HOBBICO®

SUPERSTAR 40™

RADIO-CONTROLLED TRAINER AIRCRAFT

ARF™ SERIES

All Wood–Almost Ready To Fly

Easy as 1,2,3

V1.3

Congratulations!

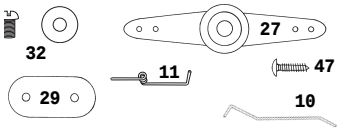
You're about to build in just days what took aviation pioneers years—a powered machine that flies. Specially created for you and other first-time radio control modelers, Hobbico's SuperStar 40 offers nearly all the excitement of piloting a real airplane...and develops skills that will take you anywhere you want in your new hobby.

Know your model's parts.

Take a moment now to match the box contents with the items listed below. Following the SuperStar 40's assembly instructions will be quite easy if you identify and organize the parts before you begin. You may also want to review the glossary of special modeling terms included at the back of this manual. Words in your instructions that appear in ***bold italic type*** are explained in this section.

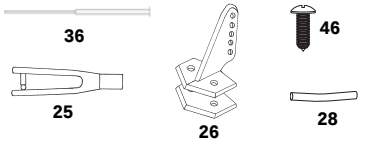
Landing Gear

Part #	Quantity
10 Main landing gear wires	2
11 Nose gear wire	1
27 Nose gear control horn	1
29 *Landing gear straps	2
31 Wheels	3
32 Wheel collars w/ set screws	5
47 3mm x 10mm wood screws	4



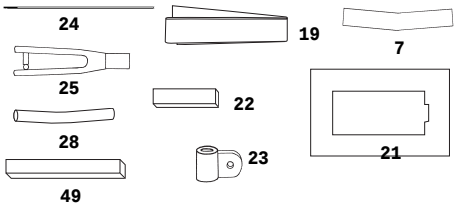
Tail Assembly

Part #	Quantity
4 Horizontal Stab and elevator	1
5 Vertical fin and rudder	1
6 Hinges	11
25 *Clevises	5
26 *Control horns	2
36 Pushrods	2
46 2mm x 15 mm machine screws	4



Wing Assembly

Part #	Quantity
1 Right wing	1
2 Left wing	1
6 Hinges	11
7 Plywood wing joiner plates	3
9 Ailerons (left and right)	2
19 Wing center section tape	1
21 Aileron servo tray	1
22 Aileron servo tray mounting blocks	2
23 *Aileron control horns	2
24 Aileron pushrods	2
25 *Clevises	5
28 Clevis safety tubing	1
49 Wing alignment peg	1



Replacement Parts Available

HCAA3065	Wing Kit	HCAA3067	Fin Set
HCAA3066	Fuselage Kit	HCAA3068	Landing Gear Set

* Parts marked with an asterisk are found on the plastic parts tree.

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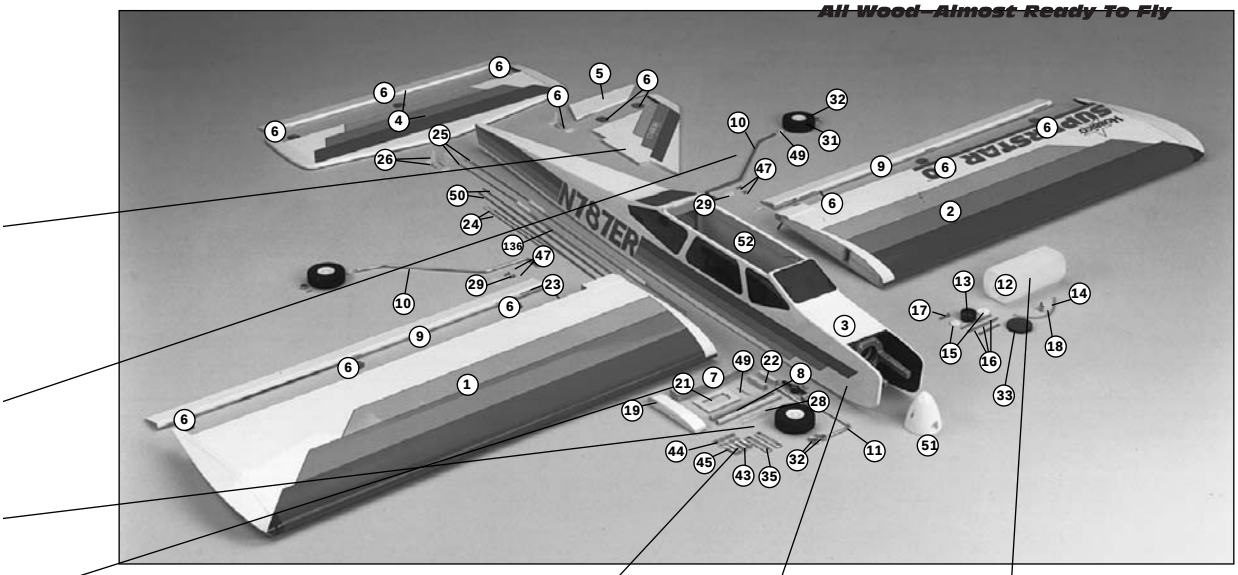
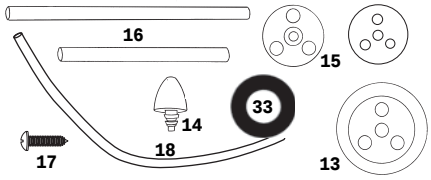


Engine Mounting Parts

Part #		Quantity
35	Engine mounting pads	2
43	Machine screws 4 mm x 20 mm	4
44	4 mm plain nuts	4
45	4 mm lock washers	4
50	Push rods and sleeves	2

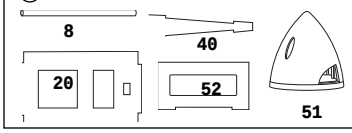
Fuel Tank & Parts

Part #		Quantity
12	Fuel tank	1
13	Neoprene tank plug	1
14	Fuel pick-up weight	1
15	Plastic plug compression disks (one large and one small)	2
16	Aluminum fuel tubing (one short and two long)	3
17	3mm x 18mm self tapping screw	1
18	Silicone fuel line	1
33	Tank collar	1



Fuselage & Parts

Part #		Quantity
3	Fuselage	1
8	Wing mounting dowels	2
20	Servo tray	1
40	Plywood stab base	1
51	Spinner	1
52	Servo tray support	1



Need Help?

If you need help or have any questions, please contact us at:

(217) 398-8970
or e-mail us at
productsupport@hobbico.com

See more of our products at
www.hobbico.com

Parts shown smaller than actual size (out of proportion).

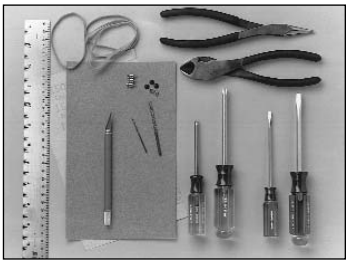
Other items you'll need:

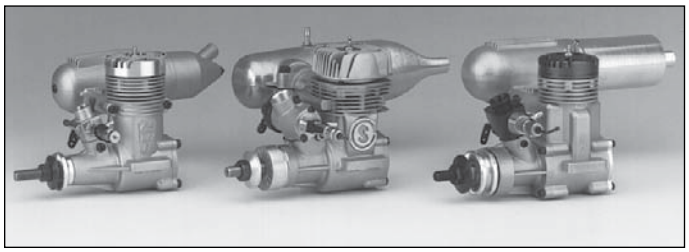
Glues

Choose any 5- or 6-minute epoxy, such as Hobbico Bullet, which has been formulated especially for R/C model building. Epoxies offer a strong bond and a variety of curing times suited for every step of assembly. You'll also need an instant-setting CA (cyanoacrylate), a thicker CA+, and a 30-minute epoxy, plus rubbing alcohol for easy epoxy cleanup.

Hardware

Tools and accessories required for assembly include a hobby knife; small and large Phillips screwdrivers; needle nose pliers; drill with 1/16" and 5/32" bits; ruler; #64 rubber bands; 3 feet of medium fuel tubing; and petroleum jelly.



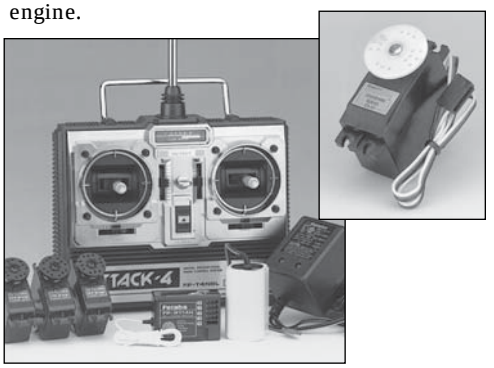


Model Engine

Power your SuperStar with any high-quality, .40-size model engine. The O.S. .40 FP, SuperTigre GS-40 and Irvine .40 RC are just a few examples. Look for features such as easy break-in, easy starting, efficient carburetion and low maintenance. Check the manufacturer's recommendations for propellers to use with your engine.

Radio Equipment

To let you send the commands that control your SuperStar 40's "flight path," you'll need a 4-channel aircraft radio system with four standard servos. Many 4-channel radios include just three servos. You may need to purchase the fourth separately. The servos and radio receiver will be mounted on-board your model and need to be cushioned from jolts and vibration. One-half inch thick foam rubber sheets are available for this purpose.



Getting Ready for Flight

Your Hobbico SuperStar 40 trainer is ready for takeoff in as little as 15-20 hours. Your hobby dealer or flying instructor (see next page) can help you decide what accessories you'll need for flight. Most are one-time only purchases—and your instructor will probably allow you to use his field box until you can outfit your own with a glow plug starter, fuel bulb or pump, and "chicken stick" or electric starter. You will need to provide your own fuel. Use glow fuel with a 10-15% nitro blend to keep your engine performing at its peak...and your SuperStar 40 will have the power to make you an accomplished pilot!

Other General Items Required

Epoxy Brushes	Felt-Tip Pen	Sandpaper	Mixing Sticks	Mixing Cups
Masking Tape	Clothespins	Paper Towels	Fine-Toothed File	Silicone Sealants
T-Pins	String	Standard Screwdriver	Thread Locking Compound	10mm Wrench
3mm Screw	Pushrod Connectors	Foam Rubber	Servo Tape	Drill and Drill Bits – 1/16", 1/8" and 5/32"

Find a Flying Instructor

The best way to begin flying your SuperStar 40 is with an experienced R/C pilot or flying instructor at your side. You'll learn faster, relax those in-flight jitters, and avoid risking your model before you're truly ready to solo.

Where do you find an instructor? Ask at your local hobby shop. They'll have information about flying clubs in your area whose membership includes qualified instructors. You can also join the Academy of Model Aeronautics (AMA), a 165,000 member-strong national organization with 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 phone number below:

Academy of Model Aeronautics
5151 East Memorial Drive
Muncie, IN 47302
Toll Free: (800) 435-9262
Fax: (765) 741-0057
Web Site: http//www.modelaircraft.org

AMA SINCE 1936

JOIN THE AMA

WARNING! This is not a toy! *Please follow these safety precautions:*

Before you fly:

1. Make sure that no other flyers are using your radio frequency.
2. Your radio transmitter must be the FIRST thing you turn ON, and the LAST thing you turn OFF.

Fuel storage and care:

1. Do not smoke near your engine or fuel.
2. Store all engine fuel in a safe, cool, dry place, away from children and pets.

When starting and running your engine:

1. Always wear safety glasses.
2. Make certain that your glow plug clip is securely attached to the glow plug—and cannot pop off, possibly falling into the spinning propeller.
3. Use a "chicken stick" or electric starter to start the engine—NOT your fingers.
4. Make sure that the wires from your starter and glow plug clip cannot become tangled with the spinning propeller.
5. Do not stand at the side of the propeller when you start or run the engine. Even at idle speed, the spinning propeller will be nearly invisible.
6. If any engine adjustments are necessary, approach the engine only from behind the spinning propeller.

90-Day Limited Warranty

If you, as the original owner of this model, discover defects in parts or workmanship within 90 days of purchase, Hobbico will repair or replace it—at the option of our authorized U.S. repair facility, Hobby Services—without charge. Our liability does not include cost of shipping to us. However, Hobby Services will pay shipping expenses to return your model to you.

You must provide proof of purchase, such as your original purchase invoice or receipt, for your model's warranty to be honored.

This warranty does not apply to damage or defects caused by misuse or improper assembly, service or shipment. Modifications, alterations or repair by anyone other than Hobby Services voids this warranty. We are sorry, but we cannot be responsible for crash damage and/or resulting loss of kits, engines, accessories, etc.

Repair Service

Your SuperStar 40 must be returned directly to Hobby Services for warranty work. The address is:
Hobby Services, Attn: Service Department, 1610 Interstate Drive, Champaign, IL 61821-1067 Phone: (217) 398-0007

Please follow the instructions when returning your model. This will help our experienced technicians to repair and return it as quickly as possible.

1. ALWAYS return your entire system, including airplane and radio.
2. Disconnect the receiver battery switch harness and make sure that the transmitter is turned off. Disconnect all batteries and drain all fuel.
3. Include a list of all items returned and a THOROUGH, written explanation of the problem and service needed. If you expect the repair to be covered under warranty, also include your proof of purchase.
4. Include your full return address and a phone number where you can be reached during the day.

If your model is past the 90-day warranty period or is excluded from warranty coverage, you can still receive repair service through Hobby Services at a nominal cost. Repair charges and postage may be prepaid or billed COD. Additional postage charges will be applied for non-warranty returns. All repairs shipped outside the United States must be prepaid in U.S. funds only.

All pictures, descriptions and specifications found in this instruction manual and on the product package are subject to change without notice. Hobbico maintains no responsibility for inadvertent errors.

Assembling the Wing

What you'll need –

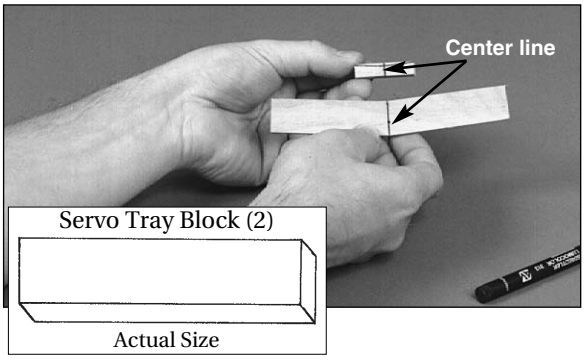
Parts in this kit

- *3 Plywood wing joiner pieces*
- *Left and right wing halves*
- *Wing center section tape*
- *6 Brass hinges*
- *2 Servo tray mounting blocks*
- *Aileron servo tray*
- *Servo hole template*
- *Covering removal template*
- *2 Aileron control horns*
- *2 Plastic clevises*
- *2 Aileron pushrods*
- *Clear plastic tubing*

...Plus, these general items:

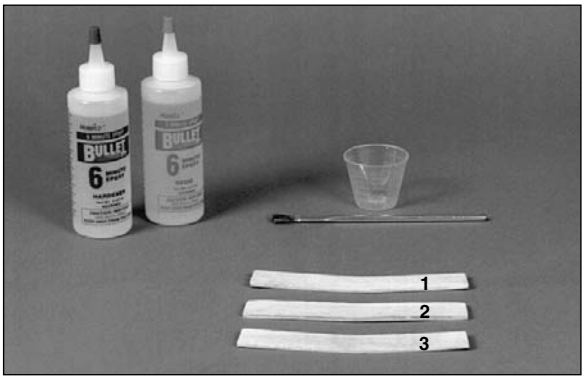
- *Epoxy brushes*
- *Rubbing alcohol*
- *Felt-tip pen*
- *Ruler*
- *Sand paper*
- *Mixing sticks*
- *Mixing cups*
- *Masking tape*
- *Petroleum jelly*
- *Hobby knife*
- *Clothespins*
- *Paper towels*
- *CA+ glue*
- *6-minute epoxy*
- *30-minute epoxy*
- *Fine-toothed file*

Aileron servo tray mounting blocks



❑ 1. Locate the 1/8" (3mm) die-cut plywood wing joiners and separate the three individual joiners from the die-cut plywood sheet using a hobby knife. Draw a center line on both sides of the plywood ***wing*** joiners and ***aileron*** servo tray mounting blocks. Use one of the plywood joiners as a template to mark the wing ***dihedral*** angle on both of the balsa 5/16" x 1-7/16" (8mm x 36mm) aileron ***servo*** tray mounting blocks. Put these mounting blocks aside for use in Step #16.

Orientation of the wing joiners

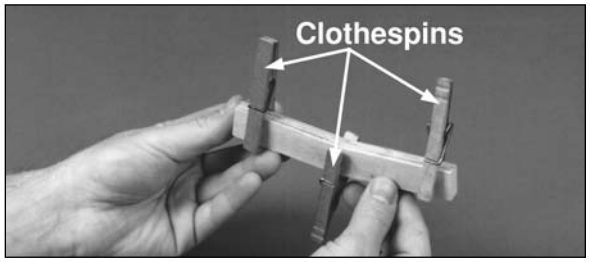


❑ 2. Arrange the three "V"-shaped plywood wing joiners in the same orientation as they will be glued together. Number each plywood wing joiner for reference in the next step.

Gluing the wing joiner

❑ 3. Mix approximately 1/4oz. (7.5ml) of 6-minute epoxy. Using a mixing stick or epoxy brush, apply an even coat of epoxy on both sides of the #2 wing joiner. With the #3 wing joiner laying flat on the work surface, stack #2 on top of #3 and #1 on the top of #2. **Note**: The epoxy should be in between the layers of the plywood wing joiners and not on the outside surfaces.

Clamping the wing joiner



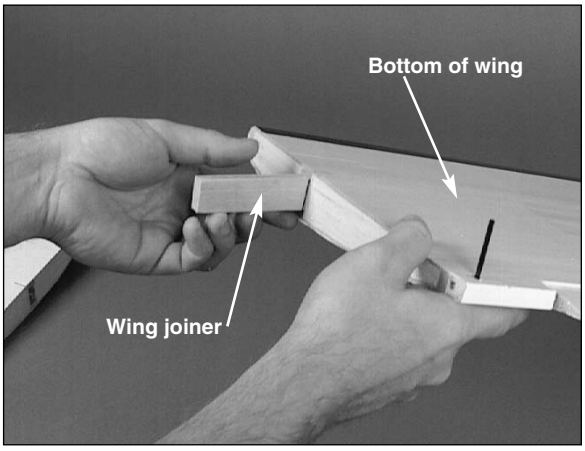
❑ 4. After epoxy has been applied to the #2 wing joiner and the joiners have been laminated, use three

clothespins to clamp the wing joiners together firmly. The excess epoxy **must** be removed before it dries-see Step #5.

Removing the excess epoxy

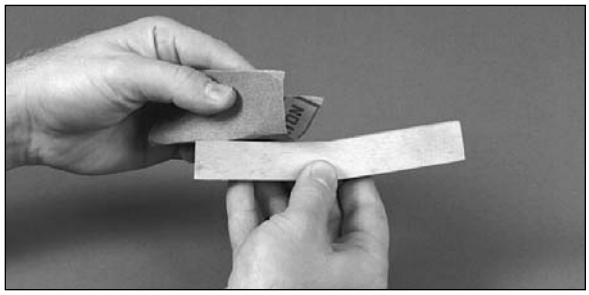
❑ 5. Excess epoxy will be squeezed out of the seams between the joiners and must be removed **before** the epoxy is allowed to cure. Use a paper towel and rubbing alcohol to remove the excess epoxy. Be careful not to disturb the alignment of the joiner pieces.

