tube.



❏ 10. Cut the unthreaded end off another pushrod to a length of 16-1/2" [420mm]. Thread a clevis onto the threaded end. Bend the front of the pushrod as necessary to connect to the carburetor arm on the engine and install the pushrod. We'll hook up the other end to the throttle servo after the servo is installed later.

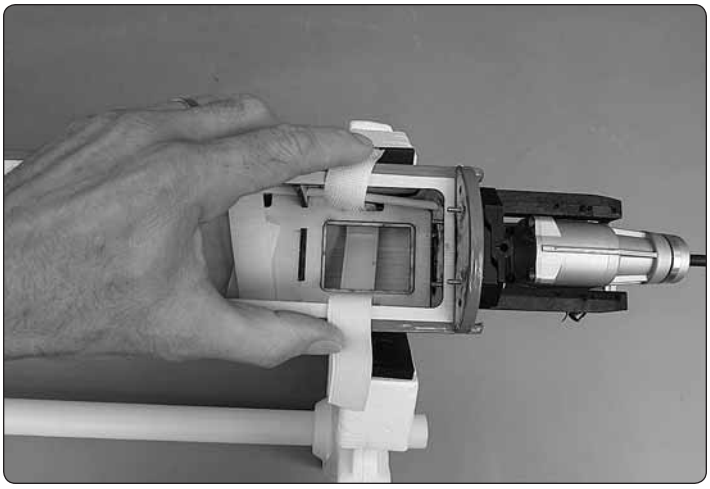
Install the Fuel Tank

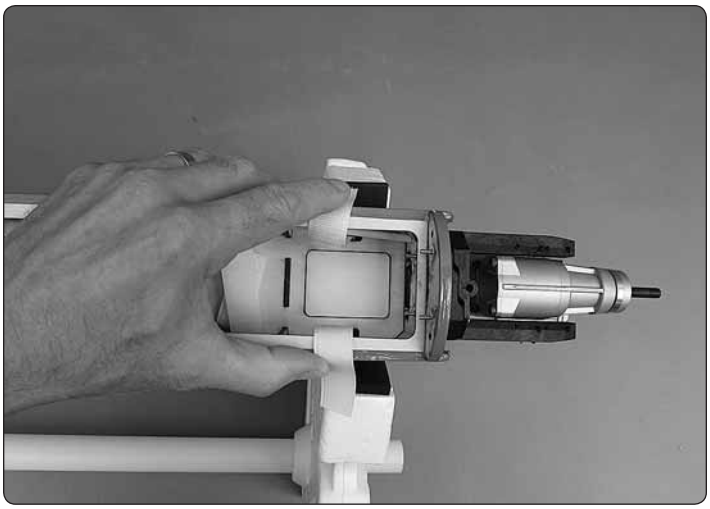
❏ 1. Loosen the screw in the stopper in the fuel tank and take out the stopper/fuel line assembly. Check to make sure the clunks are present and secure on the lines and that the vent tube is pointed up toward the top of the tank. Also make sure the lines on the clunks are not so long that the clunks can contact the back of the tank (and possibly become stuck). Make any adjustments necessary, then reassemble the tank making sure to securely tighten the screw to expand the stopper to seal the tank.



❏ 2. Make a fuel tank strap from a 6-1/2" [165mm] piece of the rougher, "hook" side and a 6-1/2" [165mm] piece of the softer, "loop" side of the included hook-and-loop material. Join the strips with 2" [50mm] of overlap to complete the fuel tank strap.

❏ 3. Make another fuel tank strap same as the first.





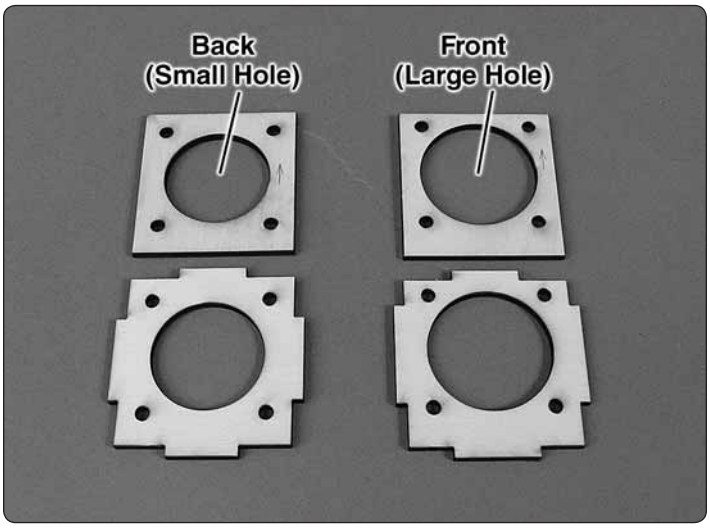
❏ 4. Cut a 2-1/4" x 4-1/2" [55 x 115mm] sheet from a piece of 1/4" [6mm] RC foam rubber to cushion the bottom of the fuel tank. Install the fuel tank straps under and up through the slots in both sides of the fuel tank floor, place the foam rubber sheet, install the tank with the lines through the hole in the firewall, and then tightly strap the tank into place.

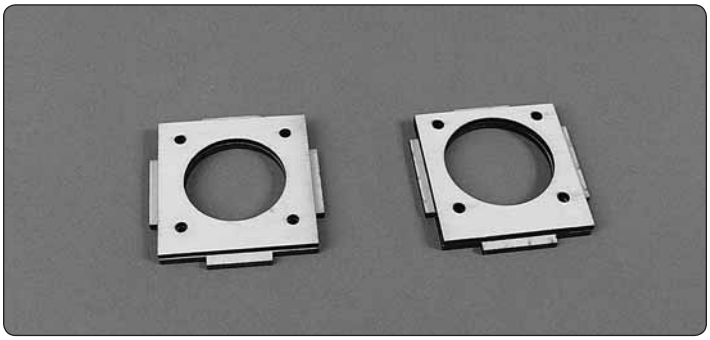
NOTE: There is a hatch in the fuel tank floor through which nose weight or the receiver battery may be installed. For now, cover the hatch with the included lite-ply cover and install the fuel tank. Later, if it is determined that nose ballast is required, the tank may be removed for access to the hatch.

❏ 5. Cut one of the fuel lines (from either of the two tubes on the bottom of the tank) to the correct length to fit the carburetor. Leave the other two lines (one for fueling/defueling, the other for the pressure/vent line from the muffler) the length they are now – we'll cut them later after the cowl has been cut and fitted.

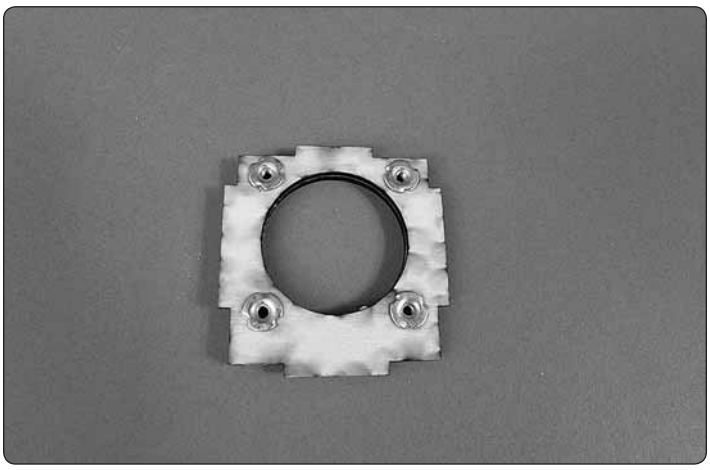
Proceed to *Cut the Cowl* on page 14. EP Version

