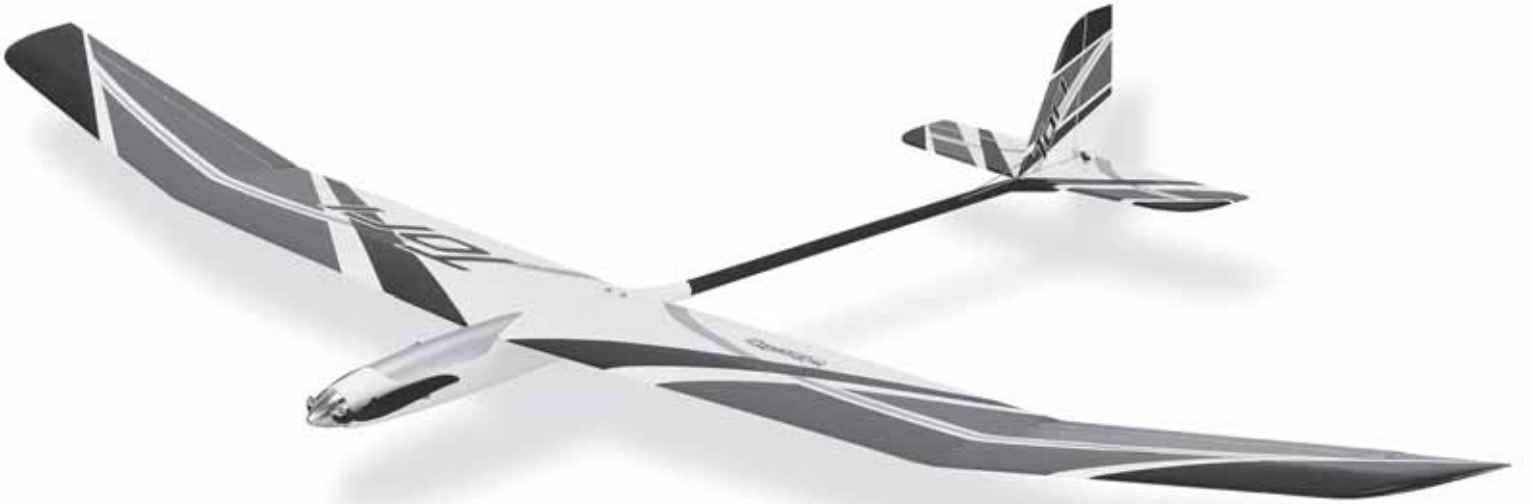


TORI

ARF
ALMOST READY-TO-FLY

Rx-R
RECEIVER-READY



INSTRUCTION MANUAL

SPECIFICATIONS

Wingspan: 78.5 in [1995mm]

Length: 42 in [1065mm]

Wing Area: 498 in² [32.1 dm²]

Weight: 29–31 oz [822–879 g]

Wing Loading: 8.4–9.0 oz/ft²
[25.6–27.5 g/dm²]

Motor: RimFire .10 Outrunner
(Included with the Rx-R)

ESC: 40A
(Included with the Rx-R)

Battery: 2S 2200mAh,
3S 1800mAh LiPo
(LiPo not included)

Propeller: 12 x 6.5 (included)

Radio: 4+ ch. radio, 4 servos
(Servos included with the Rx-R)

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 contact:
greatplanes.com/support

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



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INTRODUCTION

Thank you for purchasing the Great Planes Tori 2-meter EP Sailplane! The Tori features a carbon boom, folding prop and fiberglass fuselage. This gives you a glider that is steps above a conventional foam or all-wood glider. The Tori can be flown with either a 2S or 3S LiPo for versatility. See the **Flying** section on page 21 for more details.

NOTE: This instruction manual illustrates all the steps necessary to assemble the ARF (almost ready-to-fly) edition of the Tori. However, the Rx-R (receiver-ready) edition requires less assembly, so if assembling the Rx-R, simply skim through the manual and perform only steps that apply.

For the latest technical updates or manual revisions, find the Tori on the Great Planes web site at www.greatplanes.com. If there is new technical information or changes to this model, a "Tech Notice" box will appear on the page for the Tori on the Great Planes web site.

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) 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. As of this printing, the FAA does not require an FAA number on your plane. In the United States, please visit:

knowbeforeyoufly.org
faa.gov/uas



ELECTRIC MOTOR SAFETY PRECAUTIONS

WARNING! A spinning propeller has the potential to cause serious and permanent injury.

WARNING! Once the motor batteries are connected, the propeller can start spinning at any time. Make sure the Fail Safe is set on your radio to prevent the motor from starting if the signal is lost.

WARNING! Stand clear of the propeller when handling the aircraft. Make sure the aircraft is held securely until the battery has been disconnected.

While working on your plane, **ALWAYS** remove the propeller when the battery is connected.

ALWAYS remove the motor batteries from the plane when charging.

ALWAYS switch on the transmitter first, then the receiver.

ALWAYS unplug the motor batteries first before switching off the receiver, then transmitter.

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 reach through the arc of the propeller when plugging or unplugging the battery into the ESC.



LITHIUM BATTERY WARNING!



This product recommends the use of a lithium polymer (LiPo) battery. Improper handling of a LiPo battery could result in FIRE! A lithium battery fire has the potential to ignite surrounding areas and may cause property damage or personal injury.

For safe LiPo handling, follow ALL of these guidelines:

MOST IMPORTANT! Never leave the battery or charger unattended during charging or discharging.

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 follow the charging instructions included with your charger for charging LiPo batteries. LiPo batteries can cause serious damage or fire if misused.

ALWAYS use a LiPo-approved charger.

ALWAYS set the charger's output volts to match the battery volts.

ALWAYS charge a LiPo battery in a fireproof location.

ALWAYS balance charge the battery.

ALWAYS store and transport LiPo batteries in a fireproof container away from combustible materials.

ALWAYS KEEP OUT OF THE REACH OF CHILDREN.

ALWAYS keep LiPo batteries out of the reach of animals. A punctured battery may cause a fire.

ALWAYS disconnect the battery and unplug the charger after the charge is complete.

ALWAYS keep a supply of sand accessible when charging a LiPo battery. Dumping sand on the battery will assist in extinguishing a LiPo chemical fire.

ALWAYS remove the batteries from the plane after a crash. Set them aside in a safe location for at least 20 minutes. If the batteries are damaged in the crash, they could catch fire. If the battery starts to swell, quickly move the battery to a safe location, preferably outside away from combustible material. Place it in a bucket, covering the battery with sand.

NEVER use water to try and put out a LiPo fire.

NEVER charge or use a battery that is deformed, bent, crushed, swollen, or has any type of visible damage.

NEVER use a NiCd/NiMH peak charger to charge a LiPo battery.

NEVER charge in excess of 4.20V per cell unless the battery is rated for a higher voltage.

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 140°F (60°C).

NEVER disassemble or modify the pack wiring in any way or puncture the cells, as this may result in a fire.

NEVER discharge below 2.7V per cell. It is recommended to not discharge below 3.7V per cell.

NEVER charge the battery or set the charger on combustible materials.

NEVER charge the battery inside a vehicle or in a location that could be damaged in the event of a LiPo fire.

NEVER put a LiPo battery in the pocket of any clothing.

NEVER charge the batteries in the plane. Disconnect the batteries and remove them from the plane immediately after landing.

NEVER allow the battery to short circuit by touching exposed wires together. This may cause a fire.

NEVER operate or store batteries below 40°F (4°C) or above 110°F (43°C).

ADDITIONAL ITEMS REQUIRED

Radio/Servos

A minimum 4-channel radio is required to fly the Tori. The Tactic TTX660 is recommended because of its simple, flexible computer programming and multiple model memory. The servo tray in the fuselage is sized for Tactic TSX5 micro servos, but the cutout may be enlarged for other servos. Because of the Tori's capability to reach high altitudes, it is also recommended to use a full-range, dual-diversity receiver such as the Tactic TR625.

- Tactic TTX660 6-channel programmable radio (TACJ2660)
- Tactic TR625 6-channel receiver (TACL0625)
- (4) Tactic TSX5 micro high speed servos (TACM0205)
- **OPTIONAL***: Y-harness for ailerons (FUTM4130).

*If spoilers are desired, 5-channels will be required and the aileron servos will have to be connected to separate channels in the receiver and mixed electronically through programming in the transmitter. In this case a Y-harness is not used.

Motor , ESC, Battery

The Tori Rx-R includes the recommended RimFire motor and an ESC with similar specifications and performance to the recommended ESC. With the included 12x6.5 folding propeller, either version of the Tori may be flown on a 2S or 3S battery.

The recommended motor, ESC and battery for the Tori:

- Great Planes RimFire .10 35-30-1250 Outrunner Brushless (GPMG4595)
- Great Planes Programmable ESC 40A BL 2S-6S (GPMM2140)
- 30C 3S 11.1V 1800mAh LiPo Star (ONXP2243)
- **OR** 30C 2S 7.4V 2200mAh LiPo Star (ONXP2260)

LiPo Battery Charger

A charger capable of charging LiPo batteries is required. The Triton EQ (GPMM3155) is a suitable charger as it has plenty of power for charging the LiPos recommended for the Tori (and larger LiPos as well). The Triton EQ is also recommended for its versatility in charging all other types of batteries used in RC and may be powered by either a 12V DC power source or 110V AC.

Adhesives, Hardware and Other Accessories

Other than common hobby tools, here is a list of other items required to assemble the Tori:

- 30-minute epoxy (GPMR6043)
- Epoxy brushes (GPMR8060)
- Mixin' cups (GPMR8056)
- Mixin' sticks (GPMR8055)
- * Shoe Goo (DTXC2460)
- Threadlocker thread locking cement (GPMR6060)
- * Thin CA (GPMR6001)
- * Medium CA (GPMR6007)
- * CA applicator tips (HCAR3780)
- * CA accelerator (GPMR6035)
- * Clear tape
- * Drills: #55 (.052" [1.3mm]), 1/16" [1.5mm]

OPTIONAL:

- Great Planes C.G. Machine (GPMR2400)
 - * 3/16" Heat shrink tubing (GPMM1056) (see page 17)
- * These items not needed for Tori Rx-R

A covering iron with a cover sock may be required for tightening and re-bonding the covering that may have loosened between the time the covering was applied 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)

REPLACEMENT PARTS LIST

Order No.	Description
GPMA4401	Fuselage
GPMA4402	Wing Parts Set
GPMA4403	Tail Surface Set
GPMA4404	Hatch
GPMA4405	Propeller Blade Set 12 x 6.5
GPMA4406	Spinner/Blade Holder
GPMA4407	Aileron Servo Cover
GPMA4408	Decals

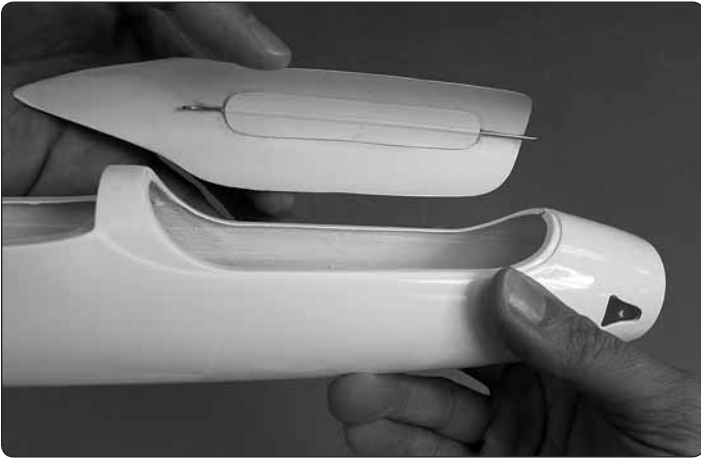
For questions, contact: greatplanes.com/support

KIT CONTENTS



1. Wing Halves
2. Pushrods
3. Wing Joiner
4. Fuselage
5. Hook & Loop Material
6. Adhesive-Backed Hook & Loop Material
7. Wire Holders, Pushrod Brace, Battery Plate
8. Stab
9. Fin
10. Propeller Blades
11. Spinner/Blade Holder
12. Canopy Hatch
13. Aileron Servo Covers
14. Aileron Servo Extensions (ARF only)
15. Hardware Pack
16. Control Horns
17. Decals

PREPARATION



❑ 1. The canopy is held in place with wire rods at both ends. To remove the canopy, slide it forward and then lift the back end up.



