1/4 Scale Aerobatic GILES G-202 ARF

INSTRUCTION MANUAL

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.

While this kit has been flight tested to exceed normal use, if the plane will be used for extremely high stress flying, the modeler is responsible for taking steps to reinforce the high stress points.

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

GREAT PLANES® MODEL MANUFACTURING COMPANY

P.O. Box 788 Urbana, IL 61803 (217) 398-8970

GPMZ0217 for GPMA1315 V1.0

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PROTECT YOUR MODEL,YOURSELF & OTHERS...FOLLOW THIS IMPORTANT SAFETY PRECAUTION

Your Giles G-202 ARF is not a toy, but rather a sophisticated, working model that functions very much like a full-size airplane. Because of its realistic performance, the Giles G-202 ARF, if not assembled and operated correctly, could possibly cause injury to yourself or spectators and damage property.

To make your R/C modeling experience totally enjoyable, we recommend that you get experienced, knowledgeable help from an instructor with assembly and during your first flights. You'll learn faster and avoid risking your model before you're truly ready to solo. Your local hobby shop has information about flying clubs in your area whose membership includes qualified instructors.

You can also contact the national Academy of Model Aeronautics (AMA), which has more than 2,500 chartered clubs across the country. Through any one of them, instructor training programs and insured newcomer training are available. Contact the AMA at the address or toll-free phone number below:

AMA SINCE 1936

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

INTRODUCTION

Congratulations and thank you for purchasing the Great Planes Giles G-202 ARF. We'd like to provide you with a bit of history on our selection of this aircraft as the newest release in the Great Planes scale aerobatic ARF line.

Richard Giles noted a trend in the International Aerobatic Club (I.A.C.) competition arena toward bigger, heavier, more costly "super monoplanes," and he wanted to do better. The resulting "full-scale" Giles G-200 and G-202 were designed specifically to be a reasonably priced, low wing loading, unlimited level, superior performer on a reasonably priced 4-cylinder engine.

Flying the Giles G-202 is a thrilling experience–as it should be for such an aerobatic model! It doesn't take much elevator or aileron throw to put the Giles through its paces. When you have a feel for your Giles G-202, the throws can be increased to high rates (illustrated in the instructions) to really showcase the aerobatic potential.

We hope you enjoy building and flying your Great Planes Giles G-202 ARF as much as we did testing the prototypes.

PRECAUTIONS

1. You must assemble the model according to the instructions. Do not alter or modify the model, as doing so may result in an unsafe or unflyable model.

2. Take time to align the components straight, true and strong.

3. Use an R/C radio system that is in first-class condition, and a correctly sized engine and components (fuel tank, wheels, etc.) throughout your assembly process.

4. You must properly install the R/C radio system and other components so that the model operates properly on the ground and in the air.

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

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

Remember: Take your time and follow directions to end up with a well-built model that is straight and true. Please inspect all parts carefully before starting to build! If any parts are missing, broken or defective, or if you have any questions about assembling or flying this airplane, please call us at (217) 398-8970. If you are calling for replacement parts, please reference the part names and numbers on page 5 and have them ready when calling.

We can also be reached by e-mail at:

productsupport@greatplanes.com

DECISIONS YOU MUST MAKE

Engine Selection

There are several engines that will work well in your Giles G-202 ARF. We recommend a SuperTigre® G-2300 for the best performance for your Giles G-202. An O.S.® FT-160 would be the best choice for a 4-stroke. Your choice of 2-stroke or 4-stroke will determine the location of the throttle servo and throttle pushrod exit on the firewall, so plan ahead.

Note: Please see the FLYING section regarding flutter, propeller selection and aerobatic performance.

PREPARATIONS

Required Accessories

Items in parentheses such as (GPMQ4243) are suggested part numbers recognized by distributors and hobby shops and are listed for your ordering convenience. ***GPM*** *is the Great Planes brand,* ***TOP*** *is the Top Flite® brand, and* ***HCA*** *is the Hobbico® brand.*

- ❑ Four-Channel Radio with Six Servos (minimum of 65 oz/in of torque for flight controls)
- ❑ “Y” Harness for Aileron and Elevator Servos (if not using a computer radio)
- ❑ Five 24" Servo Extensions for Aileron, Elevator and Rudder Servos
- ❑ Engine - See Engine Selection
- ❑ Spare Glow Plugs (O.S. #8 for most 2-Stroke engines, OSMG2691, or O.S. Type F for most 4-stroke engines, OSMG2692)
- ❑ Propeller (Top Flite Power Point®-refer to your engine’s instructions for proper size)
- ❑ 3' Medium 3/32" Glow Fuel Tubing (GPMQ4131)
- ❑ 1/4" Latex Foam Rubber Padding (HCAQ1000)

Building Supplies & Tools

These are the building tools that are required. *We recommend* ***Great Planes Pro***™ *CA and Epoxy glue.*

- ❑ 2 oz. Pro CA (Thin, GPMR6003)
- ❑ 2 oz. Pro CA+ (Medium, GPMR6009)
- ❑ CA Accelerator (GPMR6035)
- ❑ 6-Minute Pro Epoxy (GPMR6045)
- ❑ 30-Minute Pro Epoxy (GPMR6047)
- ❑ Canopy Glue (JOZR5007)
- ❑ #1 Hobby Knife Handle (HCAR0105)
- ❑ #11 Blades (HCAR0311, 100 Qty)
- ❑ Builders Triangle Set (HCAR0480)
- ❑ Masking Tape (TOPR8018)
- ❑ Electric Power Drill
- ❑ Slip-Joint & Needle Nose Pliers
- ❑ Monofilament String for Stabilizer Alignment
- ❑ Screwdrivers – Flat Blade & Phillips
- ❑ Pro Thread Locking Compound (GPMR6060)
- ❑ Isopropyl Alcohol (70%)
- ❑ Drill Bits: 1/16" [1.5mm], 3/32" [2.5mm], 1/8" [3mm], 9/64" [3.5mm], 3/16" [5mm], 7/32" [5.5mm], 1/4" [6mm], 5/16" [8mm], 1/2" [13mm], #29
- ❑ 8-32 Tap & Drill (GPMR8103)
- ❑ Top Flite Trim Seal Tool™ (TOPR2200)
- ❑ Panel Line Pen (TOPQ2510)
- ❑ Sandpaper (coarse and fine grit)
- ❑ Metal File
- ❑ 3/4 oz. Fiberglass Cloth (HCAR5000)
- ❑ Paper Towels
- ❑ T-Pins (HCAR5100)
- ❑ Silver Solder (GPMR8070)

❑ Electrical Tape or Heat Shrink Tubing
❑ Hobby Heat™ Micro Torch (HCAR0750)
❑ Razor Saw
❑ Petroleum Jelly
❑ 4" White Spinner

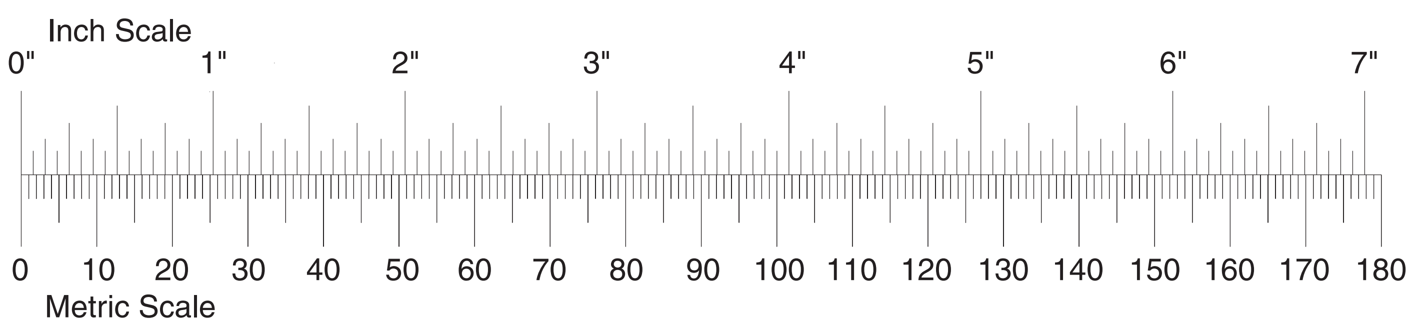
Optional Supplies & Tools

❑ CA Applicator Tips (HCAR3780)
❑ Epoxy Brushes (GPMR8060)
❑ Epoxy Mixing Sticks (GPMR8055, Qty. 50)
❑ CA Debonder (GPMR6039)
❑ Dremel® Moto-Tool™ or Similar with Cut-Off Wheel
❑ Hot Sock™ (TOPR2175)
❑ Dead Center™ Engine Mount Hole Locator (GPMR8130)
❑ Curved Tip Canopy Scissors for Canopy Trimming (HCAR0667)
❑ Switch and Charge Jack (GPMM1000)
❑ Sealing Iron (TOPR2100)
❑ Household Oil
❑ 6 oz. Segmented Lead Weight (GPMQ4485)
❑ C.G. Machine™ (GPMR2400)
❑ Power Point® Balancer (TOPQ5700)
❑ Fingertip Prop Balancer (GPMQ5000)
❑ Fueling System (Great Planes Top Fueler™, GPMQ4160)

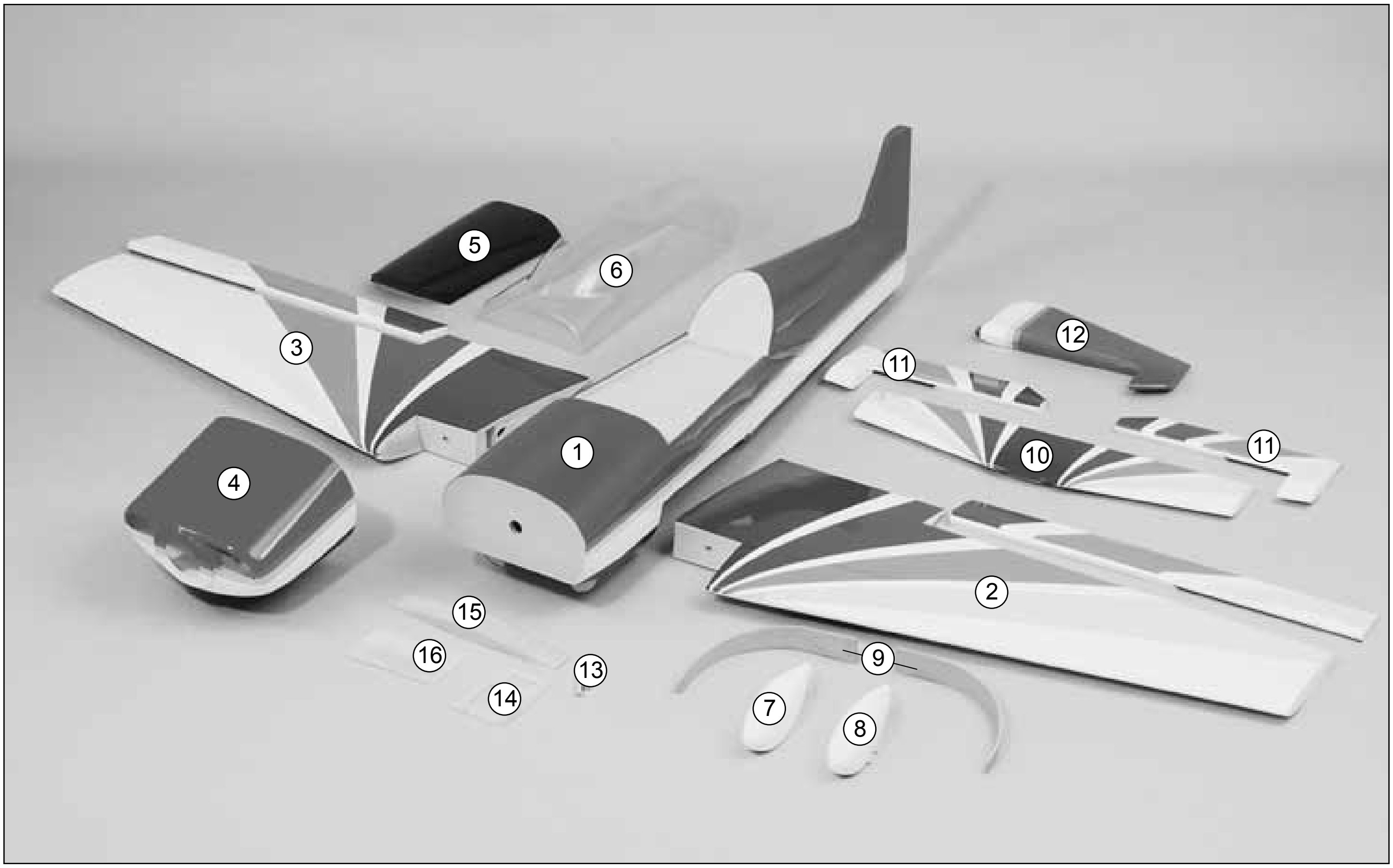
General Inspection

1. Closely inspect the fuselage, wing panels, rudder assembly and stabilizer assembly for damage. If you find any damage, contact the place of purchase, or Hobby Services at Great Planes for a replacement.

2. Eliminate any wrinkles you find in the covering by shrinking them away with a heat gun, then apply pressure to the area with a covering iron and a hot sock. This will securely bond the covering to the wood so the wrinkles will be less likely to reappear in the future. **Caution: Be careful while working around areas where the colors overlap.**



Parts List



Key#	Description	Qty
1	Fuselage	1
2	Left Wing Panel w/Aileron	1
3	Right Wing Panel w/Aileron	1
4	Cowl	1
5	Wing Belly Pan	1
6	Canopy	1
7	Right Wheel Pant	1
8	Left Wheel Pant	1
9	Aluminum Landing Gear (Right & Left)	2
10	Stabilizer	1
11	Elevator Assembly (Right & Left)	2
12	Rudder	1
13	Wing Dowels	2
14	Servo Tray	1
15	Wing Joiner	1
16	Wing Bolt Plate	1

Parts Not Shown In Photo

Description	Qty
Adjustable Engine Mount (Right & Left Halves)	2
Tail Wheel Assembly	1
Main Wheels	2
CA Hinge Strip (2" x 9")	1
Hardware Bag	1

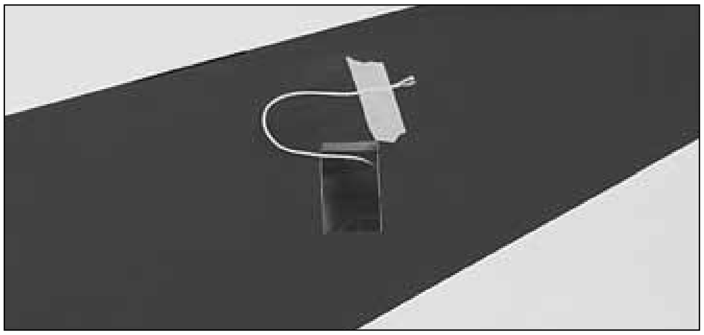
Replacement Parts

If needed, replacement parts for Giles G-202 ARF are available through your hobby supplier.