Assemble the EP Motor Mount Box

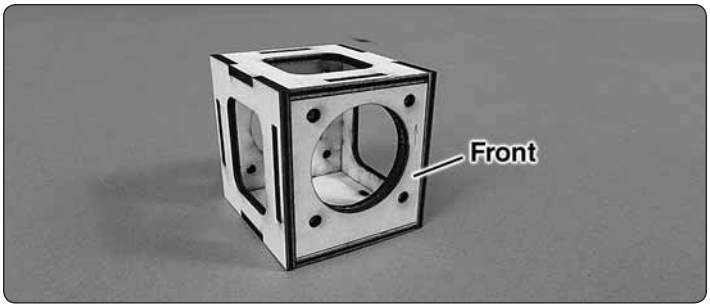


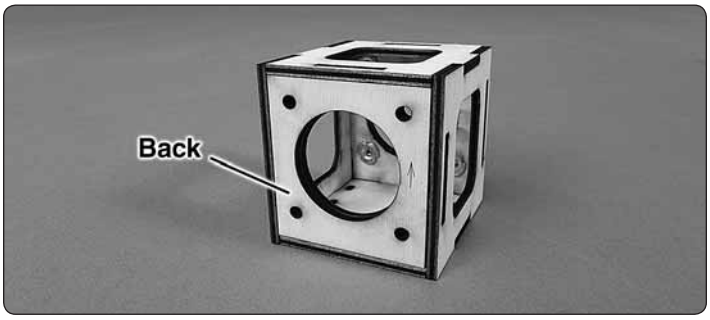


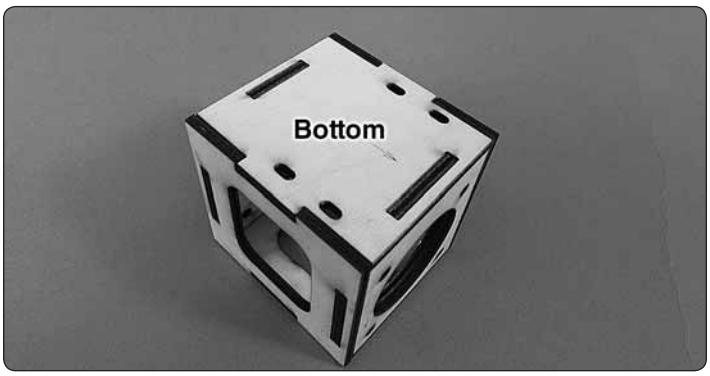
❏ 1. Glue together two pieces of the front and back of the EP motor mount box with the arrows pointing up and the holes and edges in each half aligned with each other.



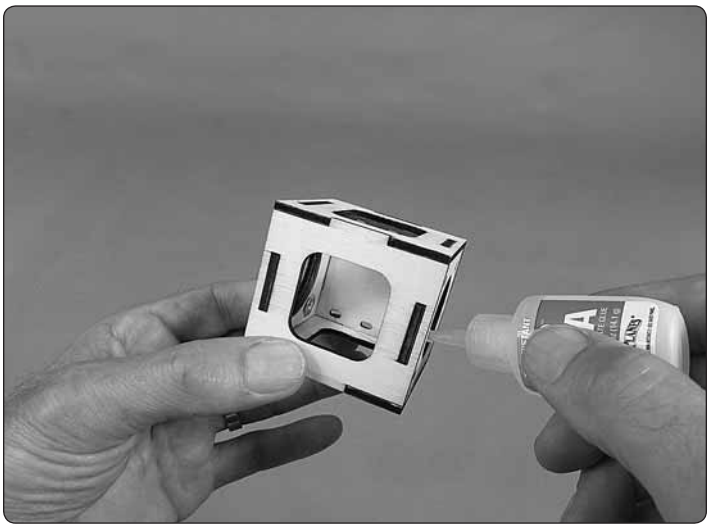
❏ 2. Place the front of the motor mount box on your workbench with the back (the surface with the tabs) facing upward as shown. Press M3 blind nuts into the back.



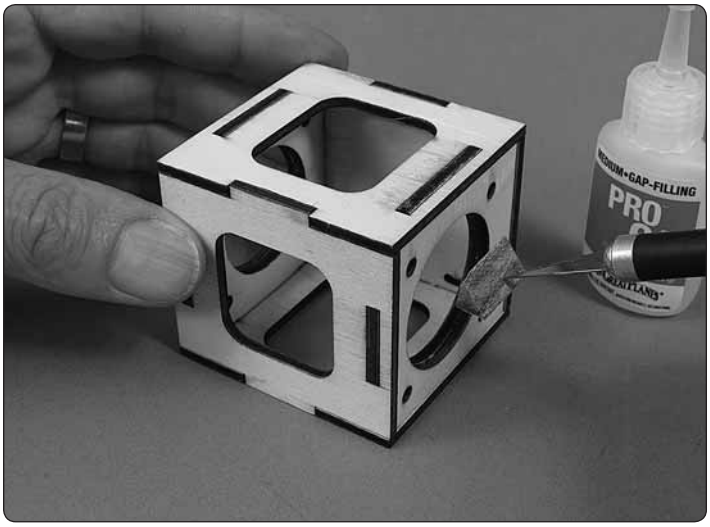




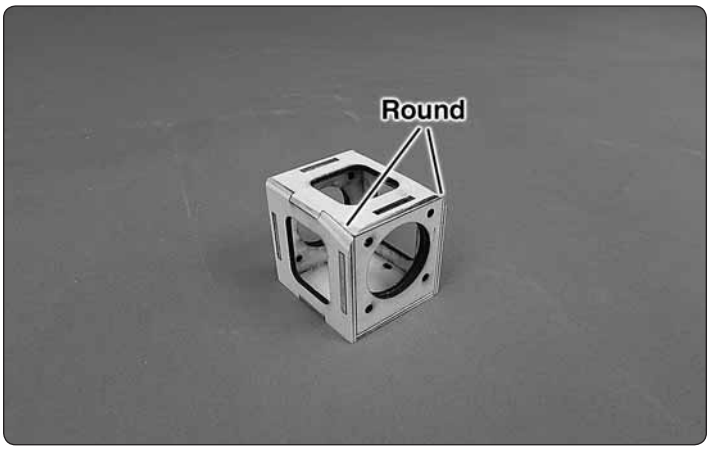
❏ 3. Before using any glue, test fit the sides, top, bottom, front and back of the motor mount box together. Make sure the arrows on the front and back point toward the top of the mount box and that the arrow on the bottom of the mount box points toward the front of the box.



❏ 4. Holding the assembly together, use medium CA to glue the box together. Use care not to get any CA on your fingers. Do not build up large glue fillets until after the next step.

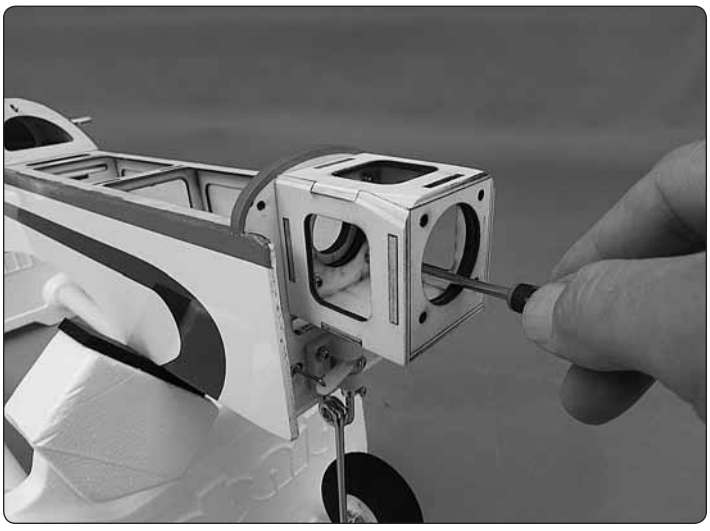


❏ 5. Glue the triangle reinforcements around the back and front—use medium CA and stick them into place with a hobby knife. Reinforce all glue joints where necessary.