❑ 2. Use a covering iron with a protective cover sock to bond areas of loose covering back down to the framework or remove any wrinkles that may have developed after the covering was applied. Start with low or medium heat to find the setting that works best (approximately 275°F measured on the surface of the cover sock). Gradually increase the heat as necessary, but too much heat may cause seams and edges to pull away or damage the color graphics printed onto the covering, so proceed with care. As you go, push down on the iron over sheeted areas to bond the covering to the wood underneath.

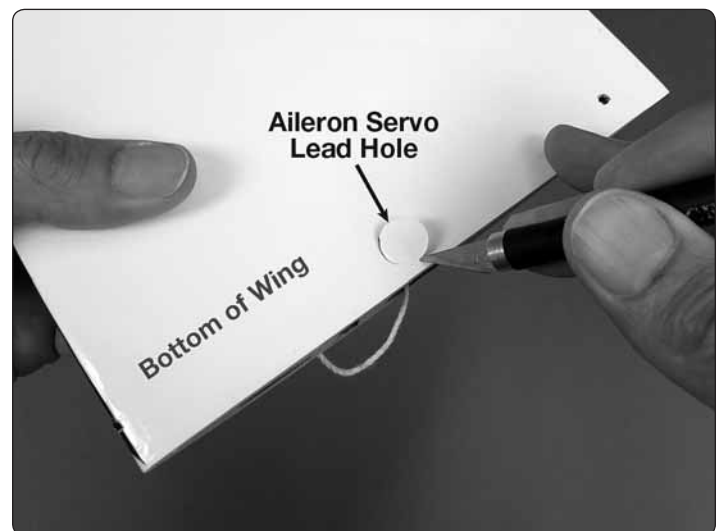
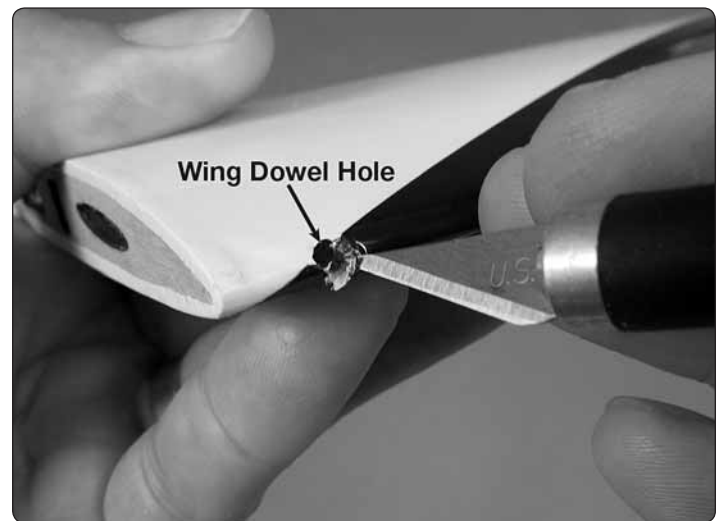
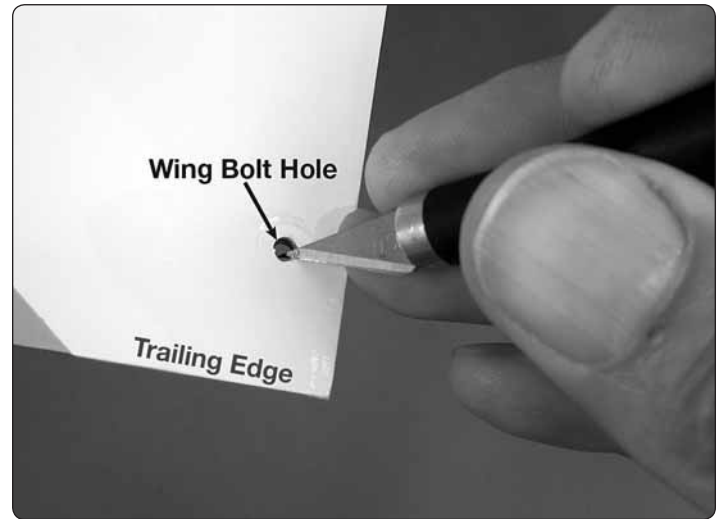
❑ 3. Stack two or three paper towel squares on top of each other and cut them into small squares. These squares may be dampened with denatured alcohol when epoxy cleanup is needed.



ASSEMBLE THE WING

Hook Up the Ailerons

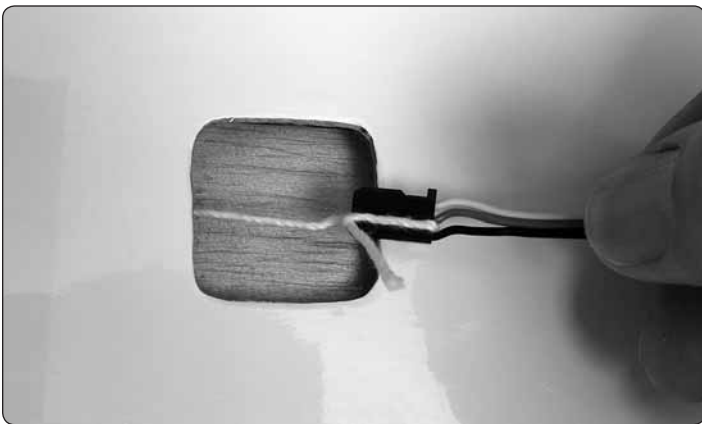
You can assemble one wing at a time, or work on both wing halves simultaneously. The left wing is shown in the photos.



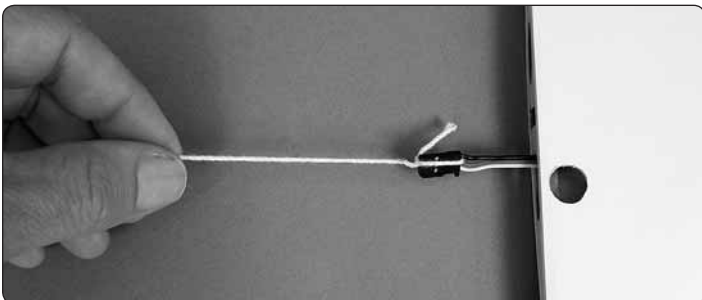
❑ 1. Cut the covering from the wing over the wing bolt holes, the leading edge dowel holes and the servo wire holes in both wing halves.



❑ 2. Use an epoxy brush to apply a **thin** coat of epoxy or medium CA to the inside of the top wing skin in the aileron servo opening. Allow epoxy to harden before continuing.



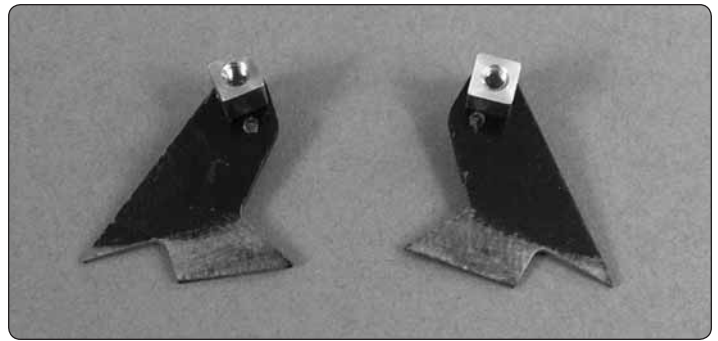
❑ 3. Tie the string in the wing around the end of the included aileron servo extension as shown – a small drop of thin CA will ensure that the knot doesn't come undone when you are drawing the servo wire through the wing.



❑ 4. Carefully pull the servo wire out as you pull the string.



❑ 5. Guide the servo connector and the wire out the hole in the bottom of the wing.

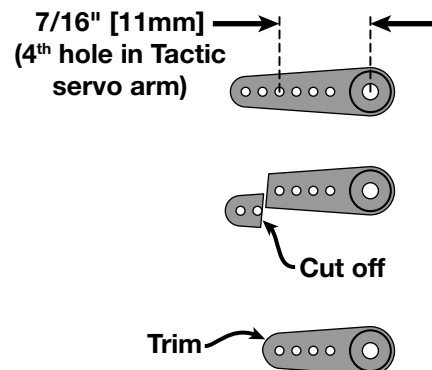


❑ 6. Use medium-grit sandpaper to roughen the bottom portion of the two larger control horns so glue will adhere. Install a brass screw-lock connector into the **top** hole of both horns and secure with a nylon retainer as shown. Be certain the retainer snaps on securely. If the retainer fits loose, replace it with another – four spares included.

❑ 7. Cut and remove the covering from the bottom of the aileron over the slots for the horns.

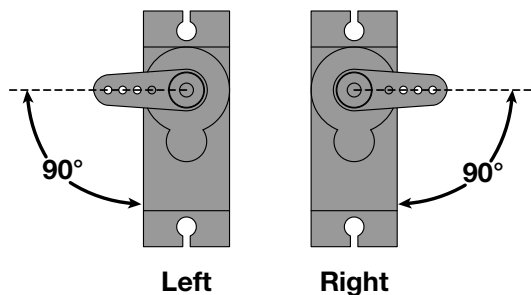


❑ 8. Insert the horn into the aileron as shown (with the screw-lock body on the **outside** of the horn toward the tip of the wing), then use thin CA to securely glue the horn into place.