Wing Set..GPMA2180
Fuselage Kit GPMA2181
Tail Set...GPMA2182
Canopy GPMA2183
Cowl GPMA2184
Wheel Pants...GPMA2185
Landing Gear Set GPMA2186

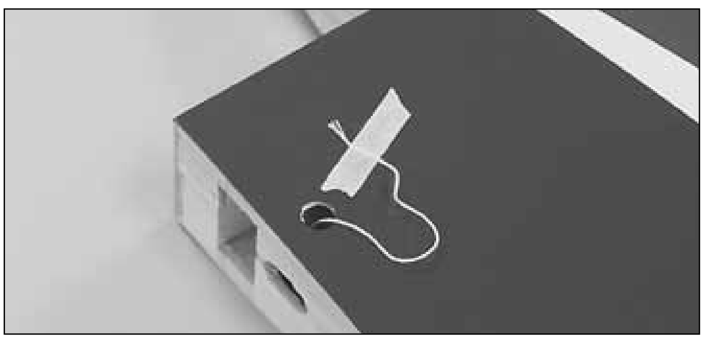
WING ASSEMBLY

Rudder Assembly

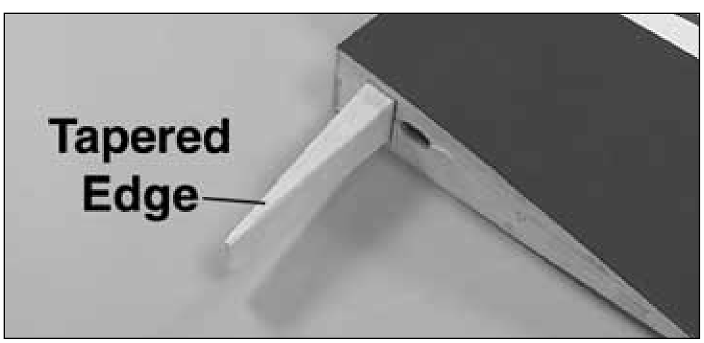


❑ ❑ 1. Locate the servo cut out on the bottom of each wing and cut the covering 1/8" [3mm] inside the edges of the opening in the bottom of the **right wing panel** for the aileron servo. Use your Top Flite MonoKote® Trim Seal Tool™ to seal the covering to the sides of the opening.

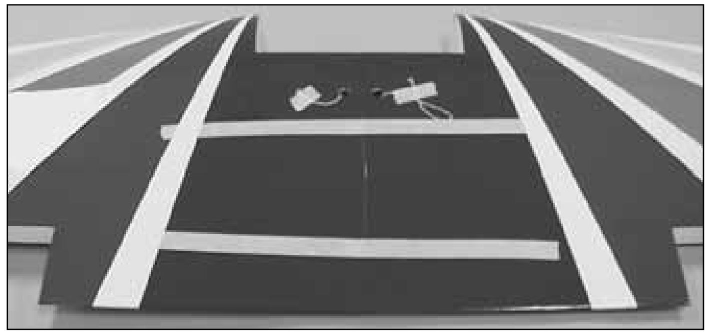
Note: You'll notice a piece of string that passes through the ribs at the location of the aileron servo well. Don't remove the string because you will use it to pull your aileron servo cord through the wing later. Tape the string in place as shown.



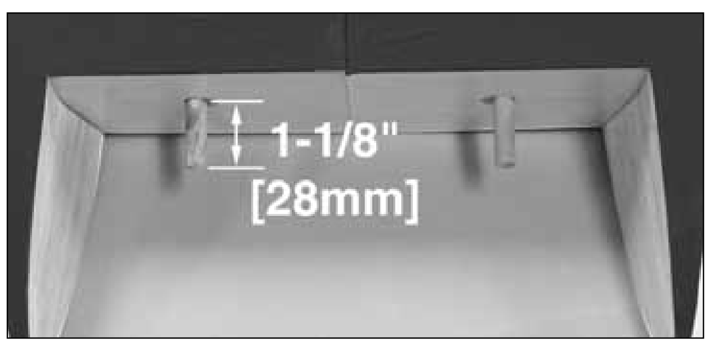
❑ ❑ 2. Locate the hole and cut the covering on the top of the right wing panel for the string to exit. Remove the tape from the wing root, and route it through the opening. Tape the string to the top of the wing.



❑ ❑ 3. Test fit the wing halves with the **wing joiner.** The tapered edge of the joiner faces the leading edge of the wing. If necessary, sand any high spots on the root end of the wing panels so there is **no gap** when you join them.

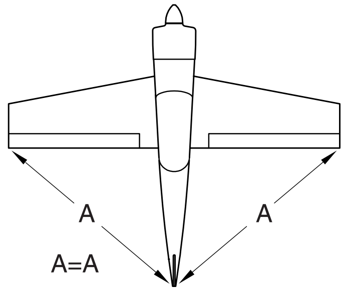


❑ 4. Tape a piece of wax paper or Great Planes Plan Protector™ over your work surface. Thoroughly coat the *joiner pockets* and the mating ends of **both** wing halves with 30-minute epoxy. Set the wing halves aside and proceed quickly. Coat all surfaces of **one half** of the wing joiner with 30-minute epoxy and place it in one of the wing halves. Coat the other half of the joiner with 30-minute epoxy and join the other wing. Use a piece of balsa or cardboard to wipe away excess epoxy. Use masking tape to tape the wing tightly together. Use a paper towel dampened with alcohol to wipe away any more epoxy that oozes out of the wing, then set the wing aside. Do not disturb the wing until the epoxy has fully cured.



❑ 5. Locate the two 5/16" x 3-3/8" [8mm x 86mm] **hardwood wing dowels.** Slightly bevel the ends of the dowels. Test fit the dowels into the wing, making sure they lock into the holes inside the wing. If necessary, drill the holes in the wing using a 5/16" [8mm] drill bit. Use 30-minute epoxy to glue the dowels into the wing, allowing them to protrude 1-1/8" [28mm].

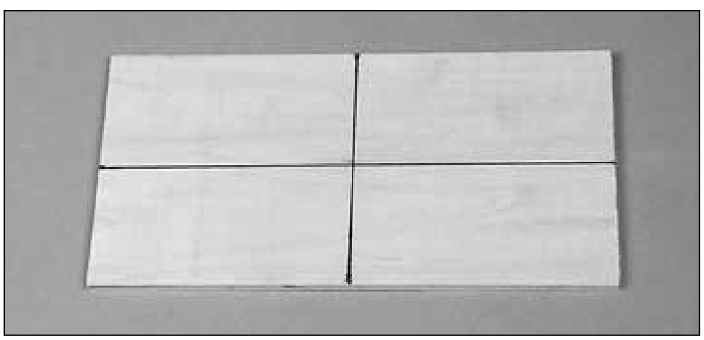
WING INSTALLATION



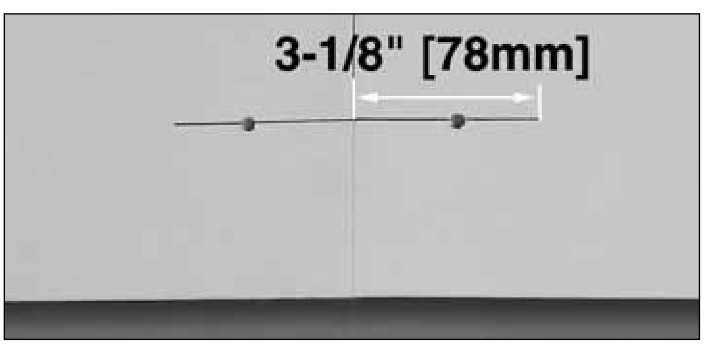
❑ 1. Place the wing on the fuselage. Measure from the aft center of the fuselage to one wing tip and record the distance. Measure from the same point to the opposite wing tip, and compare it to the first measurement. If the measurements are not the same, adjust the wing and re-measure until they are equal. Place a mark on the wing and fuselage so it can be repositioned accurately for the following steps.

❑ 2. Remove the covering from the holes in the wing center-section where the wing bolts will pass through the wing as shown in the photo for step 5.

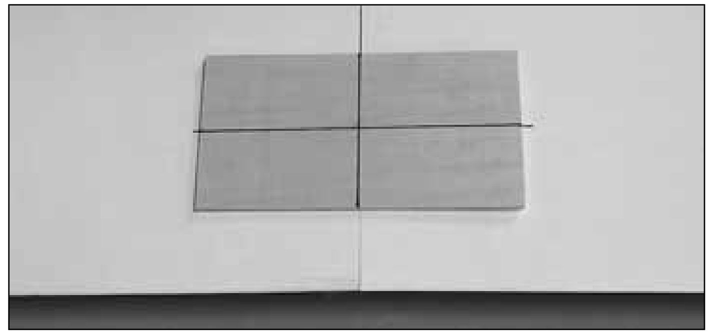
❑ 3. Bolt the wing to the fuselage using the **1/4-20 x 2" nylon bolts.** Enlarge the holes if necessary to allow the bolts to pass through the wing. Check the alignment of the wing and enlarge the holes in the wing if necessary to allow the wing to be shifted to match the alignment marks.



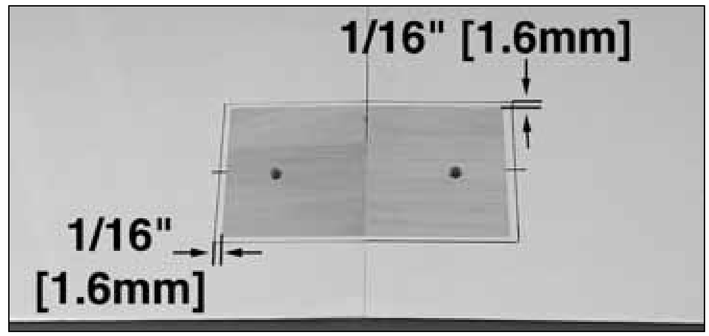
❑ 4. Locate the 1/8" x 6" x 3-1/8" [3mm x 150mm x 78mm] plywood **wing bolt plate.** Draw a vertical and horizontal centerline onto the plate as shown in the photo.



❑ 5. Draw a line 3-1/8" [78mm] to each side of the center of the wing through the center of the bolt holes.

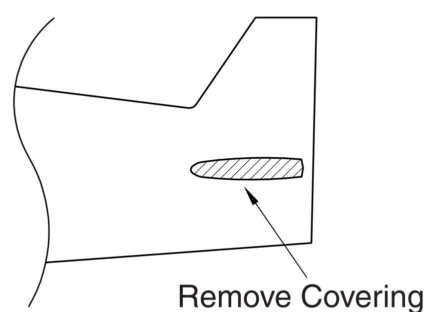


❑ 6. Position the wing bolt plate onto the bottom of the wing. Align the vertical and horizontal centerlines on the plate with the center of the wing and the line drawn through the center of the bolts. Trace around the plate using a felt-tip marker.

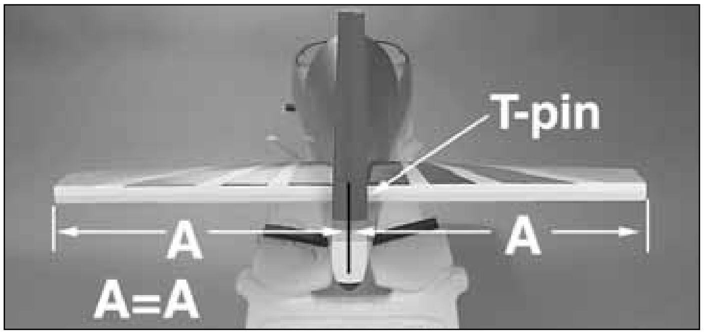


❑ 7. Use a fresh #11 blade to carefully cut through the covering 1/16" [1.5mm] inside the lines. **Do not cut the wood under the covering! This will weaken the structure and may cause failure in flight.** Remove the covering from the wing within the lines you cut. Use medium CA to glue the plate to the wing. Drill the holes for the bolts in the plate from the top of the wing.

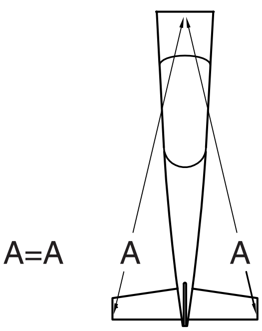
INSTALL THE STABILIZER



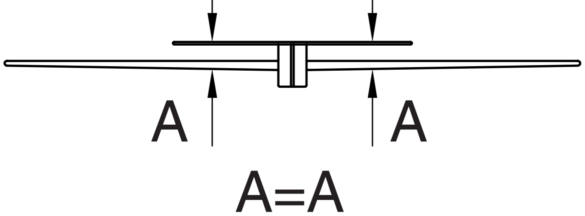
❑ 1. Remove the covering from the fuselage sides in the location for the **horizontal stabilizer.**



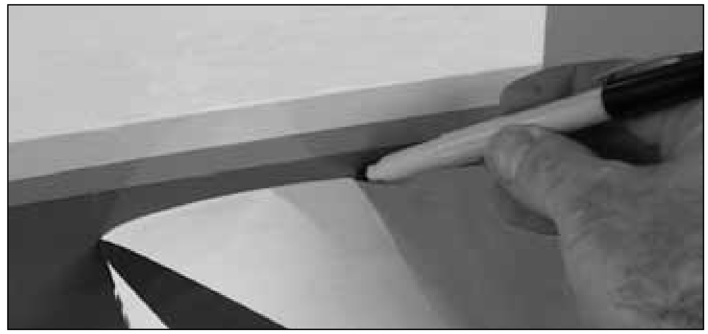
❑ 2. Slide the stabilizer into the fuselage. Center the stabilizer in the fuselage by measuring the distance from the fuselage to the tip of the stabilizer. The stabilizer is centered when the measurements from both sides are equal. Place a T-pin into the stabilizer against the fuselage on one side to allow the stabilizer to be repositioned if it accidentally moves.



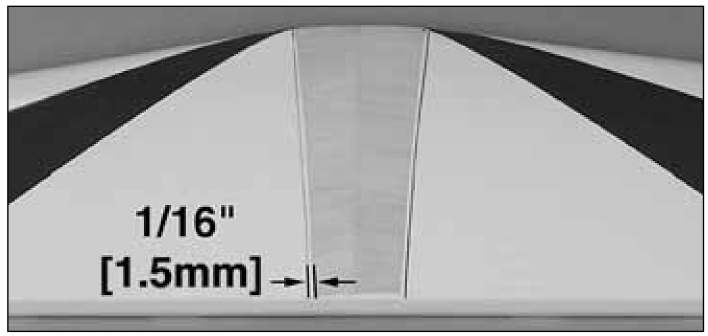
❑ 3. Perform the same technique for aligning the stab as was used for aligning the wing. This time, the center on the fuselage is at the front, rather than the rear. Mark the stab so it can be returned to its aligned location.



