EAGLE 2 ARF

Instructions

Congratulations on choosing the Eagle 2 ARF! This aircraft has been carefully engineered to provide you with all the terrific flight characteristics of the Goldberg Eagle 2 kit, a plane that has helped thousands of R/C pilots earn their wings. Your Eagle 2 ARF's sure-footed ground handling, superb stability, and super-slow landings will help make your early attempts at R/C flying successful. But first, take the time to read carefully through this booklet. It will speed the assembly process, help ensure that the plane you take to the field performs properly, and will increase your understanding of the challenging and fun sport of R/C flying.

WARNING

A radio-controlled model is not a toy and is not intended for persons under 16 years old. Keep this kit out of the reach of younger children, as it contains parts that could be dangerous. A radio-controlled model is capable of causing serious bodily injury and property damage. It is the buyer's responsibility to assemble this aircraft correctly and to properly install the motor, radio, and all other equipment. Test and fly the finished model only in the presence and with the assistance of another experienced R/C flyer. The model must always be operated and flown using great care and common sense, as well as in accordance with the Safety Code of the Academy of Model Aeronautics (5151 Memorial Drive, Muncie, IN 47302, 1-800-435-9262). We suggest you join the AMA and become properly insured prior to flying this model. Also, consult with the AMA or your local hobby dealer to find an experienced instructor in your area. Per the Federal Communications Commission, you are required to use only those radio frequencies specified "for Model Aircraft."

LIMITED WARRANTY

Carl Goldberg Products has inspected and certified the components of this aircraft. The company urges the buyer to perform his own inspection, prior to assembly, and to immediately request a replacement of any parts he believes to be defective for their intended use. The company warrants replacement of any such components, provided the buyer requests such replacement within a period of one year from the date of purchase and provided the defective part is returned, if so requested by the company.

No other warranty, expressed or implied, is made by the company with respect to this kit. The buyer acknowledges and understands that it is his responsibility to carefully assemble the finished flying model airplane and to fly it safely. The buyer hereby assumes full responsibility for the risk and all liability for personal or property damage or injury arising out of the buyer's use of the components of this kit.

CARL GOLDBERG PRODUCTS, LTD.

P.O. Box 88 Oakwood GA 30566 Phone #678-450-0085 Fax # 770-53-63 www.carlgoldbergproducts.com

ITEMS NEEDED TO COMPLETE
THIS AIRCRAFT

1 RADIO GUIDANCE SYSTEM (4 CHANNEL MINIMUM REQUIRED)
1 ENGINE .40-.45 2-CYCLE, AND MUFFLER
(a 4-cycle engine is NOT recommended)
1 CA ACCELERATOR
1 2 OZ. BOTTLE CA GLUE
1 1/2 OZ. BOTTLE CA GLUE
1 20-MINUTE EPOXY
20 #64 RUBBER BANDS

OPTIONAL
1 PIECE OF MEDIUM SANDPAPER
PAINTS FOR PILOT FIGURE & COCKPIT
HEAT GUN OR IRON (for covering touch-up)
1/2” FOAM RUBBER
SWITCH HARNESS

TOOLS AND SUPPLIES
REQUIRED FOR ASSEMBLY.

ROLL OF WAXED PAPER
MODELING OR UTILITY KNIFE
WORK SURFACE (24" x70")
ELECTRIC DRILL
1/8", 1/16", 3/32" DRILL BITS
SMALL STANDARD & PHILLIPS SCREWDRIVERS
MASKING TAPE
NEEDLE NOSE PLIERS
YARD STICK
FLEXIBLE STRAIGHT-EDGE
30-60-90° x 6"
ENGINEERING TRIANGLE
SOFT PENCIL
A FEW STRAIGHT OR "T" PINS
ADJUSTABLE WRENCH
WIRE CUTTER (DYKES)
HAIR DRYER
(OR OPTIONAL HEAT GUN)
ACID BRUSH

GLOSSARY
of common modeling terms

ARC: Almost Ready to Cover
ARF: Almost Ready to Fly
AILERON: the control surface on the wing that rolls (or banks) the plane
AIRFOIL: the shape of the wing as seen from the end
ANGLE OF ATTACK: the angle at which the wing meets the air flow
BEVEL: to sand to an angle shape
BURR: the rough edges on a piece of wood or metal after it is cut
CAP STRIP: a thin strip glued to the edges of the ribs to shape the wing
CONTROL HORN: a device attached to each control surface to provide an attachment point for the pushrod
COWL (COWLING): the nose section of the fuselage that encloses the engine
DECALAGE: the difference between the incidence of the wing and stabilizer
DIHEDRAL: the upward angle of the wings, as seen from the front
ELEVATOR: the moveable part of the horizontal tail, which controls pitch
EMPENNAGE: the tail of the plan
FIN: the fixed vertical part of the tail
FIREWALL: the plywood former at the front of the fuselage, to which the engine is mounted
FORMER: a piece which shapes the fuselage; and to which the sides of the fuselage are attached.
GUSSET: a small triangular piece glued into a corner to strengthen it
INCIDENCE: the angle of the wing or the tail in relation to the thrustline
LAMINATE: to glue two thin pieces of material together to form a thicker, stronger piece
LEADING EDGE (L.E.): the front edge of the wing that first meets the airflow
LONGERON: a stringer that runs the length of the fuselage
PITCH: an up and down movement of the nose of the plane, which is controlled by the elevator
PROTOTYPE: the full scale airplane from which the model design was taken
PUSHROD: the long, stiff dowel or wire that connects the servo with the control horn
RECEIVER ("Rx"): Receives radio signal
RETRACTS: (Retractable Landing Gear) devices for extending and retracting the wheels on command
RTF: Ready to Fly
RIB: the airfoil-shaped piece that connects the leading edge, spars and trailing edge of the wing together and holds them in shape
ROLL: tilting of the plane as viewed from the front, controlled by the ailerons
RUDDER: the moveable vertical tail of the plane, which controls yaw
SERVO: the part of the airborne radio system that moves the control surfaces
SERVO ARM (OUTPUT ARM, SERVO WHEEL): the piece that attaches to the servo and connects it to the pushrod
SHEAR WEB: wood sheeting that connects the top and bottom spars to stiffen the wing
SHIM: a thin piece of wood or other material inserted between two other pieces to improve their fit
SPAR: a wooden stick running lengthwise through the wing that serves as its backbone
SPINNER: the rounded cone that fits over the propeller hub
STABILIZER (STAB): the fixed horizontal part of the tail
STALL: a situation in which the plane is flying too slowly to move sufficient air across the wing to produce lift
STRINGER: a long piece of wood attached to the formers to shape the fuselage
THRUSTLINE: a line drawn from the center of the propeller hub straight through the airplane
TORQUE: a rolling tendency caused by the spinning propeller
TRAILING EDGE (T.E.): the edge of the wing that faces the rear of the plane
TRANSMITTER ("Tx"): Transmits radio signal to servos
TRIM: small adjustments made to the control surfaces to cause the plane to fly straight and level by itself
WASHIN: a twist in the wing that makes the trailing edge lower than normal
WASHOUT: a twist in the wing that makes the trailing edge higher than normal
WING SADDLE: the shaped part of the fuselage in which the wing rests
WHEEL COLLAR: a metal ring that holds the wheel on the axle
YAW: a right-to-left movement of the nose, controlled by the rudder

INTRODUCTION

USING THIS INSTRUCTION MANUAL

Before you begin assembling your Eagle 2 ARF, take some time to read through this entire instruction book. It is designed to take you step-by-step through the process and to give you added information on engine and radio selection and set-up, balancing your aircraft, and flying your model. The time you spend will speed the assembly process and help you avoid problems.

PREPARING FOR ASSEMBLY

You will need a work table of approximately 24 x 70" which has been covered to protect it from adhesive and paint drips, as well as cuts and other damage. Many people cover their work area with a sheet of dry wall (sheet rock) and/or waxed paper to prevent CA glue and Epoxy from ruining the work surface.

CONSTRUCTION TIPS

If you have never assembled a built-up model before, the following tips will prove helpful.

IMPORTANT: ALWAYS READ A FEW STEPS AHEAD. This will alert you to coming instructions and will help you plan accordingly.

Using the Parts Identification section, familiarize yourself with the various items included in your kit box.

As you work, CHECK OFF EACH STEP in the box provided, so that you are sure you do not forget anything.

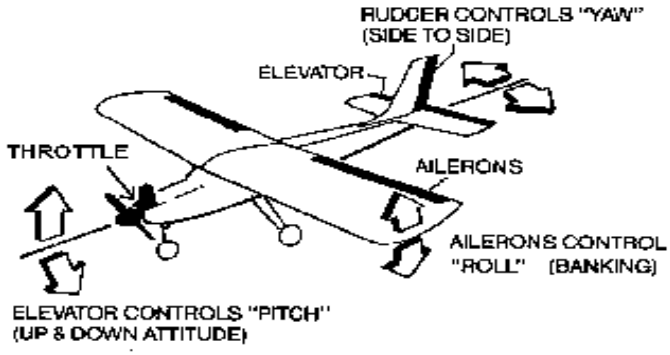
Do not hesitate to ask questions. Your local hobby dealer and area flyers will most likely by happy to help, as they want you to have a successful flying experience. You may also receive technical assistance from Carl Goldberg Products via e-mail (questions@goldbergproducts.com) or by telephone 1-678-450-0085.

SELECTING RADIO CONTROL EQUIPMENT

CHOOSING A RADIO

IMPORTANT: When selecting a radio, remember that there are many radio frequencies available, but not all of these frequencies can be used legally to operate model airplanes. Be sure to tell your dealer that you want a radio with a "Model Airplane" frequency.

Your model was designed to use a four-channel radio. In flight, the model is controlled primarily by using the ailerons and the elevator (see drawing). One radio channel controls the aileron, which is the primary turn control. It rolls, or "banks" the model. Another channel operates the elevator, which controls the pitch (climbing, level flight, and descent). The third channel is for the engine throttle and controls the engine speed. A fourth channel is used for rudder, which assists the ailerons in turning the aircraft. The new R/C flyer probably will use the rudder only for steering the model on the ground.



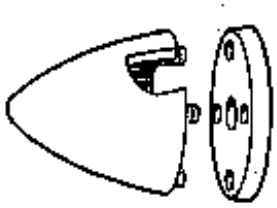
Radios are battery powered with rechargeable nickel-cadmium batteries (ni-cads). Such sets come equipped with a recharging unit. Also, many of the radio systems now available feature "servo reversing" switches which allow the pilot to reverse the response of the servo. This feature simplifies installation and is a worthwhile consideration when selecting a radio system. Other radios come with a variety of sophisticated features, such as dual rates, exponential and control mixing, etc. These features are typically used by more advanced flyers and are not necessary for flying the Eagle 2 ARF

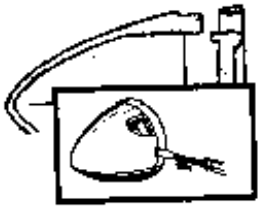
ENGINE & PROPELLER

Your plane flies well using any 2-cycle engine size from .35 to .45. (We do not recommend a 4-cycle engine for this aircraft, due to the more complicated set-up required.) The numbers .35 to .45 refer to the amount of space the piston moves through inside the cylinder of the engine. This space is called displacement; larger displacement generally means more power. If you live in a hot climate, or your flying field is approximately 3,000 feet or more above sea level, you should stay with a .45 engine. It's a good idea to select an engine that is popular at the flying field, so that if you have any engine problems, other modelers will be familiar with the engine and be able to help.