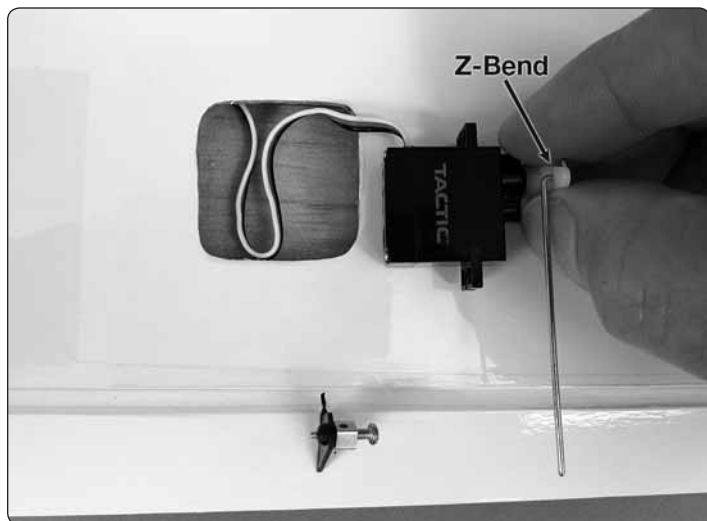


❑ 9. Identify a hole in the servo arm that is 7/16" [11mm] out from the center (this would be the 4th hole out for Tactic servos), or the next hole closest in. Use a #55 (.052" [1.3mm]) drill to enlarge the hole to fit the aileron pushrod. Then, cut off the rest of the servo arm so it will not interfere with the servo hatch cover.

❑ 10. Connect the aileron servo to the servo extension in the wing.



□ 11. Connect the other end of the aileron servo extension wire to the receiver. Turn on the transmitter and power the receiver with a separate receiver battery (or the ESC connected to the receiver and your motor battery). With the servo powered and centered, install the servo arm to the servo so it will be perpendicular to the case—if necessary, use the Sub Trims in your transmitter programming to get the servo arm perpendicular.



□ 14. Operate the aileron with the radio to make sure everything operates smoothly. Make any adjustments necessary.

If working on one wing at a time, now would be a good time to go back and assemble the second wing so both servos can be glued in at the same time.

□ 12. Connect the Z-bend end of an aileron pushrod to the servo arm as shown. Double the excess servo wire beside itself in a zigzag pattern so it will fit in the wing alongside the servo. Temporarily place the servo in the wing.



□ 15. Use Shoe Goo® or similar flexible cement to glue the servo to the top wing skin (or use tape to hold the servo in place). Allow the glue to dry at least a few hours before handling the wing and at least overnight before flying.

NOTE: CA may also be used to glue in the servos, but should the occasion to remove the servo ever arise, it is likely the servo bay in the wing will be damaged. With Zap Goo and similar types of rubbery cement it will be easier to remove the servo without damaging the wing.

□ 13. Connect the pushrod to the screw-lock connector on the aileron horn with an M2x3 Phillips machine screw.

❑ 16. After the glue holding the servos to the wing has dried, turn on the radio to center the servos. Holding the ailerons centered, connect the pushrods to the screw-lock connectors with an M2x3 Phillips machine-thread screw and a drop of threadlocker. Operate the aileron with your radio to make sure everything moves smoothly. Make any adjustments necessary. Trim the excess pushrod material.

Install the Servo Covers

❑ 1. Use curved-tip scissors or any other kind of small hobby scissors to trim the hatches down to the flat base lip that will be taped to the wing.

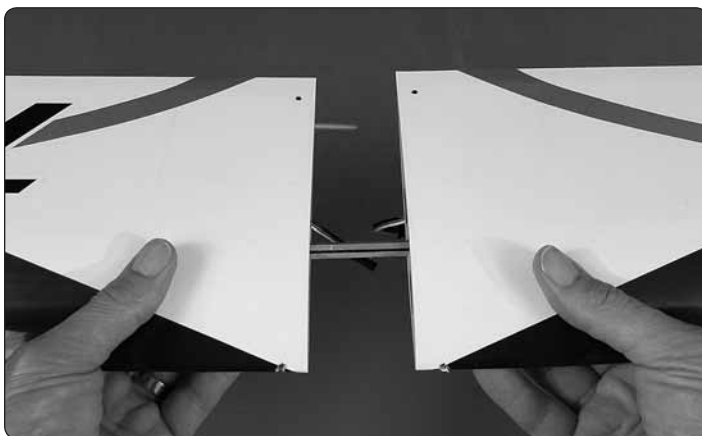


❑ 2. Position the hatch over the servo. Operate the ailerons with your radio to make sure the servo arm and/or pushrod do not interfere with the cover. Make any adjustments necessary.



❑ 3. Mount the hatch to the wing with clear tape.

Join the Wing Halves



❑ 1. Test-fit the wing halves together with the wing joiner and the nylon alignment dowel. Make any adjustments necessary for a good fit.

❑ 2. Make certain you have everything on-hand to glue the wings together including 30-minute epoxy, a mixing cup, a mixing stick, an epoxy brush, masking tape and those paper towel squares and denatured alcohol mentioned earlier in the manual.

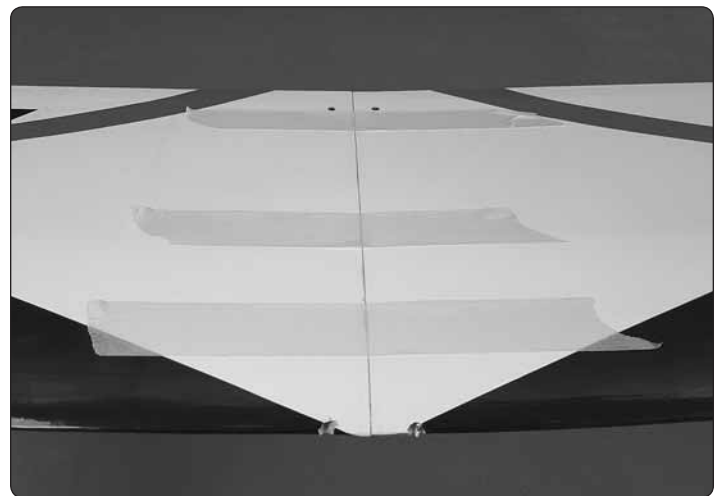
NOTE: Even though 30-minute epoxy provides enough working time to glue the wing halves together, make sure you have everything ready and work efficiently so you don't run out of working time before the epoxy begins to harden.



❑ 3. Mix approximately 1/4 oz. of 30-minute epoxy. Working quickly, pour some epoxy into the spar cavities in both wings.

❑ 4. Coat one end of the joiner and insert it into one of the wing halves, pushing it in and out several times to thoroughly coat the entire spar cavity. Remove the joiner and perform the same procedure for the other wing, but this time leave the joiner in place.

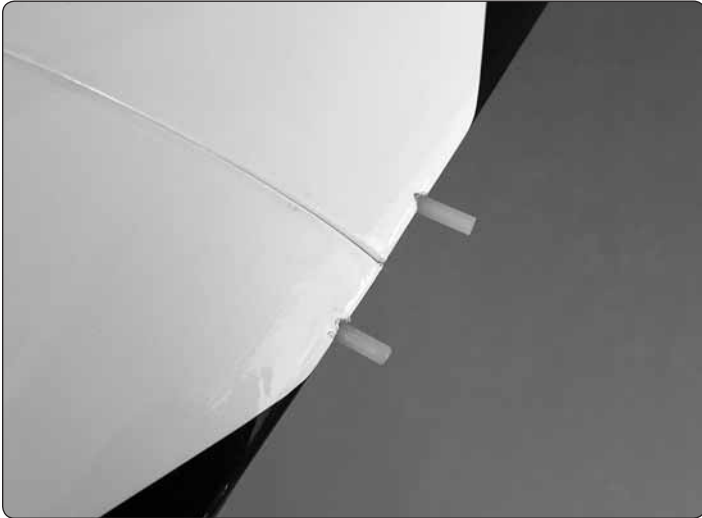
❑ 5. Coat the protruding end of the joiner and both ends of both wing halves with epoxy. Then, join the wings together and wipe away excess epoxy.



❑ 6. Use strips of masking tape on the top and bottom of the wing to tightly pull the wing halves together while using 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 tape.

- ❑ 7. After the epoxy has hardened, carefully peel off the tape. Any residual masking tape adhesive may be cleaned with another paper towel square dampened with naphtha (lighter fluid). Areas of covering that may have lifted from removing the tape should be re-tightened with your covering iron.

Mount the Wing



- ❑ 1. Roughen the remaining nylon dowels with medium-grit sandpaper. Then, test-fit the dowels into the wing leading edge.



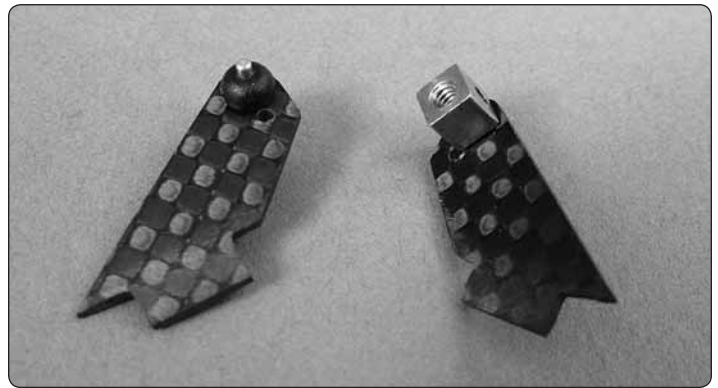
- ❑ 2. Mount the wing to the fuselage with the dowels and the M3x14 Phillips screws and M3 flat washers. Make any adjustments so the wing fits the fuselage well—if necessary, it's okay to clean out the dowel holes in the wing with a 1/8" [3mm] drill.

- ❑ 3. Remove, then reinstall the dowels with 30-minute epoxy—if the dowels fit into the wing slightly loosely, micro balloons or similar filler may be mixed in with the epoxy to fill any voids to assure a secure bond. Working quickly, wipe away residual epoxy, then reinstall the wing to the fuselage with the wing bolts. Do not glue the wing to the fuselage. Allow the epoxy to fully harden before removing the wing.

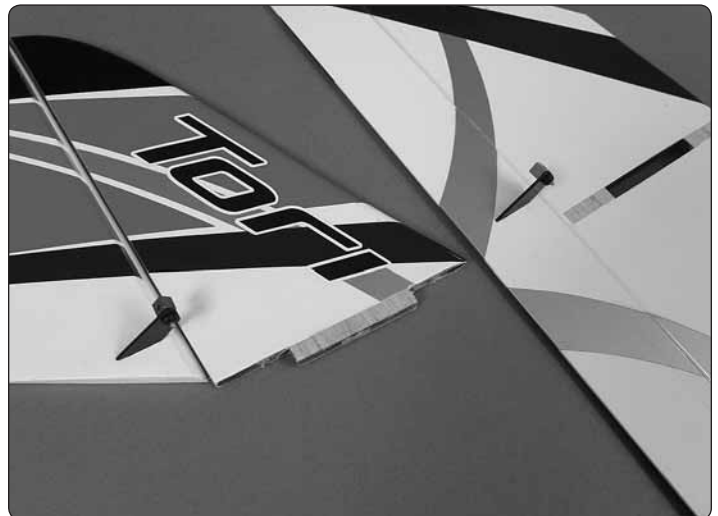
- ❑ 4. Remove the wing from the fuselage. Remove any residual glue that may have seeped out of the wing past the dowels.