❑ 4. Mount the wing to the fuselage using the nylon bolts. Stand back 8 to 10 feet [2.5 to 3 meters] and view the model from the front and rear. The stab tips should be equally spaced above the level of the wing. If not, lightly sand the high side of the stab saddle to correct the problem. Work slowly and check the alignment often.



❑ 5. Use a felt-tip pen to mark the sides of the fuselage on the bottom and top of the stab. Remove the stab from the fuselage.



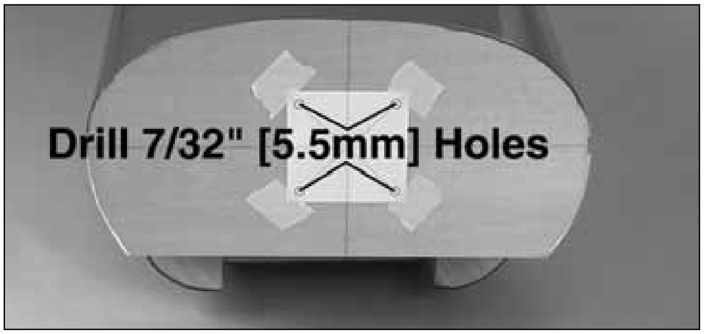
❑ 6. Use a **fresh** #11 blade to carefully cut through the covering 1/16" [1.5mm] inside the lines you marked on the bottom and top of the stab that indicate the fuse sides. **Do not cut the wood under the covering! This will weaken the structure and may cause the stab to fail in flight.** Remove the covering from the center of the stab within the lines you cut.

❑ 7. Use a liberal coating of 30-minute epoxy to glue the stab in position. Hold the stab in position with weights while the epoxy cures. Double check the alignment with the wing and fuse while the epoxy cures.

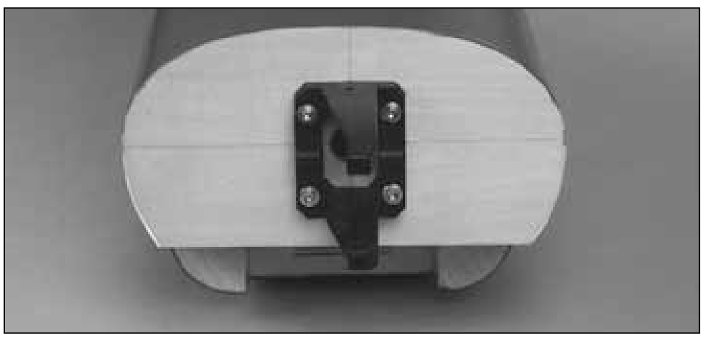
IMPORTANT: Form a thin epoxy fillet along the fuse sides where the epoxy squeezes out to create a fuelproof seal between the stab and fuselage.

ENGINE INSTALLATION

❑ 1. Cut or break the “spreader bar” from each **engine mount half.** Carefully trim any extra material left by the spreader bar from each mount half. The surfaces where the spreader bars were attached must be smooth to allow the mount halves to fit together. Trim the flashing off any rough edges if necessary.



❑ 2. Copy the **engine mount template** from the back page and tape it to the firewall as shown. At the locations on the template, drill four 7/32" [5.5mm] holes in the firewall for the engine mount blind nuts.



❑ 3. Install four **8-32 blind nuts** to the inside of the firewall. Pull the blind nuts into the back side of the firewall using 8-32 socket head cap screws with a flat washer under the head of each screw. Fit the two halves of the Engine Mount together. Use four **#8 flat washers** and four **8-32 x 1" socket head cap screws** to secure the engine mount to the firewall. Do not tighten the screws at this time, as the mount must be adjusted for the engine.

❑ 4. Test fit your engine into the mount. Adjust the width of the rails to fit the engine snugly. Tighten the mount screws to allow marking the engine mounting holes without moving the rails.

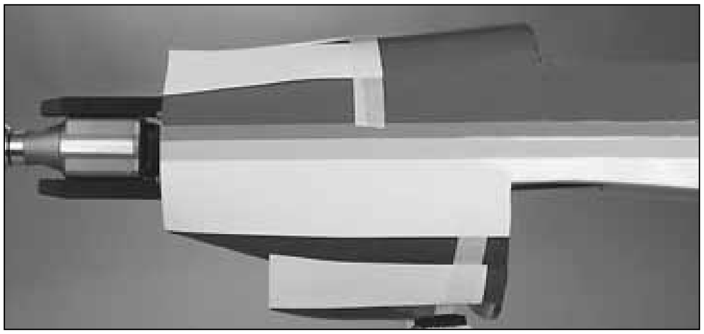
❑ 5. Position the engine on the engine mount rails so the propeller thrust washer is 5-3/4" [136mm] ahead of the firewall. Use a Great Planes Dead Center Hole Locator (GPMR8130) (not included) or a sharpened piece of wire to scribe the four engine mount holes onto the rails. Use a center punch at the marks to prevent the drill bit from wandering, then drill #29 pilot holes through the rails. Be sure to hold the drill perpendicular to the rails. If you have access to a drill press, this is a good tool for this purpose. Use an 8-32 tap to tap the holes for the 8-32 screws. Use four 8-32 x 1" socket head cap screws to secure the engine to the mount.

❑ 6. Drill a 3/16" [5mm] hole in the firewall for the throttle pushrod. The hole location will depend on whether you are installing a 2-stroke or 4-stroke engine.

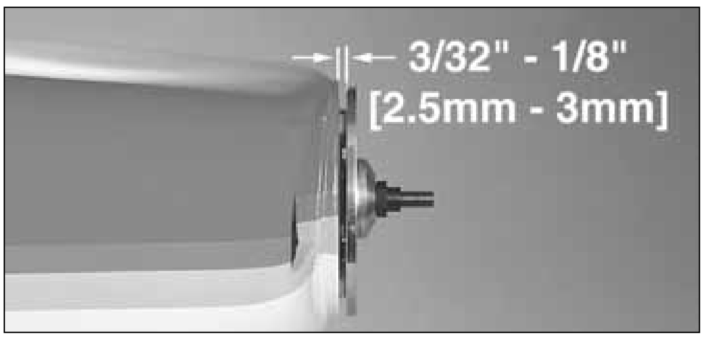
❑ 7. Roughen the outside surface of the 36" [910mm] **throttle pushrod tube** with coarse grit sandpaper. Insert the pushrod tube through the hole in the firewall. Push it in until it protrudes 1" [25mm] in front of the firewall. Use medium CA to glue the tube to the firewall, but leave it free inside the fuselage until the servos are installed.

Note: The engine has been removed from the above picture for clarity.

COWLING INSTALLATION



❑ 1. Use thin cardboard or plastic to make templates locating the firewall and forward fuselage.



❑ 2. Slide the **cowl** over the engine and fuselage. Install the spinner backplate and center the cowl 3/32" to 1/8" [2.5mm to 3mm] behind the spinner backplate. Tape the cowl in position and place four marks (two on each side of the cowl) for the cowl mounting screws using the templates.

❑ 3. Drill a 3/32" [2.5mm] hole through the cowl and fuse at each mark. Remove the cowl and enlarge the holes in the **cowl only** to 1/8" [3mm]. With the cowl removed, apply a couple of drops of thin CA to the cowl mounting holes in the fuse to harden the wood. This will prevent the holes from stripping out during flight. After the CA has cured, attach the cowl to the fuse with four **#4 washers** and four **#4 x 5/8" sheet metal screws.**

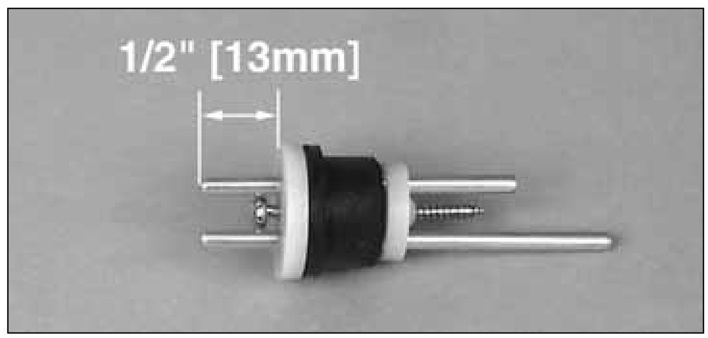
❑ 4. Remove the cowl and use a piece of thin cardboard or plastic to make templates for the cutout in the cowl for the glow plug, needle valve and exhaust. Tape the templates to the fuselage side, accurately indicating the position of the cylinder head.

❑ 5. Remove the engine and install the cowl. Transfer the glow plug, needle valve and exhaust holes from the templates onto the cowl.

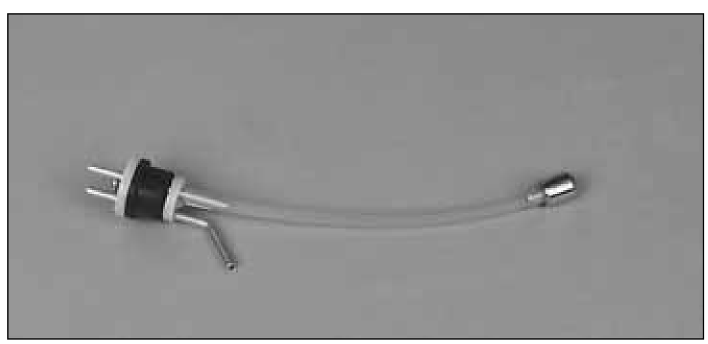
❑ 6. Remove the cowl and templates, then remount the engine. Cut out the holes in the cowl, then test fit it to the fuselage. You may want to make the cuts slightly smaller than the template outline to allow for adjustment. Adjust the position and size of the holes as needed.

FUEL TANK INSTALLATION

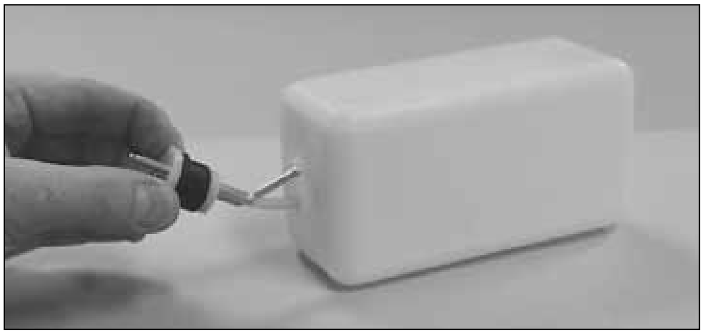
Note: There are three holes in the fuel tank stopper but only two are used for this model. Do not puncture the third hole in the stopper.



❑ 1. Push one **short aluminum tube** and one **long aluminum tube** through the **rubber stopper** until 1/2" [13mm] of the tubes protrudes from the front of the stopper. Slide the **large** cap onto the front of the stopper, and the **small cap** onto the back. Insert the **stopper screw** into the center hole in the front cap, then screw it through the stopper into the aft stopper cap. Just start the threads in the aft cap or you won't be able to insert the stopper into the tank.



❑ 2. Push one end of the **silicone pickup tube** all the way onto the **clunk,** and the other end all the way onto the short aluminum tube. Bend the long aluminum (vent) tube upward at about a 45º angle, being careful not to kink the tube.

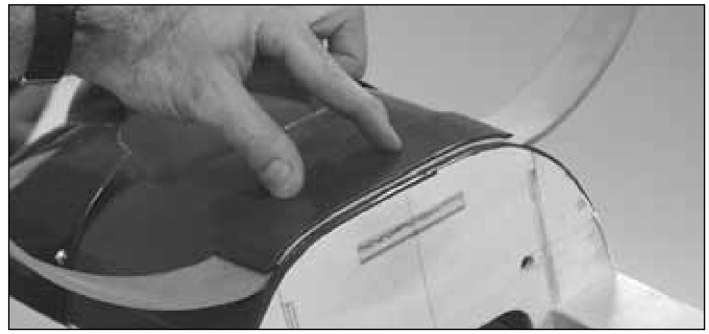


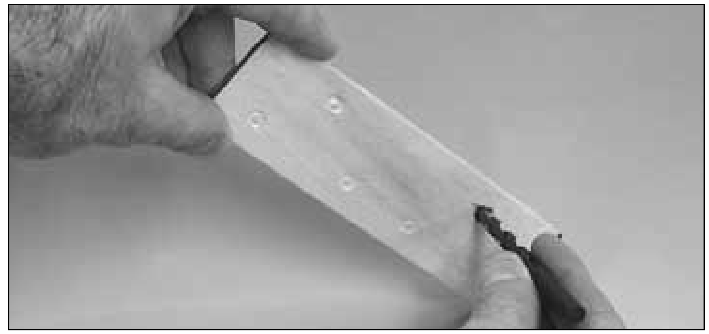
❑ 3. Test fit the stopper into the **fuel tank.** The seam around the tank should be vertical. By holding the tank up to the light you will be able to see where the vent tube is, in relation to the top of the tank. If necessary, bend the vent tube to position it about 1/8" [3mm] below the top of the tank. When satisfied with the fit, make sure the stopper is fully seated in the fuel tank. Tighten the stopper screw until the plastic cap is indented about 1/16" [1.5mm]. Doing so will lock the stopper into position. Check the clunk and pickup tube to make sure they move freely in the tank without binding or stopping.

❑ 4. Cut a piece of 1/4" [6mm] thick foam rubber to 5-1/2" x 2" [14mm x 50mm]. Place the foam onto the tank floor inside the fuselage. Before installing the tank, make sure the bent vent tube points toward the top of the fuselage. Apply a bead of 100% silicone sealer around the sides of the rubber stopper and the front edge of the fuel tank. Insert the tank fully into the tank compartment while working the stopper into the hole in the firewall. The silicone will seal the opening and help hold the tank in position after it has cured. Use two or three #64 rubber bands at the aft end of the tank to secure it to the tank floor.

MAIN LANDING GEAR INSTALLATION

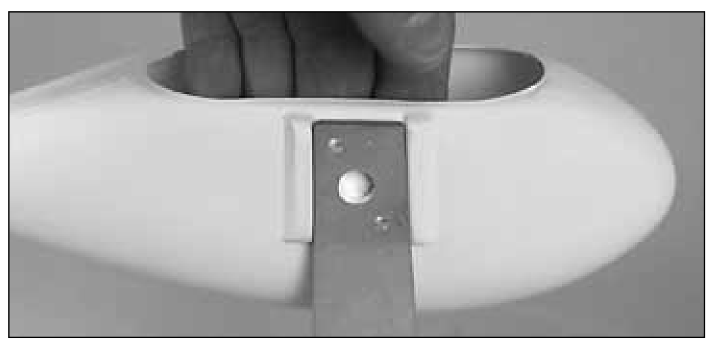
❑ 1. Locate the two **aluminum main gear** and secure them to the fuselage using six **#6 washers** and six **6-32 x 5/8" socket head cap screws.** Use thread locking compound on the screws to prevent them from loosening during flight.





❑ ❑ 2. Press the **landing gear cover** onto the bolts to transfer their locations onto the cover. Remove the cover, and remove the material from the locations to allow the cover to set flush with the fuselage. A 1/4" [6mm] drill bit works well for this step.