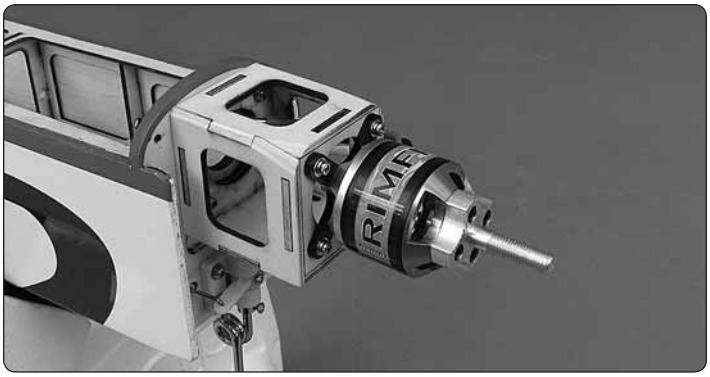


❏ 6. Round the top, forward corners of the motor mount box to clear the cowl as shown.

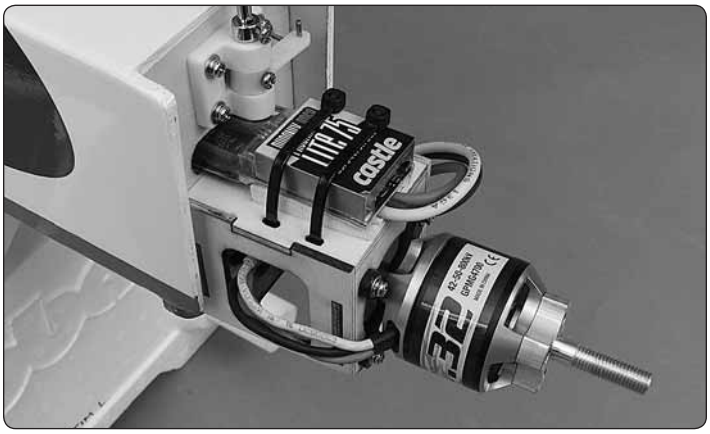
Mount the Brushless Motor



❏ 1. Mount the motor mount box to the firewall with four M3 x 12 Phillips machine screws, M3 flat washers, M3 lock washers and threadlocker.



❏ 2. Assemble the “X” mount and the propeller shaft to your motor. Mount the motor mount box with four M3 x 12 Phillips machine screws and M3 flat washers, lock washers and threadlocker.



❏ 3. Connect the ESC to the motor and mount it to the bottom of the motor mount box. For the Castle Creations Edge Lite 75 ESC we soldered the female bullet connectors that came with the motor to the three motor wires (protected with 3/16" heat shrink tubing) and a *Star* connector to the battery wires. Then we mounted the ESC to the box with a piece of foam rubber and nylon ties.

❏ 4. Power up the ESC with the receiver and transmitter and run the motor to make sure it turns the correct direction. If the motor turns the wrong direction, swap any two of the three motor wires (or reverse the *motor direction* in the ESC programming if available).

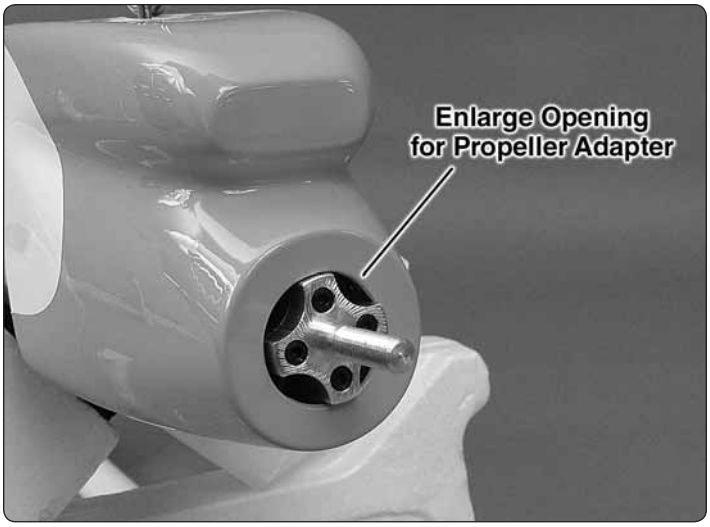
❏ 5. Cut the 1/4" x 1/4" x 4" [6 x 6 x 100mm] balsa stick into two pieces and glue them across the back of the firewall as shown.

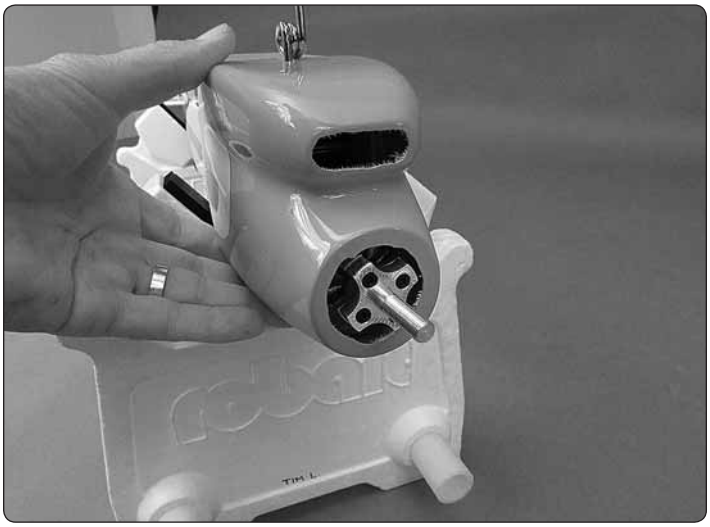
Cut the Cowl

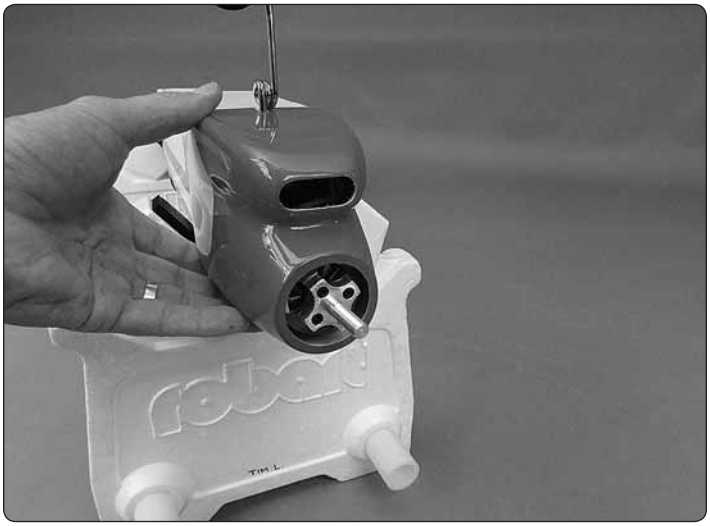
A No. 569 or 570 Dremel grout removal bit and a sanding drum are indispensable for easily and accurately cutting a fiberglass cowl. Always wear eye and breathing protection when cutting fiberglass.

❏ 1. If you have a glow engine installed, temporarily remove the engine to position the cowl for marking the location of the slot for the nose gear. Fit the cowl, then mark the slot.

❏ 2. Use the grout cutter or similar bit to cut the slot about 3/4" [20mm] deep. Test fit the cowl to make sure the slot is wide enough and deep enough to fit the cowl.