ASSEMBLE THE FUSELAGE

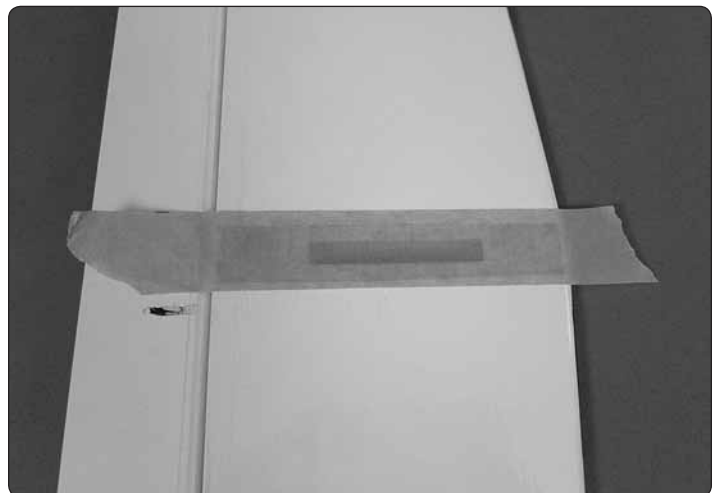
Install the Fin and Stab



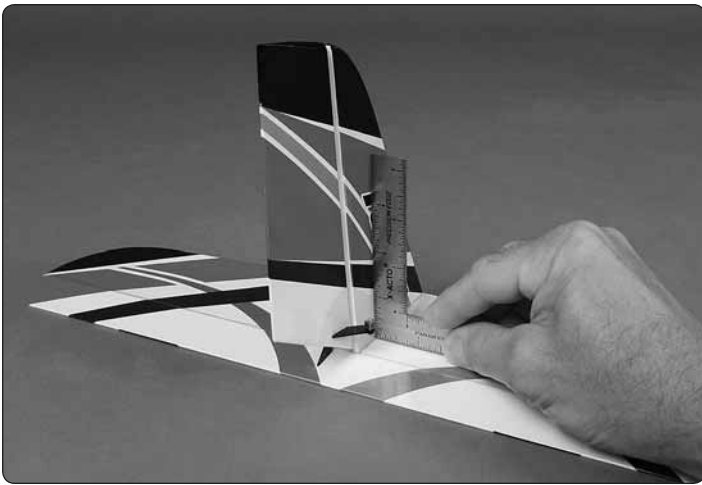
- ❑ 1. Same as was done with the aileron horns, use sandpaper to roughen both sides of the tabs on the elevator and rudder horns, then install screw-lock connectors with retainers as shown.



- ❑ 2. Cut and remove the covering from the horn slots in the top of the elevator and right side of the rudder. Glue the horns into position with thin or medium CA.

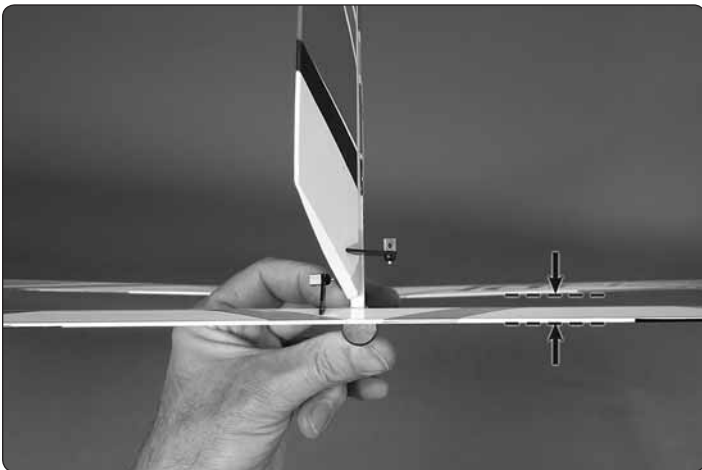


- ❑ 3. Apply a strip of masking tape to the bottom of the stab so epoxy from gluing on the vertical stab (fin) will not get through.



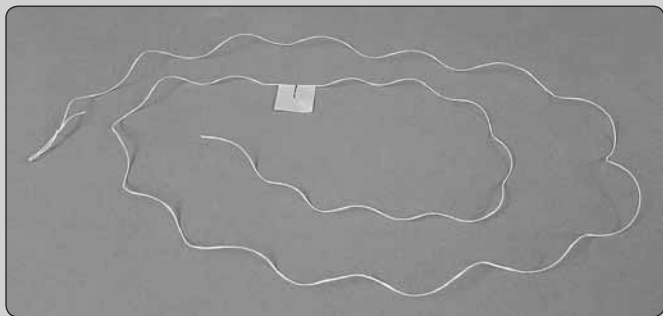
❑ 4. Check for proper alignment of the fin to the stab. Use 30-minute epoxy to glue the fin into the stab (if the fit is loose, add micro balloons to the epoxy). Use a small square to make sure the fin is perpendicular to the stab while the epoxy hardens.

❑ 5. After the epoxy has hardened, remove the masking tape from the bottom of the stab.

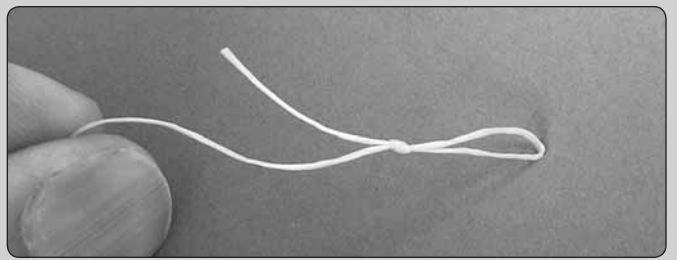


❑ 6. Mount the wing to the fuselage. Position and hold the stab on the stab saddle on the fuselage. View the stab and wing from behind to see if the stab is parallel with the wing. If necessary, sand the high side of the stab saddle on the fuselage to get the stab to align with the wing.

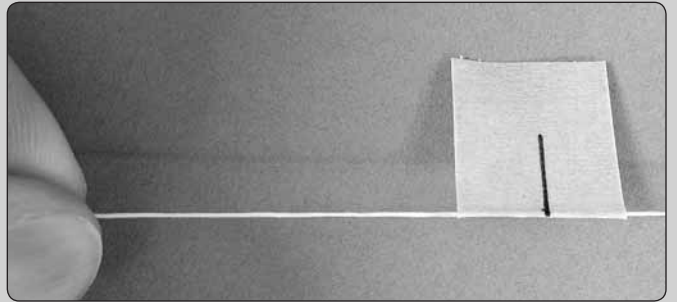
Pin-and-String Technique



We use the *pin-and-string* technique is used for centering the stab. To do this, you'll need an approximately 45" [1.2m] length of non-elastic line such as Sullivan Kevlar® thread or Kevlar fishing line.

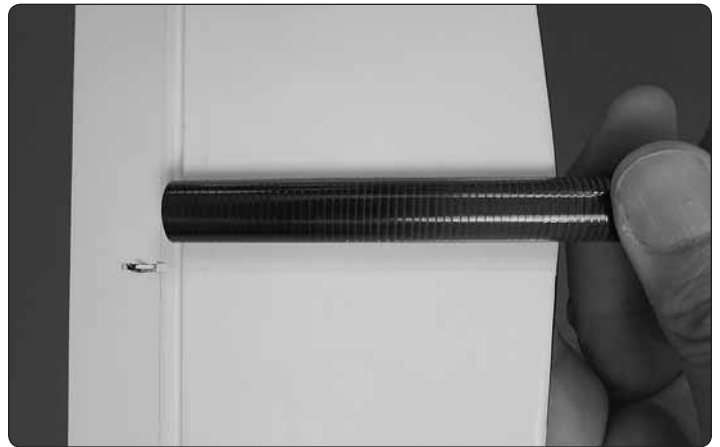


A. Tie a small loop in one end of the line.

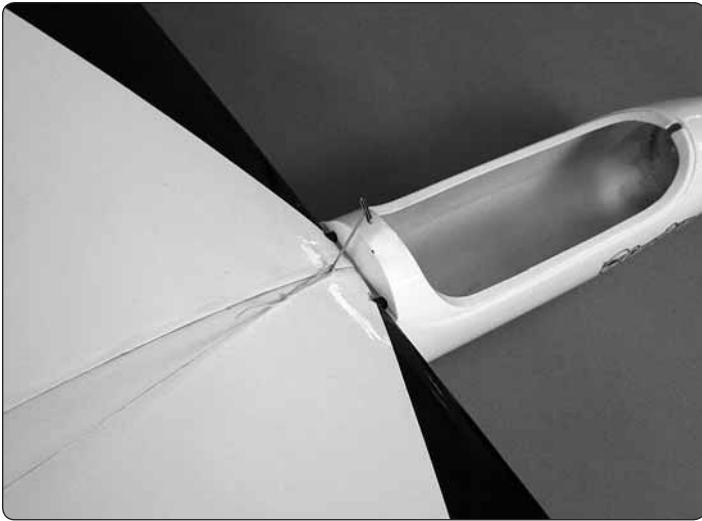


B. Fold a piece of masking tape over the line near the other end. Draw a line on the masking tape. The tape will be slipped along the line to equalize the stab as described below.

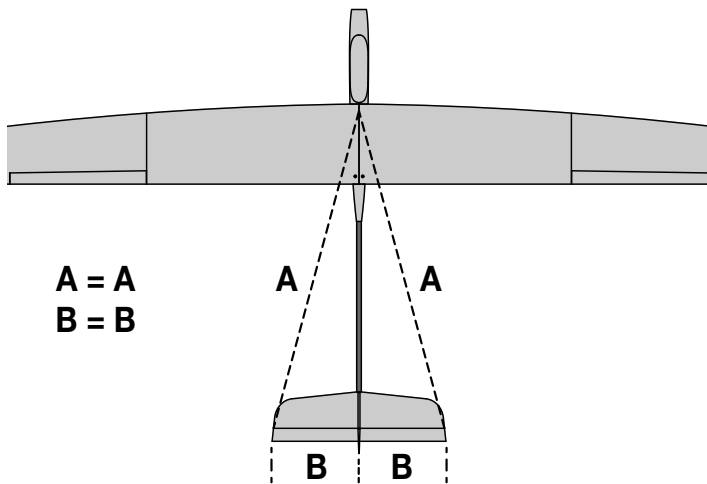
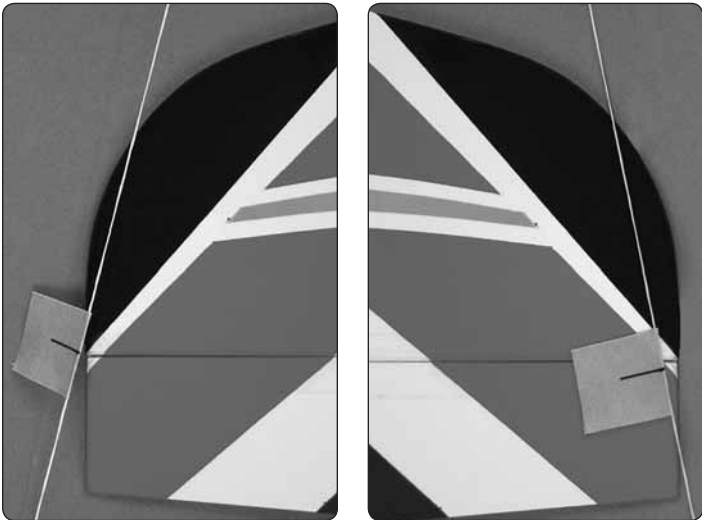
Make a dry run of the stab alignment process using the pin and string.