❑ ❑ 3. Glue the landing gear cover into position using medium CA or 6-minute epoxy. (You did use thread locking compound on those six bolts?)

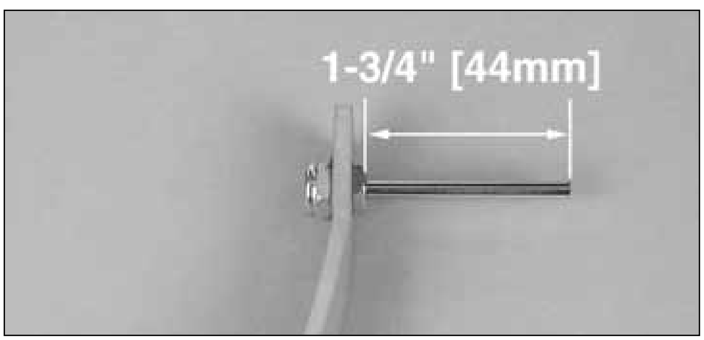


❑ ❑ 4. Position the **wheel pant** onto the landing gear. The bottom of the gear will be flush with the pant locks as shown in the photo. Use a felt-tip marker to transfer the locations of the holes in the landing gear onto the wheel pants.

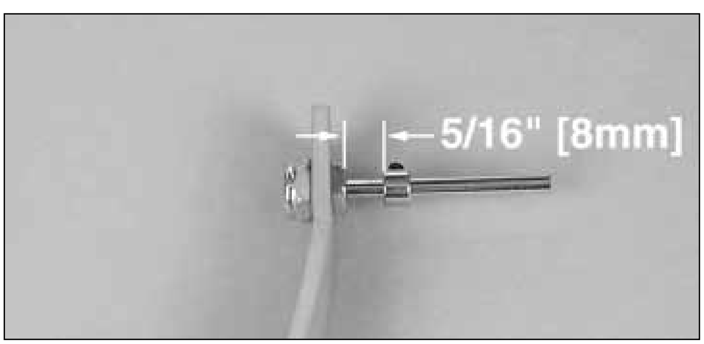
❑ ❑ 5. Drill the locations marked onto the wheel pants. Use a 1/8" [3mm] drill bit for the two smaller holes. The larger hole is drilled using a 1/2" [13mm] drill bit.

❑ ❑ 6. Glue two pieces of 1/8" x 3/8" x 3/8" [3mm x 9.5mm x 9.5mm] plywood behind the two 1/8" [3mm] holes using 6-minute epoxy. Make sure the plywood does not extend into the larger hole.

❑ ❑ 7. Use a 1/8" [3mm] drill bit to re-drill the small holes through the plywood backing plates. Press two 4-40 blind nuts into the holes in the plywood plates.



❑ ❑ 8. Attach a 5/32" **axle** to the landing gear using a **5/16" x 24 locking nut.** Trim the length of the axle to 1-3/4" [44mm] as shown.

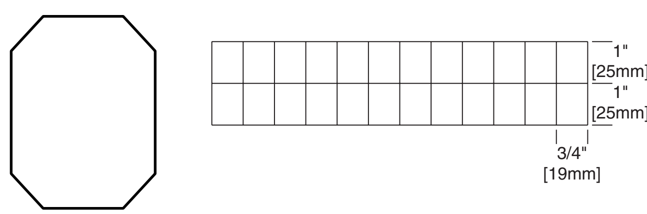


❑ ❑ 9. File a flat spot along the bottom of the axle. This provides a better area for the set screw to bite and helps keep the wheel in place. Slide a **5/32" wheel collar** onto the axle. Thread a **6-32 set screw** into the wheel collar base, and secure the collar in position 5/16" [8mm] from the hex on the axle as shown.

❑ ❑ 10. Slide the wheel pant, **wheel** and a 5/32" wheel collar onto the axle. Use two **4-40 x 3/8" machine screws** to secure the wheel pant to the landing gear. Use a 6-32 set screw to secure the wheel collar to the axle. Check to make sure the wheel rotates without binding on the wheel pant. If not, loosen the set screws on the wheel collars and adjust the position of the wheel.

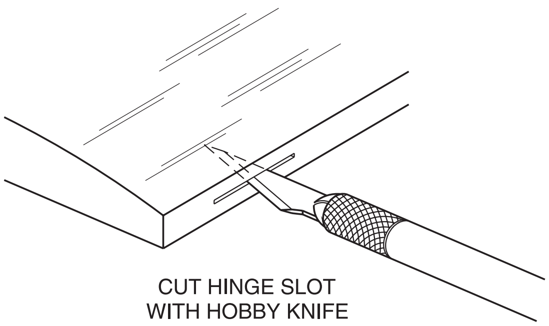
RADIO INSTALLATION

Attach the Ailerons



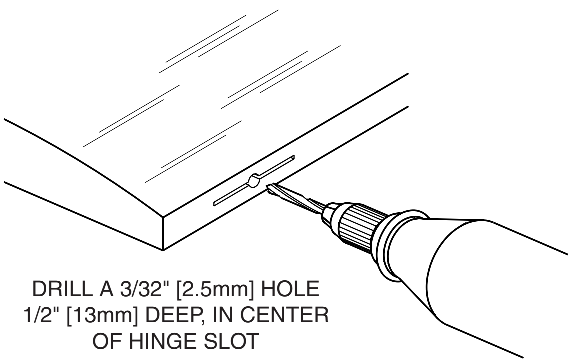
❑ 1. Cut eight 3/4" x 1" [19mm x 25mm] hinges from the **CA hinge strip** supplied with this kit. Snip the corners off so they go into the slots easier. You may cut all the hinges now, or cut them as you need them.

Before you glue in the hinges, apply a few drops of household oil to a tissue. Wipe the tissue over the trailing edge of the wing and the leading edge of the ailerons, coating them with a fine film of oil. This will prevent excess CA, you use for gluing in the hinges, from sticking to the wing and ailerons at the hinge gap.



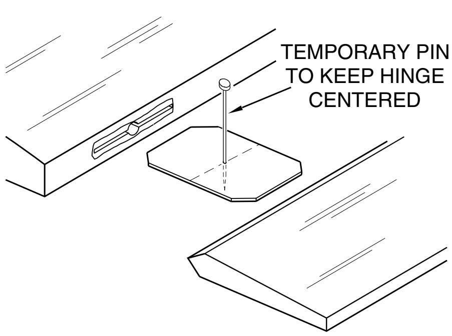
CUT HINGE SLOT
WITH HOBBY KNIFE
AND #11 BLADE

❑ ❑ 2. Test fit the ailerons to the wing. If the hinges are difficult to install or don't go in far enough, carefully enlarge the hinge slots with a hobby knife and a #11 blade.



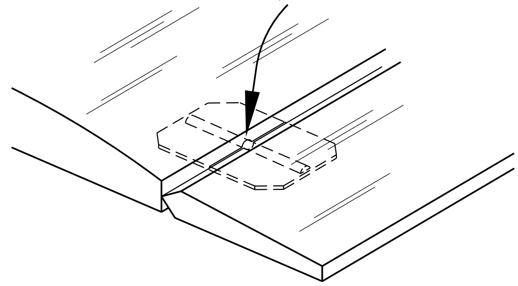
DRILL A 3/32" [2.5mm] HOLE
1/2" [13mm] DEEP, IN CENTER
OF HINGE SLOT

❑ ❑ 3. Drill a 3/32" [2.5mm] hole, 1/2" [13mm] deep, in the center of the hinge slot. If you use a Dremel® MultiPro™ for this task, it will result in a cleaner hole than if you use a slower speed drill. Drilling the hole will twist some of the wood fibers into the slot, making it difficult to insert the hinge, so you should reinsert the knife blade, working it back and forth a few times to clean out the slot.

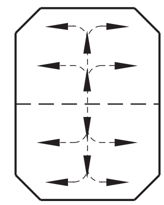


❑ ❑ 4. If the hinges don't remain centered, remove the aileron and insert a pin in the center of the hinges.

ASSEMBLE, THEN APPLY 6 DROPS
OF THIN CA TO CENTER
OF HINGE, ON BOTH SIDES

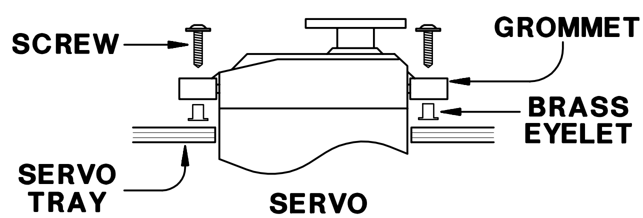


THE CA WICKS
ALONG THE "TUNNELS"
TO THE ENTIRE
HINGE SURFACE



❑ ❑ 5. Cut a paper towel into approximately 2" [50mm] squares. Add six drops of thin CA to the center of the hinges on both sides. Use the paper towel squares to absorb excess CA from the hinge gap before it cures. Do not use CA accelerator; allow the CA to cure slowly.

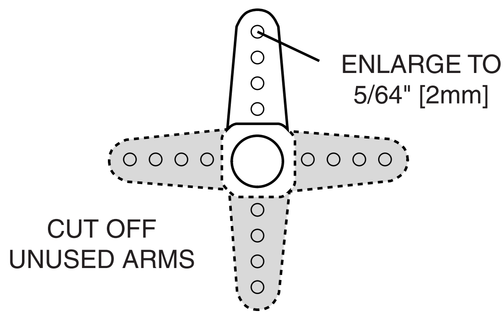
Install the Aileron Servos



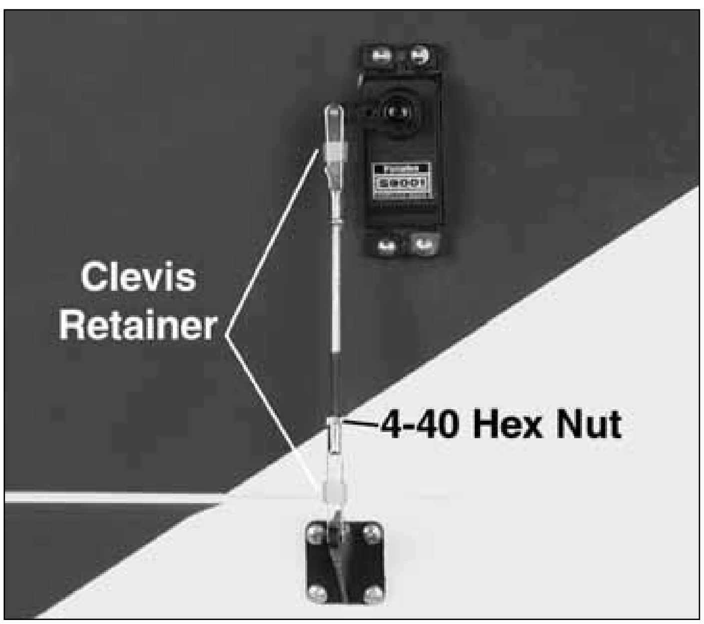
❑ ❑ 1. Install the rubber grommets and eyelets on your aileron servos. Attach a servo extension to the aileron servo. Use heat shrink tubing or electrical tape to secure the servo lead to the extension so they don't unplug in flight. Tie the string to the servo cord on one of the aileron servos.

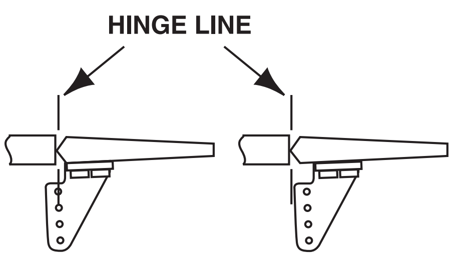
❑ ❑ 2. Fit the aileron servo in the wing. Hold the servo to the wing so the sides don't contact the wing and drill 1/16" [1.5mm] holes for the servo mounting screws. Remove the servo and wick a few drops of thin CA into each of the four holes. Mount the servo to the wing with the screws included with your servos.

❑ ❑ 3. Mount your other aileron servo in the opposite wing panel using the same procedures as above.



❑ ❑ 4. Cut the unused arms from one of your servo horns and mount it on one of your aileron servos in the wing. The remaining arm faces the tip of the wing.



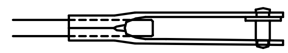


❑ ❑ 5. Hold the **control horn** on the aileron, making sure the holes align with the hinge gap. The horn must also rest on the plywood plate installed in the aileron. Use the control horn as a template to drill 3/32" [2.5mm] holes in the aileron for the mounting screws.

❑ ❑ 6. Screw the **#4 x 5/8" self-tapping screws** into the holes. Remove the screws, and apply three drops of thin CA to each hole drilled to harden the underlying plywood. Re-attach the control horns using the #4 x 5/8" self-tapping screws.

❑ ❑ 7. Thread a **4-40 hex nut** and a **4-40 threaded clevis** onto the threaded end of the pushrod wire. Attach the clevis to the control horn.

❑ ❑ 8. Use a felt-tip pen to mark the pushrod wire where it crosses the holes in the aileron servo arm. Cut the pushrod wire 3/4" [19mm] behind the mark.



❑ ❑ 9. Locate a **solder clevis.** Use the following sequence to solder the clevis to the pushrod:

❑ ❑ A. Lightly sand the pushrod and clean it with alcohol.

❑ ❑ B. Insert the pushrod into the non-threaded clevis. The wire should protrude 1/16" [1.5mm] inside the forks of the clevis.

❑ ❑ C. Apply a small amount of soldering flux to the joint.

❑ ❑ D. Apply heat evenly to the pushrod and the clevis and then touch the solder to the joint and allow it to flow.

❑ ❑ E. Allow the pushrod and clevis to cool slowly before continuing.

❑ ❑ 10. Place a **clevis retainer** onto both of the clevises. Attach the pushrod to the servo and control horn.

❑ 11. Return to step 4 and connect the other aileron servo to the other aileron the same way.

❑ 12. Turn the wing over. Use the string out of the 1/2" [13mm] holes in the center-section of the wing to retrieve your aileron servo cords.

Attach the Elevators

Note: The procedure for installing the elevators to the stabilizer is similar to the installation of the ailerons.

❑ 1. Cut six 3/4" x 1" [19mm x 25mm] hinges from the CA hinge strip supplied with this kit. Snip the corners off so they go into the slots easier. You may cut all the hinges now, or cut them as you need them.

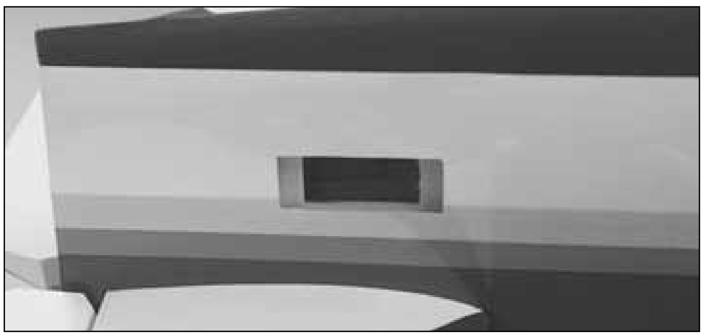
❑ 2. Test fit the elevators to the stabilizer. If the hinges are difficult to install or don't go in far enough, carefully enlarge the hinge slots with a hobby knife and a #11 blade.