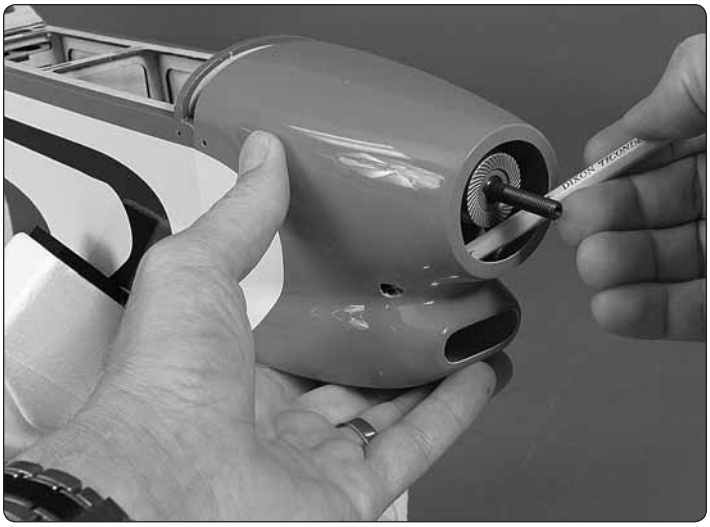


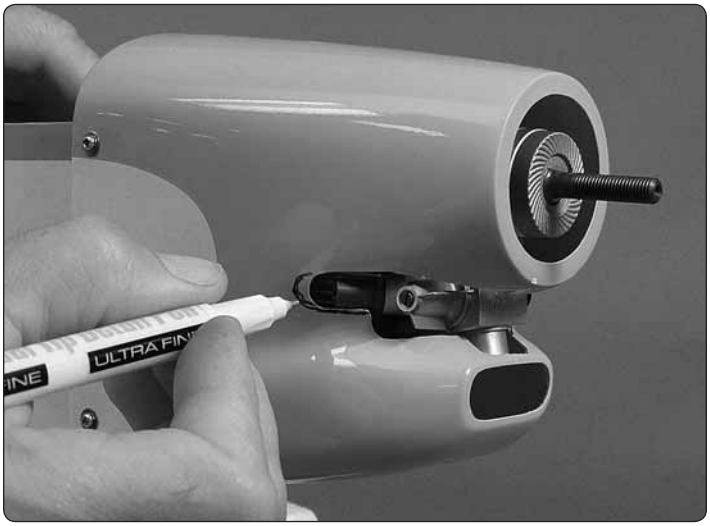
❏ 3. Cut an inlet opening in the air scoop at the bottom of the cowl. If using a brushless motor, it may also be necessary to enlarge the opening in the front for the prop adapter. Start with your grout cutter, then smooth the edges with a drum sander.

❏ 4. If using a brushless motor the cowl should require no further cutting. If using a glow engine, mount the engine back onto the engine mount. Cover any access point into the engine where fiberglass dust could enter such as the carburetor and exhaust.

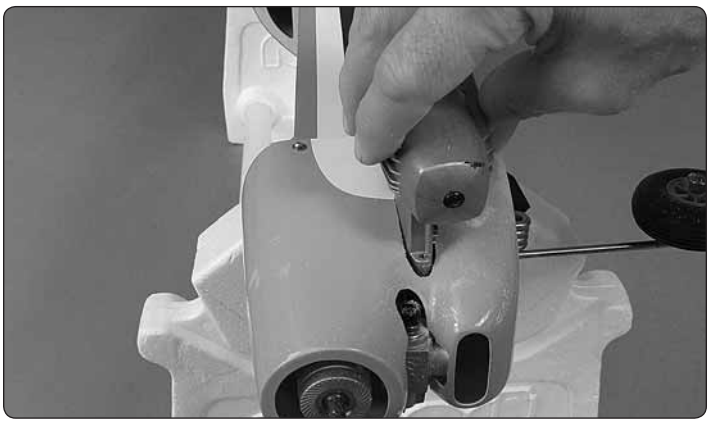
❏ 5. There's no really fast, easy way to cut holes in a cowl that fits tightly around an engine like this. The best way is to install the cowl and, little by little, mark, cut and re fit the cowl as necessary until it will go on over the engine. We started by using a pencil to mark the inside of the cowl where it interfered with the sides of the carburetor.

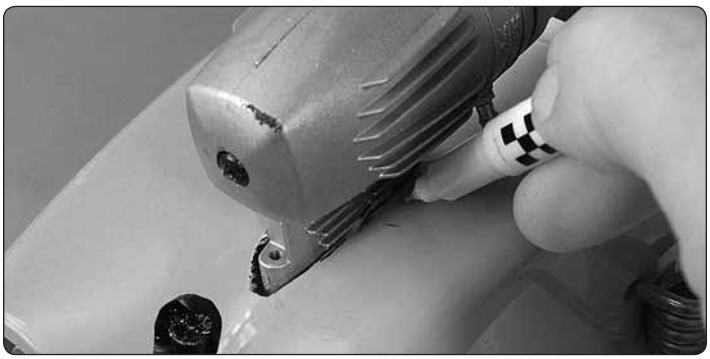
❏ 6. Use your Dremel to cut the first holes.





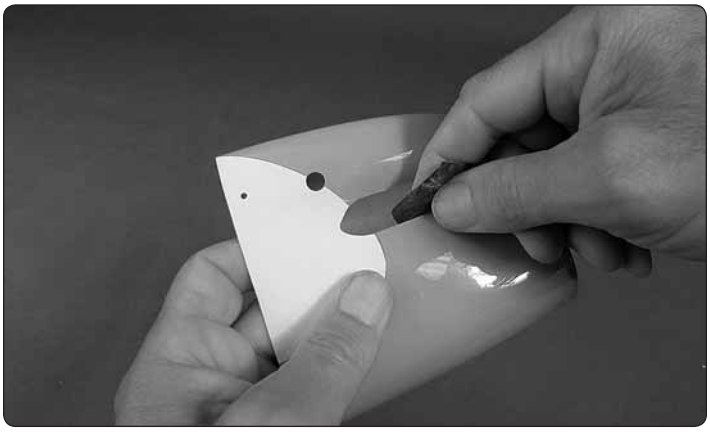
❑ 7. Continue to fit, mark and cut the cowl until you can get it to fit.





❑ 8. Once you can get the cowl to fit all the way over the engine, mark and cut the hole for the muffler. This cowl was cut so that the muffler has to be installed ***after*** the cowl (tightening the muffler bolts through holes cut in the opposite side of the cowl), but another way is to cut all the way to the back of the cowl so it can be slipped past the muffler after it has been mounted to the engine.

❏ 9. Cut any other holes necessary for the nose gear, fueling line, muffler pressure line, glow plug igniter, etc.

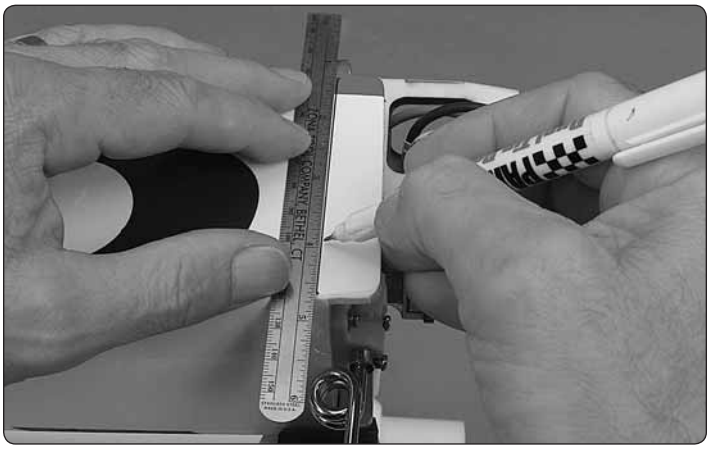


❏ 10. Once all the holes are cut and the cowl will fit over the engine and muffler, use 320-grit sandpaper to sand the edges of the cutouts smooth and even.