❑ 7. Center the exposed balsa portion on the bottom of the stab over the wing saddle. Use a T-pin to hold the front of the stab to the balsa plug in the stab saddle.



☐ 8. Insert a T-pin into the front of the wing centered between the two adjoining ribs. Loop the string over the T-pin.



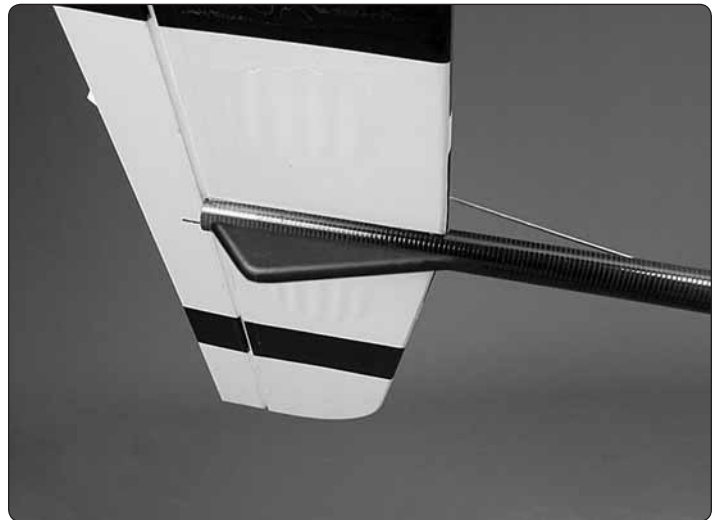
☐ 9. Pull the string back to one end of the stab. Slide the masking tape along the string until the line is even with the trailing edge of the stab.

☐ 10. Swing the string over to same spot on the other side of the stab. Adjust the stab and the tape on the string until the stab is “equalized” and rotationally centered.



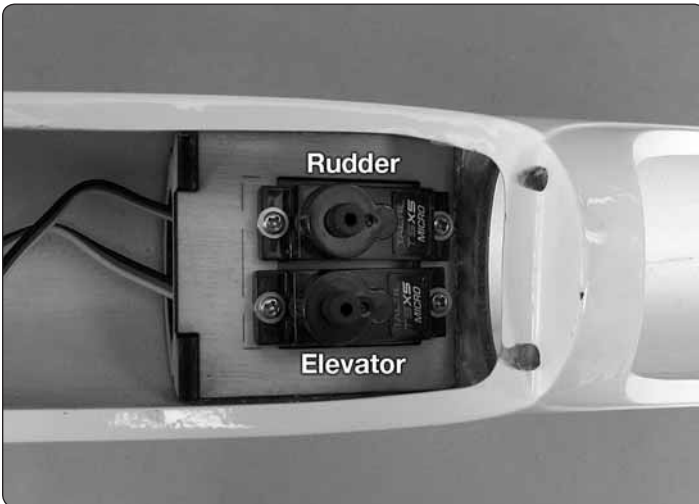
☐ 11. Remove the stab. Glue the stab into position with 30-minute epoxy using the pin and string to check alignment as done in the previous steps. A couple extra T-pins may be inserted through the stab and into the balsa saddle to tightly hold everything in position until the epoxy hardens.

☐ 12. After the epoxy from the previous step has hardened and the T-pins removed, any visible pinholes may be reduced by going over them with your sealing iron.

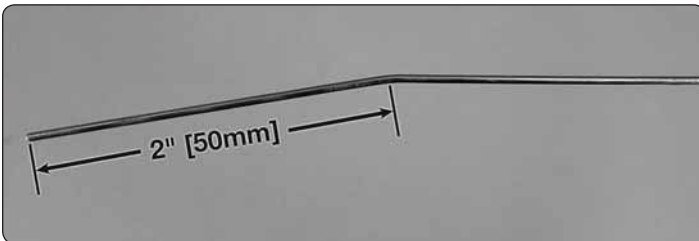
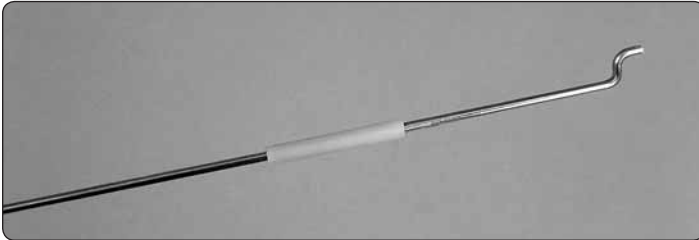


☐ 13. Use thin or medium CA glue to attach the tail skid.

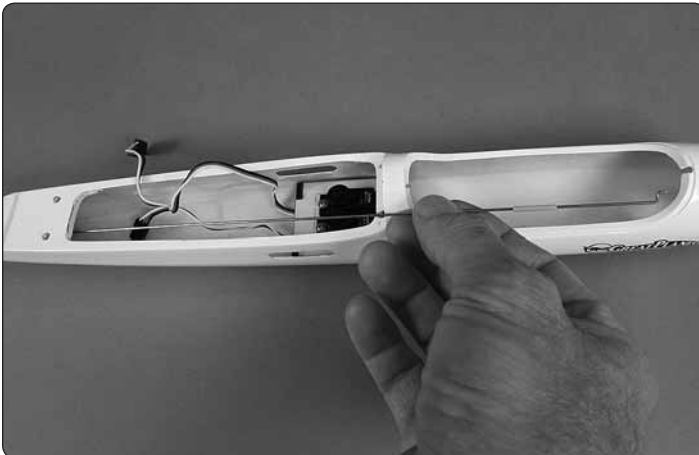
Hook Up the Elevator and Rudder



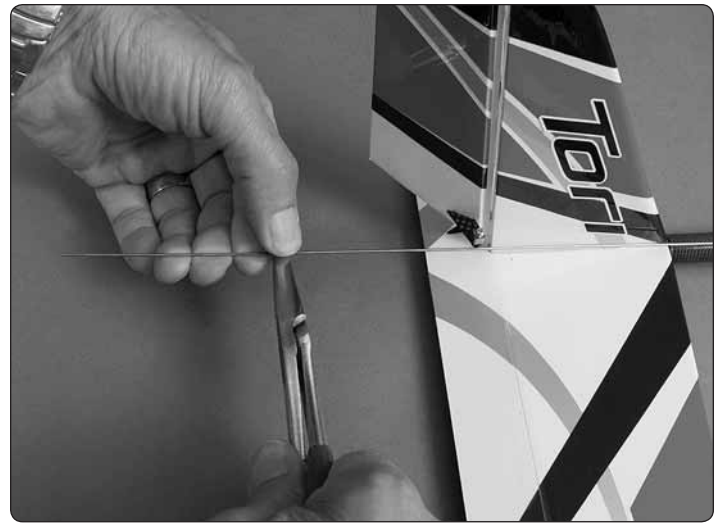
- ❑ 1. Mount the elevator and rudder servos as shown. (If your servos do not fit, the servo tray may be trimmed as necessary.) Drill 1/16" [1.5mm] holes for the servo mounting screws and mount the servos with the screws that came with them.



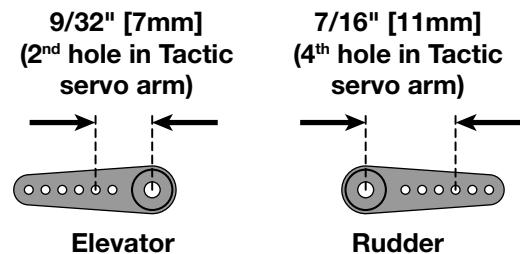
- ❑ 2. Slide one of the small, plastic tubes onto one of the pushrods. Make a slight bend 2" [50mm] from the back end of the pushrod.



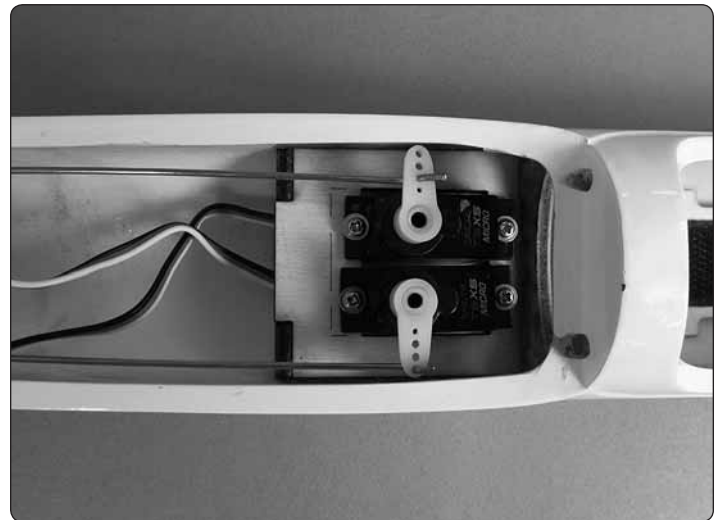
- ❑ 3. Guide the pushrod down through and out one of the slots in the boom – the bend in the wire will allow the end of the wire to poke up through the slot.



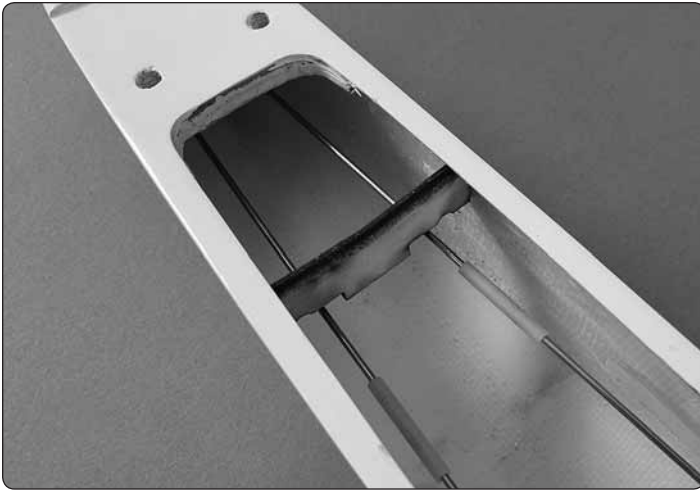
- ❑ 4. Straighten the pushrod by removing the bend.
❑ 5. Prepare and install the other pushrod through the other slot in the boom the same way – don't forget to install the small plastic tube first!