Test fit the wing joiner



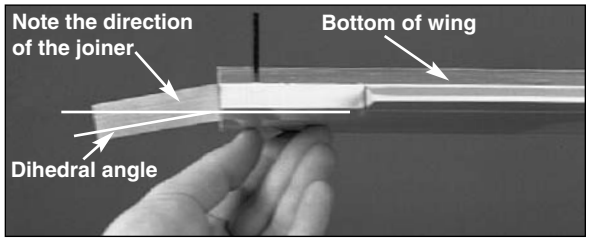
❑ 6. After the epoxy has cured and the clothespins have been removed, test fit the wing joiner in both wings by sliding the joiner into the joiner cavity in the wing. The joiner should slide in with a little resistance up to the centerline drawn on the both sides of the joiner.

Sanding the joiner



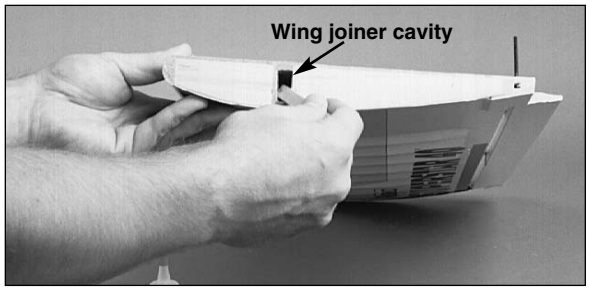
❑ 7. If the wing joiner will not fit in the cavity, lightly sand the excess epoxy and uneven surface joints from the joiner edges and sides. **Caution:** A snug fit is desirable between the joiner and the wing cavity. Do not sand excessively.

Viewing the wing dihedral



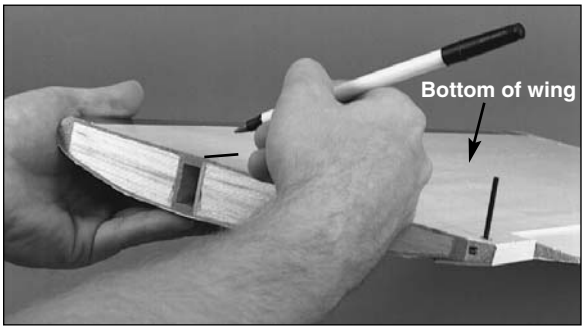
❑ 8. Pay close attention to the orientation of the wing joiner in relation to the dihedral of the wings as shown.

Gluing the joiner in the wing



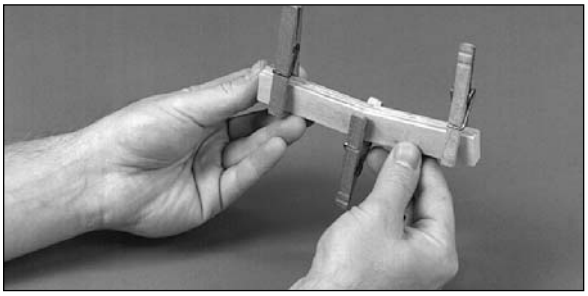
❑ 9. Mix 1/4oz. (7.5ml) of 30-minute epoxy to glue the joiner into one wing half. Use a mixing stick or epoxy brush to apply epoxy to all four sides of the joiner cavity wall. Insert the joiner into the cavity up to the centerline marked on the joiner plate. Be sure you are installing the joiner in the correct orientation to the wing. Clean the excess epoxy from the wing root rib. You must be sure all the excess glue is removed from the wing root or the wings will not fit together correctly. Allow enough time for the epoxy to fully cure before proceeding to the next step.

Marking the wing cavity



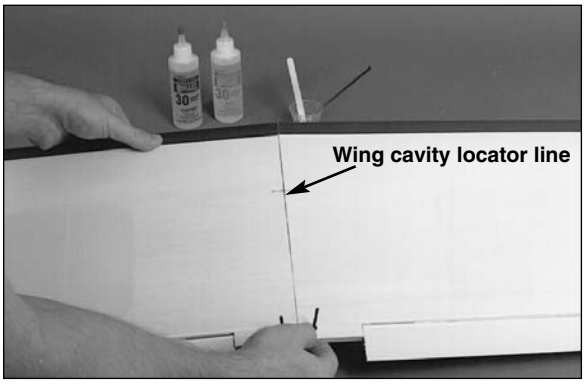
❑ 10. Lay the wing halves on the work surface with the white, flat side facing up. Place a mark at the trailing edge of the wing cavity, where the wing joiner will be inserted, on each wing half. This wing joiner locator line will serve as a guide when cutting out the aileron servo hole.

Applying the epoxy



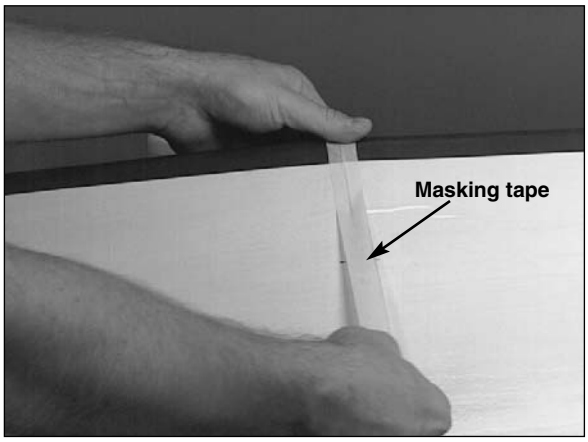
❑ 11. Mix 1/2oz. (14.5ml) of 30-minute epoxy and apply to the wing root rib and inside the joiner cavity of the second wing half.

Joining the wing halves



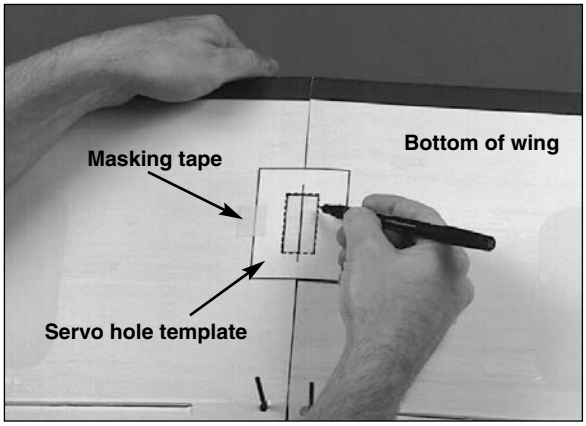
❑ 12. Assemble the two wing halves with the tightest seam possible. **No gaps** should be showing between the two wing halves. Clean the excess epoxy from the outside of the wing using a paper towel and rubbing alcohol.

Taping the wing halves together



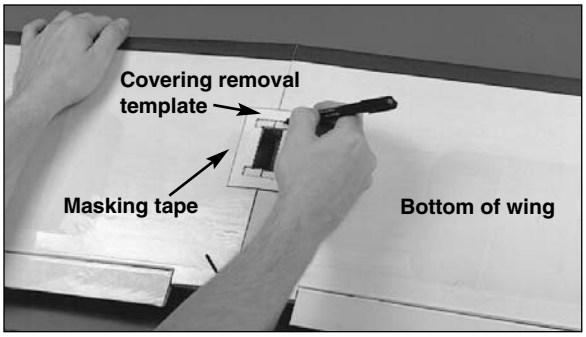
❑ 13. Cover the seam between the wing halves with masking tape. Set the wing aside to dry. It may be necessary to prop one wing half up (the tip of the wing would be 5" from the work surface) with the other wing half flat on the work surface to hold the wing halves in alignment while the epoxy is curing.

Cutting the aileron servo hole



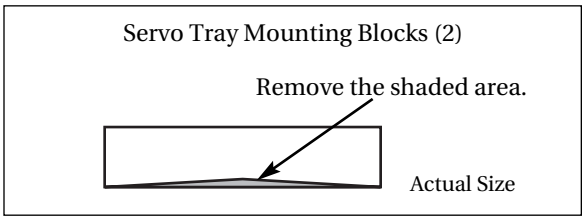
❑ 14. Remove the masking tape from the wing joint seam. With the wing laying upside down and the leading edge facing away from you, tape the aileron servo hole template to the bottom of the wing with two pieces of 1/2" (12.5mm) long masking tape. The top inside edge of the template should be placed 1/16" (1.5mm) below the the wing joiner locator line, drawn in Step#10, and the center lines should be directly over the wing joint. Using a felt-tip pen, trace the inside of the template and then remove the template. Use a hobby knife with a new blade to carefully cut-out the aileron servo hole. ***Do not*** cut through the top side of the wing or into the wing joiner cavity.

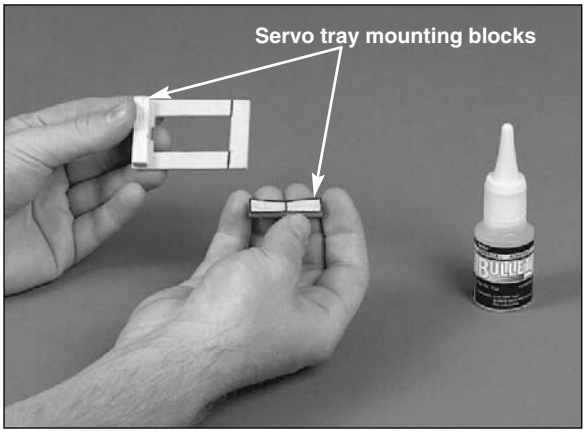
Removing the covering



❑ 15. Tape the "covering removal template" to the bottom of the wing, directly above the aileron servo hole, with two pieces of masking tape 1/2" (12.5mm) long. Trace the **inside** of the template with a felt-tip pen and then remove the template. Remove only the covering within the marked line, being careful not to cut into the balsa wing sheeting.

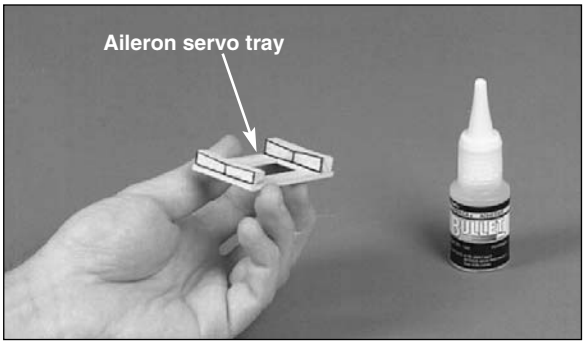
Cutting the mounting blocks





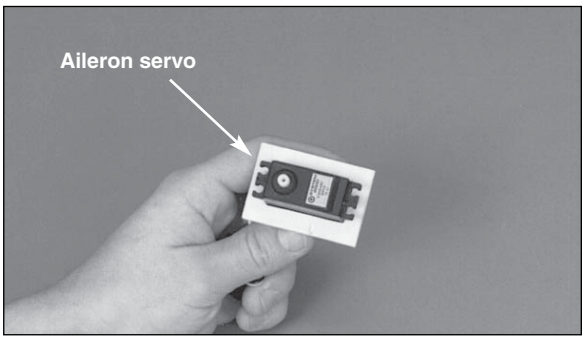
❑ 16. Locate the aileron servo tray and the two balsa 5/16" x 1-7/16" (8mm x 36.5mm) servo tray mounting blocks and position them with the marked dihedral line up. Using a sharp hobby knife, cut the angle out of the block. This angle will be placed against the wing when the servo tray is installed.

Assembling the servo tray



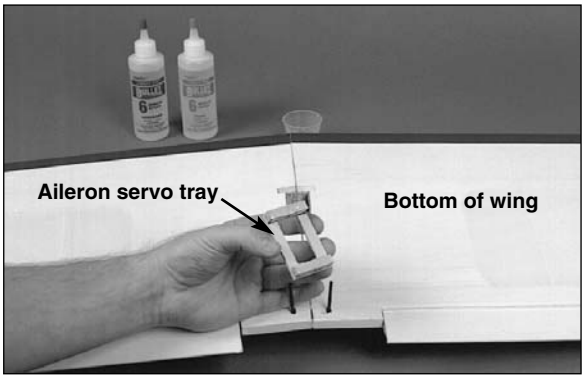
❑ 17. Apply thick CA+ to the flat side of the balsa servo tray mounting block. Place the mounting block on the aileron servo tray next to the servo opening–not on the outer edge of the tray. Note the positioning of the dihedral angle in relation to the servo tray.

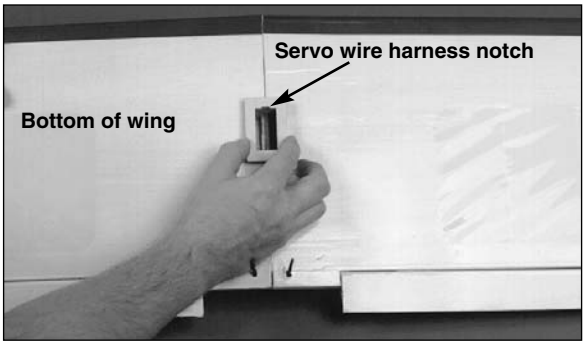
Test fitting the aileron servo



❑ 18. Test fit the aileron servo into the servo tray and the hole cut in the bottom side of the wing. Enlarge either hole, if needed, with a hobby knife or a fine toothed file until a proper fit is achieved.

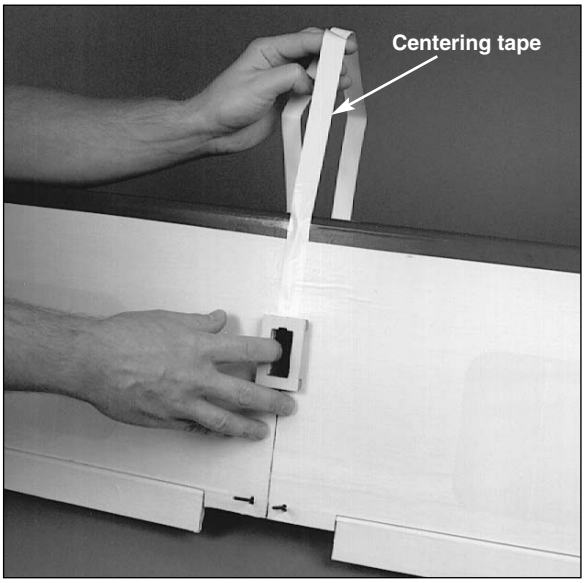
Installing the servo tray





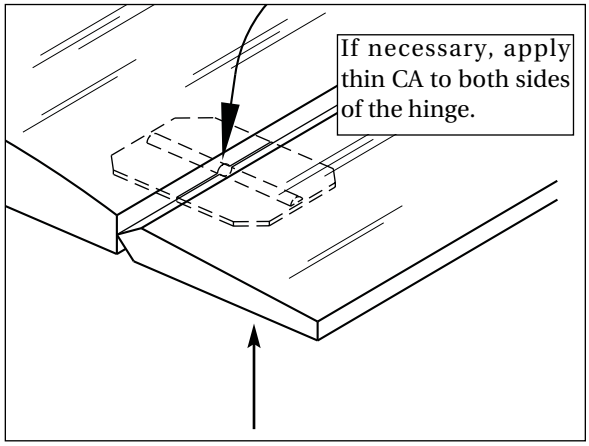
❑ 19. Mix 1/8oz. (3.5ml) of 6-minute epoxy to glue the servo tray to the bottom side of the wing. Apply equal amounts of epoxy to the mounting blocks on both ends of the servo tray. Attach the servo tray on the bottom of the wing with the servo wire harness notch facing the leading edge of the wing. The mounting blocks should be attached to the wing sheeting where the covering was removed in Step #14 and not to the wing covering. Allow the epoxy to fully cure before proceeding to the next step.

Applying the centering tape



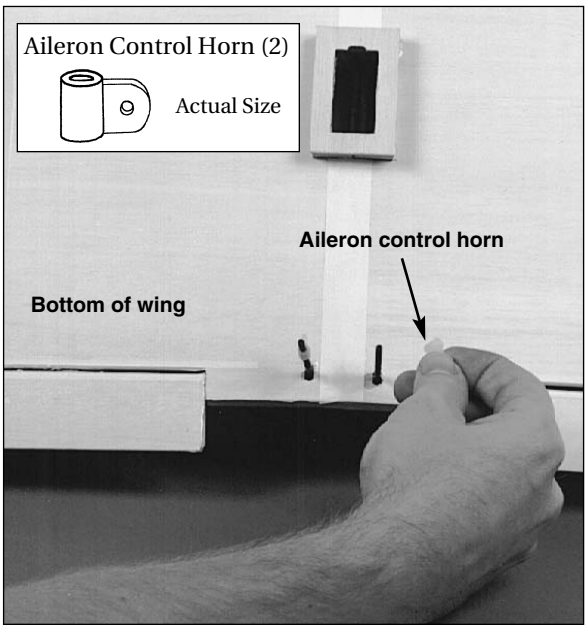
❑ 20. Starting at the front aileron servo tray block, apply the 1/2" (12.5mm) white plastic centering tape completely around the wing over the joint. A small amount of pressure should be applied to make a smooth seam.

Checking the hinges



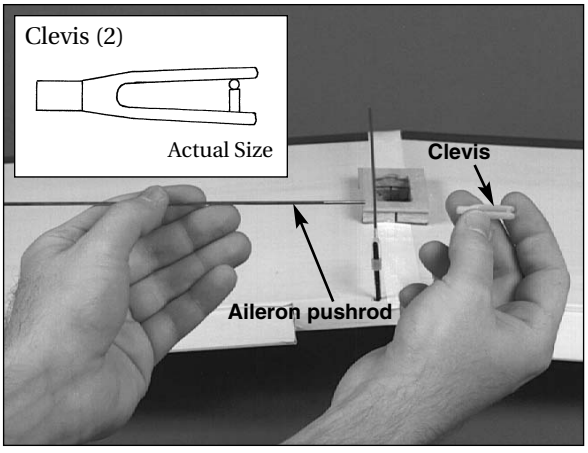
❑ 21. The hinge material used in this kit consists of a 3-layer lamination of mylar and polyester. It is specially made for the purpose of hinging model airplane control surfaces. Properly installed, this type of hinge provides the best combination of strength, durability and ease of installation. The CA hinges in your plane are preglued and must not be removed. Check each of the ailerons, the rudder and the elevator to be sure that they are secure. Gently tug on each of the control surfaces at each hinge location. If any of them seem loose, reglue them as described here. First, flex the surface all the way one direction (DO NOT REMOVE THE HINGE). Apply a few drops of thin CA glue onto each hinge. The glue will wick into the wood providing a strong joint. Use a paper towel to absorb any excess glue. Wait a few minutes for the glue to harden, then flex the surface the other direction and glue the other side of the hinge in the same manner. Finally, flex back and forth several times to free up the control surface.

Installing the aileron control horns



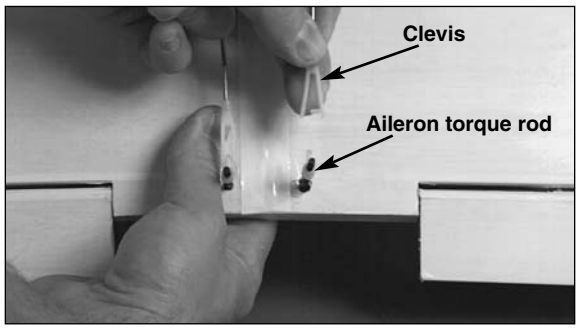
❑ 22. Locate the aileron ***control horns*** on the plastic parts tree. Remove the control horns and thread them onto the torque rods until there is 3/4" (19mm) of torque rod between the wing and control horn.