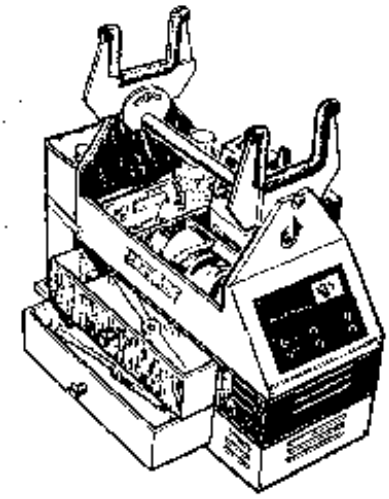
The propeller size must be matched to the engine. For example, a .35 may use a 9" diameter prop while a .45 can use a 10" prop. Refer to the information that is supplied with your engine for recommended propeller sizes. It's wise to buy a few spare props, as everyone breaks them occasionally, and particularly often when learning to fly.

Balancing your propeller helps to protect your radio from the damaging effects of vibration. There are good, easy to use prop balancers on the market. Follow the instructions that are supplied with the prop balancer. Never carve or cut a prop near the hub for any reason (such as to fit a spinner).





A 2-1/4" CGP 4-Pin Snap-On Spinner is included in the Eagle 2 ARF. It is a rugged precision molded spinner that does not require any special mounting nuts or screws. Carefully read the spinner instructions and warnings included in this book. Although a spinner helps reduce the chance of injury from a rotating prop, extreme caution always must be used when the engine is running.



The following equipment will be needed at the flying field to start your engine, make adjustments, and clean your model after flying.

FLIGHT BOX: Something sturdy in which to carry your equipment. CGP's quick-building MiniTote carries the basics: fuel, starter and battery, and a few essential tools. The larger CGP SuperTote or Monster Tote are both economical, easy to build, and pack lots of utility into little space. They hold fuel, transmitter, starter & battery, as well as many tools, in a balanced load that is easy to carry.

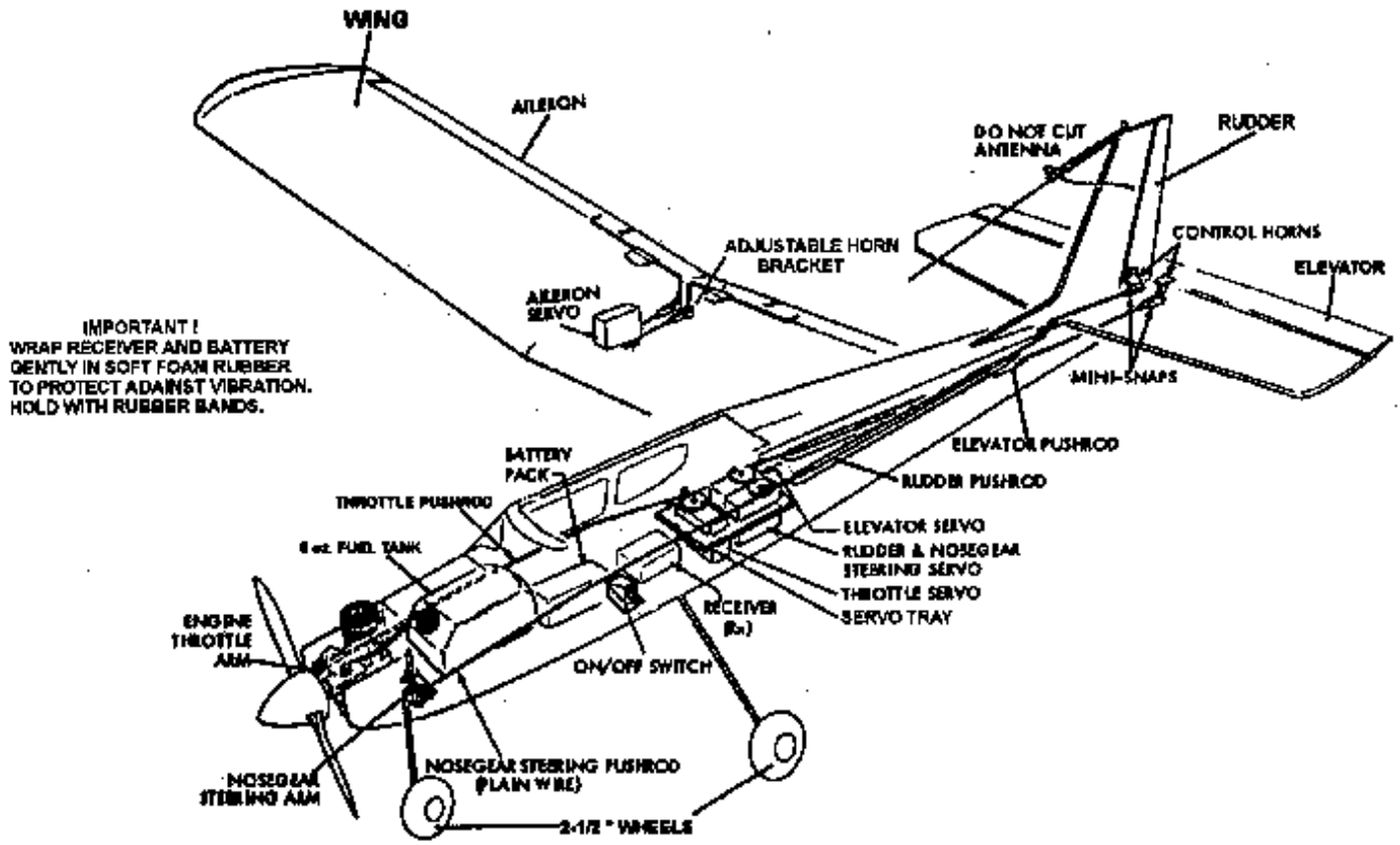
STARTING BATTERY AND GLO-PLUG CLIP: A 1-1/2 volt battery is required to heat your engine's glo-plug for starting. Wires connect the glo-plug clip to the battery. Because engine starting draws a lot of electric power from the battery, rechargeable ni-cad batteries are recommended. Although they cost more initially, they are more economical in the long run than frequently replacing dry-cell batteries.

FUEL: For best engine performance, use the fuel recommended by your engine's manufacturer. 2 and 4-cycle engines require different fuel blends. Ask your dealer to recommend a good quality 5-10% Nitro fuel.

FUEL PUMP: Needed to transfer fuel from the fuel can to the model's fuel tank. A simple squeeze-type bulb will do for small tanks, whereas manual crank or electric pumps fill larger tanks more quickly.

FUEL LINE: Have about 3 feet of silicone fuel line to make connections between the fuel pump, the fuel can, and the model's fuel tank.

EXTRA PROPS: Experts always have a few spares on hand, so flying doesn't have to stop due to a broken propeller.




Blind Nut


Small Control Horn


Large Control Horn


Adjustable Horn Bracket


Landing Gear Strap


Hatch Hold Down


Steering Arm


Socket Head Screw


Pushrod Connector with Snap Nut


Nosegear Block

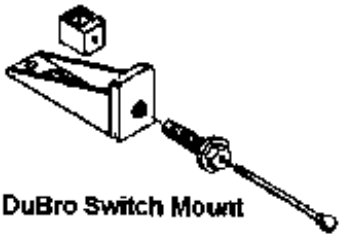

Sheet Metal Screws


Pan Head Screw


Eyelet


Wheel Collar

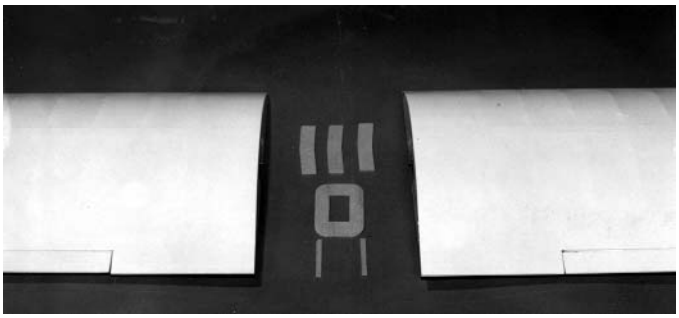

Fillister Head Screw


DuBro Switch Mount


Washer

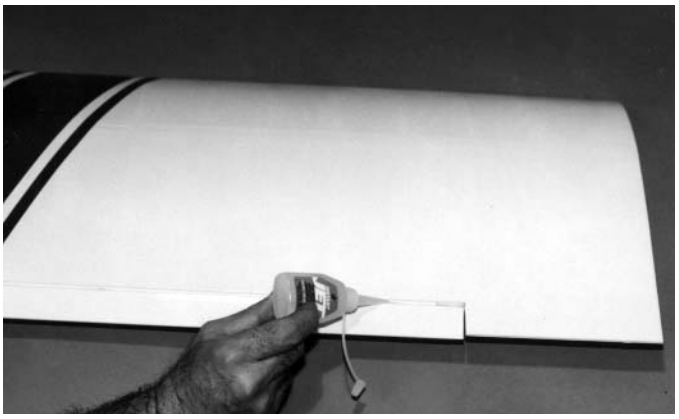

Set Screw

Wing Assembly

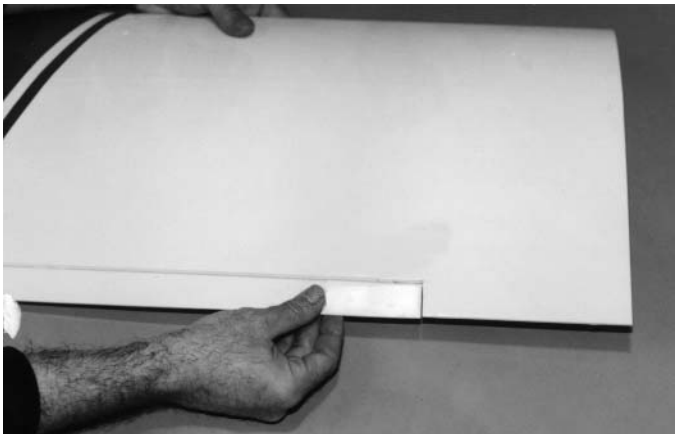


NOTE: If the covering on your aircraft has wrinkled in transit, refer to the "Covering" section earlier in this book.

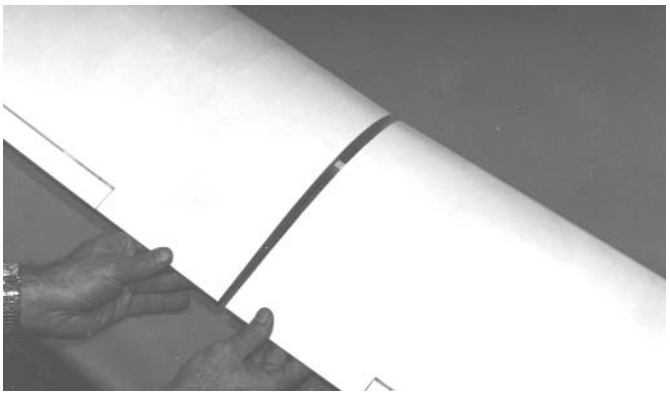
1. Collect the following wing parts, as shown above:
   - (1) Right wing
   - (1) Left wing
   - (3) Wing joiners
   - (1) Aileron servo plate
   - (2) Aileron servo plate supports



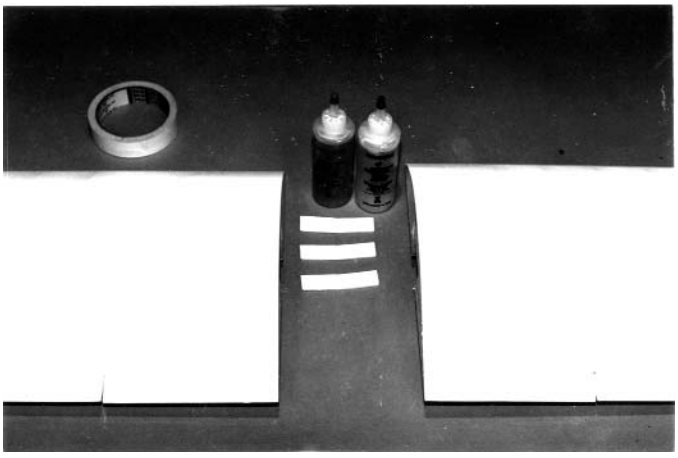
2. Although the control surfaces of the Eagle ARF have been glued in at the factory, apply a drop of Instant (thin) CA glue at each hinge location, for added security. Allow the glue to wick into the hinge slot.