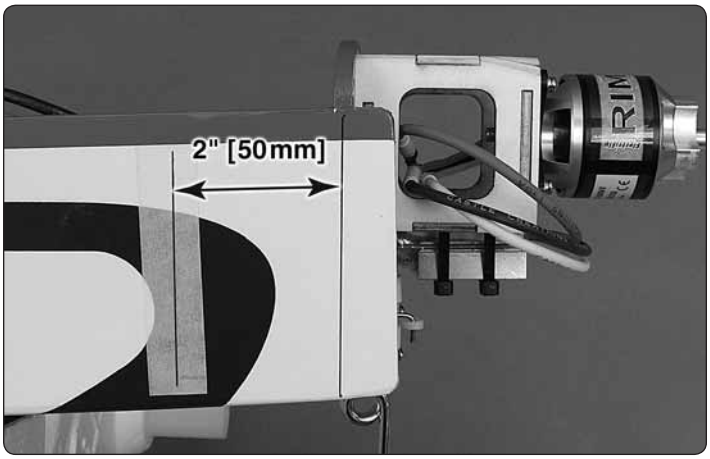
❏ 11. Here's a close-up of the finished cowl.

Mount the Cowl

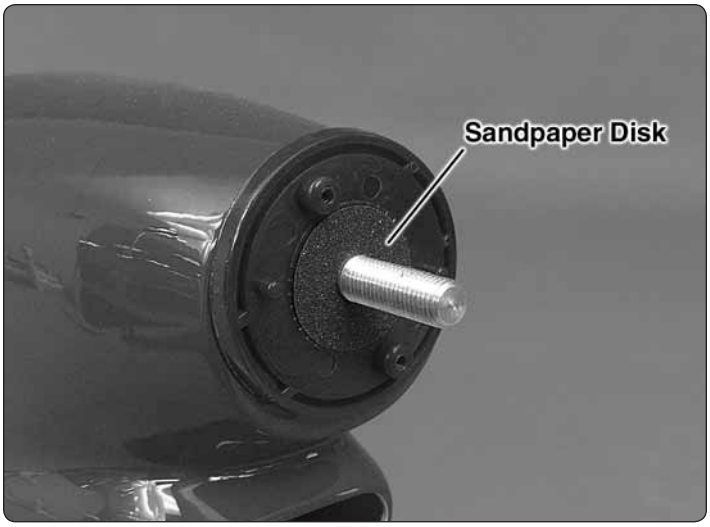
Now that the cowl can be positioned all the way over the engine and muffler, it may be mounted to the fuselage.



❏ 1. Use a straightedge and a fine-point, felt-tip pen to mark the middle of the firewall down both sides of the fuselage. The ink lines can be removed later with denatured alcohol, but if you still prefer not to mark directly on the covering you can mark over strips of tape.

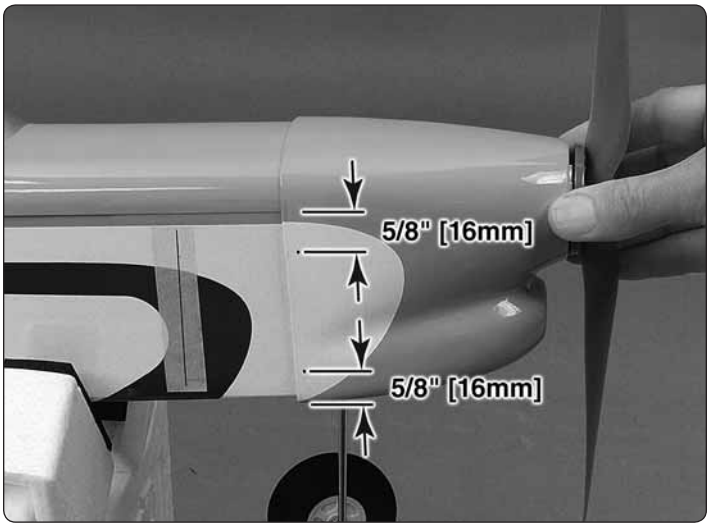


❏ 2. Mark another line down both sides of the fuselage 2" [50mm] aft of the first line. (We marked these lines over masking tape so they would be easier to see over the blue trim.)

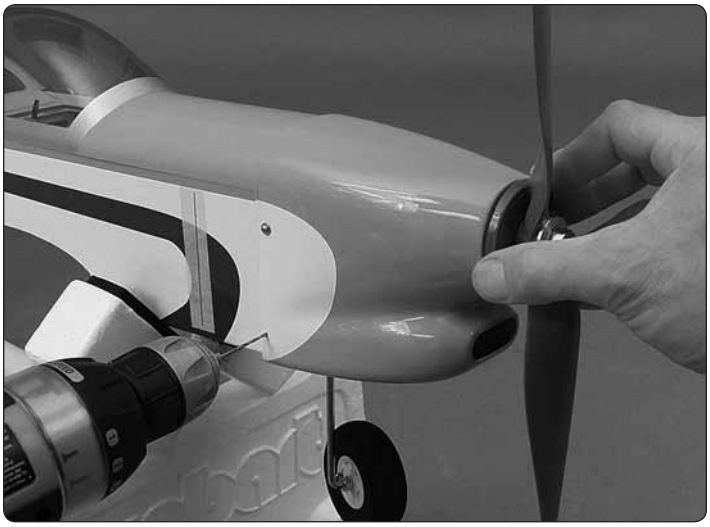


❏ 3. If necessary, enlarge the hole in the back plate of the spinner to fit the crank shaft or propeller shaft, then fit the back plate onto the engine/motor. Temporarily mount a prop to securely hold the back plate into place. (There is a sandpaper disc included that may be used to help lock the back plate to the motor or the prop to the back plate if either turns while tightening the propeller.)

❏ 4. Position the canopy hatch onto the fuselage.

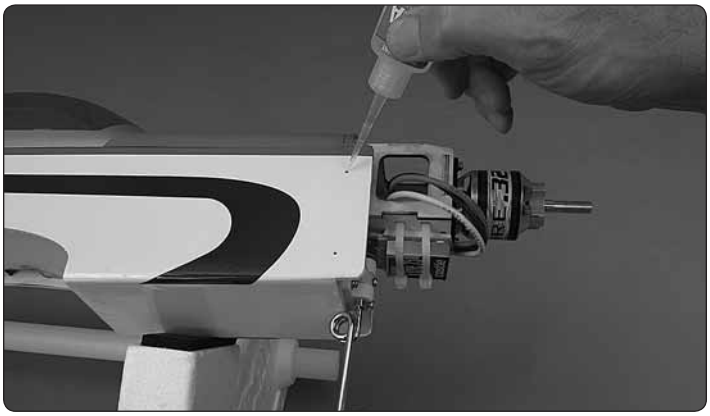


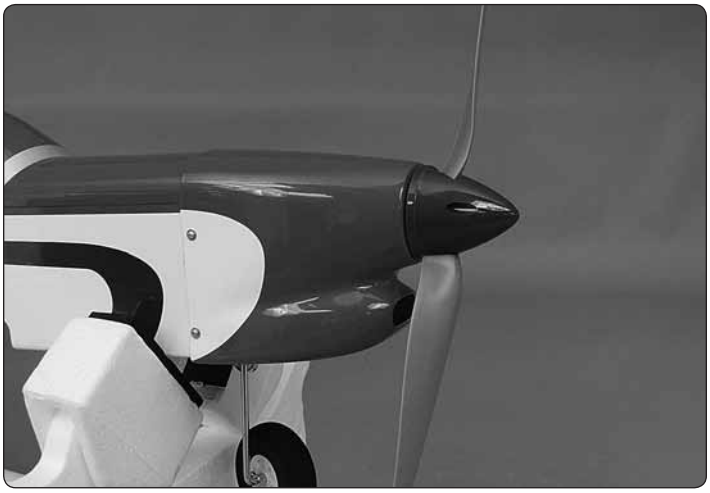
❏ 5. Insert cardboard or balsa spacers the thickness of your preferred spinner gap (approximately 3/32" [2.5mm]) between the front of the cowl and the back plate. Tape the cowl into place, or have an assistant hold the cowl centered on the back plate. Mark the screw holes on the sides of the cowl 2" [50mm] ahead of the lines on the fuselage—the top screws should be about 5/8" [16mm] down from the top of the fuselage and the bottom screws should be about 5/8" [16mm] up from the bottom of the fuselage.