Assembling the pushrods



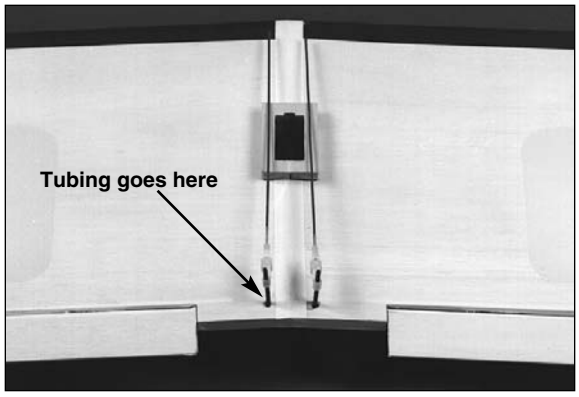
❑ 23. Locate the two plastic ***clevises*** on the plastic parts tree and two 8" (203mm) aileron control rods. Thread the clevises onto the ***pushrods*** in a clockwise motion until the rod starts to protrude from the inside of the clevis between the forks.

Installing the pushrods



❑ 24. Attach the aileron control rods to the aileron torque rods using the plastic clevises. Pry the fork of the clevis apart and insert the pin of the clevis through the hole in the aileron control horn. Press the forks of the clevis back together until they snap into place.

Aileron pushrods installed



❑ 25. Locate the 1/4" (6.5mm) diameter clear plastic tubing and cut two 1/4" (6.5mm) long pieces. **Do not** use the medium silicone fuel tubing. Slide one piece on each of the two control rod clevises to secure the connection between the clevis and the horn.

Fuselage Assembly

What you'll need -

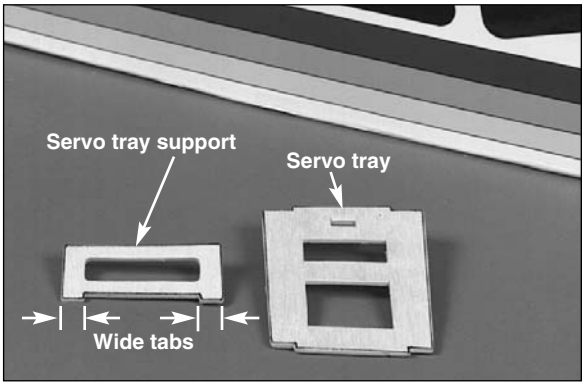
Parts in this kit

- *Scrap plywood*
- *2 Foam wheels*
- *4-4mm Wheel collars*
- *4-2 x 5mm screws*
- *Fuselage*
- *Pushrod guide tube*
- *Steering pushrod*
- *Hardwood wing dowels*
- *Plywood stabilizer mount*
- *Horizontal stabilizer*
- *Vertical stabilizer*
- *2 Plastic control horns*
- *2 Control horn backplate*
- *4-2 x 20mm S/T screws*
- *Nose gear*
- *Nose gear control horn*
- *Fuel line*
- *Fuel tank*
- *3 Aluminum tubes*
- *Tank plug*
- *2 Tank plug discs*
- *3 x 18mm S/T screw*
- *Fuel pick-up weight*
- *Foam fuel tank collar*
- *Plywood servo tray*
- *Plywood servo tray support*
- *2 Plastic landing gear straps*
- *2 Landing gear struts*
- *4-3 x 15mm S/T screws*

...Plus, these general items:

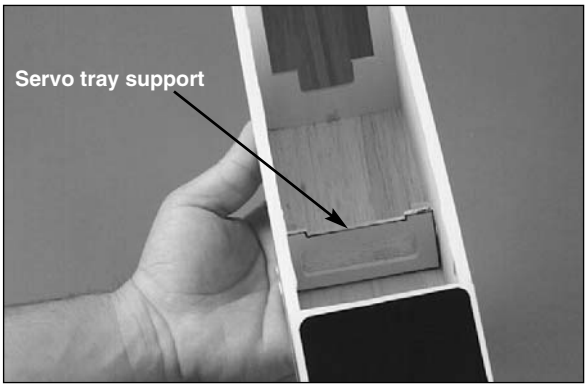
- *Paper towels*
- *6-minute epoxy*
- *30-minute epoxy*
- *Silicone sealant*
- *Ruler*
- *Mixing sticks*
- *Mixing cups*
- *Rubbing alcohol*
- *Epoxy brushes*
- *Thin CA glue*
- *Needle nose pliers*
- *Sand paper*
- *Fine toothed file*
- *Masking tape*
- *Hobby knife*
- *Felt-tip pen*
- *T-pins*
- *String*
- *Portable drill*
- *1/16", 1/8" Drill bits*
- *Phillips screwdriver*
- *Standard screwdriver*
- *Petroleum jelly*

Servo tray installation



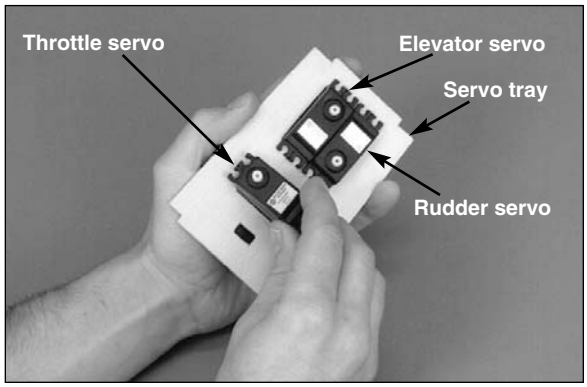
❑ 1. Locate the two plywood servo tray supports included in the kit. Only one will be used in the servo tray installation. Select the servo tray support with the wide tabs and the servo tray itself.

Gluing the servo tray support



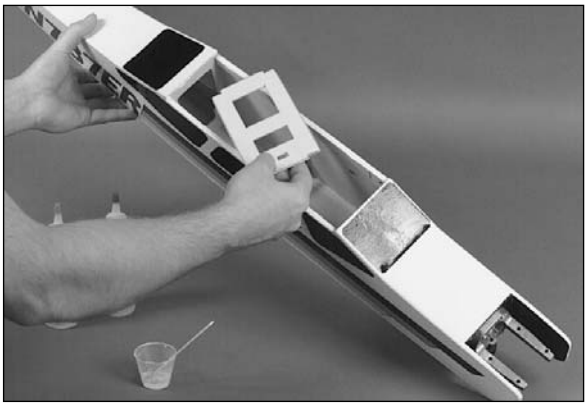
❑ 2. Mix 1/8oz. (3.5ml) of 30-minute epoxy to glue the servo tray mount into the ***fuselage.*** The servo tray mount will be positioned in front of the pre-installed hardwood ***landing gear*** block on the side facing the nose of the aircraft. Apply epoxy to all the fuselage surfaces that will come in contact with the servo tray support. Install the servo tray support. Allow the epoxy to cure.

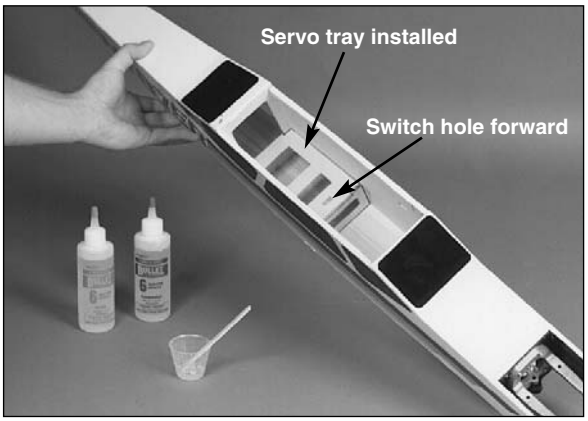
Test fitting the servos



❑ 3. Test fit your servos into the plywood servo tray. Enlarge the servo tray opening, if needed, using a fine toothed file until a proper fit is achieved. The servo should fit loosely into the radio tray up to the servo mounts. After final installation the servos should float freely on the rubber grommets.

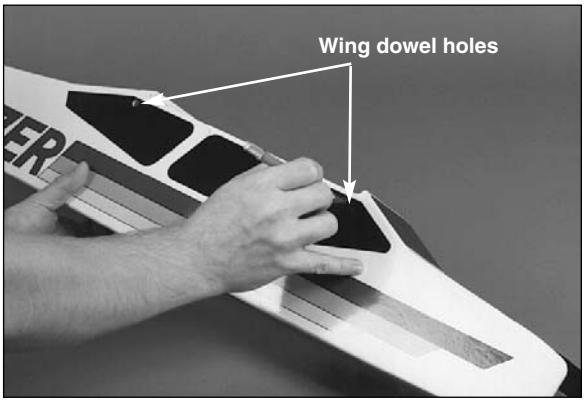
Installing the servo tray





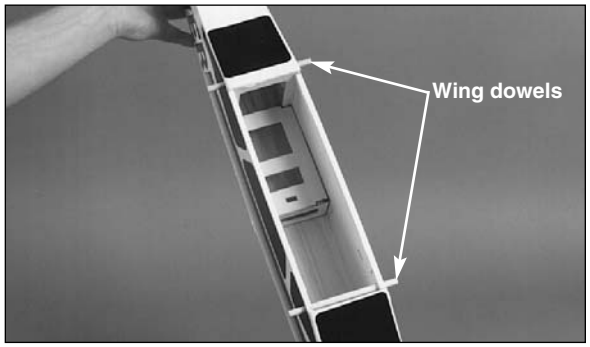
❑ 4. Mix 1/8oz. (3.5ml) of 6-minute epoxy to glue the servo tray into the fuselage. Note the direction of the servo tray before installing. The single servo cut-out is positioned toward the nose of the plane. Apply epoxy to all fuselage parts that will come in contact with the servo tray. Install the plywood servo tray into the fuselage with the switch cut out facing the front of the plane.

Installing the wing dowels



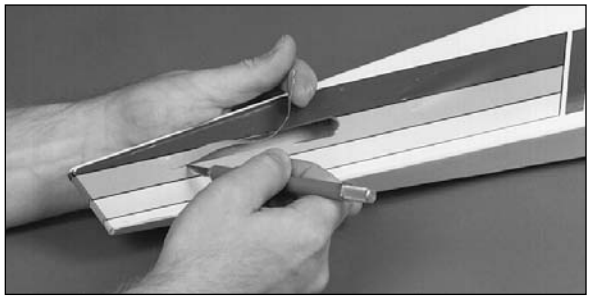
❑ 5. The wing dowel holes are predrilled. Locate the four round holes, two on each side of the fuselage, and remove the covering over each hole. **Caution:** Do not cut-out the rectangular switch holes in the side of the fuselage. Insert both 5" wooden dowels so that they protrude equal amounts on both sides. Mix 1/4oz. (7.5ml) of 30-minute epoxy to lightly seal the dowels that are protruding from the outside of the fuselage. This will keep fuel from soaking into the wooden dowels. With the remainder of the epoxy, secure the dowels in place by applying epoxy on the dowel from the inside of the fuselage next to the fuselage wall.

Wing dowels installed



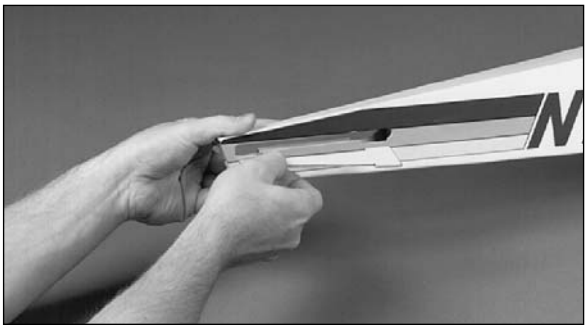
❑ 6. The front wing dowel should measure approximately 5/8" (15.5 mm) on each side of the fuselage. The rear dowel should measure approximately 3/4" (19mm) on each side. These wing dowels along with #64 rubber bands will be used to hold the wing in place.

Constructing the tail section



❑ 7. Locate the ***horizontal stabilizer*** slot under the covering on the tail section of the fuselage by pressing lightly with your finger. The slot will be located on both sides of the tail. Using a hobby knife, carefully remove the covering exposing the slots. **Note:** Do not cut into the balsa wood sheeting around the slot.

Installing the plywood stab mount

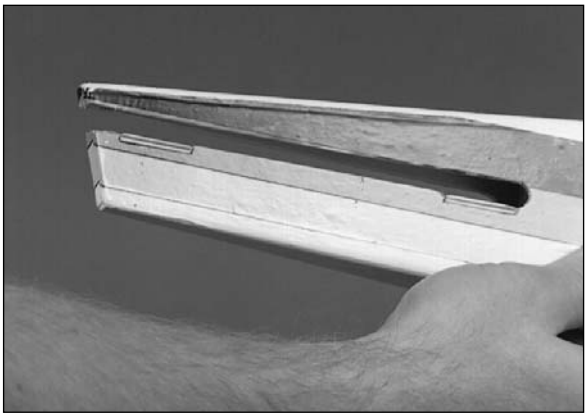


❑ 8. Locate the 1/8" (3mm) triangular plywood stabilizer mount and test fit the mount into the bottom of the horizontal stabilizer slot. Lightly sand the mount if necessary to obtain a proper fit.

Gluing the mount in place

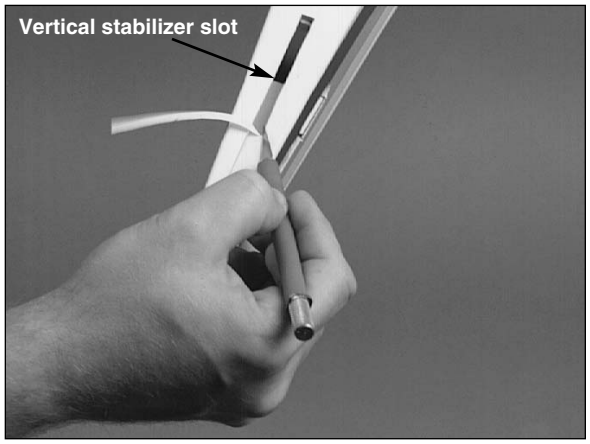
❑ 9. Mix 1/8oz. (3.5ml) of 30-minute epoxy to glue the stabilizer mount into place. Using a mixing stick, apply a generous amount of glue into the slot and position the stabilizer mount inside the slot on the bottom side. The stabilizer mount should be pressed firmly into position. Remove any excess epoxy that remains on the top of the stabilizer mount as well as on the outside of the fuselage using a paper towel and rubbing alcohol.

Removing the tail post



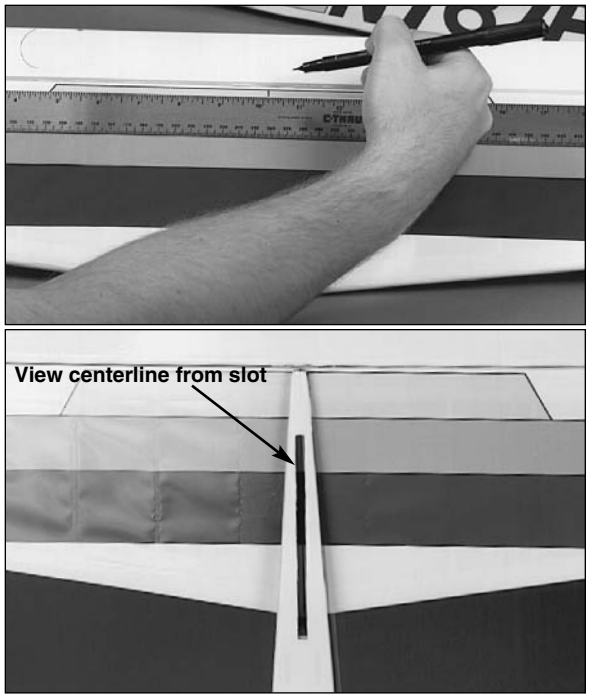
❑ 10. Located at the rear of the fuselage, behind the horizontal stabilizer slot are two balsa tail posts. These posts are left for building alignment and fuselage construction guides. Both of these posts must be removed in order to insert the horizontal stabilizer. Using a sharp hobby knife, cut the posts even with the slot as shown in the picture.

Vertical stabilizer slot covering



❑ 11 Using your finger, locate the ***vertical stabilizer*** slot on the top of the fuselage. Remove the covering with a hobby knife in the same manner as for the horizontal stabilizer slots. This will allow better viewing access when centering the horizontal stabilizer.

Finding the centerline



❑ 12. Locate the horizontal stabilizer and draw a centerline on the side with the three color decals. Insert the stabilizer into the tail section with the line showing through the vertical stabilizer slot.

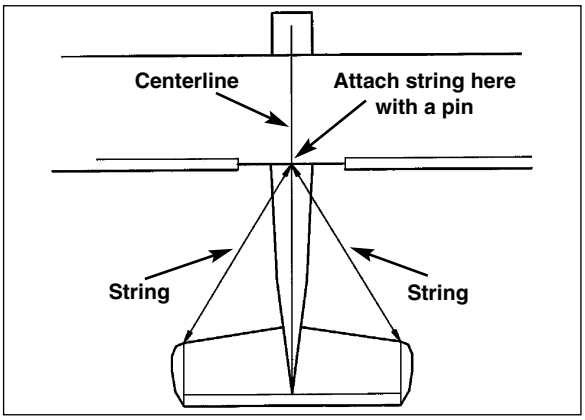
Tracing the fuselage outline

❑ 13. Using a felt-tip pen, trace a line around the tail of the airplane on the top and bottom of the horizontal stabilizer.

Removing the covering

❑ 14. Using a hobby knife, cut inside the lines made with a felt-tip pen and remove the covering from the center of the horizontal stabilizer. **Do not** cut into the balsa sheeting on the horizontal stabilizer.

Preparing to install the stabilizer



❑ 15. Attach a piece of string with a pin to the center line as shown. The string should be a minimum of 31-1/2" (800mm) in length. Stretch the string to the corner of the horizontal stabilizer. The distance from the pin to the horizontal stabilizer must be the same on both sides. This method will adjust the horizontal stabilizer to a 90Þ angle to the centerline of the aircraft.

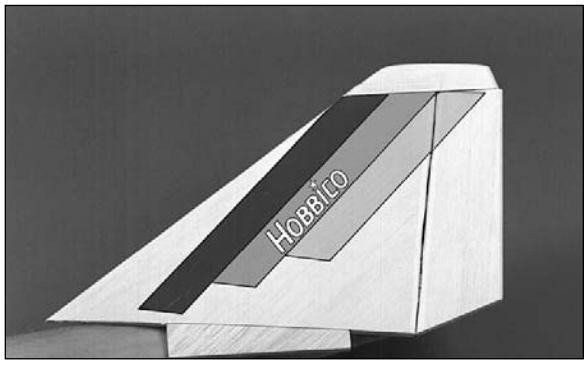
Installing the stabilizer

❑ 16. Mix 1/4oz. (7.5ml) of 30-minute epoxy to install the horizontal stabilizer. Using a mixing stick, place glue inside the horizontal stabilizer slot on all sides including the horizontal stabilizer mount. Insert the horizontal stabilizer and clean off the excess epoxy that squeezes out of the joint with a paper towel and rubbing alcohol. Adjust alignment as shown in the previous step. Set the fuselage aside to cure.

Preparing the vertical stabilizer

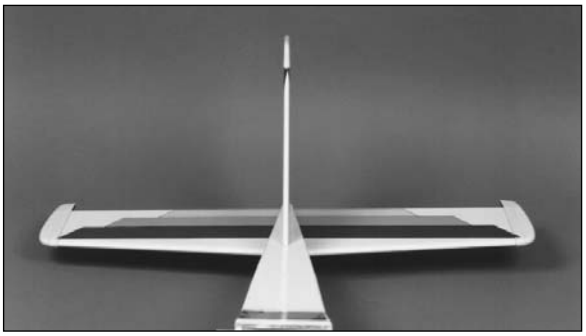
❑ 17. Locate the vertical stabilizer. Draw a line on both sides even with the bottom of the fin.