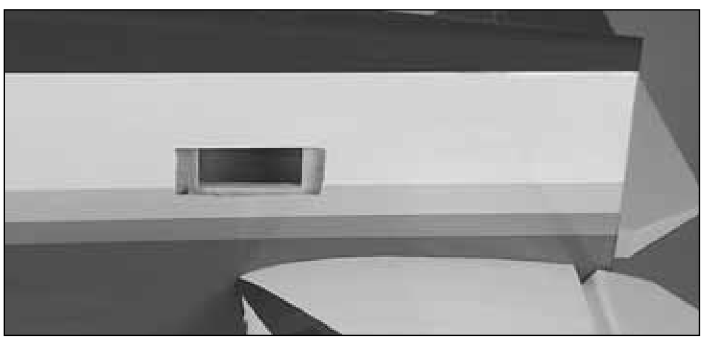
❑ 3. Drill a 3/32" [2.5mm] hole, 1/2" [13mm] deep, in the center of the hinge slot. If you use a Dremel MultiPro for this task, it will result in a cleaner hole than if you use a slower speed drill. Drilling the hole will twist some of the wood fibers into the slot, making it difficult to insert the hinge, so you should reinsert the knife blade, working it back and forth a few times to clean out the slot.

❑ 4. If the hinges don't remain centered, remove the elevator and insert a pin in the center of the hinges.

❑ 5. Cut a paper towel into approximately 2" [50mm] squares. Add six drops of thin CA to the center of the hinges on both sides. Use the paper towel squares to absorb excess CA from the hinge gap before it cures. Do not use CA accelerator; allow the CA to cure slowly.

Install the Elevator Servos

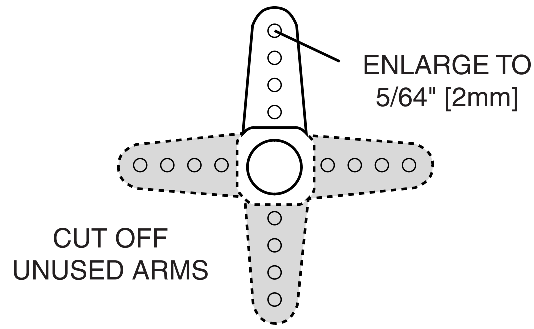




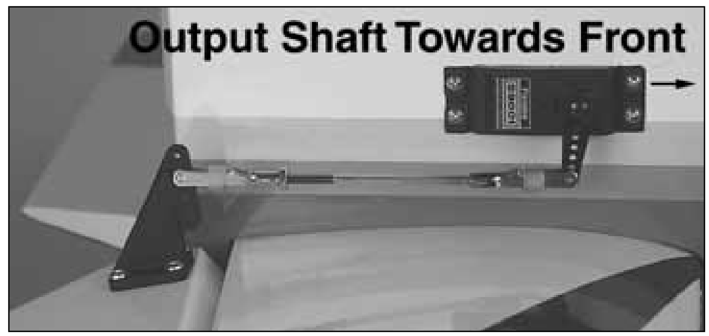
❑ 1. Locate the servo holes and remove the covering from the sides of the fuselage using a sharp hobby knife. Do not cut into the underlying wood, as this will weaken the structure and could cause a failure it flight. Seal down the edges with the Trim Seal Tool. Use 6-minute epoxy to fuelproof any exposed wood.

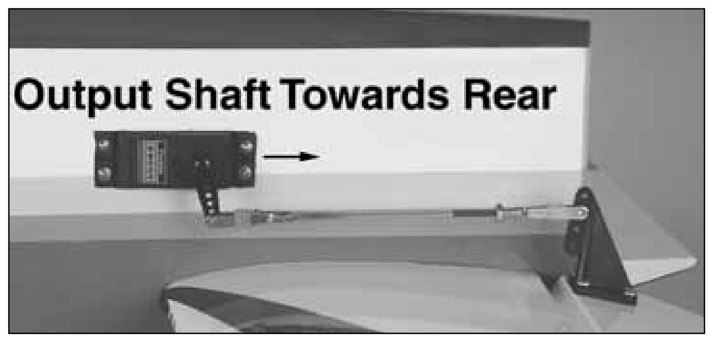
❑ 2. Install the rubber grommets and eyelets on your elevator servos. Attach a servo extension to the elevator servo. Use heat shrink tubing or electrical tape to secure the servo lead to the extension so they don't unplug in flight. Drop the extension into the fuselage.

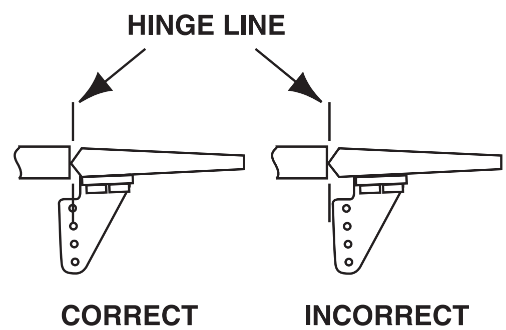
❑ ❑ 3. Fit the elevator servo in the fuselage. Hold the servo to the fuselage so the sides don't contact the fuselage and drill 1/16" [1.5mm] holes for the servo mounting screws. Remove the servo and wick a few drops of thin CA into each of the four holes. Mount the servo to the fuselage with the screws included with your servos.



❑ ❑ 4. Cut the unused arms from one of your servo horns and mount it on one of your elevator servos. The remaining arm faces the bottom of the stabilizer.





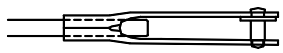


❑ ❑ 5. Hold the control horn on the elevator, making sure the holes align with the hinge gap. The horn must also rest on the plywood plate installed in the elevator. Use the control horn as a template to drill 3/32" [2.5mm] holes in the elevator for the mounting screws.

❑ ❑ 6. Screw the #4 x 5/8" self-tapping screws into the holes. Remove the screws, and apply three drops of thin CA to each hole drilled to harden the underlying plywood. Re-attach the control horns using the #4 x 5/8" self-tapping screws.

❑ ❑ 7. Thread a 4-40 hex nut and a 4-40 clevis onto the threaded end of the pushrod wire. Attach the clevis to the control horn.

❑ ❑ 8. Use a felt-tip pen to mark the pushrod wire where it crosses the holes in the aileron servo arm. Cut the pushrod wire 3/4" [19mm] behind the mark.



❑ ❑ 9. Locate a solder clevis. Use the following sequence to solder the clevis to the pushrod:

❑ ❑ A. Lightly sand the pushrod and clean it with alcohol.

❑ ❑ B. Insert the pushrod into the non-threaded clevis. The wire should protrude 1/16" [1.5mm] inside the forks of the clevis.

❑ ❑ C. Apply a small amount of soldering flux to the joint.

❑ ❑ D. Apply heat evenly to the pushrod and the clevis and then touch the solder to the joint and allow it to flow.

❑ ❑ E. Allow the pushrod and clevis to cool slowly before continuing.

❑ ❑ 10. Place a clevis retainer onto both of the clevises. Attach the pushrod to the servo and control horn.

❑ 11. Return to step 3 and connect the other elevator servo to the other elevator the same way.

Attach the Rudder

Note: The procedure for installing the rudder to the fin is similar to the installation of the elevators.

❑ 1. Cut two 3/4" x 1" [19mm x 25mm] hinges from the CA hinge strip supplied with this kit. Cut one 1-1/2" x 1" [38mm x 25mm] hinges from the CA hinge strip supplied with this kit. This larger hinge is used as the bottom hinge on the rudder. The hinge is positioned vertically in the slot. Snip the corners off so they go into the slots easier.

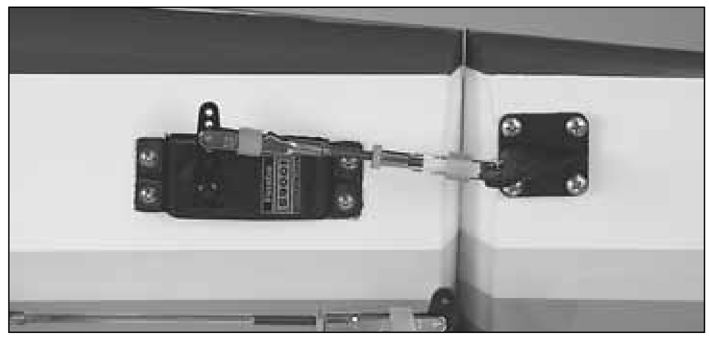
❑ 2. Test fit the rudder to the fin. If the hinges are difficult to install or don't go in far enough, carefully enlarge the hinge slots with a hobby knife and a #11 blade.

❑ 3. Drill a 3/32" [2.5mm] hole, 1/2" [13mm] deep, in the center of the hinge slot. Drill two evenly spaced holes for the bottom hinge. If you use a Dremel MultiPro for this task, it will result in a cleaner hole than if you use a slower speed drill. Drilling the hole will twist some of the wood fibers into the slot, making it difficult to insert the hinge, so you should reinsert the knife blade, working it back and forth a few times to clean out the slot.

❑ 4. If the hinges don't remain centered, remove the rudder and insert a pin in the center of the hinges.

❑ 5. Cut a paper towel into approximately 2" [50mm] squares. Add six drops of thin CA to the center of the hinges on both sides. Use the paper towel squares to absorb excess CA from the hinge gap before it cures. Do not use CA accelerator; allow the CA to cure slowly.

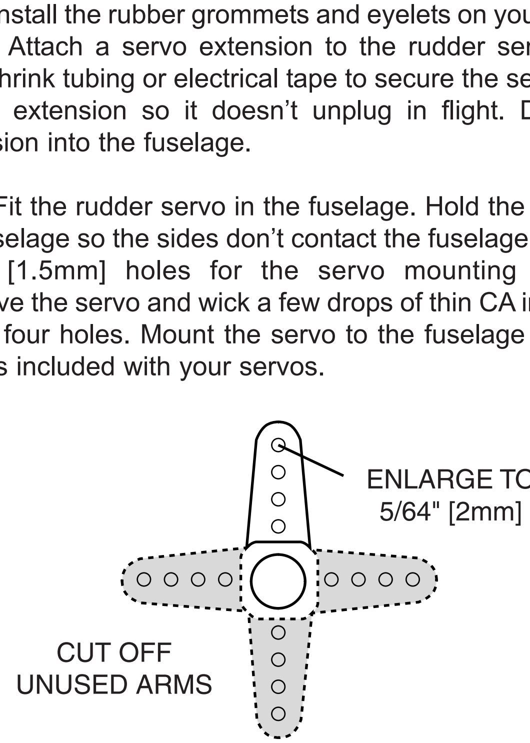
Install the Rudder Servo



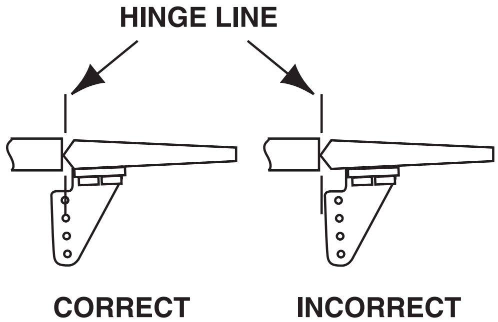
❑ 1. Locate the hole for the Rudder Servo and remove the covering from the side of the fuselage using a sharp hobby knife. Do not cut into the underlying wood, as this will weaken the structure and could cause a failure in flight. Seal down the edges with the Trim Seal Tool. Use 6-minute epoxy to fuelproof any exposed wood.

❑ 2. Install the rubber grommets and eyelets on your rudder servo. Attach a servo extension to the rudder servo. Use heat shrink tubing or electrical tape to secure the servo lead to the extension so it doesn't unplug in flight. Drop the extension into the fuselage.

❑ 3. Fit the rudder servo in the fuselage. Hold the servo to the fuselage so the sides don't contact the fuselage and drill 1/16" [1.5mm] holes for the servo mounting screws. Remove the servo and wick a few drops of thin CA into each of the four holes. Mount the servo to the fuselage with the screws included with your servos.



❑ 4. Cut the unused arms from one of your servo horns and mount it to your rudder servo. The remaining arm faces the bottom of the fuselage.

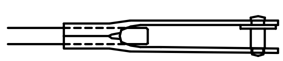


❑ 5. Hold the control horn on the rudder, making sure the holes align with the hinge gap. The horn must also rest on the plywood plate installed in the rudder. Use the control horn as a template to drill 3/32" [2.5mm] holes in the rudder for the mounting screws.

❑ 6. Screw the #4 x 5/8" self-tapping screws into the holes. Remove the screws, and apply three drops of thin CA to each hole drilled to harden the underlying plywood. Re-attach the control horns using the #4 x 5/8" self-tapping screws.

❑ 7. Thread a 4-40 hex nut and a 4-40 clevis onto the threaded end of the pushrod wire. Attach the clevis to the control horn.

❑ 8. Use a felt-tip pen to mark the pushrod wire where it crosses the holes in the aileron servo arm. Cut the pushrod wire 3/4" [19mm] behind the mark.



❑ 9. Locate a solder clevis. Use the following sequence to solder the clevis to the pushrod:

❑ A. Lightly sand the pushrod and clean it with alcohol.

❑ B. Insert the pushrod into the non-threaded clevis. The wire should protrude 1/16" [1.5mm] inside the forks of the clevis.

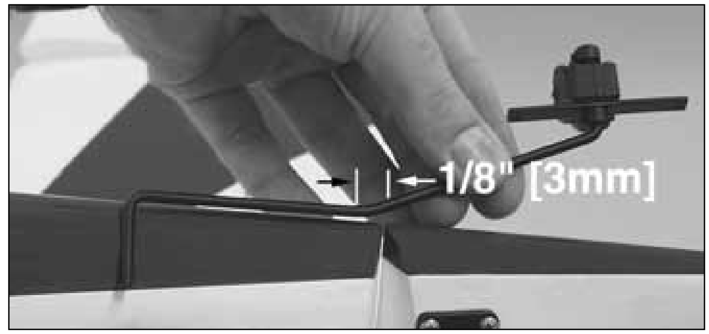
❑ C. Apply a small amount of soldering flux to the joint.

❑ D. Apply heat evenly to the pushrod and the clevis and then touch the solder to the joint and allow it to flow.

❑ E. Allow the pushrod and clevis to cool slowly before continuing.

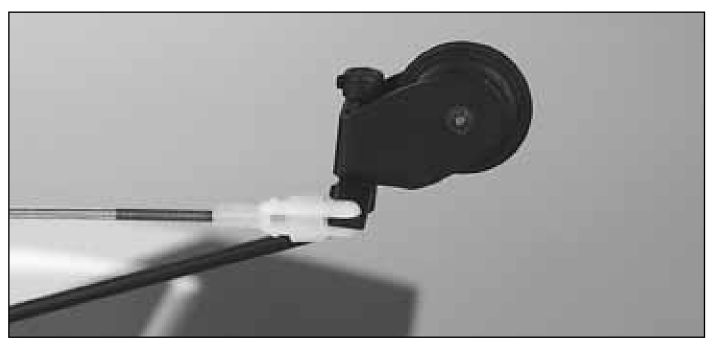
❑ 10. Place a clevis retainer onto both of the clevises. Attach the pushrod to the servo and control horn.