3. When dry, make sure the hinge installation is firm by gently pulling on each hinge location.



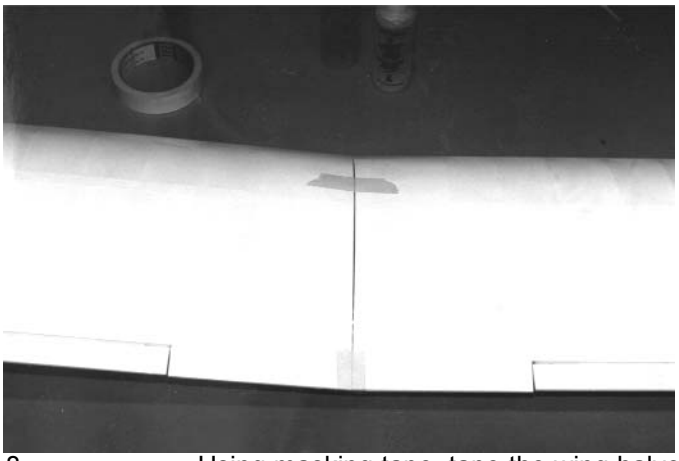
4. Holding the three wing joiner pieces together, with the angle cut facing up, insert them into the joiner pockets in both the right and the left wing halves. The joiners should fit easily in the pockets and the wing halves should meet in the middle, with the wing dihedral forming a broad "V".



5. Working on a protected surface, and with paper towel handy for cleaning fingers, THOROUGHLY mix 1-2 large (soup) spoons each from bottle A and bottle B of 30 min. Epoxy. (Use equal amounts of each part, mix with a stick in a plastic or paper cup or on a sheet of waxed paper.)

6. Spread the epoxy on the three joiners and laminate them to form a single piece. Then put additional epoxy in each wing pocket and spread a thin layer along one side of the entire center joint area. Immediately proceed to next step.

7. Working rapidly, so that the epoxy does not set before you are finished, slide the laminated wing joiner into one wing pocket and then slide the other wing half onto the joiner until the wing halves are touching.



8. Using masking tape, tape the wing halves together at the trailing edge and close to the leading edge together, as shown. This will help keep the wing from twisting.

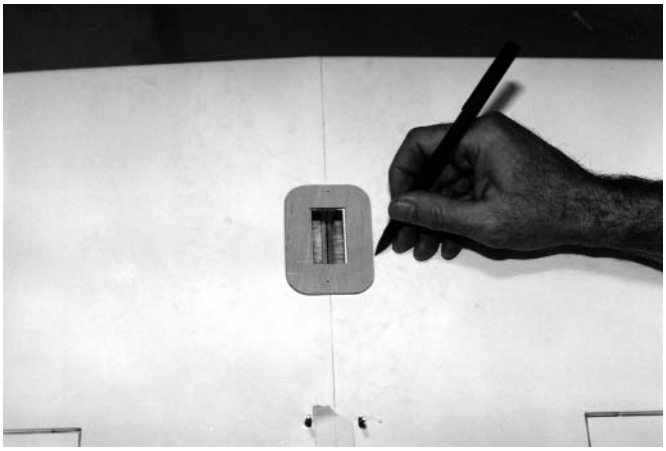
9. Next, place additional tape at several locations across the center seam of the wing, so that the halves stay firmly together while the epoxy is setting.

NOTE: The wing dihedral will force one side of the wing up off the tabletop. Place a book under the high side to help support the wing and keep the halves in the proper position. Caution: Do not distort the wing by blocking it too high and do not touch until the epoxy dries.

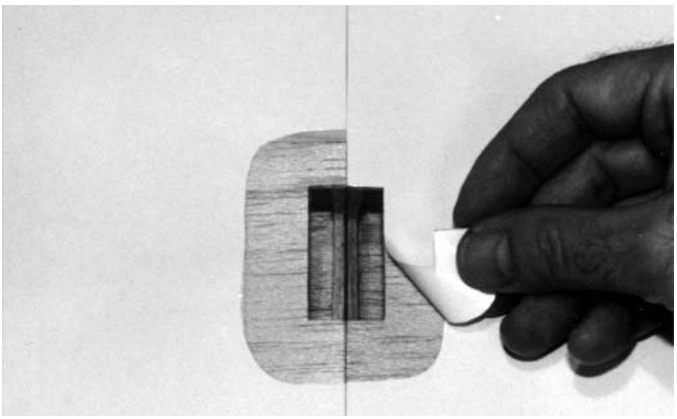
AILERON SERVO INSTALLATION

NOTE: Each radio manufacturer has its own way to mount the servos. Therefore, read the instruction manual included with your radio to understand exactly how the servo should be mounted.

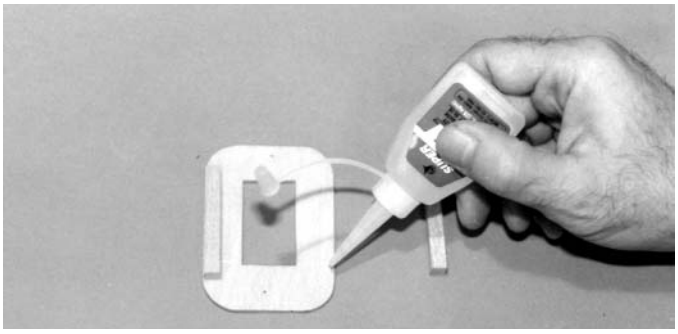
1. Collect the following parts:
   - (1) Horn bracket
   - (1) Servo tray
   - (2) ¼" sq. x 1-3/4" wood servo tray supports
   - (2) Snap links
   - (2) 7" wires threaded on one end
   - (1) Snap nut star tree.
   - (1) Servo and the necessary mounting hard ware (grommets, brass eyelets) supplied with the radio.



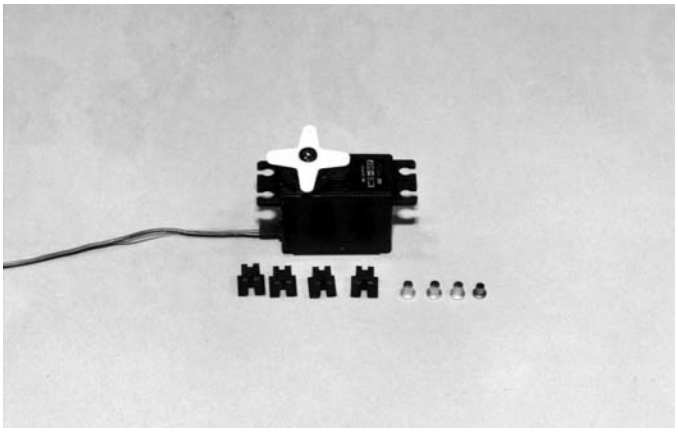
2. Place the servo tray over the servo opening in the center of the wing, as shown. Trace the outline of the servo tray.



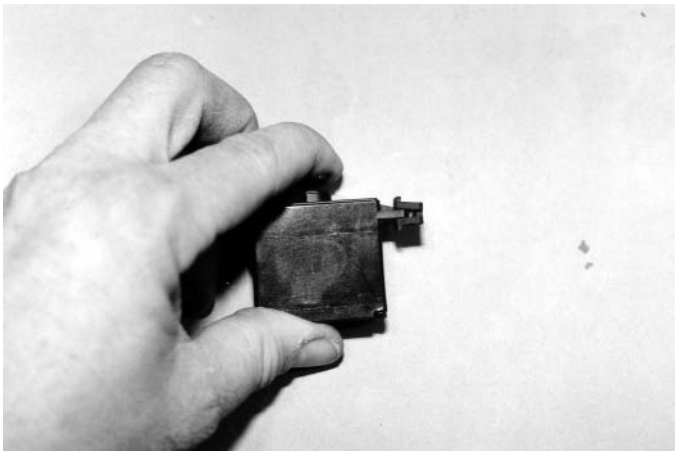
3. Being extremely careful not to cut into the wood underneath, cut the covering along the outline and remove the covering in the area where the tray will fit.



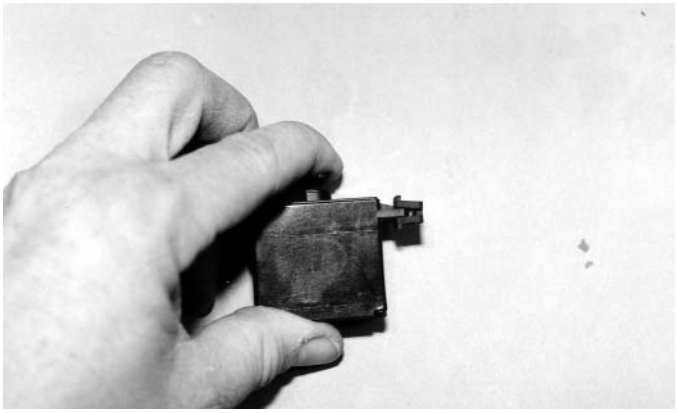
4. Using CA glue, glue the servo tray supports to the bottom of the servo tray, as shown.



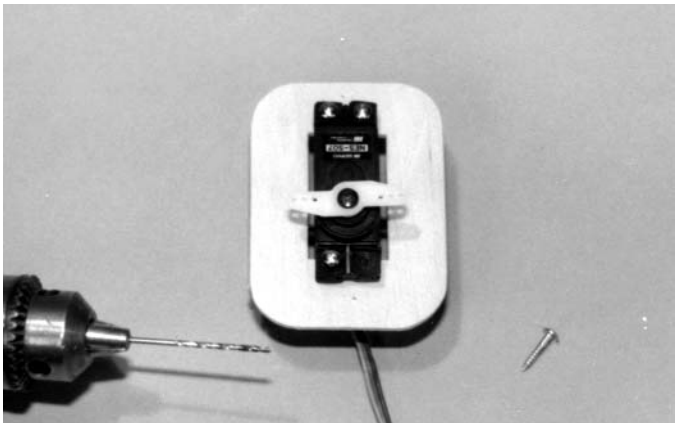
5. Gather one servo, four rubber grommets, and four eyelets from your JR radio box. If using another brand of radio, use the parts called for in the radio instructions.



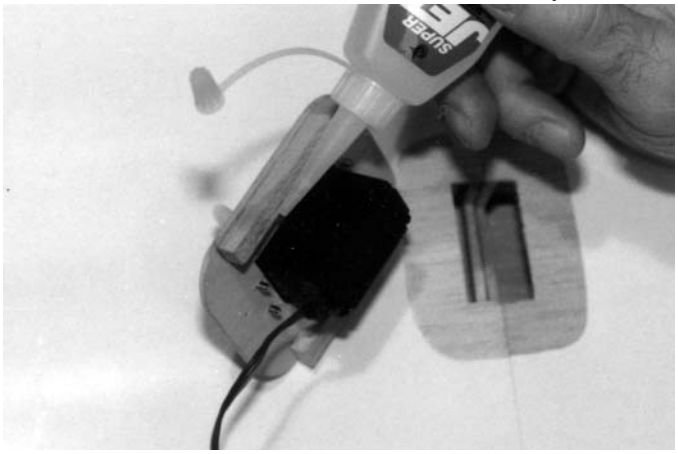
6. Place the rubber grommets over each mounting lug on the end of the servo. These rubber grommets will prevent the lugs from breaking when the servo moves around.