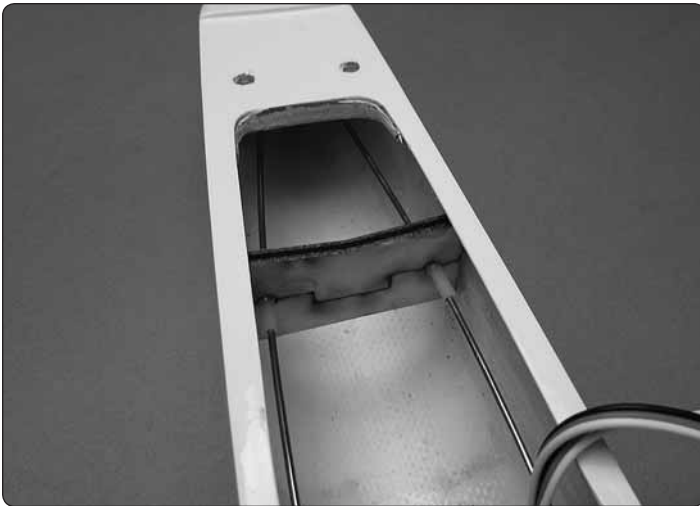
- ❑ 6. Same as was done for the aileron servo arms, enlarge the holes in the elevator and rudder servo arms with a #55 (.052" [1.3mm]) drill. It may be necessary to trim the servo arms, but only enough so they don't interfere with the inside of the fuselage when the arms are on the servos.



- ❑ 7. Fit the pushrods into the holes in the servo arms indicated in the previous illustration. Temporarily install the servo arms to the servos.



❑ 8. Fit, then glue the top portion of the pushrod brace into position all the way up against the “lip” around the wing saddle—it isn’t critical where the brace is located forward and aft—where it fits best is fine. Make sure the brace doesn’t interfere with the exit holes of the aileron servo leads.



❑ 9. Center the plastic tubes in the brace, then add and glue the bottom portion of the pushrod brace and the tubes into place.



❑ 10. Connect the servos to your receiver and power up the radio with the transmitter. With the servos centered, adjust the servo arms on the pushrods so they are perpendicular to the servo arms. Fasten the servo arms to the servos with the screws that came with them.



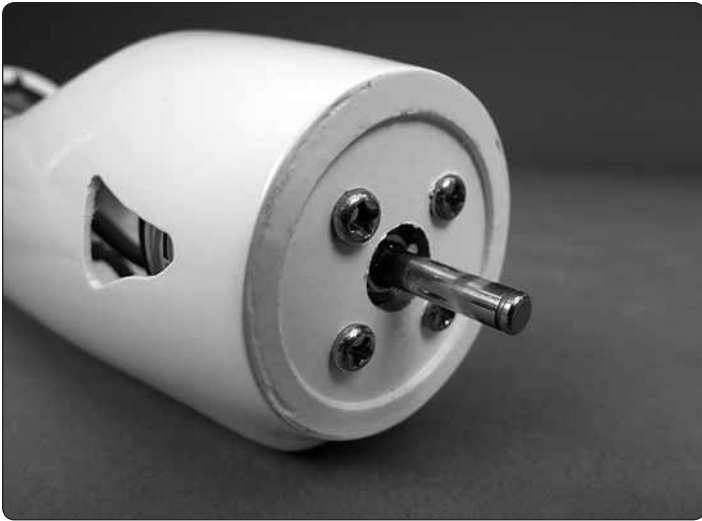
❑ 11. Still with the radio on, hold the rudder and elevator centered and tighten the pushrods in the screw-lock connectors with the M2x3 Phillips screws and a drop of threadlocker on the threads.

We’ll finish radio installation after the motor has been installed.

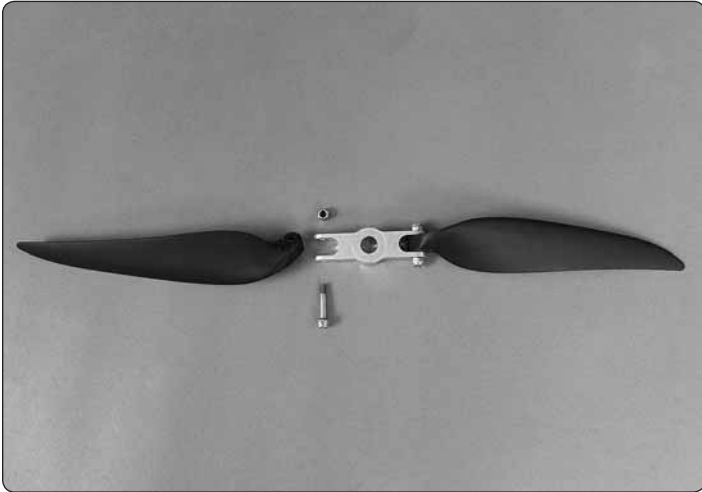
Install the Motor



❑ 1. On the RimFire .10 use a 1.5mm hex driver to loosen the set screw in the collar and remove the collar. (If ever using the motor in a reverse configuration in the future, be certain to reinstall the collar.)



❑ 2. Mount the motor with four M3x6 Phillips screws and a small drop of threadlocker on the threads. The motor wires should be oriented along the bottom of the fuselage.



❑ 3. Assemble the folding propeller as shown. Fit the propeller blades into the hub and then install the pins. The locknuts should be just tight enough so the blades still rotate freely on the pins.



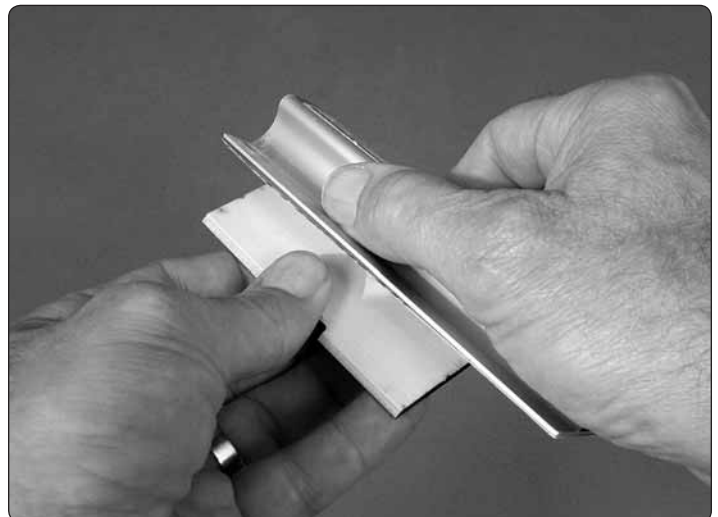
❑ 4. Apply a light film of oil to the colleted propeller shaft so the spinner back plate will be easier to remove after the prop nut has been tightened.



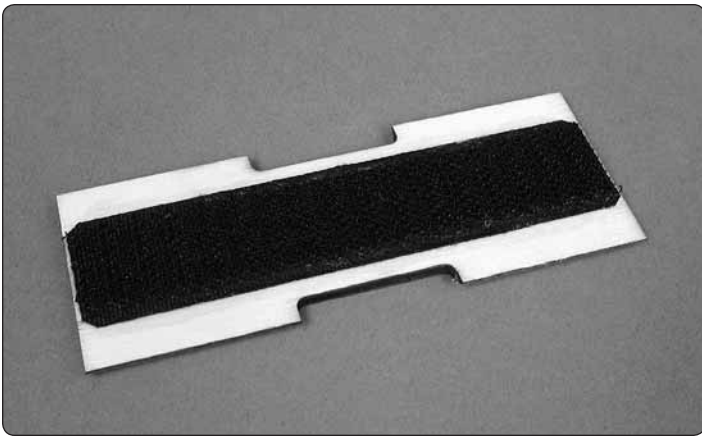
❑ 5. Temporarily test-fit the propeller/spinner assembly and check the gap between the front of the fuselage and the spinner back plate. The gap should be approximately 1-2mm.



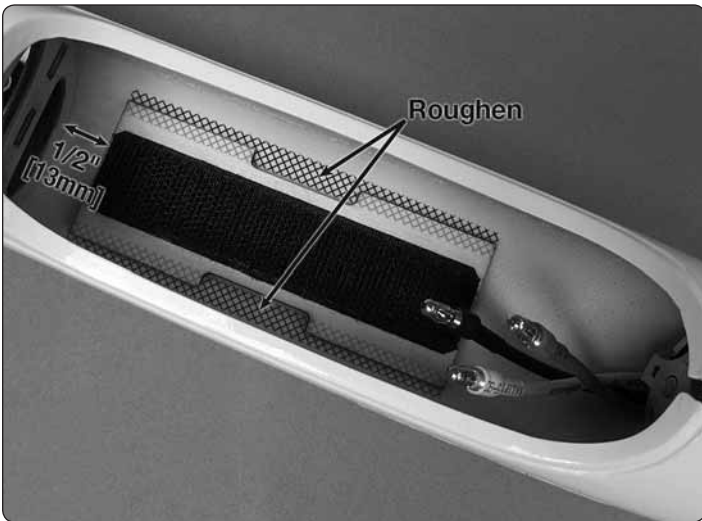
Whenever removing the propeller assembly in the future, do not tap or apply pressure to the front of the backplate. Instead, insert a sheet of hard plastic or wood between the spinner gap to push the backplate forward—it also helps to sand a bevel to the edge of the plastic or wood part so it can be wedged into the gap.



❑ 6. Bevel the edges of the battery plate to conform to the fuselage when in position.



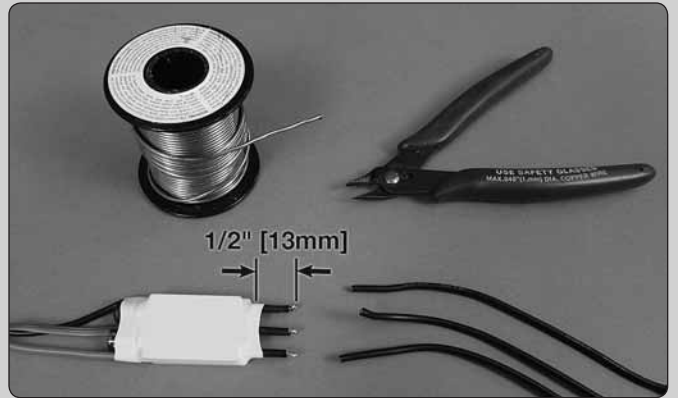
7. Cut a strip of the rougher, hook side of the included adhesive-back hook-and-loop strip to a length of 3-3/8" [85mm] and apply to the top of the battery plate with CA glue.