❏ 6. Once the screw hole locations have been marked, double-check to be sure the cowl is positioned to align with the spinner, then drill the first cowl screw hole with a 1/16" [1.6m] drill. Enlarge the hole **in the cowl only** with a 3/32" [2.4mm] drill, then insert the first M2.5 x 8 washer-head wood screw.

❏ 7. Remembering to switch over to the smaller drill each time a hole is drilled into the fuselage, one-at-a-time drill the hole, enlarge the hole in the cowl only, then insert another screw until all four screws are in.

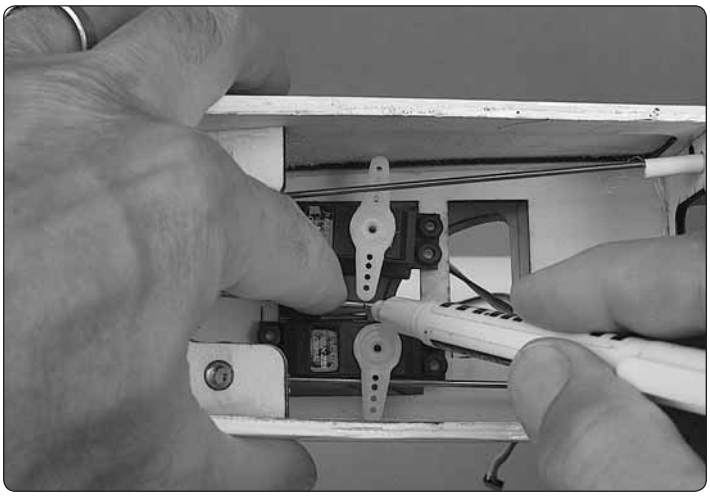




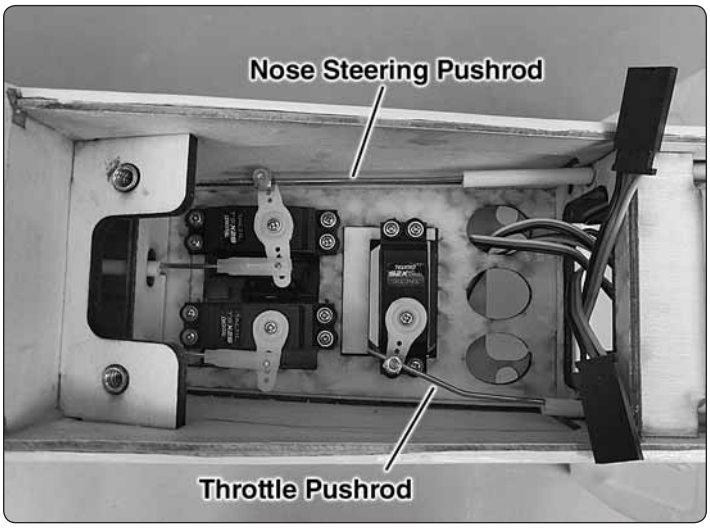
❏ 8. Remove the prop and cowl. Add a few drops of thin CA to each screw hole. Allow the CA to fully harden, then mount the cowl, prop and spinner.

Install the Radio

❏ 1. If necessary, enlarge the cutout in the servo tray to fit your servos. Then install the servos in the tray, but don't screw them down yet.



❏ 2. Cut the unused arms from your servo arms and place them on your servos. Center the servos and control surfaces. Mark the elevator and rudder pushrods where they cross the holes in the servo arms.



Refer to this photo while completing servo hookup.

❏ 3. Disconnect the clevises from the horns on the elevator and rudder and remove the pushrods from the fuselage. Make a 90-degree bend in each pushrod at the marks. Fit each pushrod to a servo arm, install a 90-degree pushrod keeper and cut off the excess wire.

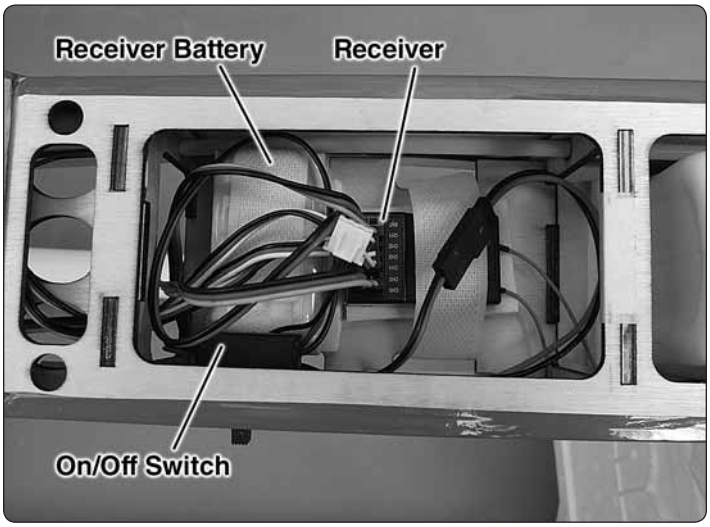
❏ 4. Remove the clevises from the back of the pushrods so they can be reinstalled into the guide tubes in the fuselage. Install the pushrods and thread the clevises back on.

❏ 5. Adjust the length of the pushrods as necessary by threading the clevises in or out, then reinstall the servo arms onto the servos.

❏ 6. Cut the nose steering pushrod to the correct length and bend it as necessary to connect the rudder servo. Connect the pushrod to the servo arm using a screw-lock connector, an M3 set screw and a retainer.

❏ 7. Install the throttle servo (if used) and use another screw-lock connector to connect the throttle pushrod to the throttle servo.

❏ 8. Now that all the pushrods are connected, drill 1/16" [1.6mm] holes in the servo tray for the servo screws. Mount the servos with the screws that came with them.



❏ 9. Mount the receiver and receiver battery (if used) with remaining hook-and-loop strap and R/C foam rubber. Mount an on/off switch (also if used). The image in this step is for a glow setup. For a brushless motor setup, the receiver may be mounted to the servo tray over the location for the glow throttle servo or to the side of the fuselage in the same area.

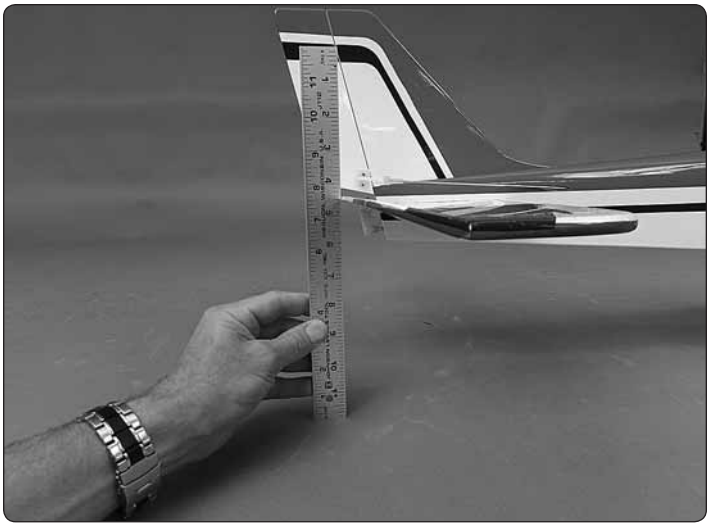
❏ 10. Plug a Y-harness or servo extensions into your receiver to connect to the ailerons through the bottom of the fuselage for connecting to the servo leads from the wing.

PREPARE THE MODEL FOR FLIGHT

Set the Control Throws

CAUTION: If you have installed a brushless motor, remove the propeller before turning on the radio and checking the throws on the workbench.