Removing the covering



❑ 18. Cutting below the line and through the covering only, remove the covering from the base of the vertical fin. **Do not** cut into the balsa fin root.

Installing the vertical stabilizer



❑ 19. Mix 1/4oz. (7.5ml) of 30-minute epoxy to glue the vertical stabilizer in place. Using a mixing stick, apply epoxy to the top of the horizontal stabilizer through the vertical stabilizer slot. Apply epoxy to the sides and bottom surfaces of the fin base that have balsa wood exposed. Insert the vertical stabilizer into the slot, making sure the fin root is seated firmly on the horizontal stabilizer. Check for a perpendicular angle between the fin and the stabilizer when viewed from the front. It is critical that the fin remains perpendicular while the epoxy is curing. T-pins or masking tape may be required to hold the fin during this time.

The stabilizers installed

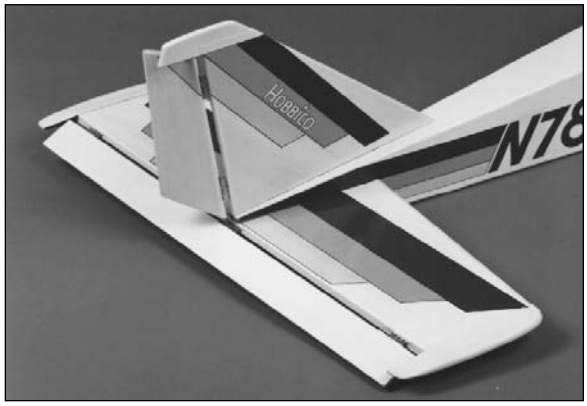
Check the elevator

❑ 20. The CA hinges in your plane are preglued and must not be removed. Check the elevator hinges to be sure that they are secure. Gently tug on the control surface at each hinge location. If any of them seem loose, reglue them as described on page 10.

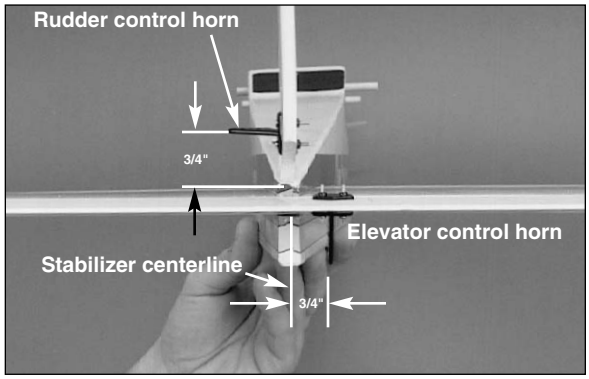
Check the rudder

❑ 21. Check the rudder hinges to be sure that they are secure. Gently tug on the control surface at each hinge location. If any of them seem loose, reglue them as described on page 10.

Rudder and elevator move freely

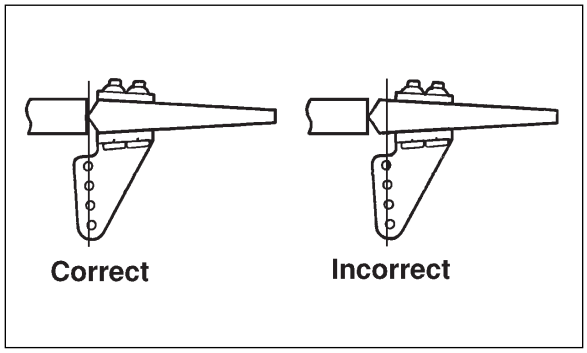


Locations of the control horns

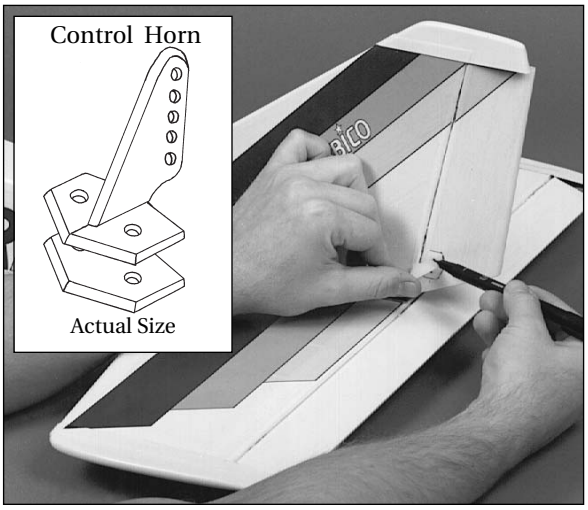


❑ 22. Notice the locations and alignment of the control horns in both the photo and the illustration before marking and drilling.

Control horn alignment



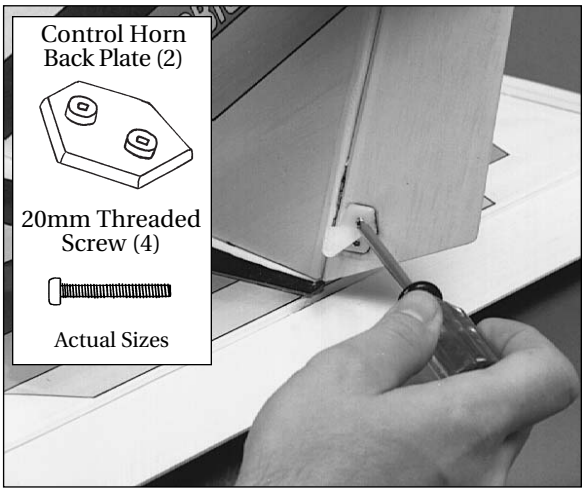
Attaching the rudder control horns



❑ 22. Locate the nylon control horns on the plastic parts tree. Position the nylon control horn on the leading edge and 3/4" (19mm) from the bottom of the rudder. Mark the two holes with a felt-tip pen. The control horn will be centered directly over the lower rudder hinge.

❑ 23. The holes of the control horn should line-up with the gap between the rudder and the vertical stabilizer.

Mounting the control horns



❑ 24. Drill two 1/16" (1.6mm) holes through the balsa rudder and the lower hinge. Insert both 2 x 20mm machine screws through the control horn, rudder and lower hinge into the control horn back plate on the opposite side of the rudder. Tighten the screws but do not crush the balsa.

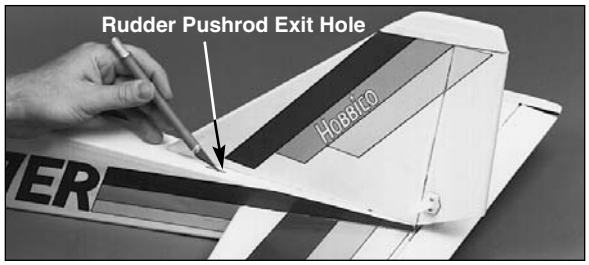
Installing the elevator horn

❑ 25. Locate the elevator nylon control horn on the plastic parts tree. Place the control horn on the bottom side of the elevator 8-7/8" (225mm) from the end of the elevator (opposite side of the rudder control horn) and mark the two holes with a felt-tip pen. Drill two 1/16" (1.6mm) holes through the elevator. With two machine screws 2mm x 20mm attach the control horn .

Locating the rudder exit hole

❑ 26. The precut rudder pushrod exit hole is located on the same side as the rudder control horn, under the covering, 2" (50.5mm) in front of the rudder on the top of the fuselage. Locate the exit hole by gently running your finger down the top of the fuselage.

Removing the covering

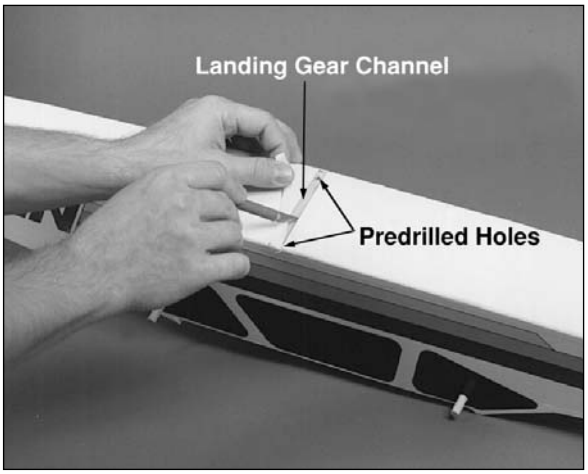


❑ 27. Using a hobby knife, remove the covering from the rudder pushrod exit hole. **Do not** remove the covering from the exit hole on the opposite side.

Cutting the elevator exit hole

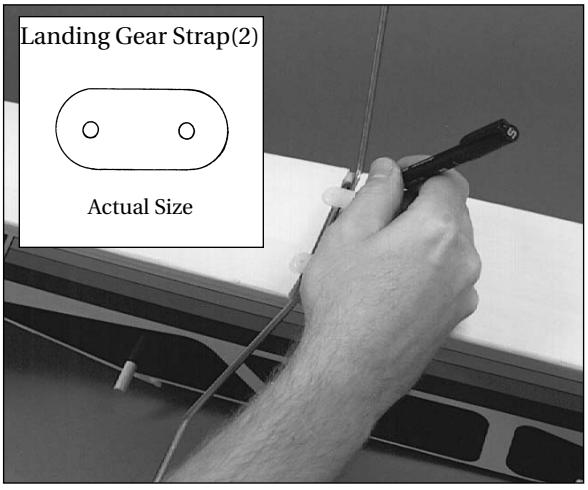
❑ 28. The precut elevator pushrod exit hole is located on the same side of the fuselage as the elevator control horn, beneath the covering 1/2" (12.5mm) in front of the horizontal stabilizer. Locate the exit hole by gently running your finger down the side of the fuselage over the covering. Using a hobby knife, remove the covering from the elevator pushrod exit hole. **Do not** remove the covering from the exit hole on the opposite side of the fuselage.

Installing the landing gear



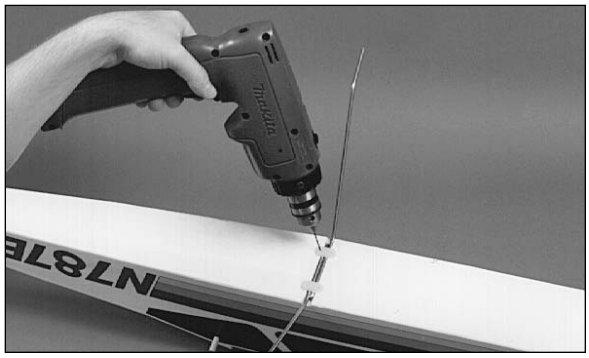
❑ 29. On the bottom of the fuselage, 12-1/2" (318mm) from the ***engine*** compartment, there is a channel located under the covering. Locate this channel by running your finger over the covering on the bottom of the fuselage. Using a hobby knife remove the covering from this channel.

Installing the struts



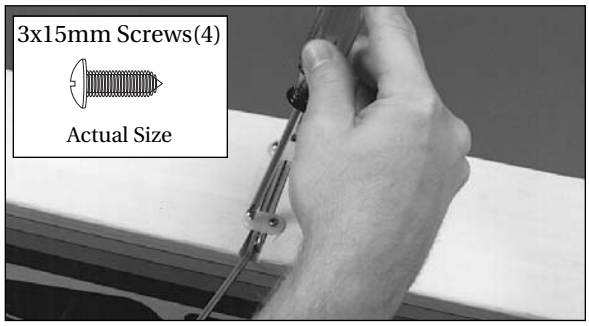
❑ 30. Place a small bead of silicone sealant in the landing gear channel. Locate the two chromed landing struts and place them in the predrilled holes inside the channel on the bottom side of the fuselage. There are two nylon landing gear straps located on the plastic parts tree. Remove these straps and place them over the landing gear struts. Using a felt-tip pen, mark the location of the strap mounting holes onto the bottom of the fuselage.

Drilling the fuselage



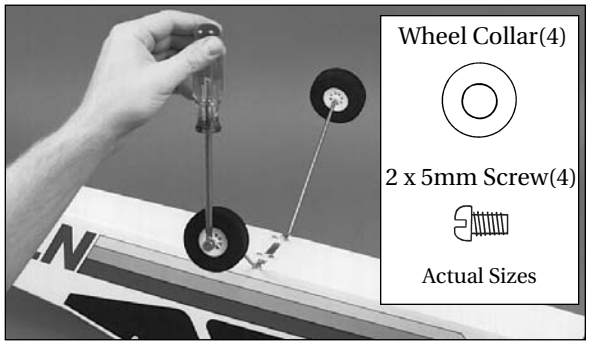
❑ 31. Drill the four holes using a 1/16" (1.6 mm) drill bit.

Mounting the struts



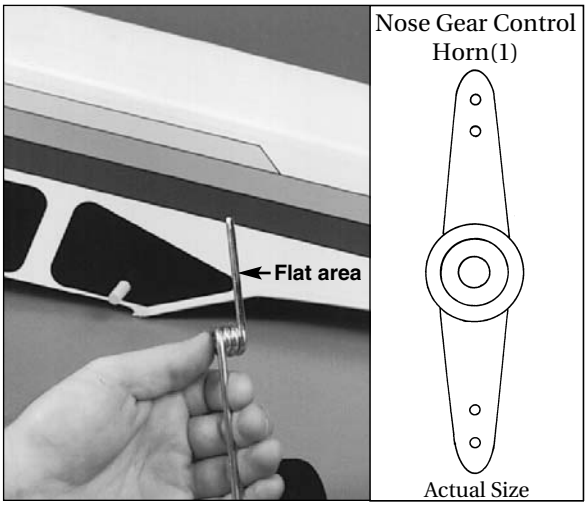
❑ 32. Using four 3 x 15mm self tapping screws, fasten the landing gear straps to the bottom of the fuselage over the struts. The struts should be flush with the bottom of the fuselage.

Mounting the wheels



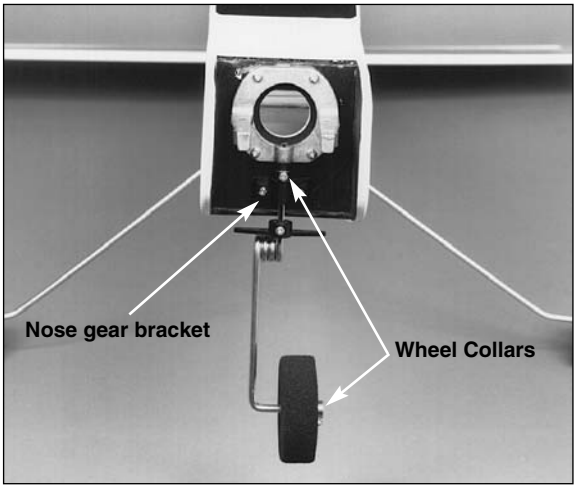
❑ 33. Locate two 3/4" x 2-1/4" (19 x 57mm) foam wheels and four 5/32" (4mm) ***wheel collars***. Place one wheel collar on each strut, followed by one wheel. Secure each wheel with an additional wheel collar, making a total of two on each strut, one on the inside and one on the outside of the wheel.

Assembling the front steering



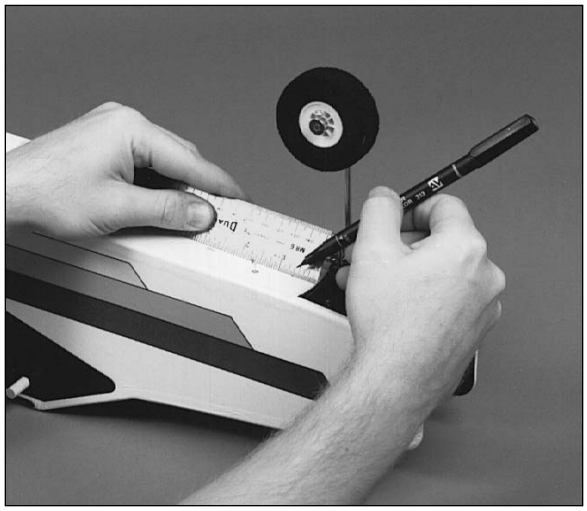
❑ 34. There is a flat area on the stem of the steering gear for the front wheel. Place the black plastic ***nose gear*** control horn on the steering stem with the steering horn arms next to the coil. Tighten the screw on the control horn firmly against the flat area on the stem.

Installing the nose gear



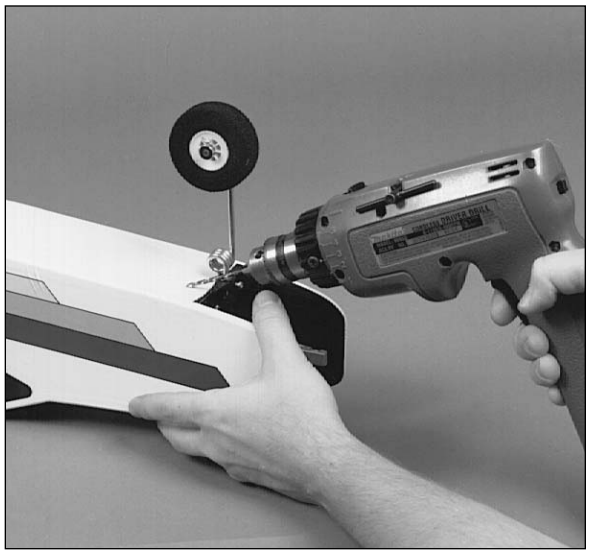
❑ 35. Mount a wheel on the nose gear using one 5/32" (4mm) wheel collar. Insert the nose gear stem into the black plastic nose gear holding bracket on the fuselage fire wall. Place a 5/32" (4mm) wheel collar between the plastic bracket and motor mount. Slide the nose gear stem through the bracket and collar into the motor mount. Leave a 7/16" (11mm) space between the control horn and mounting bracket. Lock the collar by tightening the phillips head screw on the side of the collar.

Steering pushrod exit hole



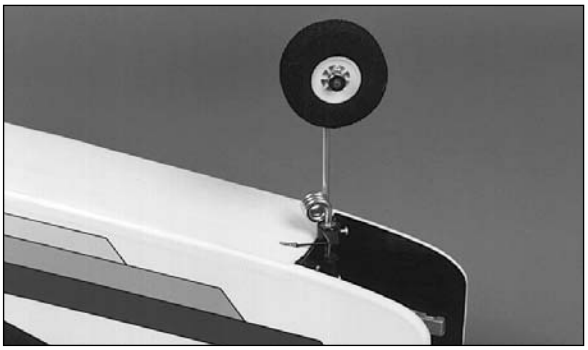
❑ 36 Using a felt-tip pen, place a mark 5/16" (8mm) from the engine compartment and 1" (25.5mm) from the side of the fuselage on the bottom of the fuselage.

Drilling the exit hole



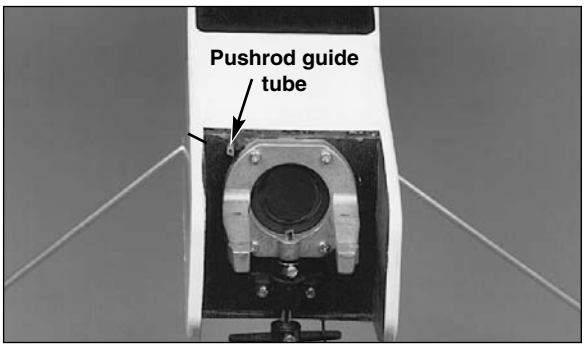
❑ 37. Using a 1/8" (3.2mm) bit, drill a hole at a 70 angle into the fuselage. It is important that the plastic guide tube exit the fuselage at a shallow angle to prevent binding of the control rod. Leave 3/8" (9.5mm) protruding through the bottom of the fuselage. Wick thin CA around the pushrod guide tube. Trim the tube to a beveled angle flush with the bottom of the fuselage.