8. Roughen the bottom of the fuselage in the area of the battery plate. Then, use medium CA to glue the battery plate into position so the aft edge will be approximately 1/2" [13mm] from the former at the wing LE.



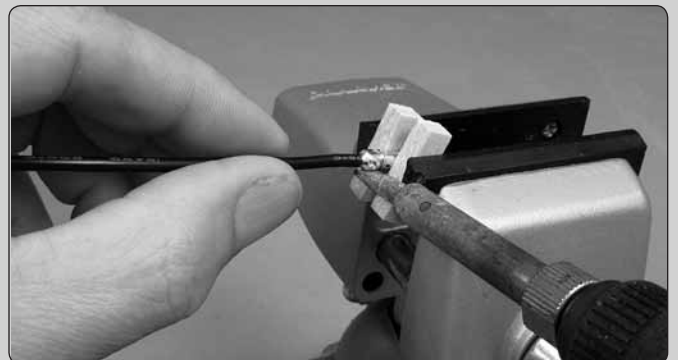
9. Determine whether you will shorten the wires on your ESC, or leave the ESC wires as-is. The ESC may be installed as supplied with the long motor wires, but removal and installation of the battery will be easier without excess wire in the way. Follow these instructions to shorten the ESC wires:



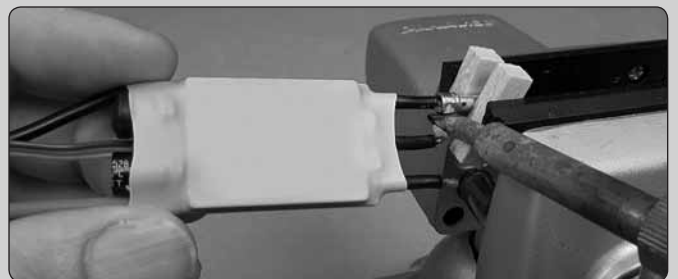
A. Cut the motor wires to the desired length – about 1/2" [13mm] is fine.



B. Strip approximately 1/8" [3mm] of the insulation from the end of the wires and tin the exposed wire.

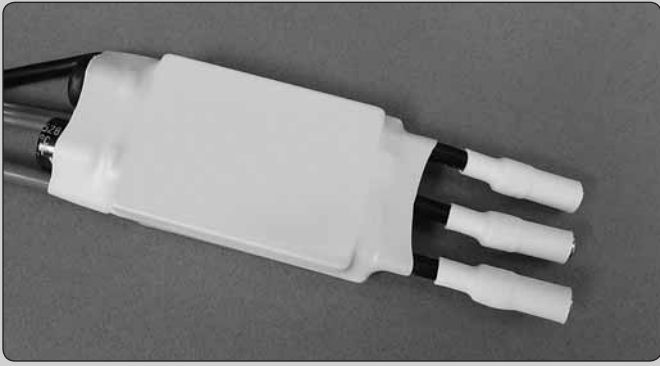


C. Cut and remove the shrink tubing from the bullet connectors on the cut off ESC wires. Then, unsolder the three bullets from the old wires.



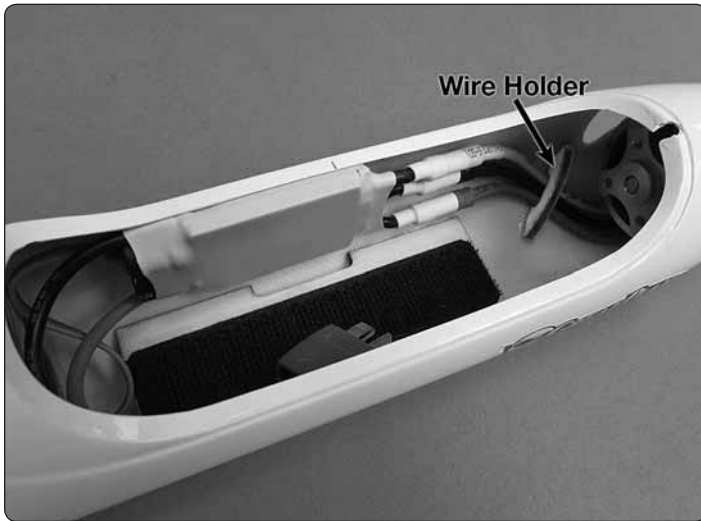
D. Re-solder the bullets to the shortened wires on the ESC.

Final Assembly

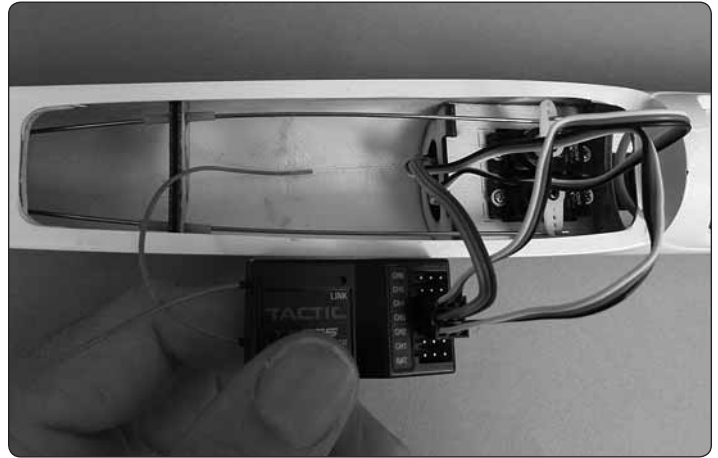


E. Cover the bullets with 3/16" [4.8mm] shrink tubing (not included).

- 10. **Remove the propeller from the motor before connecting the ESC!** Then, connect the ESC to the motor and your receiver and power up the radio so you can run the motor. Make sure the motor is turning in the correct direction. If not, simply swap any two of the wires between the ESC and the motor.



- 11. Mount the ESC to the side of the fuselage with double-sided foam mounting tape. If necessary, the included lite-ply wire holder may be glued into position to keep the motor terminal wires from contacting the motor.



- 1. Install the receiver so it will be secure, somewhat cushioned and so the antennas will be positioned according to the manufacturer's instructions. In this Tori, we taped one of the antennas to the bottom of the fuselage before installing the receiver, then fit the receiver under the pushrod guide brace with 1/4" RC foam under the receiver. A hole was drilled in the fuselage side for a plastic guide tube (cut from a tube from a spray can or similar – not included) for the other antenna to achieve the 90° separation specified for the Tactic receiver. (Note that the antennas do not have to be outside the fuselage, but doing it this way was quick and simple.)

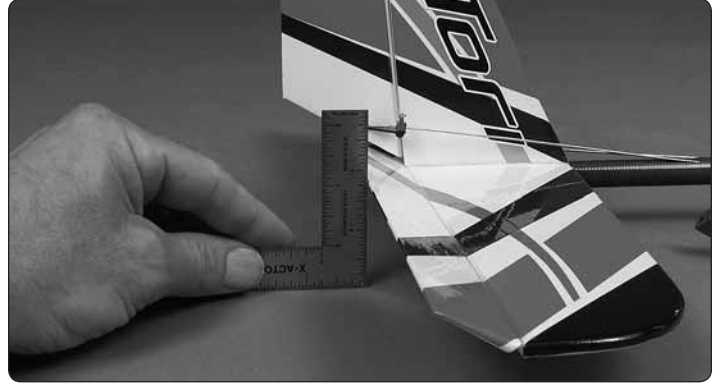


- 2. Trim the softer, "loop" side of the included adhesive-back hook-and-loop material to fit the battery, and then attach to the battery.

PREPARE THE MODEL FOR FLIGHT

Set the Control Throws

CAUTION: The propeller should not yet be installed. If the propeller is installed on the motor, **remove** the propeller while operating the radio to check the throws.



❑ 1. Measure and set the control throws according to the measurements provided below. If necessary, adjust the throws with the programming in your transmitter and/or adjusting where the pushrods connect to the servo arms and/or control horns. **NOTE:** The control throws are measured at the widest part of each control surface.

These are the recommended control surface throws:

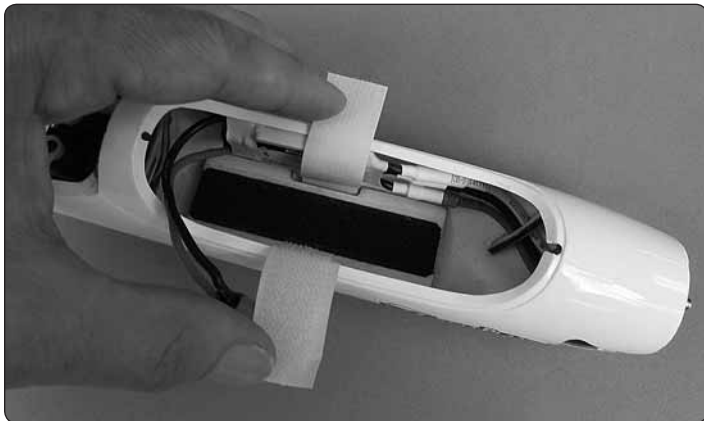
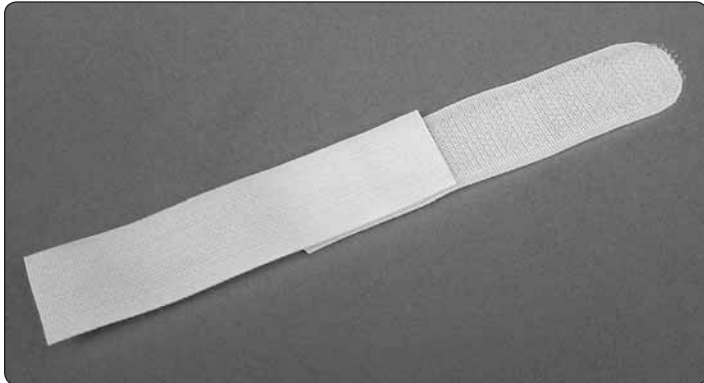
	HIGH RATE		LOW RATE	
	Up	Down	Up	Down
ELEVATOR	1/2" [13mm] 25°	1/2" [13mm] 25°	5/16" [8mm] 15°	5/16" [8mm] 15°
RUDDER	Right 1" [25mm] 28°	Left 1" [25mm] 28°	Right 3/4" [19mm] 20°	Left 3/4" [19mm] 20°
AILERONS	Up 5/8" [16mm] 33°	Down 3/8" [10mm] 19°	Up 3/8" [10mm] 19°	Down 1/4" [6mm] 13°

❑ 2. **OPTIONAL:** Set up spoilerons. Spoilerons are up deflection of both ailerons to “spoil” lift causing the model to sink. Spoilerons are not necessary, but can be an aid in landing (to shorten the approach) or to get out of thermals more quickly.

To program spoilerons in most radios, the aileron servos will have to be connected to separate channels in the receiver. Typically, the channels are mixed in the radio programming, then another mix introduced to mix both aileron servos to a switch, dial or slider for extending the spoilerons. Check your radio to see if it has a dedicated spoiler function.