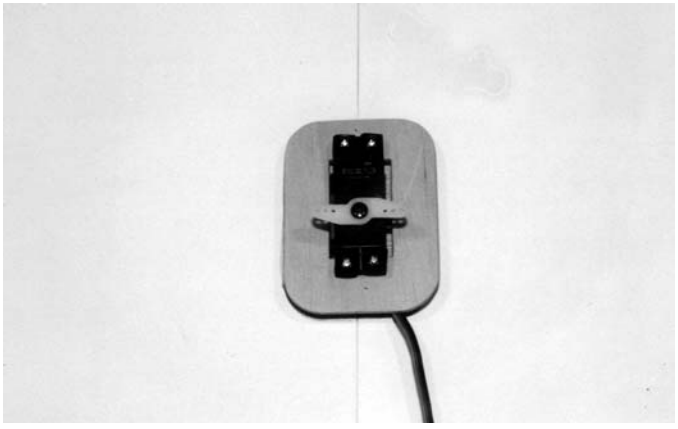
7. Working from the bottom of the mounting lug, put an eyelet into each hole. This prevents the mounting screw from being over-tightened when the servo is mounted.



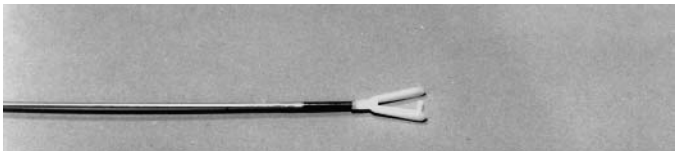
8. Place the servo into the servo-mounting tray and enlarge the opening, if needed. Mark the location of the mounting screws. Using a 1/16" drill bit, drill the holes for the screws which have been supplied with your radio. Then mount the servo into the servo tray, as shown.



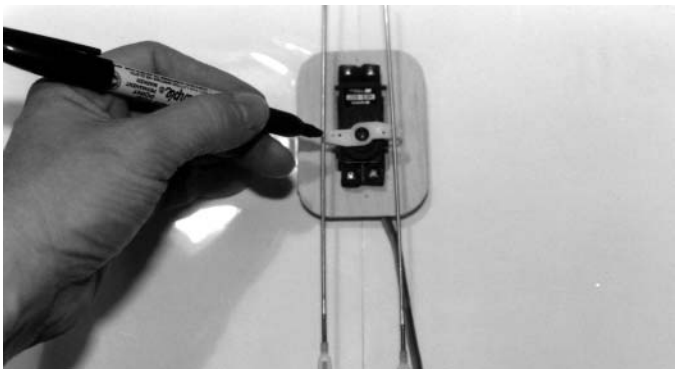
9. With the servo arm positioned nearest the trailing edge, place the servo assembly in the wing opening and check the fit. Enlarge the opening, if needed. The wire should exit under the tray, allowing the servo to fit down into the wing. When satisfied with the fit, apply CA glue to each tray support and glue assembly in place.



NOTE: The servo arm on the top of your servo must be similar to the one shown in the photo above. If it is not, choose another arm from the selection in your radio box. Twist the servo arm until it is positioned as shown above.



10. Thread the mini-snap links onto the two 7" threaded wires until the wire shows in the middle of the snap link.

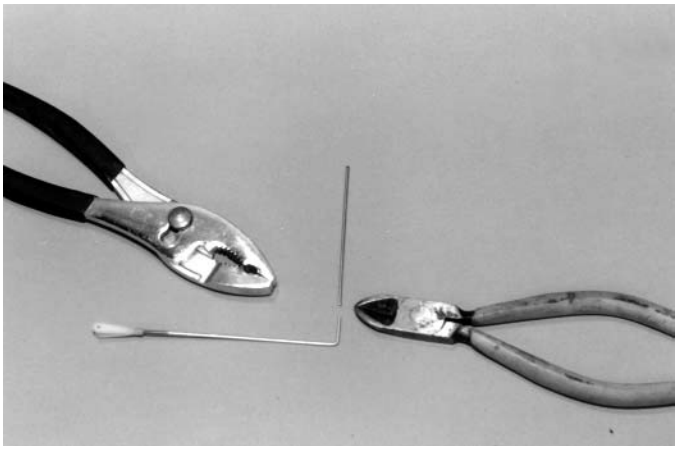


11. Thread the horn brackets on the aileron torque rods. Be sure to screw them down until they are flush with the top of the torque rods.

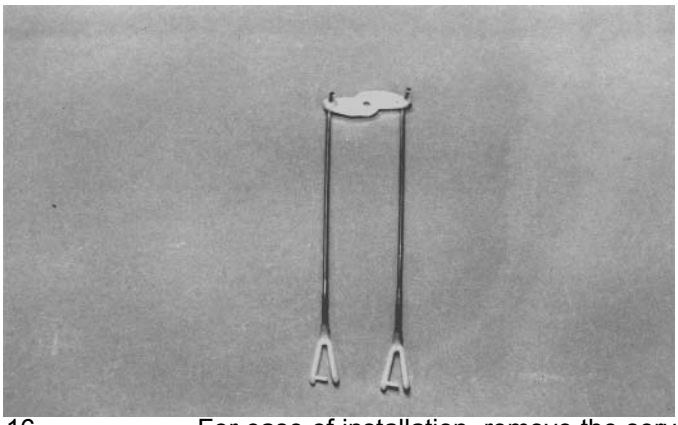
12. Referring to the above photo, install the 7" pushrod with the snap links connecting to the horn brackets.

13. To make pushrod installation easier, tape the ailerons to the wing in the center (level) position .

14. Lay the pushrods on the top of the servo arm and mark where the rod meets the outside hole.



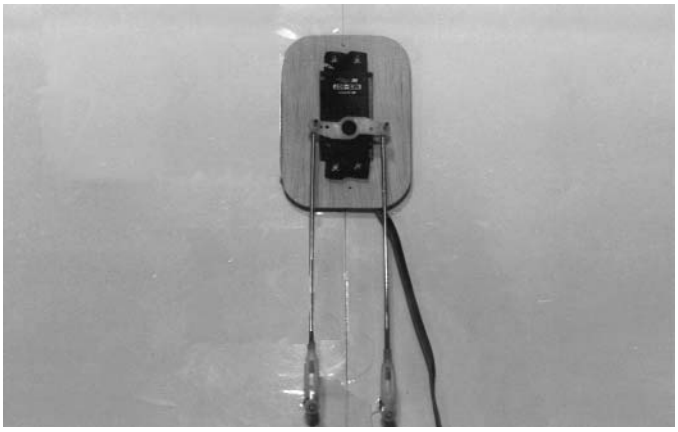
15. Remove the pushrods from the horn bracket. Make a 90° bend at the mark. Then, cut off the NON THREADED end at approximately ½" from the bend.



16. For ease of installation, remove the servo arm, as shown, and take two snap nuts from the snap nut tree.

17. Insert the pushrod through the bottom of the servo arm and then push (snap) the snap nut on top, to hold the pushrod is held in place. (Pliers may be helpful.)

18. Starting at the top of the servo opening, press the wide white vinyl tape down over the joined wing seam. MAKE SURE THE MIDDLE OF THE TAPE COVERS THE CENTER JOINT OF THE WING, WITH HALF OF THE TAPE ON EACH SIDE OF THE SEAM. Apply the tape all the way around the wing, stopping at the bottom of the servo hole. Cut off any excess tape. Peel off the clear tape on the surface of the white tape.



19. Re-install the servo arm on the top of the servo and reattach the push rods to the control horns. Be sure to REMOVE THE TAPE FROM YOUR AILERONS, so they will be able to move later, when you are setting up your radio.

This completes your wing.

TAIL ASSEMBLY & INSTALLATION

MOUNTING THE STABILIZER

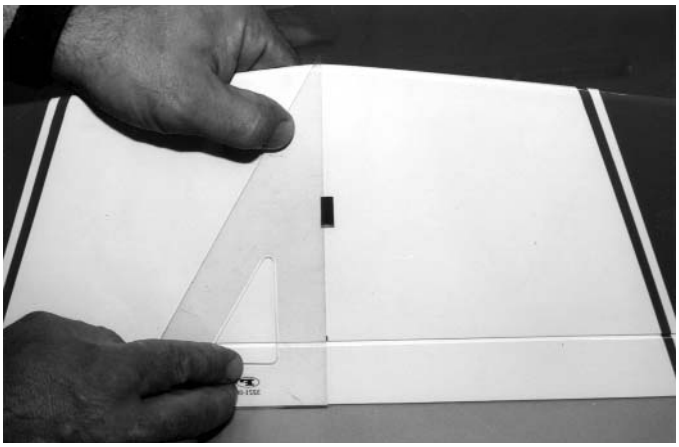
1. Collect the required parts.

(1) Fuselage
(1) Wing
(1) Stabilizer/Elevator assembly
(1) Fin
(1) Large control horn with nut plate attached
(2) 2-56 x ½ "screws

NOTE: Prior to assembly, the stab assembly has no top or bottom. Use either side to begin.

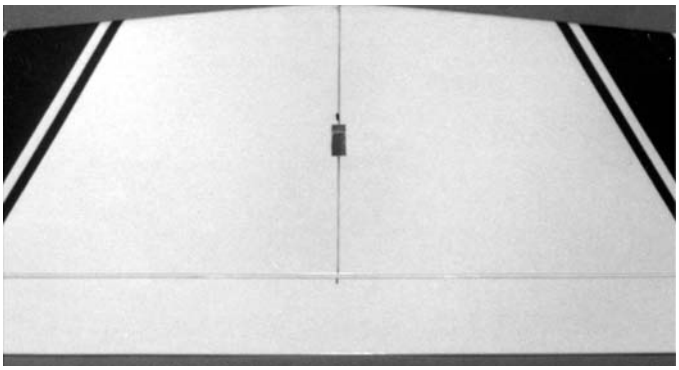
2. As with the ailerons, the stab/elevator hinges have been glued at the factory, However, for added security, apply a drop of Instant 30 min.. (thin) CA at each hinge location. Allow the glue to wick into the hinge slot.

When dry, check the installation by gently pulling on each hinge location to confirm that it is secure.

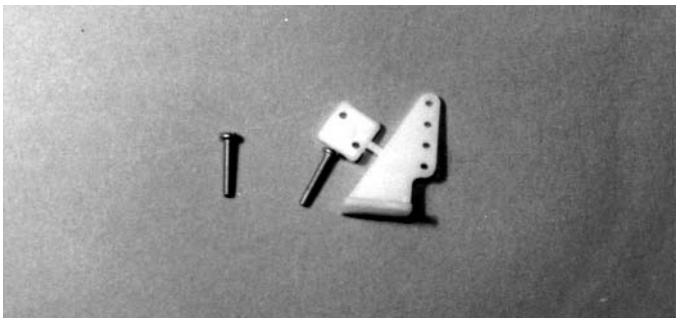


3. Locate the center of the stab and mark it at the hinge line.

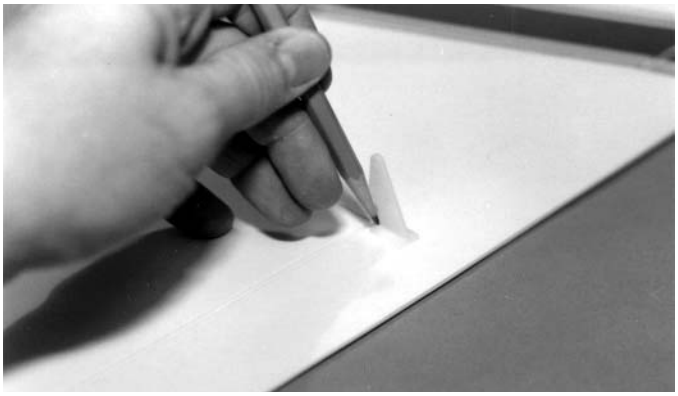
With the stab assembly on end, use your triangle to draw a line across the stab, as shown.