Installing the pushrod



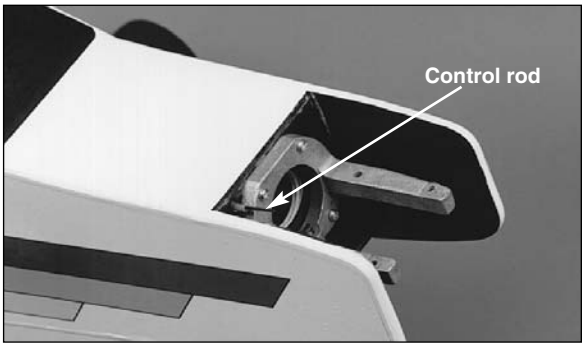
❑ 38. Locate the 17-3/4" (450mm) wire control rod and make a 1/4" (6mm) ***Z-bend*** on one end of the rod. Run the control rod through the plastic guide tube in the fuselage and insert the Z-bend into the inside hole of the steering control horn from the top side when the plane is right-side up.

Throttle control guide



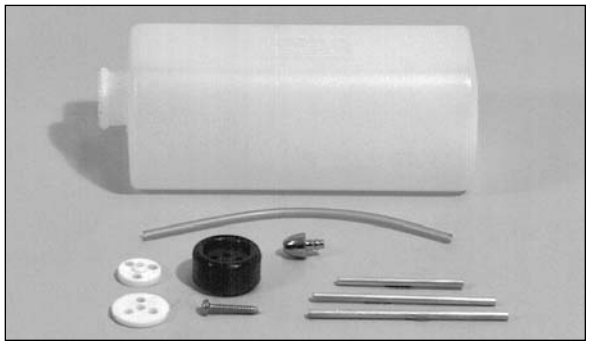
❑ 39. Insert the plastic pushrod guide tube into the predrilled hole in the engine compartment firewall. Leaving 1/4" (6mm) of the tube showing, glue the throttle control tube into the firewall using thin CA.

Insert the control rod



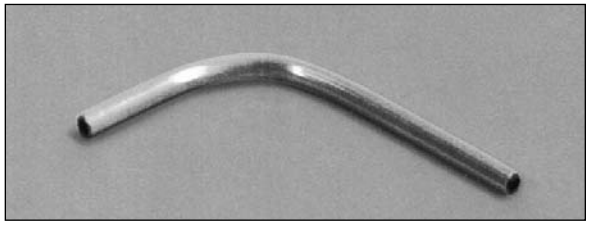
❑ 40. Insert the wire control rod into the guide tube, leaving 1/2" (12.5mm) exposed.

Fuel tank assembly



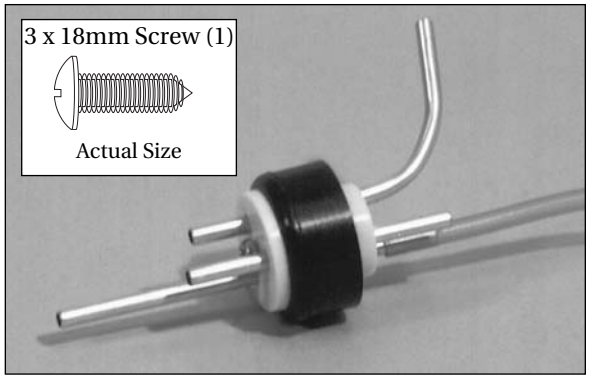
❑ 41. Locate the three aluminum tubes that are used in the ***fuel tank.*** The longest one will be used as the pressure line.

Bending the pressure line



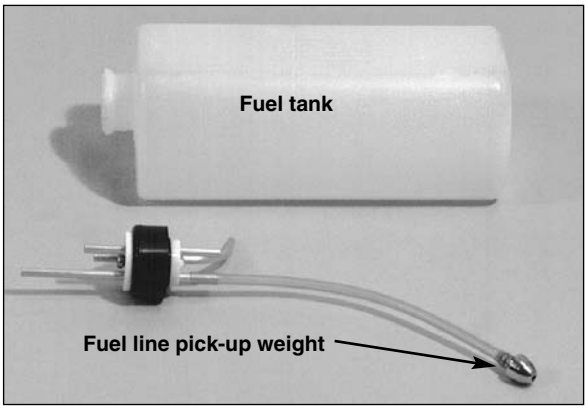
❑ 42. Being careful not to kink the tube, bend one end of the tube to a 90 angle. It may be helpful to find a rigid object that can be used as a form to bend the tube around. Leave 1-1/2" (38mm) of straight tube at one end so it can easily be inserted through the tank plug.

Assembling the tank plug



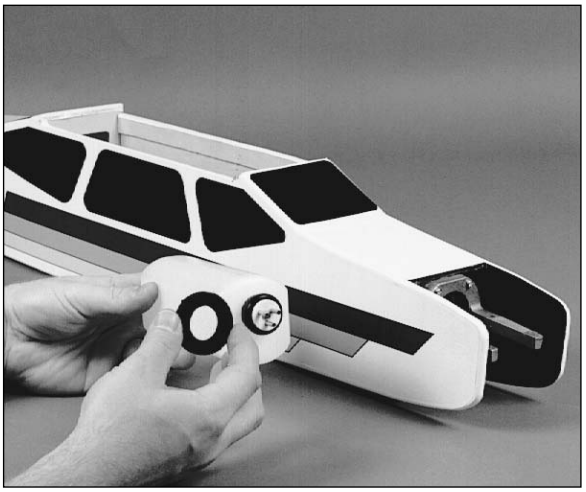
❑ 43. Locate the plastic plug discs (2). Push the aluminum tubes through the smaller stopper disc and the back of the rubber plug. Place the larger stopper disc on the opposite side and insert the 3 x 18mm self tapping screw through the larger disc, rubber plug and then into the smaller disc. Do not tighten the screw at this time.

Final fuel tank assembly



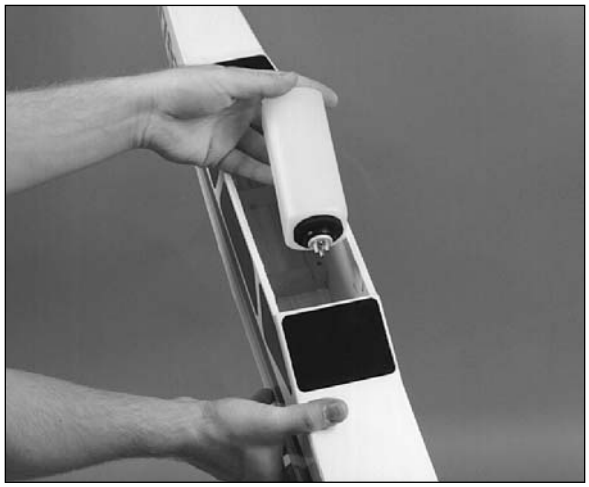
❑ 44. Locate the metal fuel pick-up weight and the medium silicone fuel tubing. Insert the fuel pick-up weight (often referred to as the "***clunk*** weight")into the fuel tubing. Compare the length of the fuel tank to the length of the fuel tubing and cut the tubing so that the fuel pick-up weight on the end of the fuel tubing will not touch the end of the fuel tank. The plug assembly can now be inserted into the tank. The pressure tube should be adjusted so the tube is pointed straight up just under the top of the tank. ***Caution:*** The pressure tube should not touch the top of the tank or fuel shut off and engine failure may occur. The stopper discs on the rubber plug can be tightened by turning the self tapping screw. Do not overtighten the plastic stopper plates or damage to the tank may occur.

Installing the foam collar



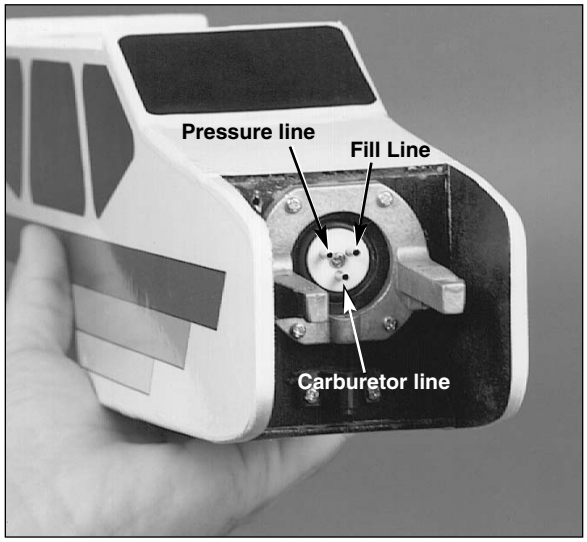
❑ 45. Locate the 1/4" x 7/8" (6 x 22mm) foam tank collar. Remove the inner foam circle and place the collar around the neck of the fuel tank.

Installing the tank



❑ 46. Insert the fuel tank into the fuselage as shown in the picture. Make sure the foam collar is seated well against the firewall.

Orientation of the fuel ports



❑ 47. Note the locations of the fuel ports. Cut three fuel line lengths,(pressure line 4-1/2" (114mm), ***carburetor*** line 4" (101mm), fill line 2-1/2" (63.5mm) from the medium silicone fuel line. Place the cut fuel lines over the correct tubes. A small piece of scrap plywood should be lightly glued behind the fuel tank inside the fuselage to keep it from moving. ***Do not*** use an excessive amount of glue in case the fuel tank needs to be removed in the future .

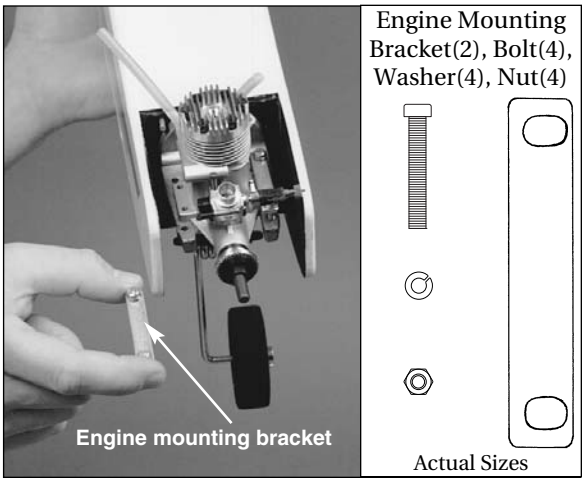
Engine Installation

What you'll need –

Parts in this kit
- Fuel line
- Spinner
- 2-2 x 12mm S/T screws
- 2 Engine mounting brackets
- 4-4 x 15mm screws
- 4-4mm lock washers
- 4-4mm nuts

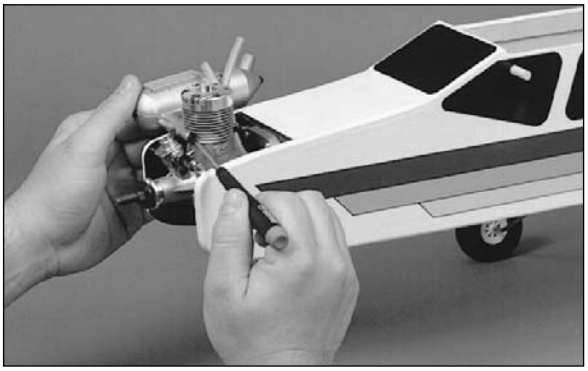
...Plus, these general items:
- Standard screwdriver
- Phillips screwdriver
- Needle nose pliers
- Thread locking compound
- 10mm wrench
- 3mm screw
- Pushrod connector

Mounting the engine



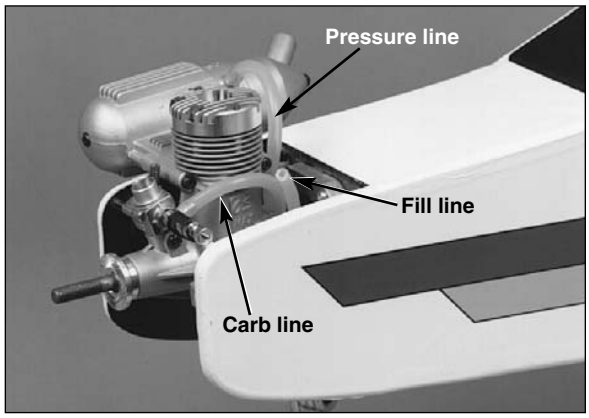
❑ 1. The picture shows an O.S. 40 FP engine mounted. Mount the engine by using two engine mounting brackets, four 4 x 15mm screws, four 4mm lock washers, and four 4mm nuts. The engine centerline must be inline with the fuselage centerline. Place the engine on the mount and secure the engine with the engine brackets. The lock washers should be located on top of the bracket under the head of the screw. The screws are secured by four 4mm nuts. **Note:** Thread locking compound is recommended for use on the engine mounting screws.

Attaching the muffler



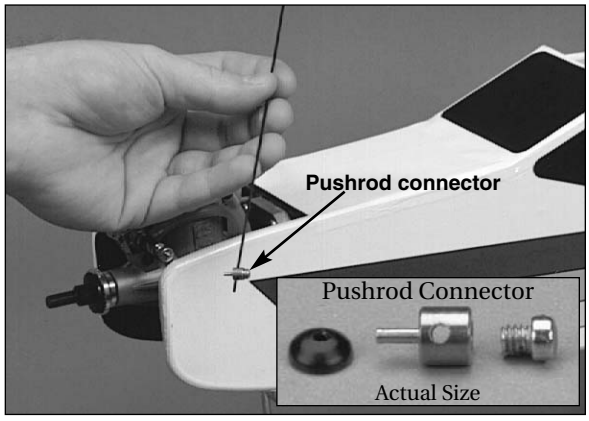
❑ 2. Locate the ***muffler*** and mount it to the engine by using two 3 x 30mm machine screws. The exhaust outlet should be pointing down and away from the fuselage.

Running the fuel line



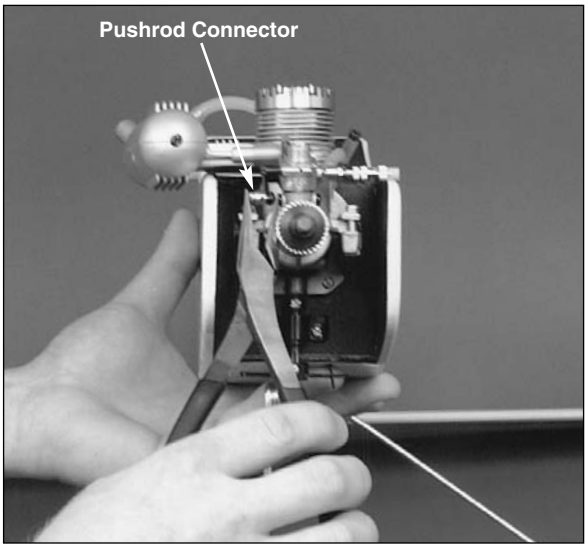
❑ 3. Run the fuel lines to the proper locations on the engine (fuel pick-up to the carburetor, pressure line to the muffler, and fill line on the same side as the fuel pick-up line).The fill line should be plugged with a 3mm screw (not included).

Installing the pushrod connector



❑ 4. Remove the wire control rod from the plastic guide tube. Slide a pushrod connector on one end of the rod, leaving 1/4" (6mm) extending past the connector. Tighten the screw located on the connector using a standard screwdriver.

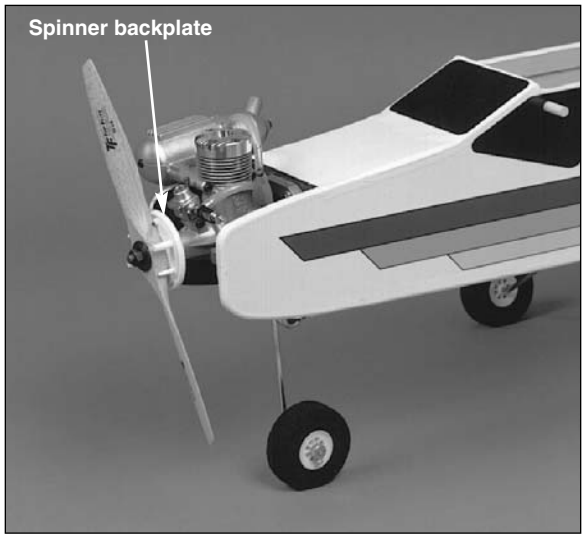
Connecting the throttle



❑ 5. Slide the throttle control rod into the plastic guide tube. Insert the stem of the pushrod connector into the outside hole on the throttle control horn. Place the retaining clip or ring on the stem and press on with needle nose pliers.

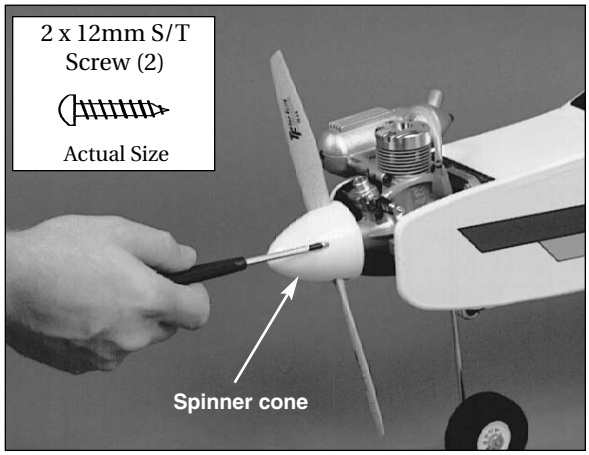
Engine and control rod installed

Mounting the propeller and spinner



❑ 6 Remove the 5.5mm nut and washer from the drive shaft of the engine. Locate the plastic ***spinner*** and place the backplate of the spinner on the drive shaft as illustrated in the picture. **Note:** It might be necessary to enlarge the hole in the spinner backplate for a proper fit over the engine shaft. Place the washer and nut back onto the shaft. The propeller must be seated in the spinner backplate correctly. Tighten the nut using a 10mm wrench.

Final spinner assembly



❑ 7. Place the spinner cone onto the backplate until they snap together. They must be aligned correctly for for a proper fit. The spinner cone must not come in contact with the prop or fatigue and fracture of the prop may occur over a period of time. Insert both 2 x 12mm self tapping screws into the spinner and tighten firmly.