Tail Gear Installation

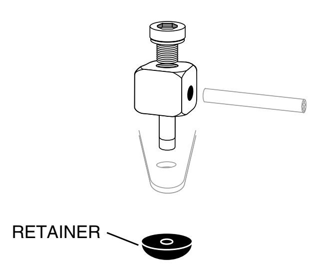


❑ 1. Locate the **tail gear assembly.** Position the assembly so the bend is 1/8" [3mm] in front of the hinge line on the rudder. Mark the fuselage where the gear assembly will enter the fuselage. Drill the location using a 9/64" [3.5mm] drill bit.

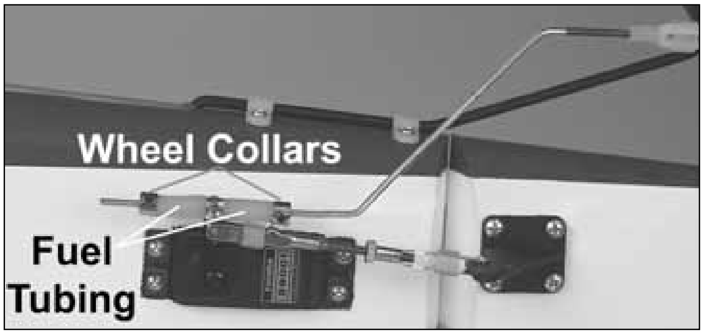
❑ 2. Attach the tail gear to the fuselage using two **nylon landing gear straps** and four **#2 x1/2" sheet metal screws.**



❑ 3. Thread a **nylon clevis** 14 turns onto a **2-56 x 12" pushrod wire**. Slide a clevis retainer onto the clevis and attach the clevis to the tail wheel steering arm.

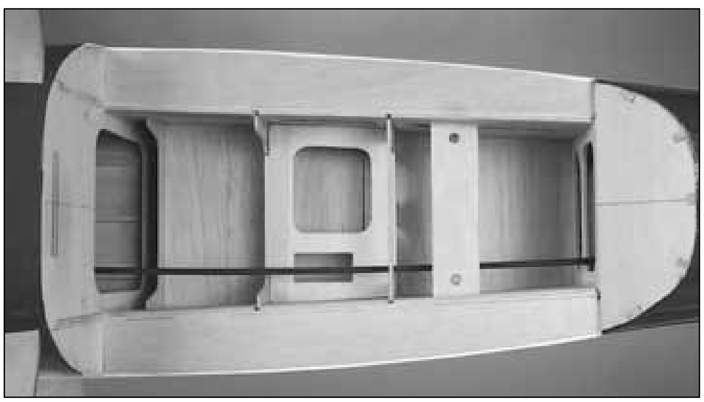


❑ 4. Install a brass **screw-lock pushrod connector** on the rudder servo horn. Snap the **nylon retainer** onto the pushrod connector post beneath the servo horn.

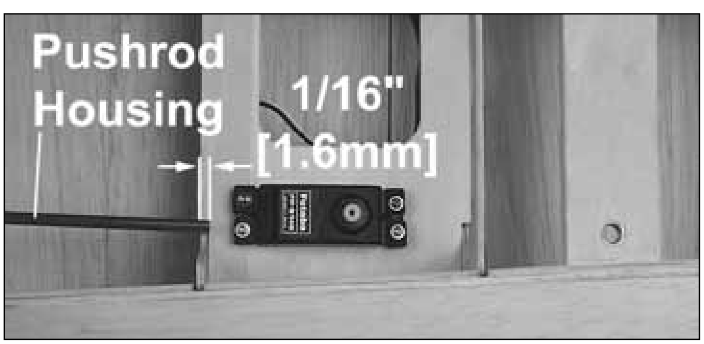


❑ 5. Make a 45º bend in the pushrod wire just after the threads. Make another 45º bend so the remaining pushrod wire will pass through the pushrod connector. Slide a **1/16" wheel collar** onto the pushrod wire. Cut a 1/2" [13mm] length of medium fuel tubing and slide it onto the wire. Slide the wire through the pushrod connector. Slide another piece of 1/2" [13mm] long fuel tubing onto the wire, then a 1/16" wheel collar. File a flat spot onto the wire. This provides a better area for the set screw to bite and helps keep the wheel collars in place. Center the rudder servo and tail wheel and secure the position of the wheel collars against the fuel tubing using two **4-40 set screws.**

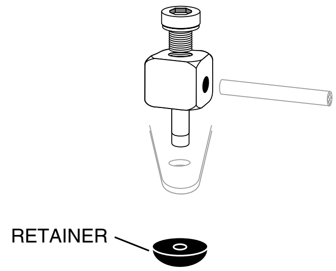
Throttle Servo Installation

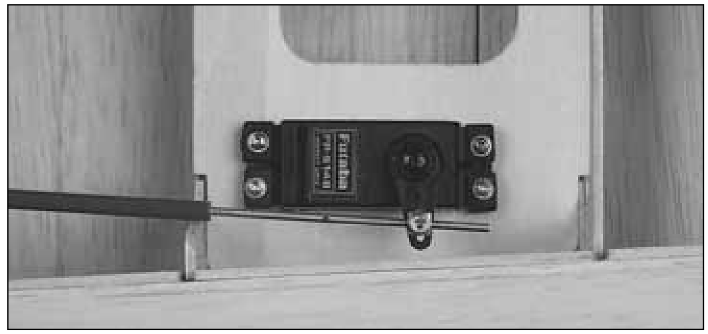


❑ 1. Locate the plywood servo tray. Test fit the tray into position, sanding as necessary for a good fit. Use 6-minute epoxy to glue the tray to the formers and fuselage sides as shown.

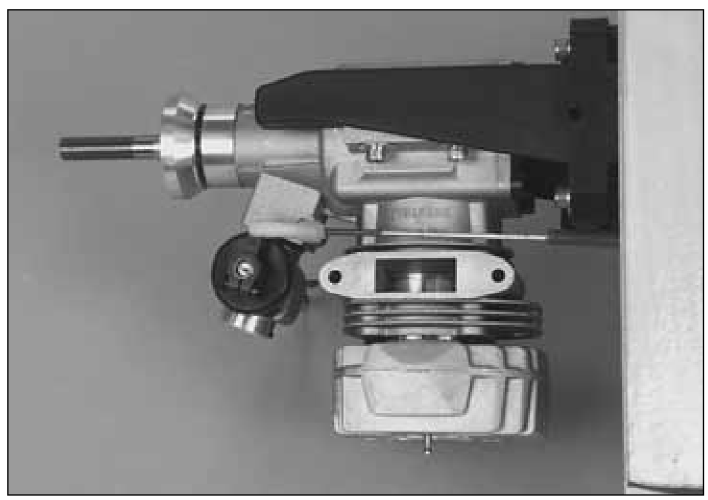


❑ 2. Install the rubber grommets and eyelets on your throttle servo. Fit the throttle servo into the servo tray. Hold the servo so the sides don't contact the tray and drill 1/16" [1.5mm] holes for the servo mounting screws. Remove the servo and wick a few drops of thin CA into each of the four holes. Mount the servo with the screws included with your servos. Trim the throttle pushrod housing 1/16" [1.5mm] aft of the servo tray.





❑ 3. Install a brass screw-lock pushrod connector with the 4-40 x 1/8" cap screw on the throttle servo horn. Snap the nylon retainer onto the pushrod connector post beneath the servo horn.

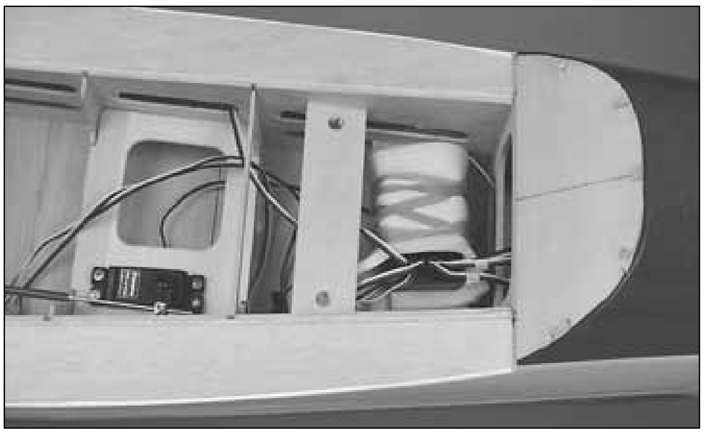


❑ 4. Assemble the 36" [910mm] **throttle pushrod wire** by installing a nylon clevis and silicone retainer onto the threaded end. Slide the throttle pushrod into its outer tube (from the firewall).

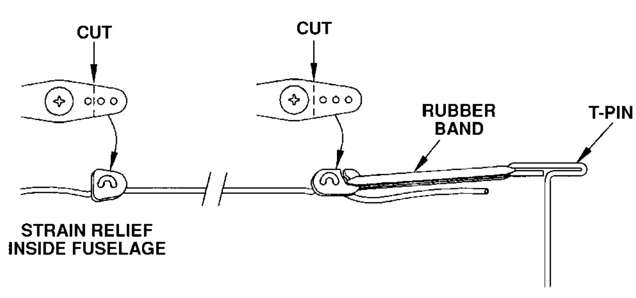
❑ 5. Bend the throttle pushrod as necessary to reach the throttle arm without binding. When satisfied with the fit, insert the pushrod through the screw-lock pushrod connector on the servo. Connect the clevis to the throttle on the engine, snap the clevis closed, then slide the retainer in place.

❑ 6. With the radio switched on, move the throttle trim and control stick to the fully closed position by pulling them back (or downward) all the way. Manually close the throttle on the carburetor completely. Tighten the cap screw on the screw-lock pushrod connector. Check throttle operation with the radio and make adjustments to the linkages as necessary for smooth operation. Use the appropriate holes in the servo and throttle arms to provide the correct amount of throttle movement and to prevent the servo from binding at its end points. Once everything is adjusted, install a spare piece of balsa as a brace near the servo for the outer pushrod housing.

Receiver & Battery Installation



❑ 1. Hook up - following the manufacturer's recommendations - the receiver, switch and battery as shown in the photo. We added a Great Planes Switch Mount & Charge Jack™ (GPMM1000, not included) for convenience and ease of use at the field, installed on the side of the fuselage. At this time, it is suggested to allow the receiver and battery the option of being moved until after the aircraft has been balanced. Once balanced, the receiver and battery should be secured into the aircraft to prevent them from moving during flight. Plug the servo extensions for the elevator and rudder servos, as well as the extensions for the aileron servos, into the receiver at this time.



❑ 2. Route the antenna to the tail of the model. You may use your preferred method or the method we use in the Great Planes model shop. Drill a 15/64" [6mm] hole through the fuse side in the proximity of the receiver. Cut a 1/2" [13mm] long piece of fuel tubing and install it in the hole. Install a strain relief (as shown in the sketch), then route the antenna through the fuel tubing to the bottom of the fuse at the tail. Use a rubber band to attach the antenna to a T-pin at the aft end of the fuselage. Do not cut or shorten the antenna wire. Leave any excess to hang free.

FINAL ASSEMBLY

❑ 1. Fit approximately 12" to 14" [300mm to 360mm] of fuel line on the pick-up and vent nipples of your fuel tank. Attach the fuel lines from the fuel tank to the engine, making sure the fuel and pressure lines are correctly attached. Be certain you do not kink the fuel lines.

Note: If your engine's carburetor is inaccessible with the cowl in position, now would be a good time to add a Great Planes Fuel Filler Valve™ (not included, GPMQ4160) to the side of your aircraft. Instructions for installation are included with the valve.

❑ 2. Locate the clear **canopy** and carefully trim along the cut lines with scissors or Lexan® shears. Test fit the canopy on the fuse as you proceed, making small adjustments as required for a good fit.

❑ 3. Paint the exposed wood behind the canopy with black paint. Install a pilot if so desired. You can use Top Flite LustreKote® without any special preparations to the paint or the model. Just make sure to mask off any areas you do not want painted.

❑ 4. Roughen the bottom 1/8" [3mm] of the inside canopy edge, being careful not to scratch any exposed areas. Glue the canopy into position with 6-minute epoxy or R/C-56 glue.

❑ 5. Attach the wing to the fuselage using the 1/4-20 x 2" nylon bolts. Test fit the **belly pan** onto the wing. Trim the belly pan as necessary to provide a tight fit against the wing. Trace around the outside of the belly pan using a felt-tip marker.

❑ 6. Remove the belly pan and remove a 1/2" [13mm] wide strip of covering 1/16" [1.5mm] inside the line drawn. Using 30-minute epoxy, glue the belly pan to the wing.

❑ 7. Cut two holes in the belly pan to access the bolts. Measure and place a mark 4-3/4" [123mm] forward of the aft edge on the belly pan. Place two marks 1-7/8" [47mm] from the centerline. Drill two 1/2" [13mm] holes at the crossing of these two lines to access the wing bolts.

Control Throw Adjustment

By moving the position of the clevis at the control horn toward the outermost hole, you will decrease the amount of throw of the control surface. Moving it toward the control surface will increase the amount of throw. If these adjustments don't accomplish the job, you may need to work with a combination of adjustments by also repositioning the pushrod at the servo end. Moving the pushrod towards the center of the servo horn will decrease the control surface throw – outward will increase it.

Control Surface Throws

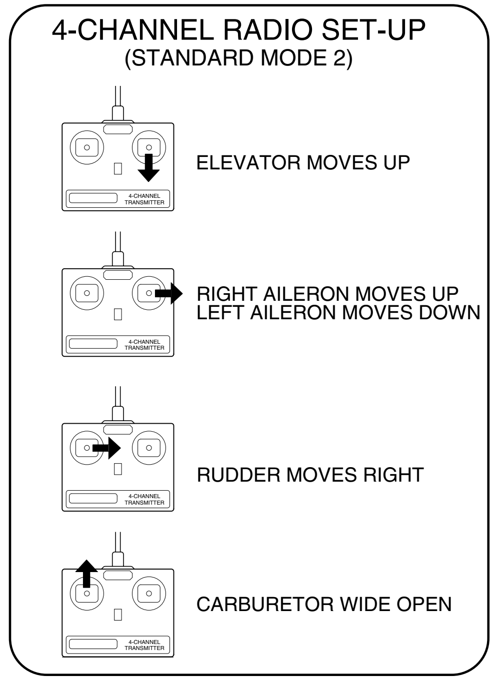
Note: Throws are measured at the widest part of the elevators, rudder and ailerons. We recommend the following control surface throws as a starting point:

Elevator	5/16" [8mm] Up	7/16" [11mm] Down
Rudder	2" [50mm] Right	2" [50mm] Left
Ailerons	3/8" [9.5mm] Up	3/8" [9.5mm] Down

These control throws are recommended for normal flying. If you are planning on performing extreme "3D" aerobatics, see the section on "Advanced Aerobatics" for the recommended control throws, notes on using computer radios and details on performing some maneuvers associated with this exciting new form of aerobatics.