In addition to the C.G., the control throws also have a major effect on how the model flies and whether or not your first flight will be successful. Do not skip this important step and make sure the throws are within the specified range. If necessary use programming in your transmitter and/or change the locations of the pushrods in the servo arms and/or control horns to adjust the throw.



❏ 1. It's probably easiest to check and set the control throws with the wing mounted on the fuselage. Mount the wing. Check and set the control throws according to the measurements below:

These are the recommended control surface throws:		
	LOW	**HIGH**
ELEVATOR Up & Down	3/8" [10mm] 14°	1/2" [13mm] 18°
RUDDER Right & Left	3/4" [19mm] 21°	1" [25mm] 27°
AILERONS Up & Down	3/8" [10mm] 19°	1/2" [13mm] 24°

❏ 2. Adjust the control throws as necessary by using the programming in your transmitter and/or reconnecting the pushrods to holes farther out or farther in on your servo arms and/or the control horns.

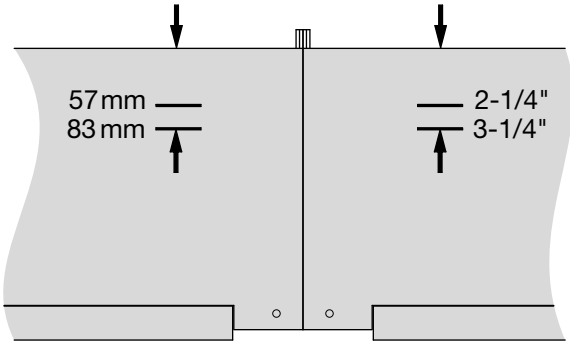
❏ 3. Once you have the nose wheel centered and the carburetor arm working properly, tighten the set screws in the screw-lock connectors with threadlocker.

Check the C.G.

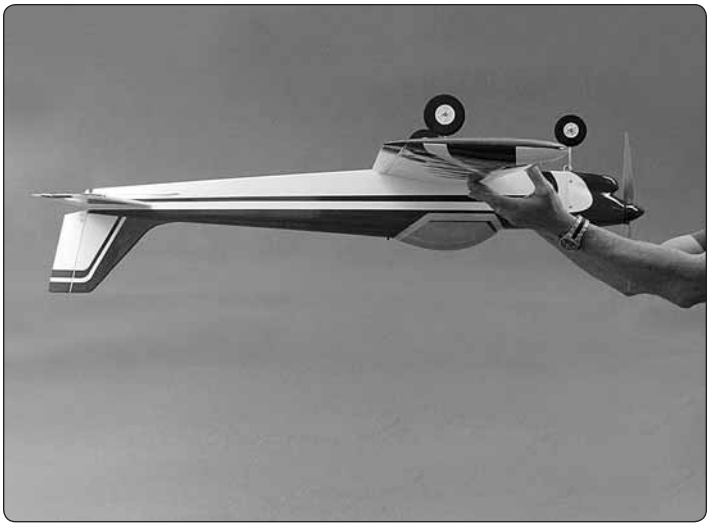
Same as the control throws, the C.G. has a great effect on how the model flies. If the C.G. is too far forward the model may be too stable and unresponsive to control inputs. If the C.G. is too far aft the model may be too responsive and instable.

❏ 1. The model should be completely ready to fly with all components installed (and an empty fuel tank if using a glow engine). If you've installed a brushless motor, leave the battery out of the plane, but keep it handy for positioning on the bottom of the fuselage to determine where the battery should be mounted inside.

❏ 2. If you've installed a brushless motor, reinstall the propeller and spinner.



The recommended C.G. is 2-1/4" – 3-1/4" [57mm – 83mm] back from the leading edge of the wing.

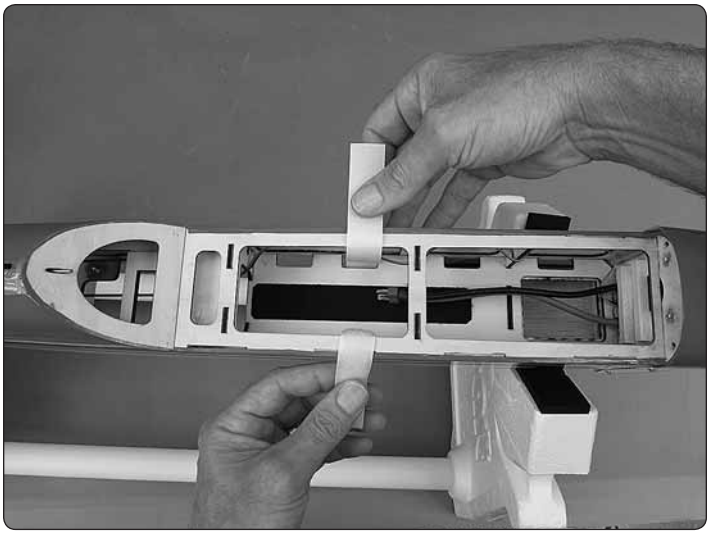


❏ 3. Use a Great Planes C.G. Machine to balance the model according to the measurements specified, or mark the balance range on the top of the wing and lift the model upside-down with your fingertips. If you've installed a brushless motor position the battery on the bottom of the fuselage to get the model to balance.

As long as the model balances anywhere within the specified range it is acceptable (but less-experienced pilots should perform first flights with the Sport balanced in the middle or forward half of the range (slightly nose heavy).

❏ 4. If the Sport doesn't balance where specified, move the receiver battery or motor LiPo battery or add stick-on lead ballast to the nose or tail to achieve the correct C.G.

❏ 5. If you've made any adjustments by adding ballast or moving components check the C.G. again before flying.



❑ 6. If using a brushless motor, once you've determined where to install the battery, apply the strip of the rougher, hook-side of the included adhesive-back hook-and-loop strip to the battery tray in the fuselage. Make a battery strap from the included hook-and-loop strap material and install the strap through the cutouts nearest the middle of the battery.

Balance the Model Laterally

❑ 1. Lift the Sport several times by the propeller shaft and the tail to see if one wing drops.

❑ 2. If one wing drops consistently, add weight to the opposite tip by sticking it to the outside or strategically concealing it inside the balsa tip. **An airplane that has been laterally balanced will track better in flight and maintain its heading better during maneuvers when the plane is climbing.**

PREFLIGHT

Engine/Motor Safety Precautions

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

- Keep all engine fuel in a safe place, away from high heat, sparks or flames, as fuel is very flammable. Do not smoke near the engine or fuel; and remember that engine exhaust gives off a great deal of deadly carbon monoxide. Therefore **do not run the engine in a closed room or garage**.
- Get help from an experienced pilot when learning to operate engines.
- Use safety glasses when starting or running engines.
- Do not run the engine in an area of loose gravel or sand; the propeller may throw such material in your face or eyes.
- Keep your face and body as well as all spectators away from the plane of rotation of the propeller as you start and run the engine.
- Keep these items away from the prop: loose clothing, shirt sleeves, ties, scarfs, long hair or loose objects such as pencils or screwdrivers that may fall out of shirt or jacket pockets into the prop.
- Use a "chicken stick" or electric starter to start the engine. Do not use your fingers to flip the propeller. Make certain the glow plug clip or connector is secure so that it will not pop off or otherwise get into the running propeller.
- Make all engine adjustments from behind the rotating propeller.
- The engine gets hot! Do not touch it during or right after operation. Make sure fuel lines are in good condition so fuel will not leak onto a hot engine, causing a fire.
- To stop a glow engine, cut off the fuel supply by closing off the fuel line or following the engine manufacturer's recommendations. Do not use hands, fingers or any other body part to try to stop the engine. To stop a gasoline powered engine an on/off switch should be connected to the engine coil. Do not throw anything into the propeller of a running engine.