Radio Installation

What you'll need –

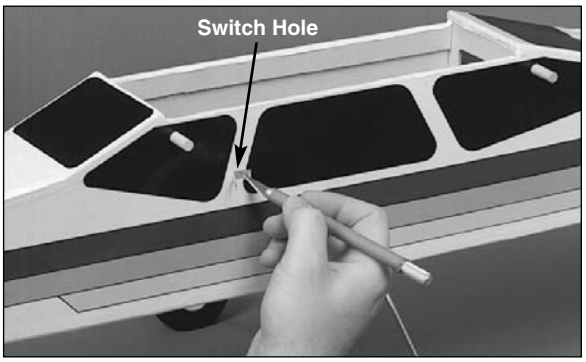
Parts in this kit

- *Elevator pushrod*
- *Rudder pushrod*

...Plus, these general items:

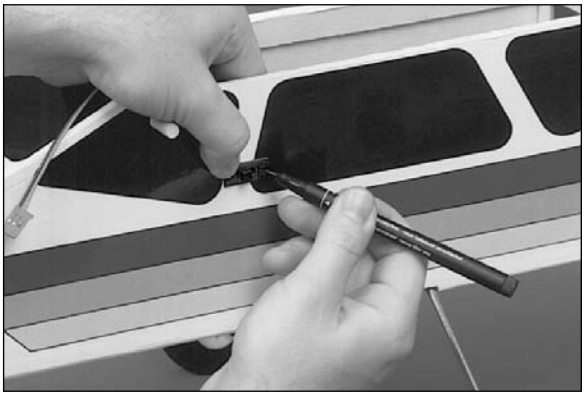
- *CA+ glue*
- *Needle nose pliers*
- *Felt-tip marker*
- *Phillips screwdriver*
- *Portable drill*
- *Servo tape*
- *Foam rubber*
- *Wing saddle tape*
- *Pushrod connector*
- *Hobby knife*
- *Masking tape*
- *#64 Rubber bands*
- *T-Pins*
- *1/16" drill bit*
- *Control surface gauge*

Removing the covering



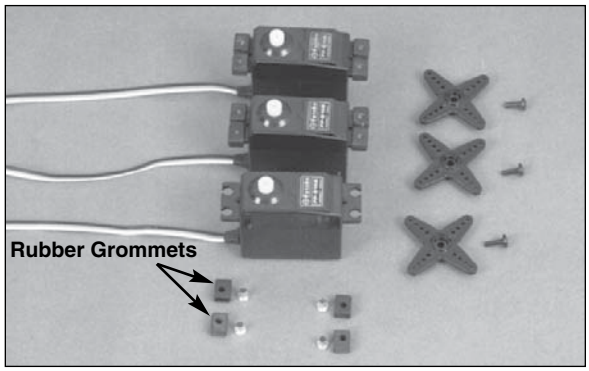
❑ 1. Locate the precut rectangular switch hole on the inside of the fuselage as shown in the picture. Remove the covering from the hole using a hobby knife.

Installing the switch



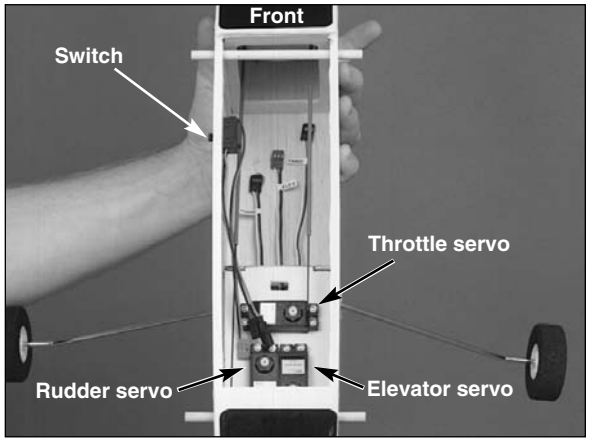
❑ 2. Locate the receiver ***switch harness*** in the radio system and remove the face plate. Place the switch into the hole with the switch facing outward. Put the face plate over the switch and mark the screw holes with a felt-tip marker using the plate as a template. Drill the screw mounting holes using a 1/16" (1.6mm) drill bit. Install the switch from the inside of the fuselage with the "on" position toward the rear of the plane. If the switch would get hit, it would not turn the receiver off. Secure the switch using the two screws supplied with the switch.

Assembling the servos



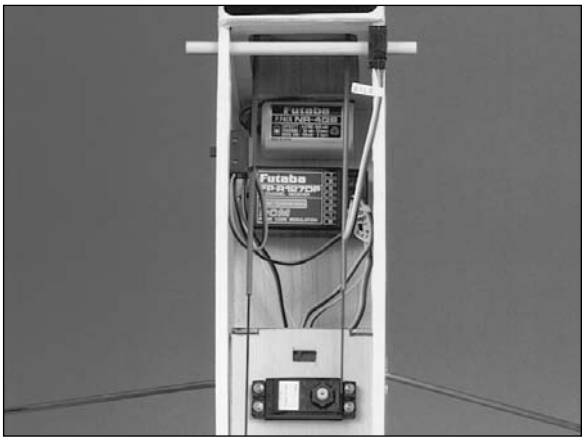
❑ 3. Remove the servo arms and wheels from the three servos. Install the rubber grommets that came with the radio system onto the servos, following the manufacturer's instructions.

Servo installation



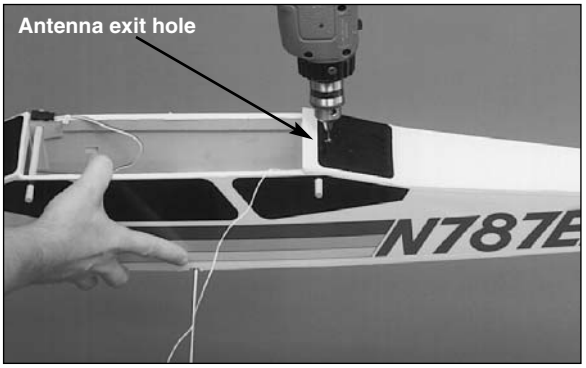
❑ 4 Install the three servos from your radio system as shown in the picture. Refer to the radio manufacturer's manual for more detailed instructions. Notice the location and orientation of each servo as well as the switch location.

Receiver and battery installation



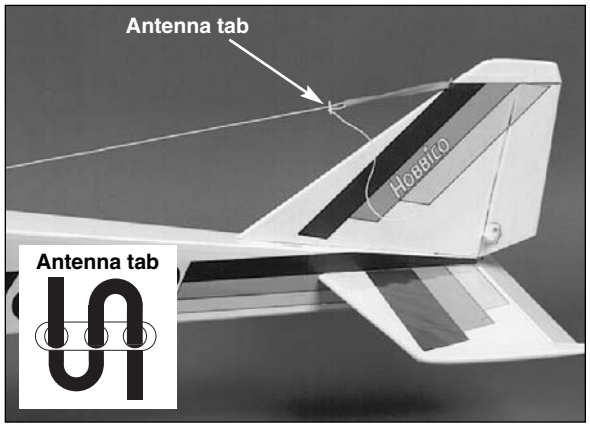
❑ 5. Wrap the ***receiver*** and battery pack in ***foam rubber*** using rubber bands or masking tape to hold the foam in place. The battery pack wire harness, receiver wire connecting block end and antenna should be left accessible. Plug the battery pack into the switch and the switch into the receiver. The servos should be plugged into the correct position on the receiver connecting block before final receiver installation. Connect the aileron servo extension connecting wire to the receiver connecting block. Refer to the manufacturer's manual for more detailed instructions. Secure the battery pack and receiver in the fuselage using servo tape. The picture shows installation without foam for visual clarity.

Drilling the fuselage



❑ 6. Drill a 1/16" (1.6mm) exit hole in the center of the rear window 1"(25.5mm) down from the edge of the radio compartment. Route the antenna under the plywood servo tray and up through the exit hole. Tie a knot in the antenna before it is fed through the exit hole to keep it from being pulled out of the receiver. **Do not** cut the antenna wire. The receiver is tuned to a specific length of antenna.

Securing the antenna

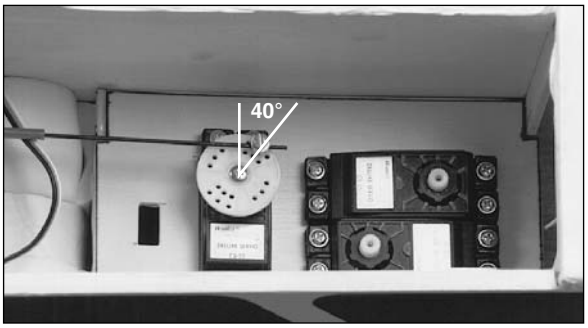


❑ 7. Use a medium T-pin to attach a #64 rubber band to the top portion of the vertical stabilizer. Tie the antenna to the rubber band using tension to keep the antenna tight. Use caution not to damage the antenna. A servo horn can be cut and used to hold the antenna in place with less likelihood of damage to the antenna wire.

Idle throttle position

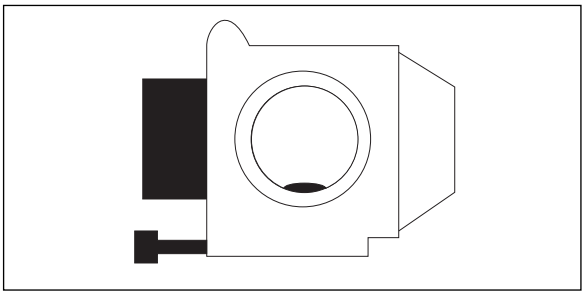
❑ 8. With the radio system on, move the throttle stick down (idle position) and the throttle trim up. All other trim and stick controls should be moved to their neutral positions.

Throttle servo linkage



❑ 9. Locate the round servo horn and install the pushrod connector in the hole 3/8" (9.5mm) from the center of the servo horn following the procedure described in Step #5, engine installation. Slide the throttle control rod through the pushrod connector. Gently press the servo horn onto the throttle servo so that the pushrod connector is positioned at about 40Þ to the rear of the plane as shown above.

Throttle linkage adjustment

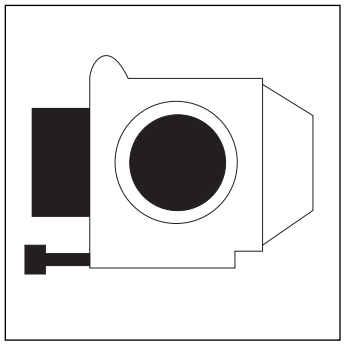


❑ 10. Pull on the throttle control rod while viewing the opening in the top of the carburetor. Leave the throttle open about 1/16" (1.5mm) and secure the throttle ***pushrod*** in the pushrod connector. Then cut-off the excess pushrod 1/4" (6.3mm) past the pushrod connector.

Full throttle control movement

For full throttle, move the throttle stick and trim forward. If the servo horn moves in the wrong direction, switch the reversing switch for the throttle on the ***transmitter*** or use a reversed rotation servo.

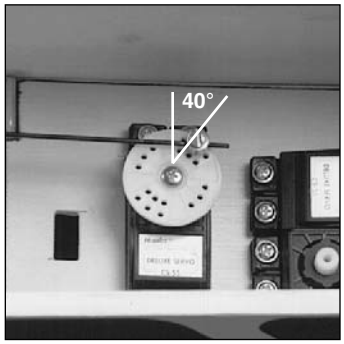
The throttle servo horn should move forward to about 40Þ.



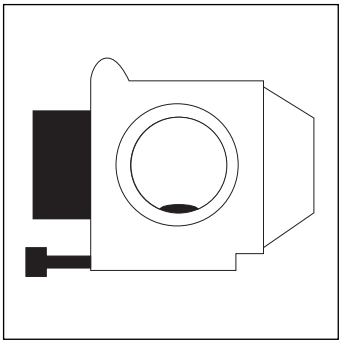
The carburetor should be completely open.

Idle throttle control movement

For idle speed, move the throttle stick back with the throttle trim forward.



The throttle servo horn should move 40Þto the rear.

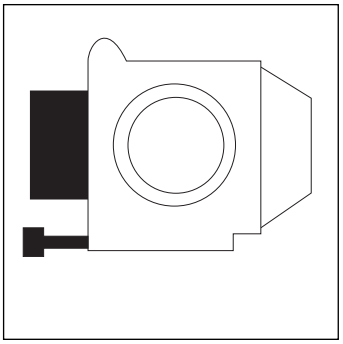


The carburetor should be open only 1/16" (1.5mm).

Engine shut-off

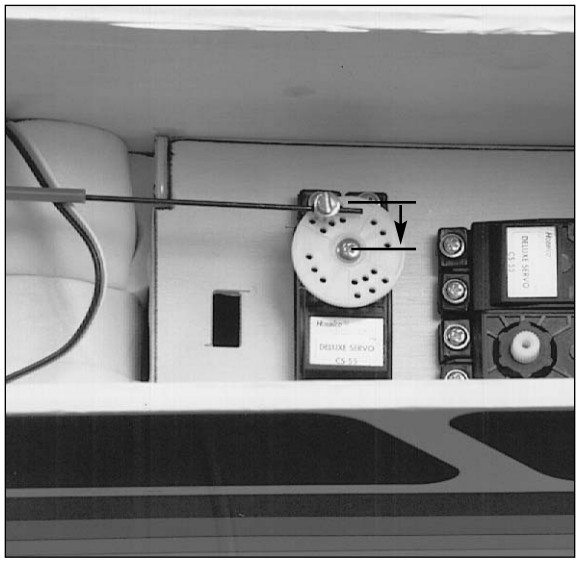
To stop the engine, move the throttle stick back and the throttle trim back.

The throttle servo horn should be 45Þ to the rear.



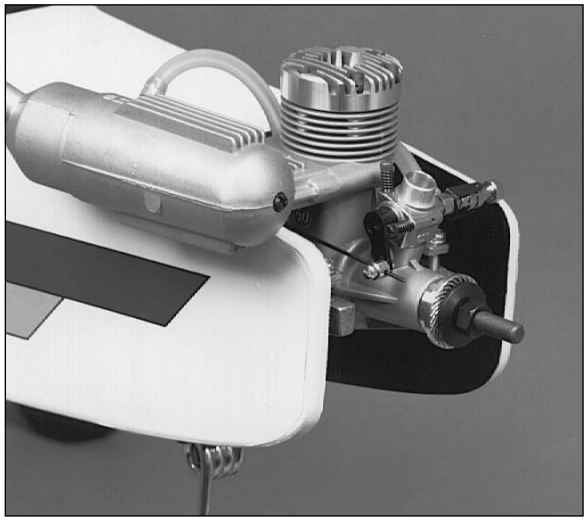
The carburetor should be completely closed.

Decreasing throttle movement



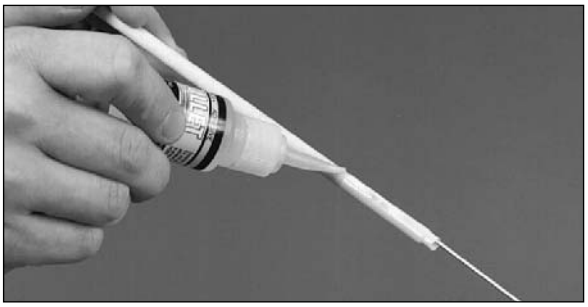
❑ 11. If the throttle control rod moves too far it will bend slightly and the servo will make a noise of some type. This will drain the receiver battery. To reduce the movement of the throttle control rod, move the pushrod connector closer to the center of the servo horn.

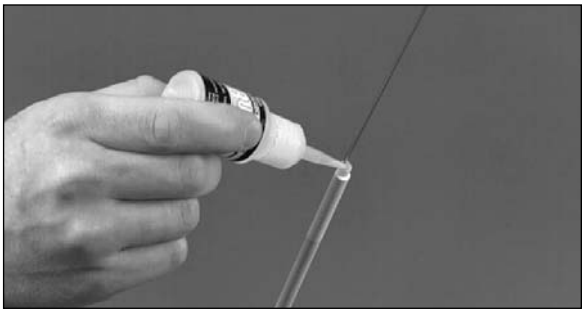
Increase throttle movement



❑ 12. To increase the movement of the throttle control rod, move the pushrod connector on the throttle arm closer to the mounting screw.

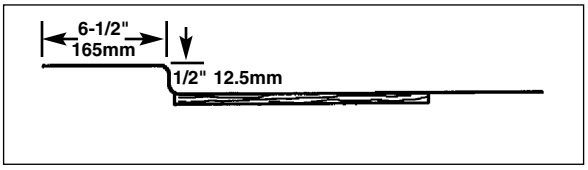
Preparing the pushrods





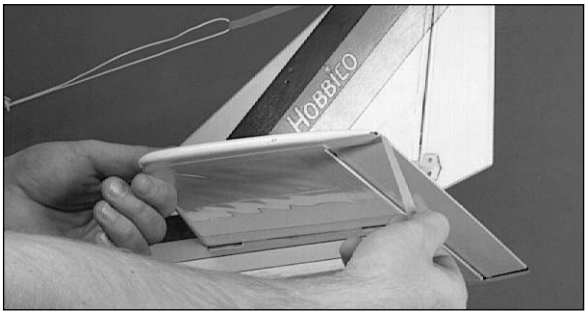
❑ 13. Locate the two wooden dowel pushrods and apply thick CA+ to both ends of the shrink tubing to insure a proper bond between the dowel and the metal rod.

The elevator pushrod



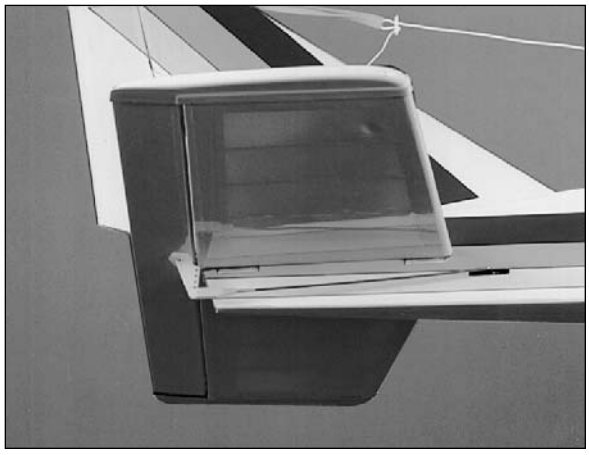
❑ 14. Using the illustration as a guide make a Z-bend in the threaded rod on the elevator pushrod.

Taping the elevator



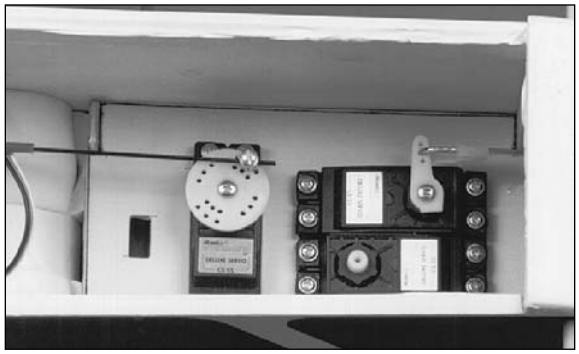
❑ 15. Use masking tape to hold the elevator in the neutral position while installing the pushrod and connecting the servo linkage.

Install the pushrod



❑ 16. Insert the elevator pushrod through the fuselage and out the elevator exit hole. Find a nylon clevis on the plastic parts tree and thread the clevis onto the pushrod until the pushrod is visible on the inside of the clevis. Connect the clevis to the elevator control horn using the outer hole.

Connecting to the servo

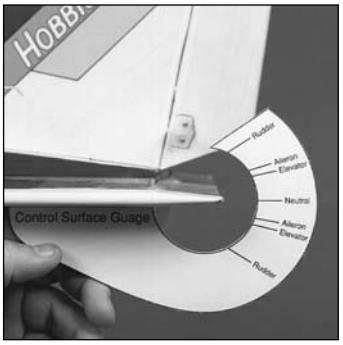


❑ 17. Cut one arm from the servo horn to reduce the chance of interference with other control servos. Lay the control rod on the second hole 1/2" (12.5mm) from the center of the servo. Mark the control rod at the hole location. Bend the rod down 90Þ and cut the control rod 1/4" (6mm) after the bend. The control rod may need to be removed from the fuselage to make the bend. Be very careful of the relationship between the "Z-bend" in the threaded rod and the 90Þ bend. Insert the L-bend into the second hole 1/2" (12.5mm) from the center of the servo arm. Locate the retaining clevis and connect it to the control rod by slipping it over the 90Þ bend and clipping it onto the control rod, the rod will protrude through the servo arm and retaining clevis.

Neutral elevator

Cut-out the control surface gauge and glue it to a piece of scrap cardboard. For level flight, center the elevator stick.