❑ 2. Test-fit the battery in place. Make sure it can be installed so that the discharge and balance leads will not contact the spinning motor.



❑ 3. **Optional:** Make a battery strap from the included hook-and-loop strap material. For typical flying, a battery strap is not necessary. But if for some reason you have a battery that does not conform well to the battery mount plate, or if you plan on flying inverted or aggressively, you may want to use the battery strap.

The degree of spoilers is not critical and how much is needed is up to your personal taste. About 3/8" [9.5mm] is a good place to start. If possible, control the spoilers with a proportional dial or slider so you can extend the spoilers proportionally (instead of using a switch which is *all or nothing*).

Arm the ESC

Before the motor will rotate, the ESC must be armed first:

1. To arm the ESC, move the throttle stick to the lowest position, turn the transmitter on, and wait for the initiation tones followed by a single beep. Note: The ESC will auto-calibrate the low throttle stick position when powered on. Be sure that throttle stick is at its lowest point when you plug the flight battery in (or at the highest point for setting the brake function- see below).
2. Move the throttle stick to full throttle and the ESC will confirm this position with a double beep.
3. Lower the throttle again and the ESC will confirm this lowest position with a sequence of four beeps. **THE ESC IS NOW ARMED.** Advancing the throttle stick will cause the motor to rotate. **The propeller blades should not be installed on the motor until you are ready for flight and you have confirmed the Fail Safe is operating correctly!**

Set the Fail Safe and the Motor Brake

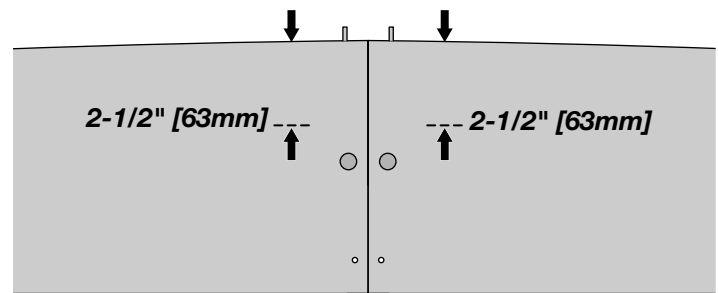
FAIL SAFE: While you have your radio operational and **without the propeller mounted**, now would also be a good time to set and check the Fail Safe function of your transmitter. Refer to the instructions that came with your radio control system to set Fail Safe on the throttle channel so that, in the event of loss of signal, the motor will stop. To test the Fail Safe, with the propeller removed and the radio control system turned on, advance the throttle slightly (just enough to make the motor turn) and turn off the transmitter. If the Fail Safe is set correctly, the motor will stop when the transmitter is turned off.

MOTOR BRAKE: While you still have your radio system powered up and **without the propeller mounted**, check the motor brake.

Advance the throttle stick to run the motor, and then move the throttle stick down to stop the motor. The motor should stop abruptly (not coast gradually to a stop). If the motor does not come to an abrupt stop and the brake in the ESC is not activated, activate the brake as described below:

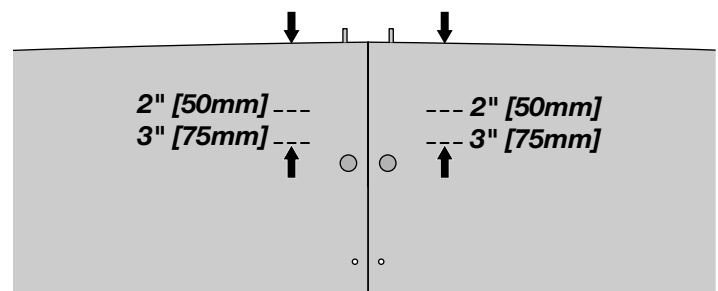
- A. Disconnect the battery from the ESC so it will not receive power.
- B. With the transmitter turned on, advance the throttle stick.
- C. Connect the battery to the ESC to power the motor. Listen for the series of beeps. There will be three single beeps separated by pauses (for brake OFF), then a series of three double beeps separated by pauses (for brake ON). To turn the brake ON, lower the throttle during the series of double beeps. If you wish to turn the brake OFF, lower the throttle during the three single beeps. Now the brake is set to the desired function and you may disconnect the battery and turn off the transmitter.

Check the C.G.



Recommended starting C.G.

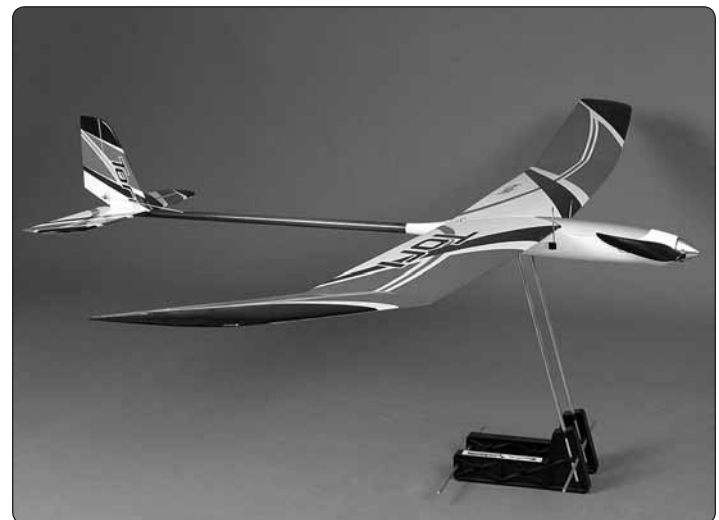
1. Set the rulers on a Great Planes C.G. machine to 2-1/2" [63mm], or mark the recommended, starting C.G. location on the bottom of the wing where shown.



Recommended C.G. range

NOTE: The recommended C.G. **range** is from 2" to 3" [50mm - 75mm] back from the leading edge of the wing approximately where it meets the fuselage. As long as the Tori is balanced within this range it will fly and respond well. Balanced nearer the front end of the C.G. range the Tori will be more stable and penetrate wind a little better. Balanced nearer the aft end of the C.G. range the Tori will "float" and respond to lifting air a little better.

2. Mount the wing to the fuselage and install the propeller assembly, battery, and the canopy. **Do not** connect the battery at this time.

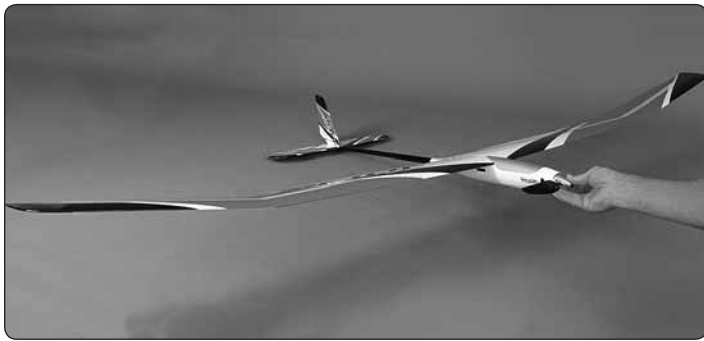


3. At this point the Tori should be completely ready to fly. Check the C.G. by placing the model on the C.G. machine,

or lift at the lines you marked indicating the recommended, starting C.G. Depending on the battery you are using, there should be a little leeway to shift the battery forward or aft to change the C.G. so it balances at the recommended starting C.G.

4. Once the location of the battery has been determined, make a mental note of this location, or mark the inside of the fuselage or the battery tray to position the battery here for the proper C.G. when flying the model.

Balance the Model Laterally



1. Leaving the tail skid on the work surface, lift the Tori several times by the propeller shaft 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

Motor Safety Precautions

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

- Use safety glasses when starting or running motors.
- Do not run the motor in an area of loose gravel or sand; the propeller may throw such material in your face or eyes.
- Keep your face and body as well as all spectators away from the plane of rotation of the propeller as you run the motor.
- Keep these items away from the prop: loose clothing, shirt sleeves, ties, scarfs, long hair or loose objects such as pencils or screwdrivers that may fall out of shirt or jacket pockets into the prop.

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 **Fail Safe** is programmed correctly so in the event the receiver ever loses signal (or, if you inadvertently turn off the transmitter before disconnecting the battery or vice-versa) the motor will not turn. Follow the instructions that came with your radio control system to check and set the Fail Safe.

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

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.

General Preflight Information

The RimFire .10 is rated for 30A constant current and 35A surge current. The included 12x6.5 folding propeller draws an average maximum (in flight) current of about 29A on a 3S battery and about 23A on a 2S battery, so there is no danger of overloading the motor and it can be run full-throttle for extended periods (during massive ascensions to altitude). With a 3S 1800mAh battery this should provide approximately three minutes of full-throttle run time and with a 2S 2200mAh battery about 4-1/2 minutes of full-throttle run time. On 3S the Tori “specs out” in about twenty seconds.

You may experiment with 2S and 3S batteries to find the combination you like best. With lighter 2S batteries the Tori may not climb as quickly, but it will be lighter and have a farther aft C.G. for detecting thermals easier.

Either way, it is recommended to use a flight timer to indicate when to stop running the motor so as not to over-discharge the battery. In the case of a glider such as the Tori, it is desirable to link the timer to the throttle stick so only motor run time—not the total time the model is airborne—will be counted. Until you know what time to set the timer for, start with a conservative number: say two-minutes for a 3S setup and three-minutes for a 2S setup.

FLYING

The *Tori* is not necessarily fragile, but it is a light-weight motor glider designed for catching thermals, so fly it to that purpose, not as an indestructible, toss-around, foam sport model. Full throttle flight should be reserved for climbing to thermal-hunting altitudes only. Be responsible using the throttle.

Experienced pilots may launch the *Tori* themselves, but for the maiden flight, intermediate pilots might want to solicit the assistance of another pilot to launch the *Tori* for them. It may be a good idea to add a few clicks of up elevator trim so the *Tori* will be sure to initially climb when released. Once the *Tori* is trimmed for straight-and-level flight it will not be necessary to add up elevator trim.

Typically, the *Tori* would be launched at full-throttle, but anything from about half-throttle to full-throttle is fine.

The first objective will be to get the *Tori* trimmed. Once trimmed and at altitude, extend the spoilers (if programmed) to see how the *Tori* behaves. Eventually, you'll get a feel for when (and if) to extend the spoilers so you can land your *Tori* right on the spot!

The *Tori* has no particular flight characteristics that you need to be made aware of. It's just an honest-flying, well-mannered floater glider.

Have fun chasing thermals with your *Tori*!



When the timer sounds, land. Use a LiPo battery checker to measure the resting (unloaded) voltage after you land. Each cell in the pack should not be below 3.7V/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 use the worksheet below to determine optimum flight times based on your flying style and battery capacity.

	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	4.25 min	1290 mAh	303 mAh/min	2200 mAh	1760 mAh	5.8 min	18.2 A
2							
3							
4							
5							
6							
7							
8							

This model belongs to:

	Name
	Address
	City, State, Zip
	Phone Number
	AMA Number
	FAA Number