WARNING: For brushless electric motors, never have the motor battery connected to the ESC without the transmitter turned on – after each flight (or any time after running the motor) **always** disconnect the battery ***before*** turning off the transmitter. And when ready to fly (or whenever running the motor for any reason), always turn on the transmitter first before connecting the motor battery.

Also make certain your **failsafe** is programmed for throttle to 0% so in the event the receiver loses signal the motor will not turn. Follow the instructions that came with your radio control system to check and set the failsafe.

The recommended RimFire .32 is rated for 50A constant current and 80A surge current. Powered by a 4S LiPo on an APC 13 x 8E it draws about 58A static and momentary, maximum peaks of about 50 – 55A in the air, but averages a little less than 20A through a "normal" flight. This is a suitable propeller choice and flies the Sport well—it can be zoomed around in the sky, or cruise at lower throttle settings for more scale-appearing flight.

Typical flight time may be as low as 4 minutes or even over 8 minutes depending on how aggressive and active you are with the throttle – more power means shorter flight times.

Always unplug and remove the battery after your flight.

In any case, use a flight timer initially set to a conservative time (4 minutes for example). When the timer sounds, land. Use a LiPo checker to measure the resting (unloaded) voltage when you land. The voltage should not be below 3.75V/cell. When you charge the battery also note how much capacity it took to recharge (indicating how much was used for the flight). Strive to use no more than 80% of the battery's capacity. Adjust your timer according to the voltage and capacity used for the flight.

You can also use the worksheet on page 24 to determine optimum flight times based on your flying style and battery capacity.

CAUTION: Never run the motor on the ground for more than a few seconds. Otherwise, you may overload the motor, battery or ESC.

Battery Precautions

Charge and store LiPo batteries in a safe place!

Never leave charging LiPo batteries unattended!

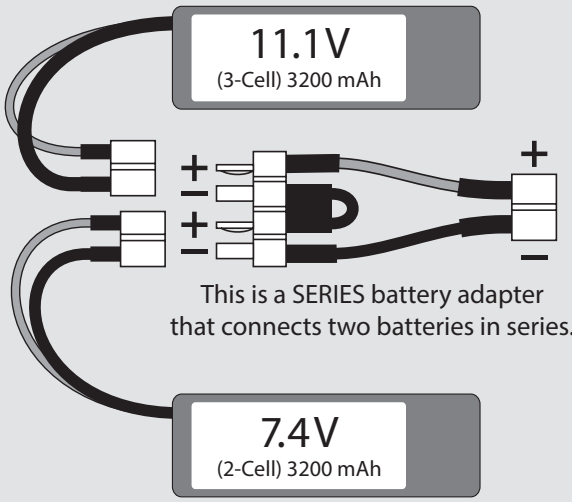
Before mounting the motor and setting up the ESC and battery, read the following important battery precautions:

IMPORTANT: If using multiple battery packs that are connected with an adapter, never charge the batteries together through the adapter. Always charge each battery pack separately. Charge the batteries, then read the following precautions on how to connect multiple packs for flying the model:

Battery Precautions:

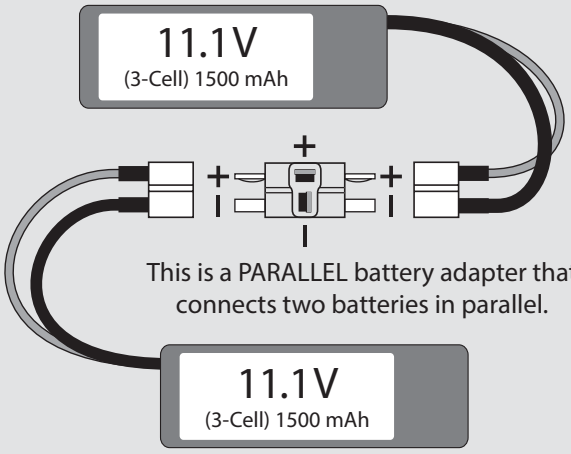
There are two ways to connect multiple battery packs: In **Series** and in **Parallel.**

These are two 3200mAh batteries (one 11.1V and the other 7.4V). When joined in SERIES, the result will be a 18.5V, 3200 mAh battery.

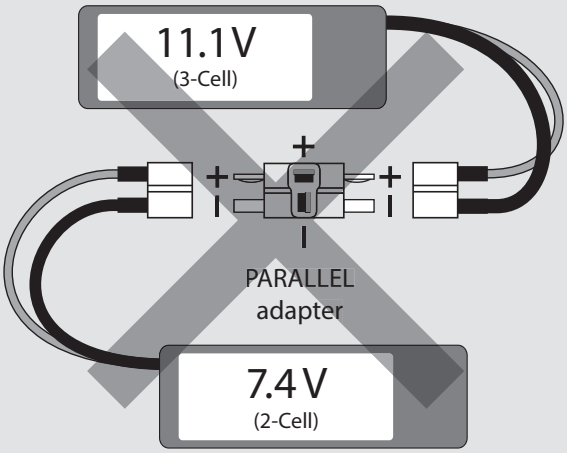


1. Connecting batteries in "Series" means to connect the +'s to the –'s and the –'s to the +'s. This combines the batteries' Voltages, but the capacity remains the same.

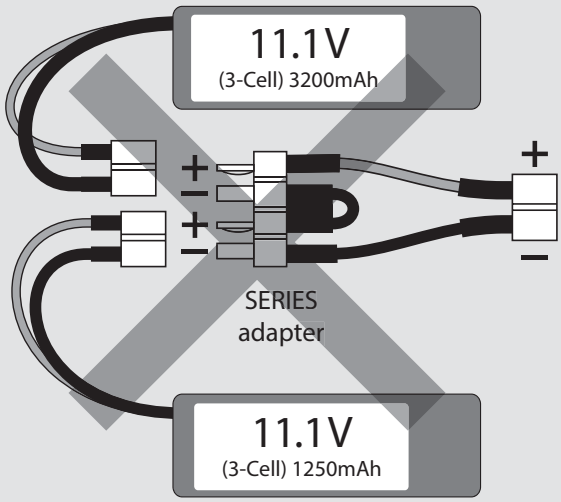
These two 1500mAh batteries (both 11.1V) are being joined in PARALLEL. The result will be one 11.1V, 3000mAh battery.



2. Connecting batteries in "Parallel" means to connect the +'s to the +'s and the -'s to the -'s. This combines the batteries' capacities, but the Voltage remains the same.



NEVER connect battery packs with different Voltages in Parallel–only combine in Series. Otherwise, the batteries will try to "equalize" with the larger one trying to "charge" the smaller one, thus causing heat and likely a fire.



Also NEVER connect battery packs with different capacities in Series or in Parallel.

Range Check

Don't forget to perform your usual ground range checks as written in the instruction manual that came with your radio system to be certain it is operating correctly.

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

There are no particular flight characteristics about the Sport that you need to be made aware of ahead of time. If you prefer flying on high-rates most of the time, it will be easier to takeoff with the rudder on low rates so the nose wheel will not be too responsive. Once airborne, you can switch the rudder to high rates.

The Sport is a well-balanced, neutral, easy-flying plane that exhibits no bad tendencies and will go wherever you point it. Simply fly the Sport within your capabilities and take it easy for the first couple of flights to give yourself time to become acclimated to it.

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

GOOD LUCK AND GREAT FLYING!

	A	B	C	D	E	F	G
	FORMULAS		B / A		D x .8	E / C	B/1000/(A/60)
	Flight Time (.10 ths)	Recharge Capacity	mAh/minute	Battery Capacity	Target Capacity to Use in Flight	Recommended Flight Time	Avg. In-Flight Current
1	4.6 min	2221 mAh	483 mAh/min	3800 mAh	3040 mAh	6.3 min	29.0 A
2							
3							
4							
5							
6							
7							
8							
9							
10							