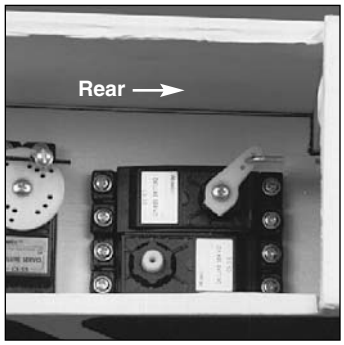
The elevator servo horn should be 90Þ to the servo.



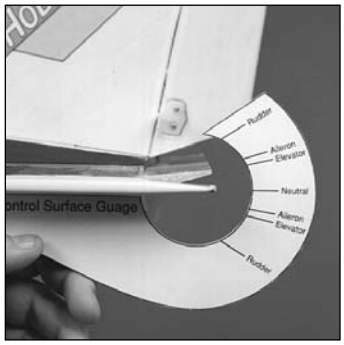
The elevator should be in the neutral position.

Up elevator

To gain altitude, or make the plane rise, move the elevator stick back.



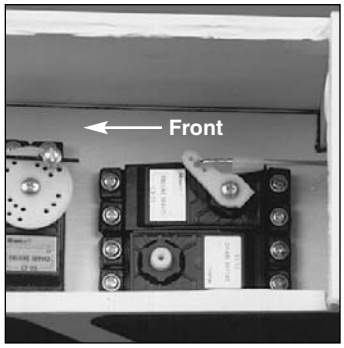
The servo horn should move towards the rear.



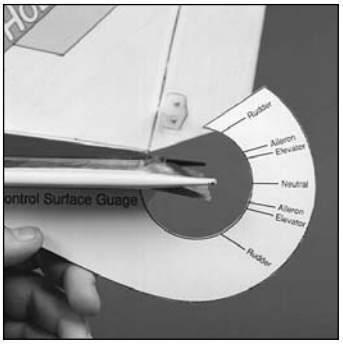
The elevator will move up as shown on the control surface gauge.

Down elevator

To lose altitude, or make the plane go down, move the elevator stick forward.

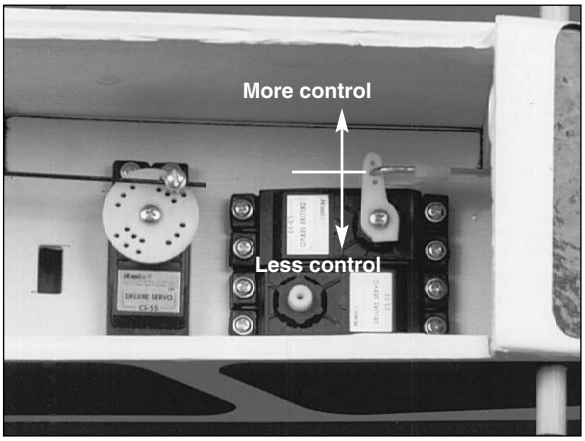


The servo horn should move towards the front of the plane.

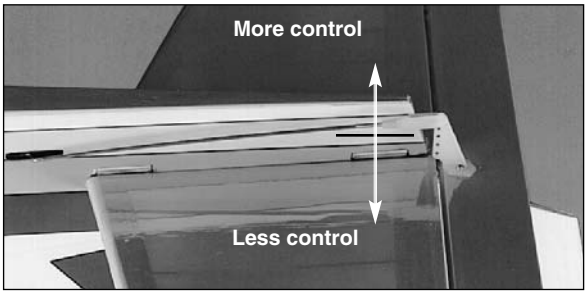


The elevator will move down as shown on the control surface gauge.

Elevator movement adjustment

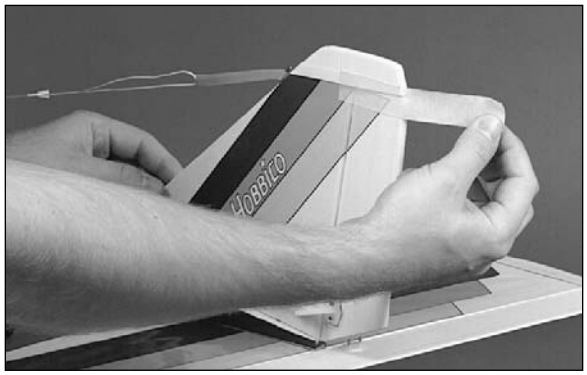


or



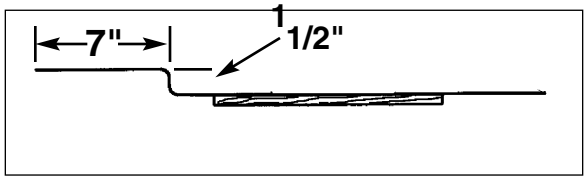
❑ 18. If the elevator moves too far, move the control rod closer to the center of the servo horn **or** farther out on the elevator control horn. If the elevator does not move far enough, move the control rod farther out on the servo horn or closer to the elevator on the elevator control horn.

Tape the rudder



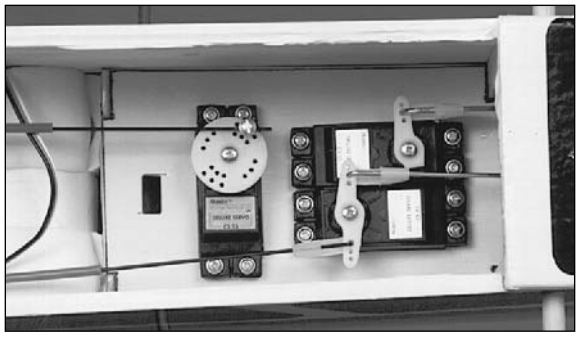
❑ 19. Use masking tape to hold the rudder in the neutral position while installing the pushrod and connecting the servo linkage.

The rudder pushrod



❑ 20. Using the illustration as a guide, make a Z-bend in the threaded rod on the rudder pushrod.

Connecting the servo

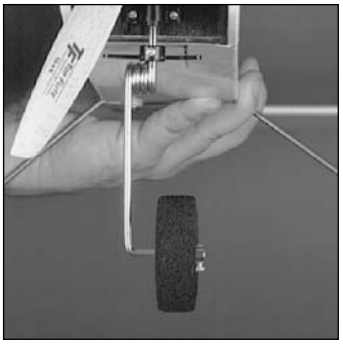


❑ 21. Using the same technique as described in Step #17 (except use the whole servo horn) connect the rudder control rod. **Note:** Make sure the steering gear is straight before marking the control wire. Position the steering control rod over the rudder servo horn on the opposite side of the rudder linkage and mark the rod above the inside hole 3/8" from the center of the servo horn. Cut the wire 1/4" longer than the mark and then make a L-bend on the mark. Insert the wire into the servo horn in the inside hole and place a retaining clevis on the connection as in previous steps.

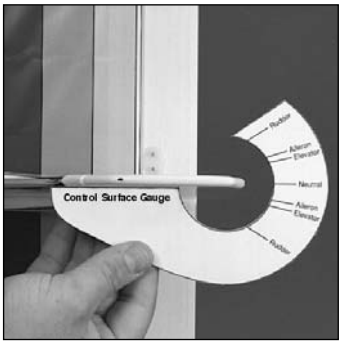
Neutral Rudder

With the rudder stick centered, the plane will fly straight.

The servo horn should be 90Þ to the servo.



The nose wheel should be straight ahead.

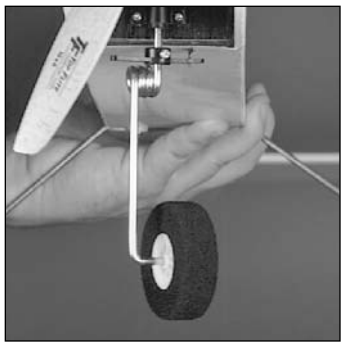


The rudder should be at neutral.

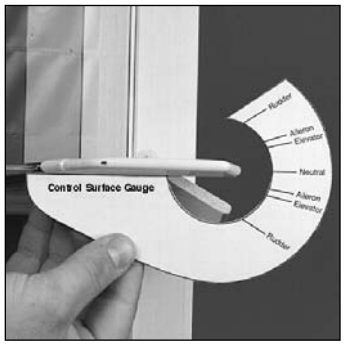
Left turn

To turn the plane left, move the rudder stick to the left.

The rudder servo horn should rotate counter clockwise.



The nose wheel should turn left.

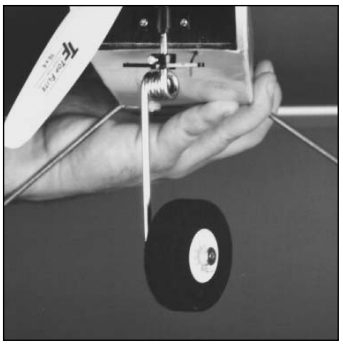


The rudder should move to the left as shown on the control surface gauge.

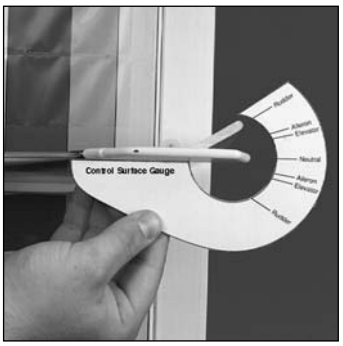
Right turn

To turn the plane right, move the rudder stick to the right.

The rudder servo horn should rotate clockwise.

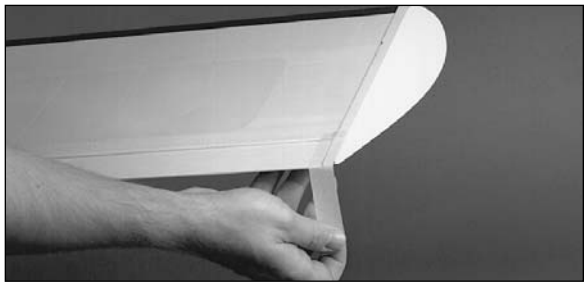


The nose wheel should move to the right.



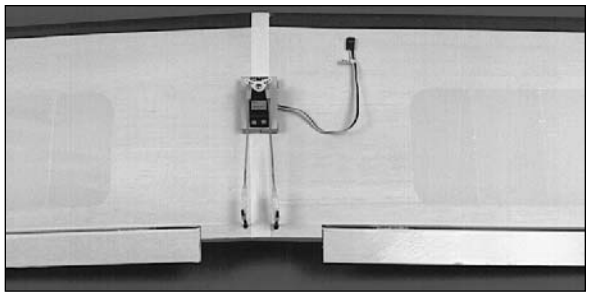
The rudder should move to the right as shown on the surface control gauge.

Taping the ailerons



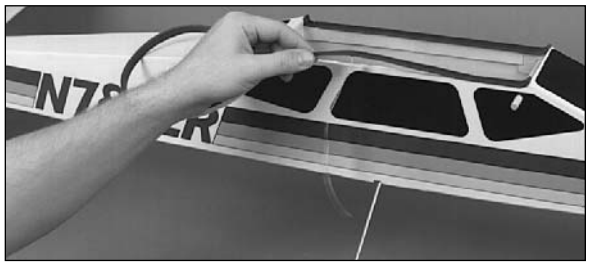
❑ 22. Use masking tape to hold the ailerons in the neutral position while connecting the servo linkages.

Installing the aileron servo



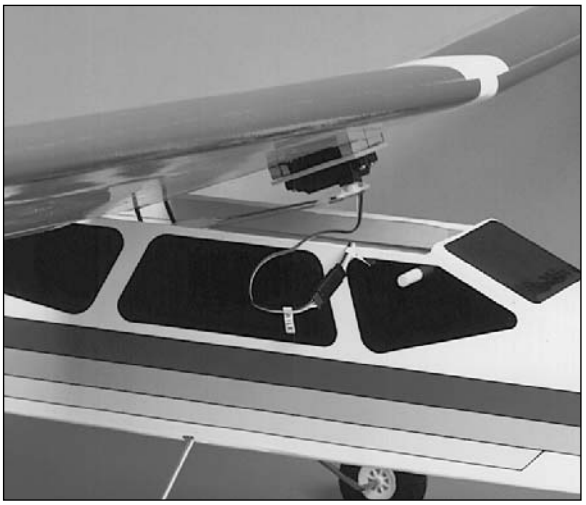
❑ 23. Install the rubber grommets that came with the radio system on the servo, follow the manufacturer's directions. Insert the servo into the servo tray and secure with four 2 x 15mm wood screws. Fasten a star servo horn onto the servo using the screw supplied with the servo. Cut the extra arms off so it forms a "V" shape. The ailerons need to move up farther than they do down. This is called Aileron Differential and will help the airplane turn. Position the control rods over the middle hole in the servo arm and mark the wire with a felt-tip marker. Cut the wire leaving 1/4" past the mark. Connect the rods with retaining clevises as described in previous steps.

Attach the wing saddle tape



❑ 24. Apply a piece of wing saddle tape to each side of the wing saddle to prevent oil from the exhaust from entering the fuselage.

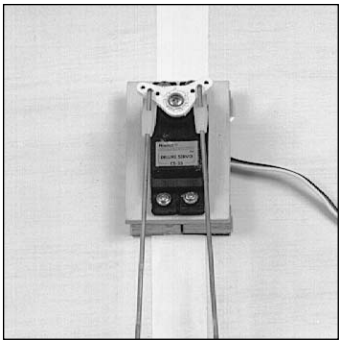
Mounting the wing



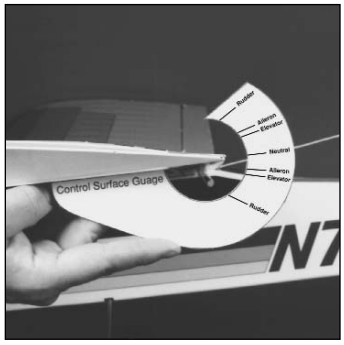
❑ 25. Connect the aileron servo to the receiver by using an aileron extension, usually provided with the radio system.

Straight level flight

For straight and level flight, the aileron stick should be centered.



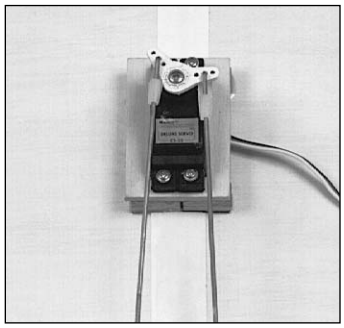
The aileron servo horn arms should be equal on both sides.



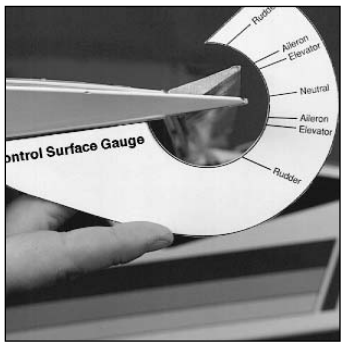
The ailerons should be at neutral.

Left roll

To roll the plane to the left, move the aileron stick to the left.



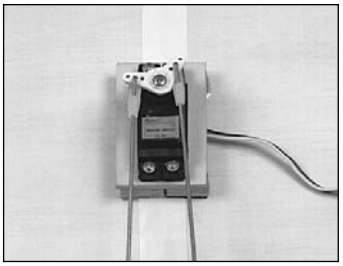
The aileron servo horn should rotate clockwise.



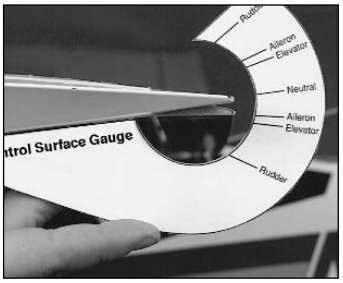
The left aileron will move up as shown on the surface control gauge. The right aileron will move down.

Right roll

To roll the plane to the right, move the aileron stick to the right.

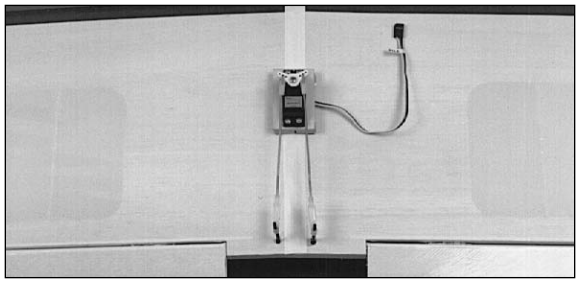


The aileron servo horn should rotate counter clockwise.

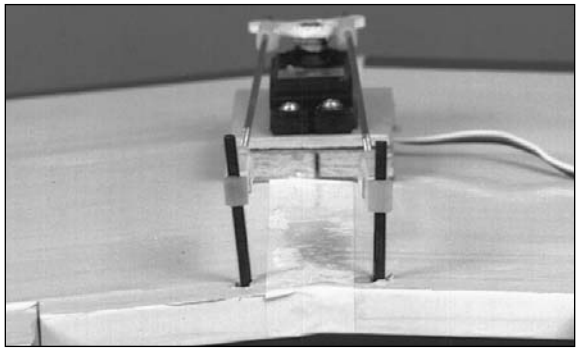


The left aileron should move down as shown on the surface control gauge. The right aileron should move up.

Adjusting amount of aileron throw



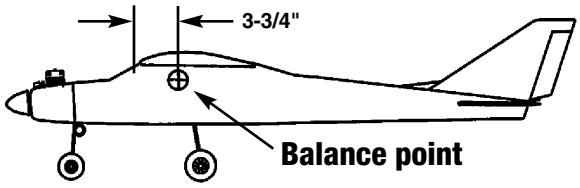
or



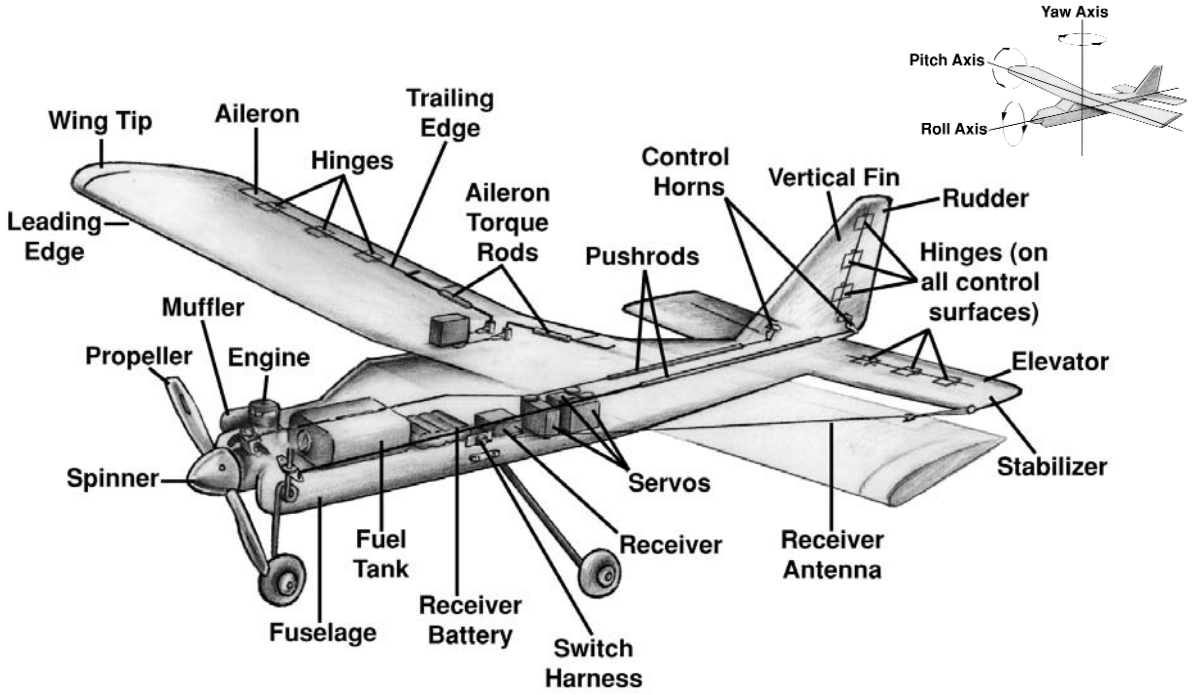
❑ 26. If the ailerons do not move far enough, move the aileron control rods farther out on the servo horn or move the aileron control horns farther down on the aileron torque rods. If the ailerons move too far, move the aileron control rods closer to the center of the aileron servo horn or move the aileron control horn higher on the aileron torque rods.