4. Continue the line across the elevator and around the Leading Edge of the stab to the top side, to help in locating the control horn.

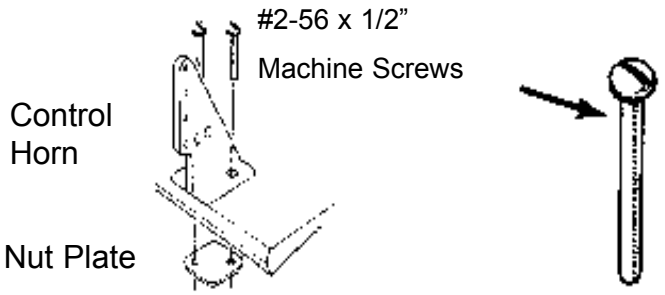


5. Cut off the nut plate attached to the large control horn.

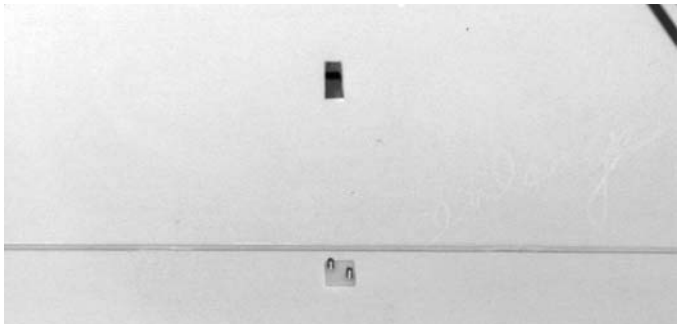


6. Locate the centerline of the control horn right over the centerline on the elevator. With a pencil, mark the location of the holes on the base of the control horn onto the elevator.

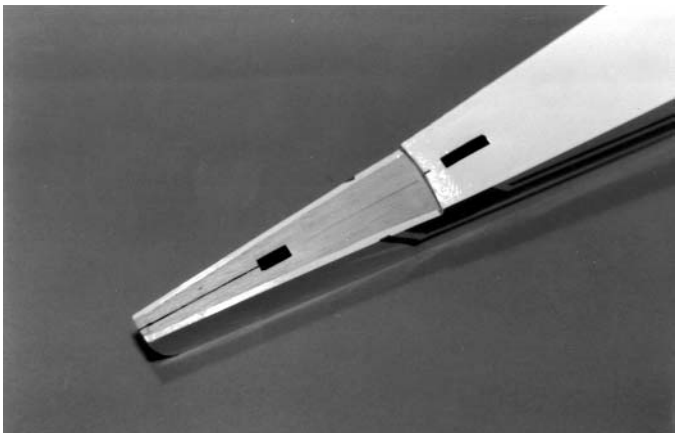
7. Drill a 3/32" diameter hole through the elevator at each hole location.



8. Place the large control horn on the elevator and push the 2-56 x ½" screws through the holes.



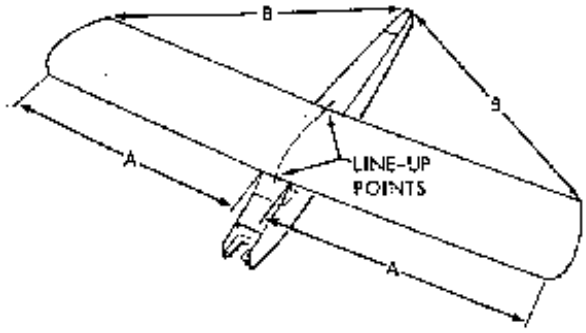
9. Holding the screws in place, turn the elevator over and place the back plate (cut from the control horn) over the screws. Tighten the screws, a little at a time, until the wood just starts to dent. Set the stab aside for now.



10. Mark a centerline down the stab platform area, as shown. Be sure to extend the line onto the covering on top of the fuse and onto the back of the fuse, so that you will be able to locate the center once you have put the stab in place.

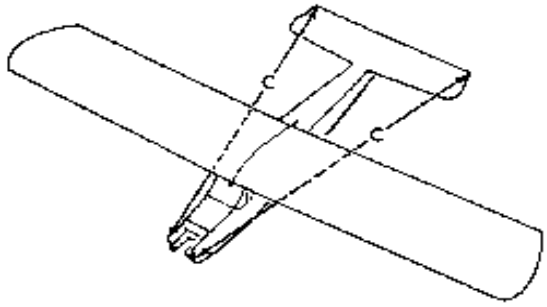
11. Using a twisting motion, insert the wing dowels through the fuselage cabin. The dowels should protrude an equal distance on either side of the cabin. When satisfied with the location, glue in place.

OPTIONAL: Before flying your airplane, seal the exposed ends of the wing dowels and any other unprotected wood surfaces with fuel proof paint .



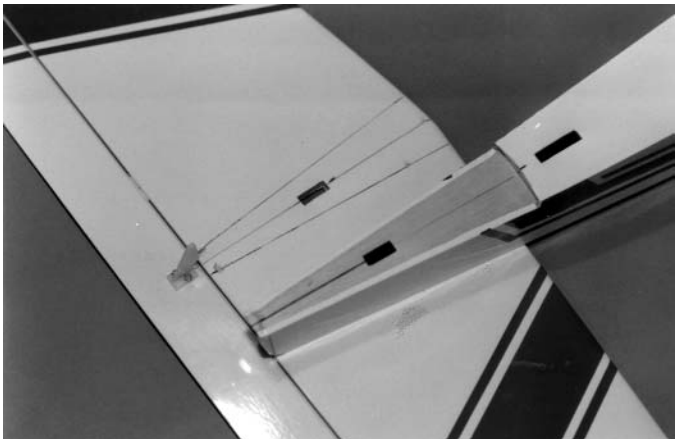
12. Mount the wing on the fuse, using #64 rubber bands. Measure carefully, as shown above, from the fuselage sides out to the wing tips ("A" arrows) to be sure the wing is centered. Then measure from the wing tips to the back end of the fuselage ("B" arrows) to make sure the wing is square with the fuse.

13. Using masking tape or a washable marking pen, mark the wing center at the leading and trailing edges. Mark the top of the fuselage at the wing centerpoint.

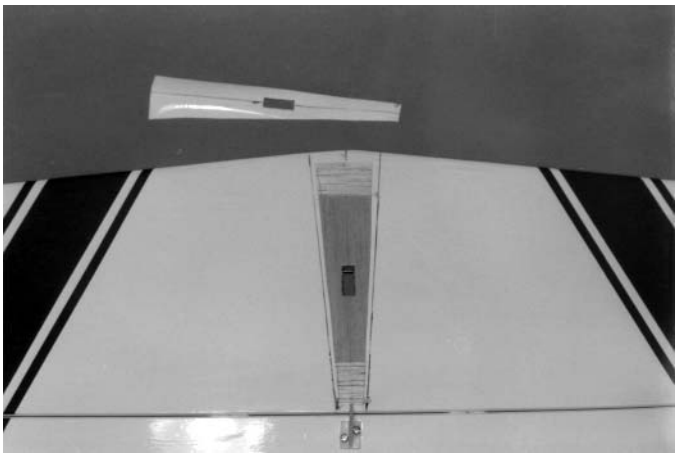


14. Using no glue, and with the control horn pointing down, trial fit the stab onto the fuse, adjusting it as needed to line up with the wing. Measure from the stab tips to the fuse front ("C" arrows) to make sure the stab is square with the fuse.

15. View the model from the rear, as shown, to see if the stab is level, with respect to the wing. If not, cut paper strips about ¼ x 1" and shim under the low side until the stab is level.



16. When satisfied with the fit, draw match-up lines on both the stab and the fuse to show the correct location of the stab on the fuselage.

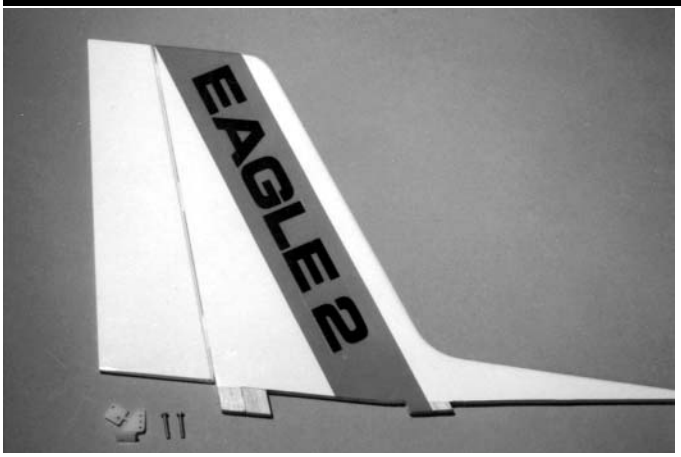


CAUTION: In the following step, take great care to avoid cutting into the wood structure underneath the covering!

17. Using a sharp-bladed hobby knife, strip covering from the stab at the points where the stab and fuse mate, being sure to leave 1/8" to 3/16" of covering overlap, as shown above. Erase any marks that will show after the installation.

18. Mix epoxy as before (about 2 large spoonfuls), and glue the stab in place on the fuselage. Check again to make certain the tail assembly is level and straight. **Allow epoxy to dry THOROUGHLY.**

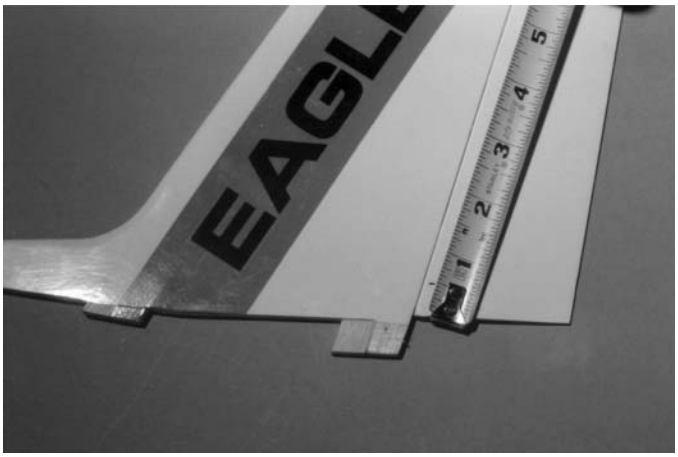
INSTALLING THE FIN



1. Collect the following parts:

(1) Fin/rudder assembly
(1) Small control horn
(2) #2-56 x ½" screws

2. Remove the wing. Add a drop of thin CA to the fin/rudder hinges, as you have done with the aileron and elevator hinges. When dry, CHECK TO MAKE SURE THE HINGES ARE SECURELY GLUED by pulling gently, but firmly, on the rudder.