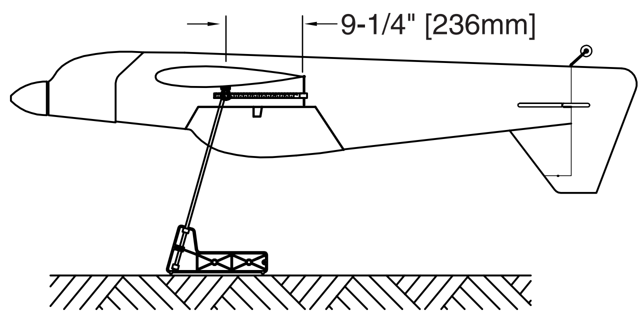
One leading cause of crashes is flying an airplane with its control throws set differently from those recommended in the instructions. The Great Planes AccuThrow™ lets you quickly and easily measure actual throws first, so you can make necessary corrections before you fly. Large, no-slip rubber feet provide a firm grip on covered surfaces without denting or marring the finish. Spring tension holds AccuThrow's plastic ruler steady by each control surface. Curved to match control motions, the ruler provides exact readings in both standard or metric measurements. **GPMR2405.**

Make sure the control surfaces move in the proper direction as illustrated in the following sketch:



BALANCE YOUR MODEL

Note: This section is **VERY** important and must **NOT** be omitted! A model that is not properly balanced will be unstable and possibly unflyable.



❑ 1. The balance point (C.G.) is located 9-1/4" [236mm] forward from the trailing edge of the wing. Balance your Giles using a Great Planes C.G. Machine™ Airplane Balancer (GPMR2400) for the most accurate results. This is the balance point at which your model should balance for your first flights. After initial trim flights and when you become more acquainted with your Giles, you may wish to experiment by shifting the balance up to 3/8" [9.5mm] forward or backward to change its flying characteristics. Moving the balance forward may improve the smoothness and stability, but the model may then require more speed for takeoff and may become more difficult to slow for landing. Moving the balance aft makes the model more agile with a lighter, snappier "feel" and often improves knife-edge capabilities. In any case, please start at the location we recommend. Do not at any time balance your model outside the recommended range.

❑ 2. With the wing attached to the fuselage, all parts of the model installed (ready to fly), and an empty fuel tank, block up the tail as necessary to level the stab. Lift the model at the desired balance point, and observe the tail of the aircraft. If the tail drops, the model is “tail heavy” and you must add weight* to the nose to balance the model. If the nose drops, it is “nose heavy” and you must add weight* to the tail to balance the model.

Note: Nose weight may be easily installed by using a “spinner weight.” Tail weight may be added by using Great Planes (GPMQ4485) “stick-on” lead weights.

* If possible, first attempt to balance the model by changing the position of the receiver battery. If you are unable to obtain good balance by doing so, then it will be necessary to add weight to the nose or tail to achieve the proper balance point. Remember to secure the receiver and battery after your model has been balanced.

Balance Your Model Laterally

IMPORTANT: Do not confuse this procedure with “checking the C.G.” or “balancing the airplane fore and aft.”

Now that you have the basic airplane nearly completed, this is a good time to balance the airplane laterally (side-to-side). Here is how to do it:

❑ 1. Assemble the model as in preparation for flight. (No fuel is required for this procedure.)

❑ 2. With the wing level, lift the model by the engine propeller shaft and the fin post (this may require two people). Do this several times.

❑ 3. If one wing always drops when you lift the model, it means that side is heavy. Balance the airplane by adding weight to the opposite, lighter wing tip.

Note: An airplane that has been laterally balanced will track better in loops and other maneuvers.

ADVANCED AEROBATICS

Computer Radios. As you prepare to fly the Giles G-202 ARF for the first time, there are a few features on computer radios we’d like to mention. There are many others, of course, but these are commonly used features on most computer radios. If you are using a non-computerized radio, this information may still be of interest to you for future installations.

ATV or Travel Volume: ATV is a wonderful feature of computer radios which allows you to make minor adjustments to how far a servo travels at its extremes. For example, you install the throttle pushrod, and it’s almost perfect, except you have some binding at wide open. Instead of struggling with the clevises to try to keep full throttle but not have the binding, you can turn down the ATV slightly until the binding is gone.

Why only adjust ATV slightly? Control linkages are really just a lesson in leverage. The less distance the servo is moving for a given throw at the surface, the less leverage you have given the servo to do the job. Thus the lower you set the ATV, the less power you are leaving for the servo to apply to the surface. Additionally, a servo has only so many points within its range of motion. By cutting its range in half, you’ve also diminished the precision of the servo by 50%. Because of both of these issues, we strongly recommend setting the high rates as close as possible to 100% on the ATV.

Dual Rates: Setting dual rates helps make your model easier to fly in a variety of situations. For example, an expert pilot who wants to do torque rolls will need a large amount of control throw. However, he does not want that same huge volume of throw when he is trying to do smooth loops or slow rolls. Low rates give your model a soft feel, with aggressive responsiveness just a flip of a switch away.

Exponential, the best of both rates: Exponential is a feature which modelers tend to either love or hate. The benefits of exponential are that they make the elevator, for example, feel like it is on low rates when you are moving the stick near center; however, when you get farther from center the model gets progressively more responsive. The reason this is helpful is that it allows you to make soft, minor adjustments when small corrections are needed, but still allows you sufficient throw to make major changes at full stick. For example, you can smoothly level the wings while flying along straight and level without over-controlling, yet still have enough aileron throw at full stick to complete a one-second roll.

Idle Down and Throttle Kill: Idle down allows you to have a switch set for a high idle, ideal for most aerobatics where you have little or no risk of dead sticking, as well as a lower idle setting for, say, landings, taxiing, and minimum throttle maneuvers such as spins. The throttle kill setting on most computer radios will idle your engine down whatever percent you set it so that your engine will shut off when the switch is thrown AND the throttle stick is in the idle position. This is an excellent safety feature to shut off your engine in emergency situations. If you are utilizing a gasoline engine, you can mix your electronic kill switch to your throttle kill position for consistency.

EXPERT TIP

3D Aerobatics and Freestyle Aerobatic Competition

Competition aerobatics is a great way to challenge your skills, enjoy camaraderie with hobbyists who share interests in aerobatics and similar aircraft, and get to show off your new Giles G-202 ARF! Even if you don't ever intend to compete, learning and practicing competition routines is a great way to stretch your skills and expand your awareness of your aircraft's orientation and performance at all times in all flights. For more information on scale aerobatics, visit **http://www.mini-iac.com/** or contact your AMA representative for information on reaching the regional director in your area.

A separate event of IMAC (scale aerobatic) contests is called Freestyle. This is a 3-minute "anything safe goes" chance to really pull out the stops and show off all your finest hot dogging, or watch others and learn new and exciting aerobatic maneuvers to add to your flying. Since 1995, a new form of aerobatic maneuvers has developed known as "3D." The name comes from helicopter freestyle and, as it implies, is based upon the aircraft doing maneuvers that involve all 3 axes in one maneuver. Another definition is aerobatics below the stall speed of the aircraft. Below we've provided you some examples of some popular 3D and other freestyle maneuvers the aircraft does exceptionally well and some information on how to perform them. Be sure to always practice new maneuvers high and safe and, ideally, have an experienced pilot with you who is familiar with both the maneuvers you are trying AND your Giles G-202 ARF.

Before beginning any of these extreme "3D" maneuvers, you will need to adjust your control throws accordingly. The throws to use are as follows:

Ailerons	1-1/4" up [32mm up]	1-1/4" down [32mm down]
Elevator	7/8" up [47mm up]	1-7/8" down [47mm down]
Rudder	5" right [130mm right]	5" left [130mm left]

Use a longer control horn on the servo to obtain these control throws rather than moving the linkage closer to the control surface. This will give a mechanical advantage to the servo, and also help in preventing flutter.

Torque Roll: Since Charlie Hillard did the first torque roll to win the World Championships in the 70's, the torque roll is probably the most widely recognized "3D" maneuver. To properly torque roll, an airplane must be "hanging on the prop" so that it is not climbing or losing altitude. Note that the vertical C.G. of the airplane will affect whether it hangs truly vertical or slightly "on its back" or "on its belly" (the tail slightly farther from or closer to the pilot than the spinner). When an aircraft is hung perfectly and not climbing or diving, the torque of the engine will pull the aircraft around to the left on its own, resulting in a torque roll (feeding left aileron when an airplane is close to hanging is NOT a torque roll). The modeler's job is to keep the plane upright, giving slight elevator and rudder corrections to keep the plane from twisting off vertical or it will fall out of the torque roll. This is much more difficult than it sounds because you must notice the slightest need for correction and make it promptly, plus you have to remember the rudder works opposite of your instinct if the aircraft is "belly in" (the underside facing the pilot). To help get past this, we recommend practicing trying to hang the model belly in until the rudder application becomes natural. This will really help when you get torque rolling.

Knife-Edge Loop: The knife-edge loop is a challenging maneuver that takes lots of courage! (Don't try this maneuver until you are *REALLY* confident flying your model knife-edge, and can feed aileron or elevator – or have set a mix – that means you can smoothly fly knife-edge without seeing any pitching or rolling.) Fly the plane knife-edge into center stage from the left at full throttle. Gradually apply more left rudder until the model just starts to climb knife-edge. Apply more rudder to maintain the round shape until you've completed 1/4 loop. (If you're nervous, do just this first 1/4 of the loop until you get comfortable.) For the next 1/4 loop you will gradually need to ease out of the left rudder and may even need a small amount of right rudder at the top of the loop to keep the shape round. Again, it will take *LOTS* of practice to get a round shape. For now let's just get all the way around! Now for the scary part – throttle back as you come across the top of the loop and again start to apply left rudder. When you hit the 3/4 point of the loop it gets really exciting! You'll need to balance rudder and slowly add throttle until the airplane finishes the bottom of the loop, easing it to straight knife-edge flight. *WHEW!* This is a really impressive show of power, aerobatic capability and piloting skill when you can do it cleanly and round.

Hangar Keyhole: The hangar keyhole is a unique 3D maneuver that has lots of WOW factor. Its kind of a combination of the two maneuvers we just covered. Climb vertically and bring the model to a hangar, but do not stop long enough to let the torque pull the model around (climbing or sliding slightly will not be noticeable to spectators but will keep air flowing over the ailerons and provide you roll authority to stop the torque). When the model is hanging, rock the plane left with rudder, then apply full throttle and full right rudder and hold both, completing 3/4 of a VERY tight knife-edge loop. When done correctly, the plane pivots around the wingtip in a very small area. This maneuver can be done in either direction similarly.

Knife-Edge Tumble: This is an impressive looking maneuver that really isn't as difficult as it looks. (Before learning this maneuver you must be able to confidently snap and tumble your Giles and stop the aircraft at exactly a single snap without over rotating.) Simply fly the model knife-edge from the right at full throttle so the model has reasonable airspeed. Perform one full right negative tumble by maintaining your rudder and throttle settings while applying full down elevator full right aileron, releasing in time to end again flying knife-edge to the right. Note that you may need to use some positive elevator and/or left aileron to stop the tumble at exactly knife-edge. This maneuver is easier to the right because torque helps stop the tumble, and it can be done at varied airspeeds with proper throttle and rudder modulation.

Knife-Edge Slide: A knife-edge slide is a unique landing approach which MUST be practiced with altitude until complete confidence is gained. From several hundred feet out from the end of the field, rotate to knife-edge, throttle back and apply full rudder. Allow the aircraft to descend rapidly in knife-edge flight, gradually rolling the aircraft into a slip as it approaches the runway, then set the plane on the runway on its gear. This maneuver takes LOTS of courage and even more practice so be sure to practice the landing phase of it at a hundred feet or more until you get comfortable, then gradually work the plane down.

Rolling Circle: A rolling circle is a gorgeous precision maneuver this plane does so well we just had to mention it! You must be able to confidently do slow rolls, including proper rudder application, before learning to do a proper rolling circle. Once you can do a slow roll properly, practice adjusting the elevator and rudder application off by 1/4 roll, so you apply the most push at the first quarter, the most rudder at the inverted stage, the most pull at the 3rd quarter, etc. As you get confident, practice varying the roll rates and rudder/elevator application until you can control the plane's roll rate and position at each quarter of the circle, resulting in an 8 roll rolling circle (2 rolls per quarter), then a 4 roll, then a 2 roll, and then, with tons of practice, a single roll rolling circle. Practice rolling to the outside and to the inside, and modifying the roll timing and variations (inside roll then outside roll then inside roll, or 3 rolls, etc.)

PREFLIGHT

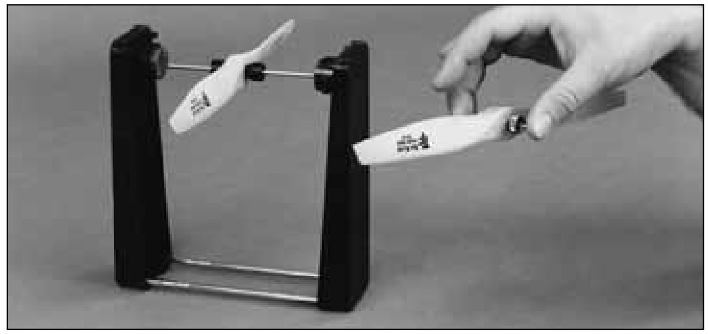
At this time check all connections including servo horn screws, clevises, servo cords and extensions.

Charge the Batteries

Follow the battery charging procedures in your radio instruction manual. You should always charge your transmitter and receiver batteries the night before you go flying and at other times as recommended by the radio manufacturer.

Balance the Propeller

Carefully balance your propellers before flying. An unbalanced prop is the single most significant cause of vibration. Not only may engine mounting screws vibrate out, possibly with disastrous effect, but vibration may also damage your radio receiver and battery. Vibration may cause your fuel to foam, which will, in turn, cause your engine to run lean or quit.



We use a Top Flite Precision Magnetic Prop Balancer™ (TOPQ5700) in the workshop and keep a Great Planes Fingertip Balancer (GPMQ5000) in our flight box.

Find a Safe Place to Fly

Since you have chosen the Giles G-202 ARF, we assume that you are an experienced modeler. Therefore, you should already know about AMA chartered flying fields and other safe places to fly. If for some reason you are a relatively inexperienced modeler and have not been informed, we strongly suggest that the best place to fly is an AMA chartered club field. Ask the AMA or your local hobby shop dealer if there is a club in your area and join. Club fields are set up for R/C flying and that makes your outing safer and more enjoyable. The AMA address and telephone number are in the front of this manual. If a club and flying site are not available, find a large, grassy area at least 6 miles away from houses, buildings and streets and any other R/C radio operation like R/C boats and R/C cars. A schoolyard may look inviting but is too close to people, power lines and possible radio interference.