Balance your model!

Balancing your model is an important part of preparing your model for flight and **must not be omitted**. A model that is not properly balanced will be unstable and possibly unflyable. Your model should be balanced prior to its first flight with the aircraft in basically flight ready condition and with the fuel tank empty. In other words, all construction should be complete, the on-board radio system should be installed and the wing attached. The model is balanced by supporting it at two points on the underside of the wing, one on each side of the fuselage, approximately 3-3/4" back from the leading edge of the wing. A pair of soft pencil erasers make good points to support the model and will not mark the bottom of the wing or let it slip loose. While supporting the plane at the assigned points, make sure that the plane balances horizontally. If the model fails to rest in a level position, weight will need to be moved or added to achieve a proper balance. Before adding weight to your model, first try repositioning the on-board receiver battery to balance the plane. A weighted propeller hub is effective in balancing models that need weight in the nose. There are also stick-on lead weights available that are good for final adjustments to the balance. A poorly balanced model can be dangerous to fly. A nose-heavy model is very sluggish and slow to respond to control inputs. A tail-heavy model can become so sensitive that is is uncontrollable. Do not attempt to fly your model without balancing it carefully.



Glossary of Terms



Ailerons – Hinged control surfaces located on the trailing edge of the ***wing,*** one on each side, which provide control of the airplane about the ***roll axis.*** The control direction is often confusing to first time modelers. For a right roll or turn, the right hand aileron is moved upward and the left hand aileron downward, and vice versa for a left roll or turn.

Canard – A unique type of airplane, in which the ***wing*** is located near the back of the ***fuselage*** and the ***horizontal stabilizer*** is located at the nose of the fuselage.

Carburetor – The part of the ***engine*** which controls the speed or throttle setting and lean/rich mixture via setting of the needle valve.

CG (Center of Gravity) – For modeling purposes, this is usually considered the point at which the airplane balances fore to aft. This point is critical in regards to how the airplane reacts in the air. A tail-heavy plane will be very snappy but generally very unstable and susceptible to more frequent stalls. If the airplane is nose heavy, it will tend to track better and be less sensitive to control inputs, but will generally drop its nose when the throttle is reduced to idle. This makes the plane more difficult to land since it takes more effort to hold the nose up. A nose heavy airplane will have to come in faster to land safely.

Chamfer – To slightly round-off or bevel a corner.

Charge Jack – The plug receptacle of the ***switch harness*** into which the charger is plugged to charge the airborne battery. An ***expanded scale voltmeter (ESV)*** can also be plugged into it to check battery voltage between flights. It is advisable to mount the charge jack in an accessible area of the ***fuselage*** so an ESV can be used without removing the ***wing.***

Charger – Device used to recharge batteries and usually supplied with the radio if ***NiCd*** batteries are included.

Chicken Stick – A hand-held stick used to flip start a model airplane ***engine.***

Clevis – A small clip which is threaded or soldered onto the wire end of a ***pushrod*** and connects the pushrod to the ***control horn*** of a control surface. The threads allow fine adjustment of length of the ***pushrod.***

Clunk – A weighted fuel pick-up used in a fuel tank to assure the intake line is always in fuel.

Computer Radio – A radio control unit in which the ***transmitter*** has several advanced functions which can be programmed completely to fine tune an airplane without making mechanical changes.

Control Horn – The arm which is attached to a control surface at the hingeline and is connected to a ***pushrod.***

Dead Stick – A term used to describe unpowered flight (glide) when the ***engine*** quits running.

Differential Throw – Ailerons that are set up to deflect more in the upward direction than downward are said to have "Differential Throw." The purpose is to counteract "Adverse Yaw."

Dihedral – The V-shaped bend in the ***wing.*** Typically, more dihedral causes more aerodynamic stability in an airplane and causes the ***rudder*** to control both ***roll and yaw axis.*** This is why some ***trainers*** and ***sailplanes*** require only 3-channels of radio control—i.e., having no ***ailerons.***

Ding – Minor dent or damage to the structure. Also, a nick in a prop. Dinged props must be replaced.

Down Thrust – Downward angle of the engine relative to the centerline of the airplane. Down thrust helps overcome the normal climbing tendency of flat bottom wings.

Electric Starter – A hand-held electric motor used for starting a model airplane ***engine.*** Usually powered by a 12-volt battery.

Elevator – Hinged control surface located at the trailing edge of the ***horizontal stabilizer,*** which provides control of the airplane about the ***pitch axis*** and causes the airplane to climb or dive. The correct direction of control is to pull the ***transmitter*** elevator control stick back, toward the bottom of the transmitter, to move the elevator upward, which causes the airplane to climb and vice versa to dive.

Epoxy – A two-part resin/hardener glue that is extremely strong. It is generally available in 6 and 30-minute formulas. Used for critical points in the aircraft where high strength is necessary.

Expanded Scale Voltmeter (ESV) – Device used to read the battery voltage of the on-board battery pack or ***transmitter*** battery pack.

Field Charger – A fast battery charger designed to work from a 12-volt power source, such as a car battery.

Flaps – Hinged control surface located at the trailing edge of the ***wing*** inboard of the ***ailerons.*** The flaps are lowered to produce more aerodynamic lift from the wing, allowing a slower takeoff and landing speed. Flaps are often found on scale models, but usually not on basic trainers.

Flare – The point during the landing approach in which the pilot gives an increased amount of up elevator to smooth the touchdown of the airplane.

Flight Box – A special box used to hold and transport all equipment used at the flying field.

Flight Pack (or Airborne pack) – All of the radio equipment installed in the airplane, i.e., ***Receiver, Servos,*** Battery, ***Switch Harness.***

Flutter – A phenomenon whereby the elevator rudder or aileron control surface begins to oscillate violently in flight. This can sometimes cause the surface to break away from the aircraft and cause a crash. There are many reasons for this, but the most common are excessive hinge gap or excessive "slop" in the pushrod connections and control horns. If you ever hear a low-pitched buzzing sound, reduce throttle and land immediately.

Frequency Control – The FCC has allowed the 72MHz band to be used for R/C aircraft operations. This band is divided up into many different channels in which you can choose a radio system. You should be aware that certain areas have frequencies in which there is pager interference. This is why it is always a wise move to check with your local hobby shop to find out any channels that may be troublesome in the area you wish to fly.

Fuel Overflow Line (Vent) – The fuel line is either open to atmospheric pressure or attaches to the muffler pressure nipple to pressurize the ***fuel tank*** for better fuel flow to the engine. This is the line through which the fuel will overflow when the tank is full.

Fuel Pick-Up Line – The fuel line in the fuel tank through which fuel travels to the carburetor. Typically a flexible tube with a weight or "Clunk" on the end which allows it

to follow the fuel with changes in aircraft attitude. This is the line through which the tank is filled.

Fuselage – The body of an airplane.

Glitch – Radio problem that never happens unless you are over trees or a swamp.

Glow Plug – The heat source for igniting the fuel/air mixture in the engine. When starting the engine a battery is used to heat the filament. After the engine is running, the battery can be removed. The wire filament inside the plug is kept hot by the "explosions" in the engine's cylinder. *See next heading and "idle bar plug."*

Glow Plug Clip/Battery – A 1.2-volt battery, which is connected to the glow plug on a model airplane engine for starting. The battery is removed once the ***engine*** is running steadily.

Grease-in – A very smooth, gentle landing without a hint of a bounce.

Hit (or to be hit) – Sudden radio interference which causes your model to fly in an erratic manner. Most often caused by someone turning on a radio that is on your frequency, but can be caused by other radio sources miles away.

Horizontal Stabilizer – The horizontal tail surface at the back of the ***fuselage*** which provides aerodynamic pitch stability to the airplane.

Idle Bar Plug – This type of glow plug has a "bar" across the tip to help prevent raw fuel from being splashed onto the glow element. Too much raw fuel will cool the plug and prevent it from igniting the fuel/air mixture. An idle bar is a help in obtaining a low idle speed.

Lateral Balance – The left-right or side-to-side balance of an airplane. An airplane that is laterally balanced will track better through loops and other maneuvers.

Leading Edge (LE) – The very front edge of the wing or stabilizer. This is the edge that hits the air first.

Muffler – A device attached to the exhaust stack of the ***engine*** to reduce noise and increase back-pressure which helps low speed performance. **Note:** Most R/C Clubs require the use of mufflers.

Muffler Baffle – A restrictor plate inside the muffler which reduces engine noise. This plate can be removed to increase power, but only if there are no noise restrictions where you fly.

Needle Valve – Adjustment on a ***carburetor*** used to set proper fuel/air mixture. Some carburetors have separate needle adjustments for low and high throttle. Typically, turning the needle adjustment clockwise (screwing in) leans the mixture (less fuel) and vice versa. However, there are a few exceptions—refer to the ***engine*** manufacturer's instructions.

NiCd – Nickel Cadmium battery. Rechargeable batteries which are typically used as power for radio ***transmitters*** and ***receivers.***

Nitro (Nitromethane) – A fuel additive which increases a model engine's ability to idle low and improves high speed performance. Ideal nitro content varies from engine to engine. Refer to the engine manufacturer's instructions for best results. Nitro content in fuel is indicated by the percent of the fuel.

Ni-starter – A self-contained battery and glow plug clip, used when starting the engine. *See "glow plug clip."*

One-point landing (or a figure 9) – Synonymous with "stuffing it in." Something we hope you never do.

Pitch Axis – The airplane axis controlled by the ***elevator.*** Pitch is illustrated by holding the airplane at each wing tip. Raising or lowering the nose is the pitch movement. This is how the climb or dive is controlled.

Power Panel – 12-volt distribution panel that provides correct voltage for accessories like glow-plug clips, fuel pumps and electric starters. Usually mounted on a field box and connected to a 12-volt battery.

Prop Pitch – Props are designated by two numbers, for instance *10 - 6*. The first number is the prop's length, 10". The second number is the pitch or angle of the blades. The 6 represents the distance the propeller will move forward in one revolution, in this case 6".

Re-Kitting Your Airplane – Changing your finished model back into a kit, as a result of "stuffing it in."

Receiver (Rx) – The radio unit in the airplane which receives the

transmitter signal and relays the control to the ***servos.*** This is somewhat similar to the radio you may have in your family automobile, except the radio in the airplane perceives commands from the transmitter, while the radio in your car perceives music from the radio station.

Roll Axis – The airplane axis controlled by the ***ailerons.*** Roll is illustrated by holding the airplane by the nose and tail. Dropping either wing tip is the roll movement. This is used to bank or turn the airplane. Many aircraft are not equipped with ailerons and the Roll and Yaw motions are controlled by the rudder. This is one reason why most trainer aircraft have a larger amount of dihedral.

Root – *See "Wing Root."*

Rudder – Hinged control surface located at the trailing edge of the ***vertical stabilizer,*** which provides control of the airplane about the ***Yaw Axis*** and causes the airplane to Yaw left or right. ***Left rudder*** movement causes the airplane to Yaw left and ***right rudder*** movement causes it to Yaw right.

Servo – The electro-mechanical device which moves the control surfaces or throttle of the airplane according to commands from the ***receiver.*** The radio device which does the physical work inside the airplane.

Servo Output Arm – The removable arm or wheel which bolts to the output shaft of a servo and connects to the ***pushrod.***

Shot down – A "hit" that results in a crash landing. Sometimes caused by radios miles away.

Slop – Unwanted, excessive free movement in a control system. Often caused by a hole in a servo arm or control horn that is too big for the pushrod wire or clevis pin. This condition allows the control surface to move without transmitter stick movement. *Also, see "flutter."*

Solo – Your first totally unassisted flight that results in a ***controlled*** landing.

Spinner – The nose cone which covers the hub of the propeller.

Sport Airplane – A model which possesses some attributes of many of the specialty airplanes and are best for general flying as they are the most versatile and durable.

Stall – What happens when the angle of attack is too great for the wing to generate lift regardless of airspeed. When the wing cannot generate lift, the model "falls out of the sky" until sufficient airspeed is gained. Then, you can get control of the model – this takes altitude and should be avoided upon takeoff! (Every airfoil has an angle of attack at which it generates maximum lift – the airfoil will stall beyond this angle).

Switch Harness – The on/off switch for the ***flight pack*** which is mounted in an accessible location on the ***fuselage.***

Tachometer – An optical sensor designed specifically to count light impulses through a turning propeller and read out the engine RPM.

Throw – The distance a control surface (such as elevator, aileron, rudder) can travel. Throw is measured at the trailing edge of the control surface.

Tip stall – The outboard end of one wing (the tip) stops developing lift, causing the plane to roll suddenly in the direction of the stalled wing. This situation is not fun when you are only a few feet off the runway trying to land.

Track – The path the model takes through the air or on the ground.

Trainer Airplane – A model designed to be inherently stable and fly at low speeds, to give first-time modelers time to think and react as they learn to fly.

Trailing Edge (TE) – The rearmost edge of the wing or stabilizer.

Transmitter (Tx) – The hand-held radio controller. This is the unit that sends out the commands that you input.

Transmitter Modes – Mode I. Left hand stick controls ***elevator*** and ***rudder.*** Right hand stick controls ***throttle*** and ***aileron.***

Mode II. Left hand stick controls ***throttle*** and ***rudder.*** Right hand stick controls ***elevator*** and ***aileron.*** Mode II is by far the most popular in the Unites States.

Touch-and-go – Landing and taking off without a pause. Often confused with a good bounce.

Vertical Fin – The non-moving surface that is perpendicular to the horizontal stabilizer and provides yaw stability. This is the surface to which the rudder attaches.

Washout – An intentional twist in the wing, causing the wing tips to have a lower angle of attack than the wing root. In other words, the trailing edge is higher than the leading edge at the wing tips. Washout helps prevent tip stalls and helps the "PT" family of trainers recover, hands-off, from unwanted spiral dives.

Wheel Collar – A small, round retaining device used to keep a wheel from sliding off an axle.

Wing Loading – This is the amount of weight per square foot that has to be overcome to provide lift. It is normally expressed in ounces per square foot. This specification can be easily calculated as follows: If you know the square inches of the wing, simply divide by 144 to obtain square feet. Divide the total weight (in ounces) of the airplane by the wing area (in square feet). This information is valuable when deciding on which airplane to build next. Planes with high wing loading numbers must fly faster to stay in the air. These are generally "performance" airplanes. Conversely, planes with lower numbers do not need as much air flowing around the wing to keep it flying. Gliders and trainer airplanes fall into this category because slow, efficient flight is desirable.

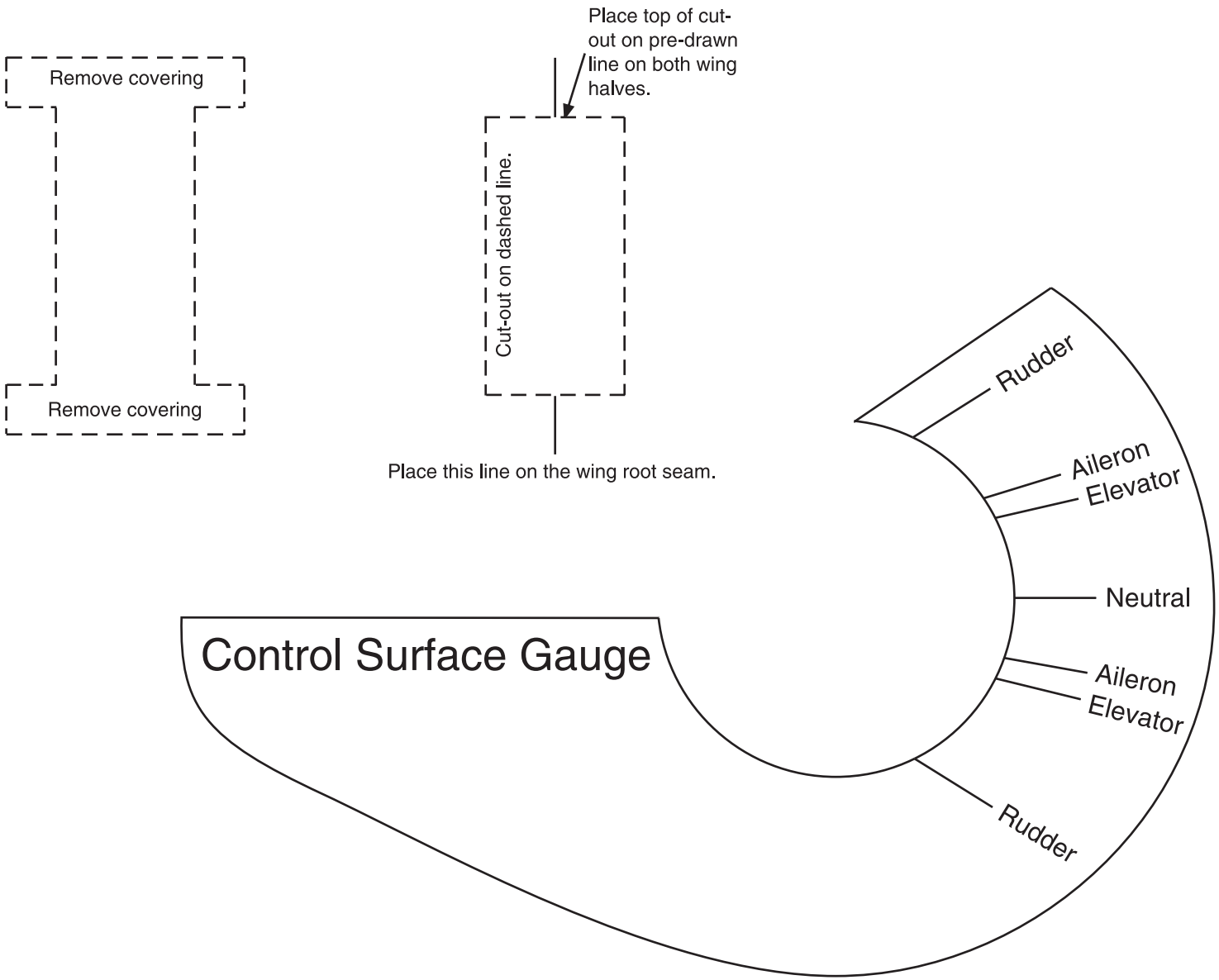
Wing Root – The centerline of the wing, where the left and right wing panels are joined.

Yaw Axis – The airplane axis controlled by the rudder. Yaw is illustrated by hanging the airplane level by a wire located at the center of gravity. Left or right movement of the nose is the Yaw movement.

Z-Bend – A simple Z-shaped bend in the wire end of a pushrod, which is used to attach the pushrod to a servo output arm.

Z-Bend Pliers –A plier type tool used for easily making perfect Z-bends.

BUILDING NOTES	
Kit Purchased Date:_____	Date Construction Finished: _____
Where Purchased: _____	Finished Weight: _____
Date Construction Started: _____	Date of First Flight: _____
FLIGHT LOG	


Remove covering
Remove covering
Place top of cut-out on pre-drawn line on both wing halves.
Cut-out on dashed line.
Place this line on the wing root seam.
Control Surface Gauge
Rudder
Aileron
Elevator
Neutral
Aileron
Elevator
Rudder