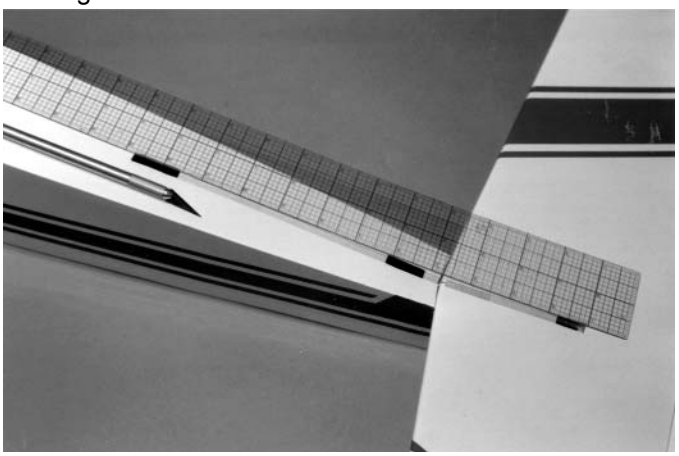


3. Making sure your rudder/fin assembly is facing the same direction as the above photo, measure up from the bottom of the rudder ½" (12 mm.) Put a mark, next to the hinge line, for the location of the control horn.

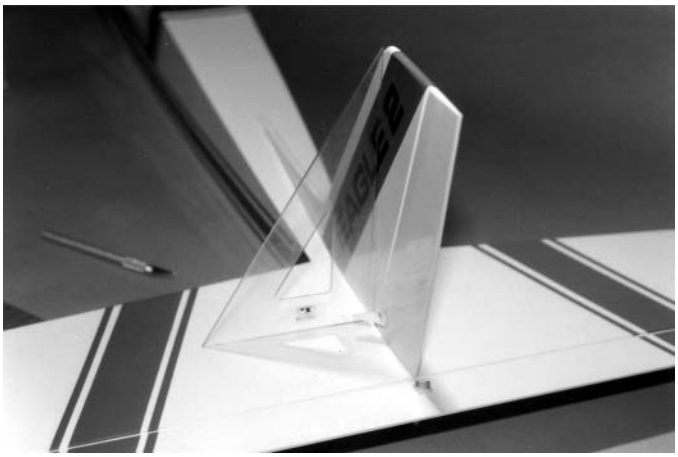
4. Separate the nut plate from the small control horn.

5. Place the control horn on the rudder, as shown above, and mark the hole locations on the rudder, just as was done on the elevator. Then drill 3/32" holes and mount the control horn, screwing through the rudder to the nut plate.

6. Slide the fin mounting posts into the top of the fuselage and check the fit. The fin should fit easily into each slot and should stand upright by itself. Enlarge the holes, if necessary. When satisfied with the fit, draw lines on both sides of the fin, showing its location on top of the fuselage.



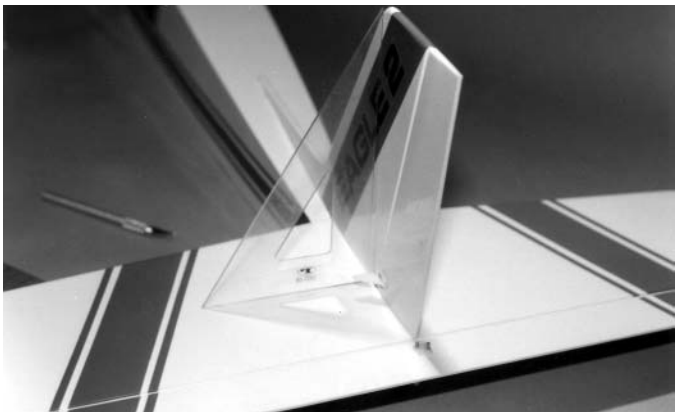
7. Remove the fin and carefully trim away the covering where the fin mounts on the fuselage and stab, being sure to **avoid cutting into the wood structure underneath.**



8. Remount the fin back on the fuselage and put a 90° triangle against the fin to make sure it is mounted perpendicular to the stab.

9. When satisfied with the fit, mix up a couple of spoonfuls of epoxy.

10. Remove the fin and apply a thin, even coat of epoxy on the bottom of the fin and along both sides of the fin mounting posts. Be careful not to apply too thick a coat of epoxy, to avoid the glue squeezing out from underneath the fin.



11. Mount the fin on the fuselage and place the 90° triangle against the fin. Use masking tape to hold the triangle in place until the epoxy dries. Make sure to not glue the triangle!

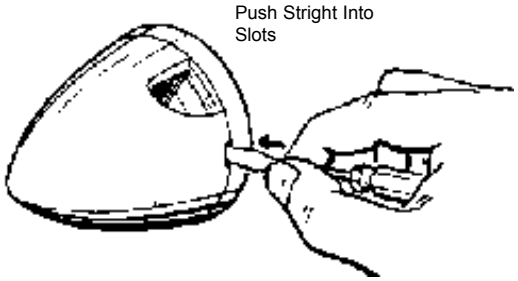
INSTALLING FUSELAGE COMPONENTS

SPINNER ASSEMBLY

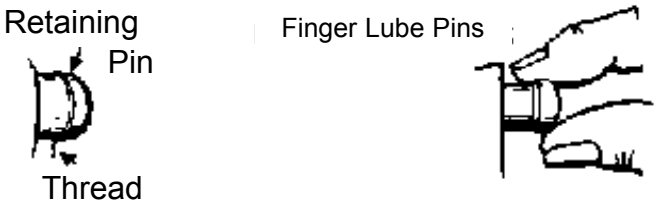
CAUTION: The spinner, propeller, and engine, if improperly installed, or if misused, may result in serious injury to you or to others. Follow the spinner assembly instructions, and other instructions and warnings elsewhere in this book, carefully.

General Precautions:

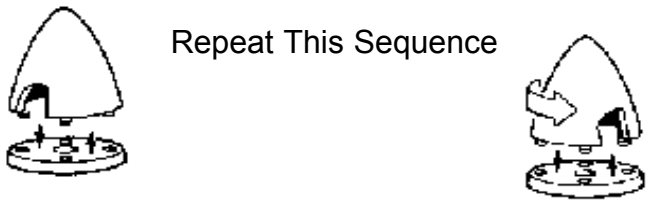
· Never use a spinner where the cut-out is too small for the propeller you are using.
· Follow the engine and prop mounting instructions.
· Inspect frequently, and discard any prop with nicks, scratches, splits, cracks, or any other signs of damage. Never repair a prop!
· Inspect for loosening and retighten using a prop wrench.
· Make sure you and any spectators are not in the plane of rotation of a prop.
· Protect you eyes with safety glasses.
· Get expert advice from your dealer or equipment manufacturer, if you have any questions or concerns regarding the spinner, engine, or propeller.



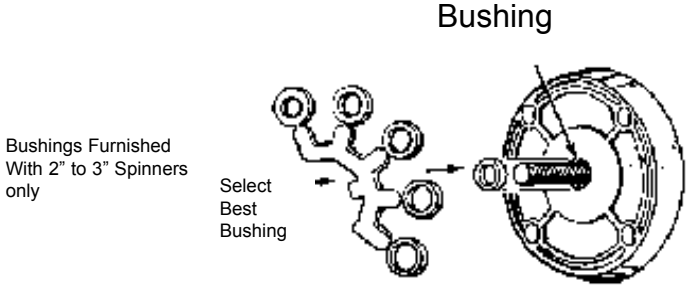
1. Open the spinner by carefully pushing a small screwdriver (one that does not exceed the width of the slot) straight into all four slots. DON'T TWIST! For safety, hold the screwdriver close to the tip.



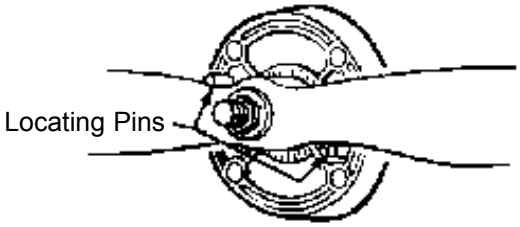
2. Examine the Retaining Pins closely for possible tiny threads and remove.
Rub fingers around the Retaining Pins, to give them a little lubrication.



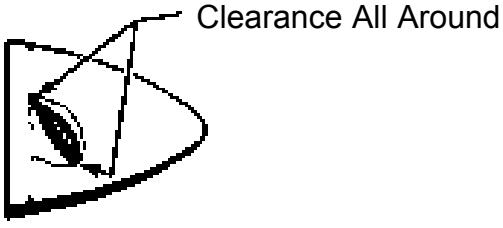
3. "Work in" the spinner by assembling and disassembling three or four times, rotating the pins each time before snapping the spinner to the backplate. The spinner will be quite stiff, at first. You may also boil it in a pan of water for 20 minutes to rehydrate the nylon and make it more workable.



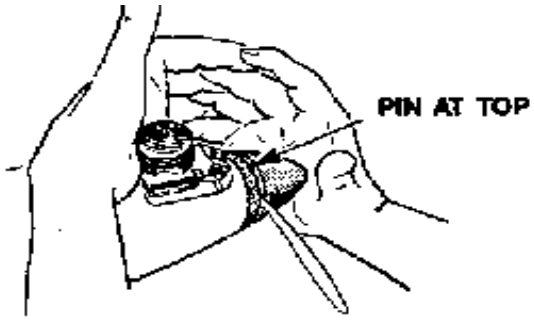
4. Place the backplate on the engine. It should fit snuggly. If it does not, add one of the bushings provided, using a drop of glue to secure it, if necessary.



5. Set the prop against the locator pins and hold while tightening the nut. The prop may turn away from the pins, as you tighten. If this happens, secure the prop with a small drop of CA glue. If you are not satisfied with the prop-to-spinner match-up using the locator pins, rotate the prop 90° and adjust prop as desired.



6. Large cutouts have been molded into the spinner for propeller clearance. Make sure the prop you have selected has clearance all around.

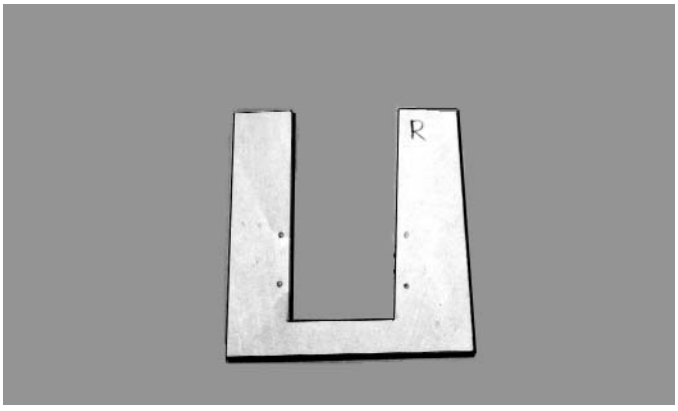


7. Close the spinner by positioning the spinner with the retaining pin at the top and squeezing the backplate onto the nose cone. Rotate the next pin to the top and repeat, until all four pins are secure.

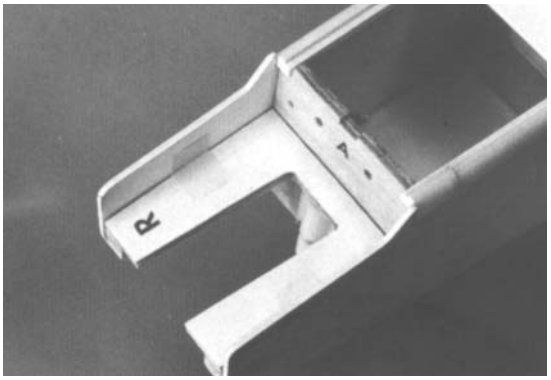
8. Examine the spinner for good fit. Make sure there is no distortion evident. Look for a slight separation between the spinner cone and the backplate, as shown above.

MOTOR MOUNT INSTALLATION

NOTE: Make sure the tail assembly is thoroughly dry before removing the triangle and continuing.