Ground Check the Model

Inspect your radio installation and confirm that all the control surfaces respond correctly to the transmitter inputs. The engine operation must also be checked by confirming that the engine idles reliably, transitions smoothly and rapidly to full power and maintains full power, indefinitely. The engine must be "broken-in" on the ground by running it for at least two tanks of fuel. Follow the engine manufacturer's recommendations for break-in. Make sure that all screws remain tight, that the hinges are secure and that the prop is on tight.

Range Check Your Radio

Whenever you go to the flying field, check the operational range of the radio before the first flight of the day. First, make sure no one else is on your frequency (channel). With your transmitter on, you should be able to walk at least 100 feet away from the model and still have control. While you work the controls, have a helper stand by your model and tell you what the control surfaces are doing. Repeat this test with the engine running at various speeds with a helper holding the model. If the control surfaces are not always responding correctly, do not fly! Find and correct the problem first. Look for loose servo connections or corrosion, loose bolts that may cause vibration, a defective on/off switch, low battery voltage or a defective receiver battery, a damaged receiver antenna, or a receiver crystal that may have been damaged from a previous crash.

Engine Safety Precautions

Note: 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 the engine exhaust gives off a great deal of deadly carbon monoxide. 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. Do not throw anything into the propeller of a running engine.

AMA SAFETY CODE (excerpt)

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

General

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

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

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

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

9. I will not operate models with pyrotechnics (any device that explodes, burns, or propels a projectile or 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 airplane.

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

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

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

FLYING

The Giles is a great flying sport airplane that flies smoothly and predictably, yet is highly maneuverable. It does not have the self-recovery characteristics of a primary trainer. Therefore, you must either have mastered the basics of R/C flying or seek the assistance of a competent R/C pilot to help you with your first flights.

Takeoff

Although the Giles has excellent low speed characteristics, you should always build up as much speed as your runway will permit before lifting off, as this will give you a safety margin in case of a “flame-out.”

Flying

We recommend that you take it easy with your Giles for the first several flights and gradually "get acquainted" with this fantastic aircraft as your engine gets fully broken-in. Add and practice one maneuver at a time, learning how she behaves in each one.

CAUTION (THIS APPLIES TO ALL R/C AIRPLANES): If, while flying, you notice any unusual sounds, such as a low-pitched "buzz," this may be an indication of control surface "flutter." Because flutter can quickly destroy components of your airplane, any time you detect flutter you must **immediately** cut the throttle and land the airplane! Check all servo grommets for deterioration (this will indicate which surface fluttered), and make sure all pushrod linkages are slop-free. If it fluttered once, it will probably flutter again under similar circumstances unless you can eliminate the slop or flexing in the linkages. Here are some things which can result in flutter: Excessive hinge gap; Not mounting control horns solidly; Sloppy fit of clevis pin in horn; Elasticity present in flexible plastic pushrods; Side-play of pushrod in guide tube caused by tight bends; Sloppy fit of Z-bend in servo arm; Insufficient glue used when gluing in the elevator joiner wire or aileron torque rod; Excessive flexing of aileron, caused by using too soft balsa aileron; Excessive "play" or "backlash" in servo gears; and Insecure servo mounting.

Landing

When it's time to land, make your approach as you would any low-wing sport aircraft. If your Giles is assembled straight and true, you'll find that you can really flare it out for slow landings without fear of tip stalling. Because the Giles is such a forgiving aircraft, there are no bad habits to deal with during landing. You will find it very easy to get the plane down on the ground without pulling the throttle to a complete idle. A little practice is all it takes to make 3-point landings look easy.

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

APPENDIX

FLIGHT TRIMMING

Note: *The following article has been reprinted in part for future reference and also as a guide for your flight instructor or experienced flying partner to help you with trimming your model. If further information is required, please contact your local hobby dealer, local flying club or call Great Planes at (217) 398-8970*

A model is not a static object. Unlike a car, which you can only hunt left or right on the road (technically, a car does yaw in corners, and pitches when the brakes are applied), a plane moves through that fluid we call air in all directions simultaneously. The plane may look like it's going forward, but it could also be yawing slightly, slipping a little and simultaneously climbing or diving a bit! The controls interact. Yaw can be a rudder problem, a lateral balance problem or an aileron rigging problem. We must make many flights, with minor changes between each, to isolate and finally correct the problem.

The chart accompanying this article is intended to serve as a handy field reference when trimming your model. Laminate it in plastic and keep it in you flight box. You just might have need to consult it at the next contest! The chart is somewhat self-explanatory, but we will briefly run through the salient points.

First, we are assuming that the model has been C.G. balanced according to the manufacturer's directions. There's nothing sacred about that spot — frankly, it only reflects the balance point where a prototype model handled the way the guy who designed it thought it should. If your model's wing has a degree more or less of incidence, then the whole balance formula is incorrect for you. But, it's a good ballpark place to start.

The second assumption is that the model has been balanced laterally. Wrap a strong string or monofilament around the prop shaft behind the spinner, then tie the other end to the tail wheel or to a screw driven into the bottom of the aft fuse. Make the string into a bridle harness and suspend the entire model inverted (yes, with the wing on!). If the right wing always drops, sink some screws or lead into the left wing tip, etc. You may be surprised to find out how much lead is needed.

At this point the model is statically trimmed. It's only a starting point, so don't be surprised if you wind up changing it all. One other critical feature is that the ailerons must have their hinge gap sealed. If shoving some Scotch tape or Monokote into the hinge gap to prevent the air from slipping from the top of the wing to the bottom, and vice-versa, bothers you, then don't do it.

To achieve the maximum lateral trim on the model, the hinge gap on the ailerons should be sealed. The easiest way to do this is to disconnect the aileron linkages, and fold the ailerons as far over the top of the wing as possible (assuming they are top or center hinged). Apply a strip of clear tape along the joint line. When the aileron is returned to neutral, the tape will be invisible, and the gap will be effectively sealed. Depending on how big the ailerons are, and how large a gaping gap you normally leave when you install hinges, you could experience a 20 percent increase in aileron control response just by this simple measure.

Your first flights should be to as certain control centering and control feel. Does the elevator always come back to neutral after a 180° turn or Split-S? Do the ailerons tend to hunt a little after a rolling maneuver? Put the plane through its paces. Control centering is either a mechanical thing (binding servos, stiff linkages, etc.), an electronic thing (bad servo resolution or dead band in the radio system), or C.G. (aft Center of Gravity will make the plane wander a bit). The last possibility will be obvious, but don't continue the testing until you have isolated the problem and corrected it.

Let's get down to the task of trimming the model. Use the tachometer every time you start the engine, to insure consistent results. These trim flights must be done in calm weather. Any wind will only make the model weather vane. Each "maneuver" on the list assumes that you will enter it dead straight-and-level. The wings must be perfectly flat, or else the maneuver will not be correct and you'll get a wrong interpretation. That's where your observer comes in. Instruct him to be especially watchful of the wings as you enter the maneuvers.

Do all maneuvers at full throttle. The only deviation from this is if the plane will routinely be flown through maneuvers at a different power setting.

Let's commence with the "engine thrust angle" on the chart. Note that the observations you make can also be caused by the C.G., so be prepared to change both to see which gives the desired result. Set up a straight-and-level pass. The model should be almost hands-off. Without touching any other control on the transmitter, suddenly chop the throttle. Did the nose drop? When you add power again, did the nose pitch up a bit? If so, you need some down thrust, or nose weight. When the thrust is correct, the model should continue along the same flight path for at least a dozen plane lengths before gravity starts to naturally bring it down.

Do each maneuver several times, to make sure that you are getting a proper diagnosis. Often, a gust, an accidental nudge on the controls, or just a poor maneuver entry can mislead you. The thrust adjustments are a real pain to make. On most models, it means taking the engine out, adding shims, then reassembling the whole thing. Don't take shortcuts.

Don't try to proceed with the other adjustments until you have the thrust line and/or C.G. correct. They are the basis upon which all other trim settings are made.

Also, while you have landed, take the time to crank the clevises until the transmitter trims are at neutral. Don't leave the airplane so that the transmitter has some odd-ball combination of trim settings. One bump of the transmitter and you have lost everything. The trim must be repeatable, and the only sure way to do this is to always start with the transmitter control trims at the middle.

The next maneuver is somewhat more tricky than it looks. To verify C.G., we roll the model up to a 45° bank, then take our hands off the controls. The model should go a reasonable distance with the fuse at an even keel. If the nose pitches down, remove some nose weight, and the opposite if the nose pitches up. The trick is to use only the ailerons to get the model up at a 45° bank. We almost automatically start feeding in elevator, but that's a no-no. Do the bank in both directions, just to make sure that you are getting an accurate reading of the longitudinal balance.

We now want to test the correct alignment of both sides of the elevator (even if they aren't split, like a Pattern ship's, they can still be warped or twisted). Yaw and lateral balance will also come into play here, so be patient and eliminate the variables, one-by-one. The maneuver is a simple loop, but it must be entered with the wings perfectly level. Position the maneuver so that your assistant can observe it end-on. Always loop into the wind. Do several loops, and see if the same symptom persists. Note if the model loses heading on the front or back side of the loop. If you lose it on the way up, it's probably an aileron problem, while a lose of heading on the way back down is most likely a rudder situation.

Note that the Yaw test is the same looping sequences. Here, however, we are altering rudder and ailerons, instead of the elevator halves. We must repeat that many airplanes just will not achieve adequate lateral trim without sealing the hinge gaps shut. The larger you make the loops (to a point), the more discernable the errors will be.

The Lateral Balance test has us pulling those loops very tightly. Pull straight up into a vertical and watch which wing drops. A true vertical is hard to do, so make sure that your assistant is observing from another vantage point. Note that the engine torque will affect the vertical fall off, as will rudder errors. Even though we balance the wing statically before leaving for the field, we are now trimming it dynamically.

The Aileron Coupling (or rigging), is also tested by doing Hammerheads Stalls. This time, however, we want to observe the side view of the model. Does the plane want to tuck under a bit? If so, then try trimming the ailerons down a small bit, so that they will act as flaps. If the model tends to want to go over into a loop, then rig both ailerons up a few turns on the clevises. Note that drooping the ailerons will tend to cancel any washout you have in the wing. On some models, the lack of washout can lead to some nasty characteristics at low speeds.

Again, we reiterate that all of these controls are interactive. When you change the wing incidence, it will influence the way the elevator trim is at a given C.G. Re-trimming the wing will also change the rigging on the ailerons, in effect, and they may have to be readjusted accordingly.

The whole process isn't hard. As a matter of fact it's rather fun — but very time consuming. It's amazing what you will learn about why a plane flies the way it does, and you'll be a better pilot for it. One thing we almost guarantee, is that your planes will be more reliable and predictable when they are properly trimmed out. They will fly more efficiently, and be less prone to doing radical and surprising things. Your contest scores should improve, too.

We wish to acknowledge the Orlando, Florida, club newsletter, from which the basics of the chart presented here were gleaned.

Reprinted in part by Great Planes Model Manufacturing Company, courtesy of Scale R/C Modeler magazine, Pat Potega, Editor, August 1983 issue.

See the Flight Trimming Chart on Page 27

TRIM FEATURE	MANEUVERS	OBSERVATIONS	CORRECTIONS
CONTROL CENTERING	Fly general circles and random maneuvers.	Try for hands off straight and level flight.	Readjust linkages so that Tx trims are centered.
CONTROL THROWS	Random maneuvers	A. Too sensitive, jerky controls. B. Not sufficient control.	If A, change linkages to reduce throws. If B, increase throws.
ENGINE THRUST ANGLE[1]	From straight flight, chop throttle quickly.	A. Aircraft continues level path for short distance. B. Plane pitches nose up. C. Plane pitches nose down.	If A, trim is okay. If B, decrease downthrust. If C, increase downthrust.
CENTER OF GRAVITY LONGITUDINAL BALANCE	From level flight roll to 45º bank and neutralize controls.	A. Continues in bank for moderate distance. B. Nose pitches up. C. Nose drops.	If A, trim is good. If B, add nose weight. If C, remove nose weight.
YAW[2]	Into wind, do open loops, using only elevator. Repeat tests doing outside loops from inverted entry.	A. Wings are level throughout. B. Yaws to right in both inside and outside loops. C. Yaws to left in both inside and outside loops. D. Yaws right on insides, and left on outside loops. E. Yaws left in insides, and right on outside loops.	If A, trim is correct. If B, add left rudder trim. If C, add right rudder trim. If D, add left aileron trim. If E, add right aileron trim.
LATERAL BALANCE	Into wind, do tight inside loops.	A. Wings are level and plane falls to either side randomly. B. Falls off to left in loops. Worsens as loops tighten. C. Falls off to right in loops. Worsens as loops tighten.	If A, trim is correct. If B, add weight to right wing tip. If C, add weight to left wing tip.
AILERON RIGGING	With wings level, pull to vertical climb and neutralize controls.	A. Climb continues along same path. B. Nose tends to go to inside loop. C. Nose tends to go to outside loop.	If A, trim is correct. If B, raise both ailerons very slightly. If C, lower both ailerons very slightly.

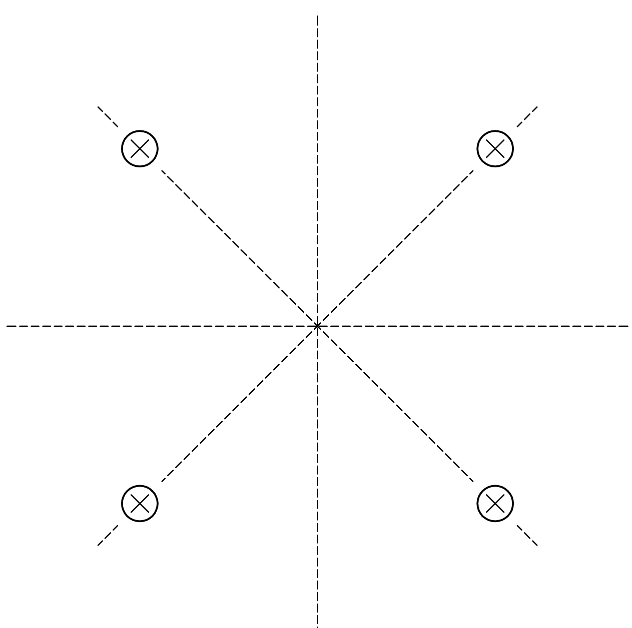
1. Engine thrust angle and C.G. interact. Check both.
2. Yaw and lateral balance produce similar symptoms. Note that fin may be crooked. Right and left references are from the plane’s vantage point.

BUILDING NOTES

Kit Purchased Date: ____________________	Date Construction Finished: ____________________
Where Purchased: ____________________	Finished Weight: ____________________
Date Construction Started: ____________________	Date of First Flight: ____________________

FLIGHT LOG	

Engine Mount Template



Refer to this template when instructed in this manual.