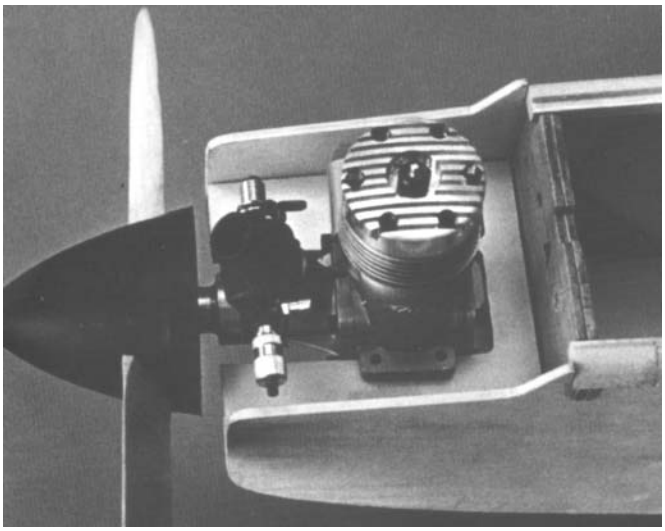


1. Place the wooden motor mount on your work surface, exactly as shown above. The cut out for the motor should offset, so that there is a little more wood in the lower the right corner. This will give your engine right thrust. Write the letter "R" in the upper right hand corner to mark the top and the right side of the motor mount.

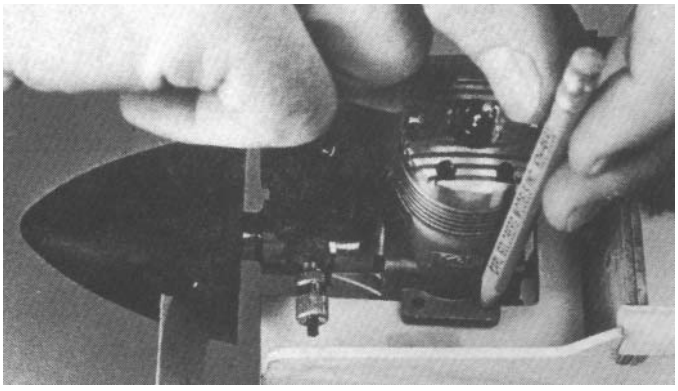


2. With the "R" facing up and on the right side of the aircraft, as shown, place the motor mount in the fuselage. but do not glue at this time. Position your engine on top of the motor mount.

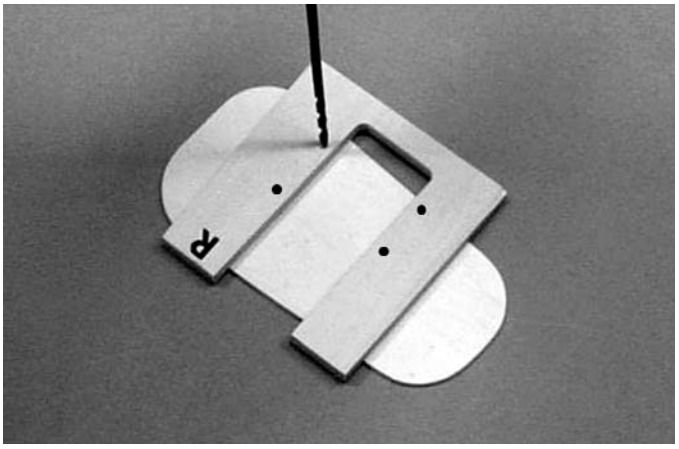
NOTE: The motor mount cutout will accept most standard size motors. However, if your motor is wider than the mount, carefully trim equal amounts from both sides of the opening, until your engine fits. Preserve the right offset, as described above.



3. Slide the engine to the rear of the opening until the back of the spinner has clearance of approximately 1/8".



4. When you are satisfied with the fit, use a pencil to mark straight down through the engine mounting holes onto the motor mount.



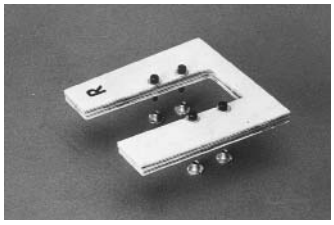
5. Remove the engine from the motor mount and the motor mount from the fuse. At the marked hole locations, drill four 1/8" holes through the motor mount.

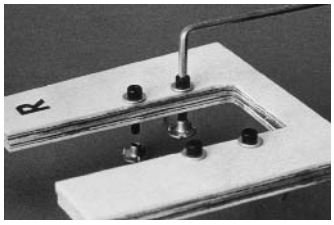
HINT: Place scrap ply under the motor mount to avoid splintering when drilling.

6. Using a toothpick, apply a drop of Vaseline in each blind nut hole and on the top engine screw hole to keep epoxy out of the openings.

7. Mix up approximately 2-3 spoonfuls of epoxy and making sure the "R" is facing up, glue the motor mount in place. The epoxy should cover all areas of contact between the motor mount and the rail on which it is sitting.

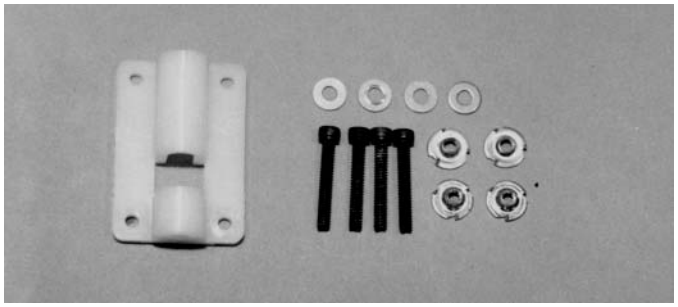
8. Finally, put a thin coat of epoxy over all the wood surfaces: above and below the motor mount, on the wood firewall, and on the fuse sides. This will protect these areas from fuel and oil when your engine is running.





9. After the epoxy dries, permanently install four blind nuts in the bottom of the engine mount, using socket head screws and washers to pull the blind nuts up into the screw holes, as shown. After tightening the blind nuts, remove the screws.

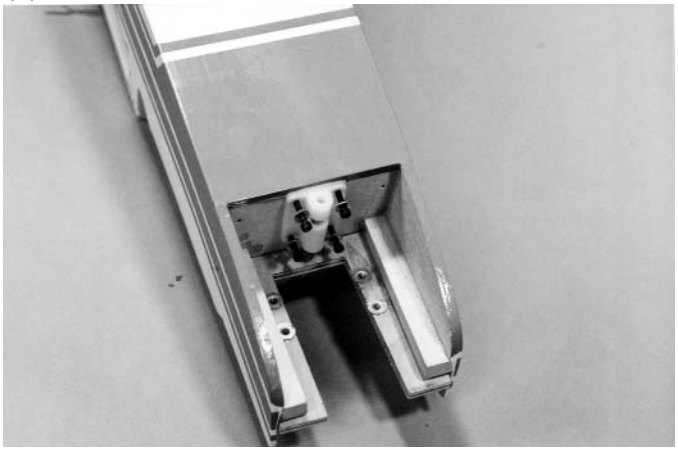
NOSEGEAR BLOCK INSTALLATION



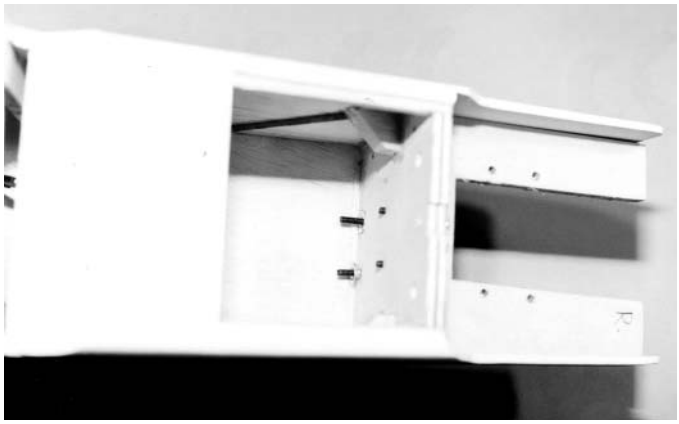
1. Collect the following items:

(1) Nosegear block
- (4) 4-40 x ½ socket head screws
- (4) 4-40 blind nuts

(1) # 4 washer



2. Turning fuse upside down and using the Allen wrench supplied with this kit, screw the nosegear block to the firewall with the 4-40 x ½" screws and the #4 washers. Screw the bolts part way until the ends are just coming through the backside of the firewall. Refer to photo for correct installation.



3. Turn the fuse right side up and place the 4-40 blind nuts on the ends of the screws, with the teeth pointed toward the firewall.

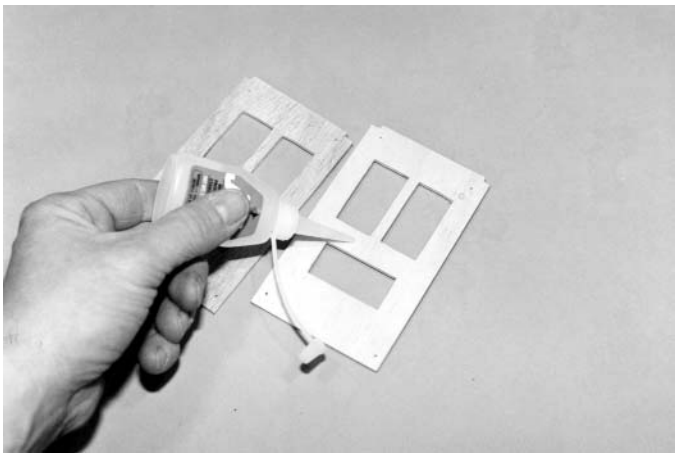
SERVO INSTALLATION

1. Collect the following items:

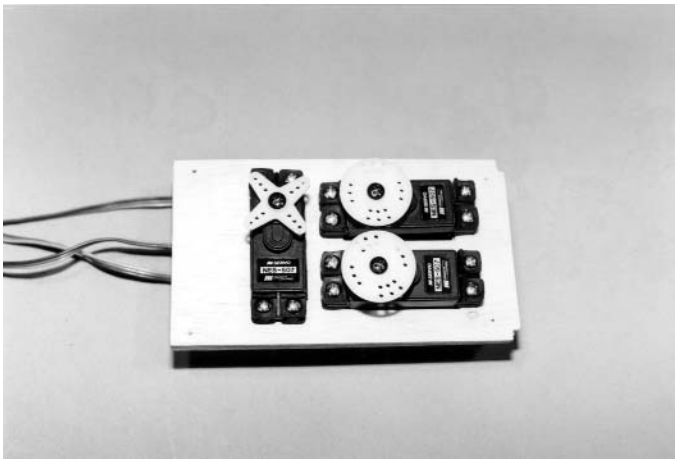
(2) Plywood servo trays
(3) Servos
(12) Servo rubber grommets
(12) Servo eyelets
(12) Servo screws
(1) ¼ x½ x 3-5/8 wood servo rail

2. Set up the three servos in the same manner as the wing servo was prepared. Review the Wing Assembly section of the book, if necessary. Also refer to the specific instructions included with your radio.

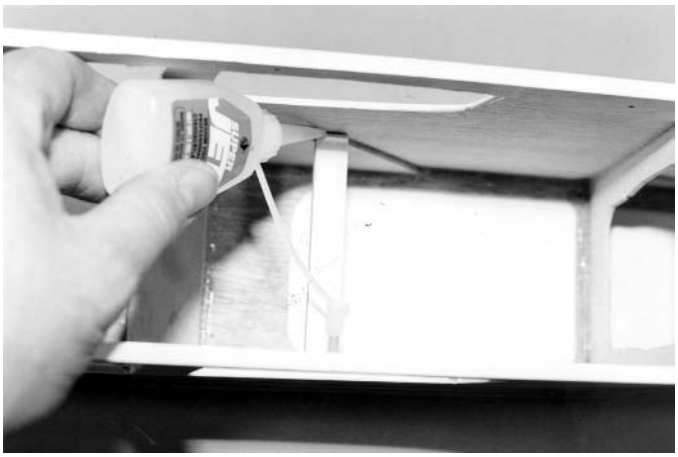
3. Using Ca Glue, laminate the two plywood



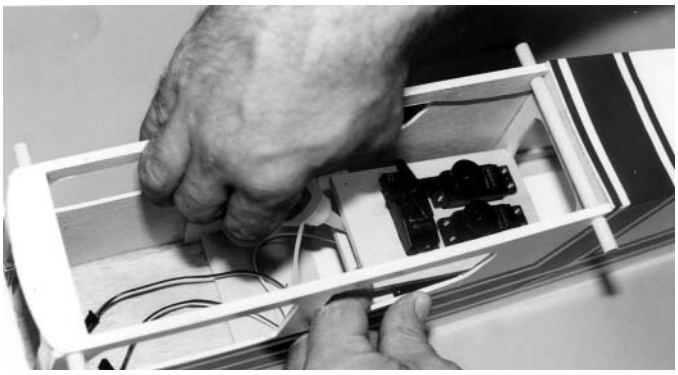
servo trays together. Hold flat and allow to dry.for approximately one minute.



4. Place the servos in the tray and install with screws, as shown. Make sure the servo arms and wheels on your servos look approximately like the ones in the photo. If necessary, change the arms and wheels to match.

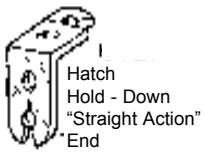


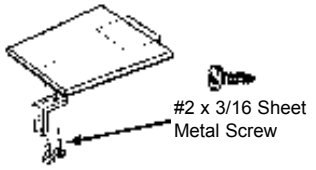
5. Position the ¼ x ½ x 3-5/8" wood servo rail inside the fuselage, fitting it into the notches in the side doublers. If the rail is too tight, sand to fit. When satisfied, glue in place.



6. Slide the servo tray into the fuselage, placing the back of the servo tray into the notches in the rear cabin former. After making sure the tray is straight in the fuselage, CA glue in place by putting glue on top of the rail and at the notches in the rear cabin former.

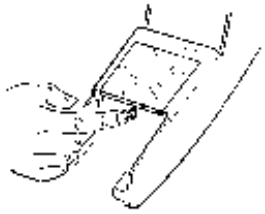
HATCH INSTALLATION



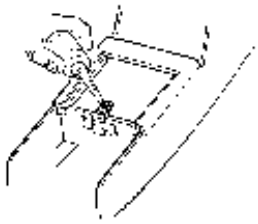


1. Collect the follow parts:

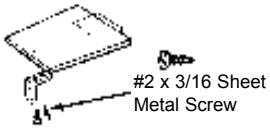
(1) Hatch hold-down
(3) #2 x 3/16" sheet metal screw
(1) Hatch cover



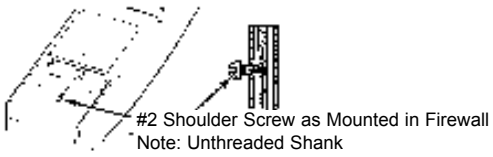
2. Position the hatch cover on the fuse. Press hold-down against the front of the firewall and up against the bottom of the hatch cover, as shown. The "straight action" end should point towards the fuse bottom. Tape in position on firewall.



Remove the hatch cover and apply CA glue to the hold down. Replace the hatch cover on fuse, gluing it to the hold-down. Allow to dry.



3. When dry, remove the hold-down/hatch assembly from the firewall and drill two 1/16" pilot holes. Secure the hold-down to the hatch with the two 3/16" screws.



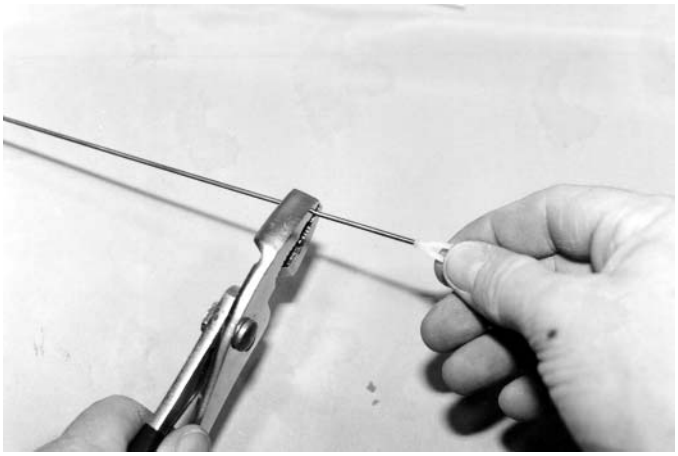
4. Reposition the hatch on the fuse. Mark the location for the #2 screw and install the screw on the firewall, as shown. Be sure to leave enough of the unthreaded shank to engage the hold-down. Snap on and off several times, to make sure the screw is properly secured.

THROTTLE PUSHROD INSTALLATION

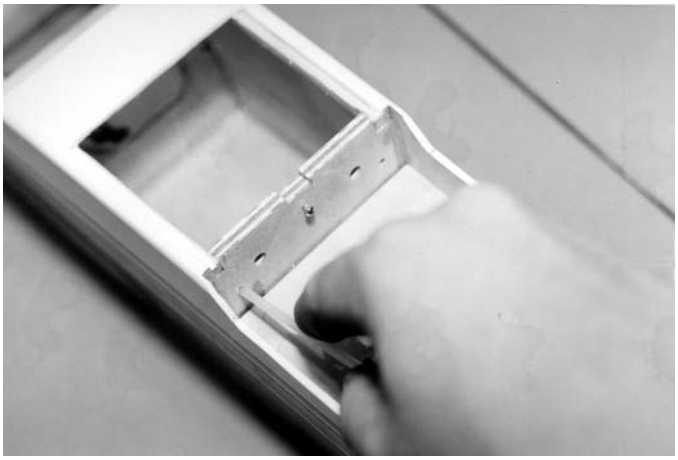
1. Collect the following parts:

(1) 1/8" x 10-1/2" nylon tube
(1) .072 x 19" threaded rod
(1) nylon mini-snap link

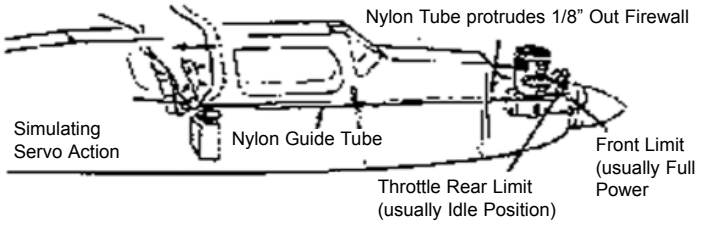
2. Remount the engine into the front of the fuselage.



3. Screw the mini-snap link onto the threaded rod.



4. Referring to the photo, start at the hole in the right side of the firewall and slide the throttle guide tube into the fuselage and through the upper notch on the side of the front cabin former. The nylon guide tube should protrude 1/8" out of the firewall as shown in the following drawing.



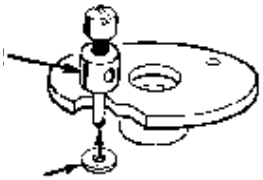
5. Referring to the drawing, and starting at the firewall, slide the threaded rod into the nylon tube. Connect the mini-snap link to the engine throttle arm.

6. Again referring to the drawing, move the pushrod back and forth to simulate servo action. If the pushrod does not move freely, adjust the wire bend where necessary. Test the front and rear "limits" of the throttle arm, to have a feel for what they are.

NOTE: Later, when setting the controls, make sure to set the throttle servo linkage within the range of the throttle arm movement.

7. Glue the nylon tube to the firewall and to the second former.

8. Remove the servo wheel from the throttle by removing the screw on the center of the arm and then pulling up gently on the arm.



Broken View Through Servo Wheel To Show Installation

9. Install the push rod connector on the servo arm as shown.

10. Guide the throttle pushrod wire though the pushrod connector and slide the servo arm up to the throttle servo.

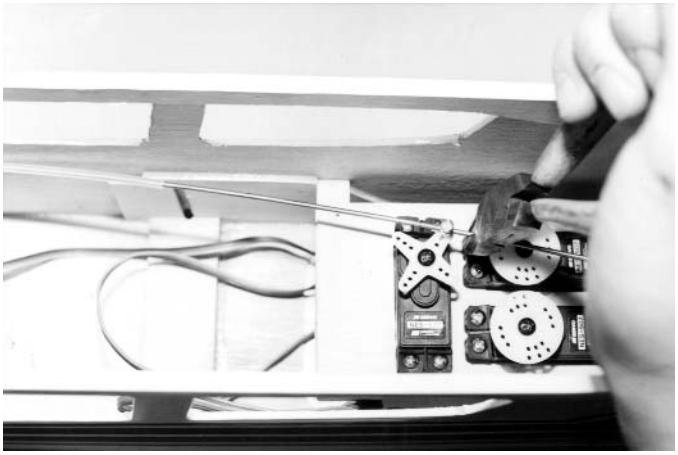
11. Replace the servo arm on the throttle servo and twist the servo arm clockwise until it stops. Reposition the servo arm, as well, so that it is in the same position as shown in the photo. Then replace the screw into the center of the servo arm.

12. Pull the throttle pushrod back through the untightened pushrod connector until it stops, and then tighten the setscrew on top of the pushrod connector.

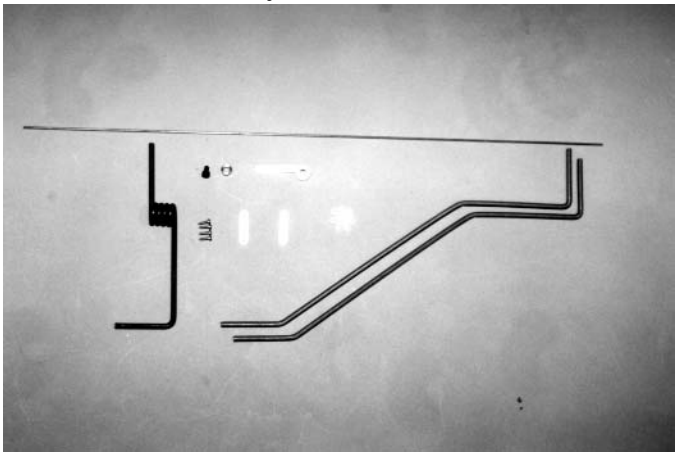
13. When the setscrew is tight, twist the throttle servo arm counter-clockwise until the servo stops. Now look at the carburetor in the front of your engine. The carburetor should be open (high speed) all the way, just as shown above.

14. Now twist the throttle servo arm clockwise until the servo stops. At this point, the carburetor should be closed (slow speed).

NOTE: The throttle servo will be adjusted more accurately after the radio installation.



15. Cut the excess throttle pushrod wire sticking out beyond the pushrod connector. Leave about a ½" of wire, to allow for adjustments.



1. Gather the necessary items:

(1) Fuselage
(2) Main gear wire struts
(2) ¾" landing gear straps (measure hole to hole)
(4) #2 x 5/16 sheet metal screws
(1) Nylon nosegear steering arm
(1) Wheel collar
(1) 6-32 x 3/16 socket head screw
(1) 5/32 nosegear strut
(1) Nylon snap nut
(1) 16-3/4" wire

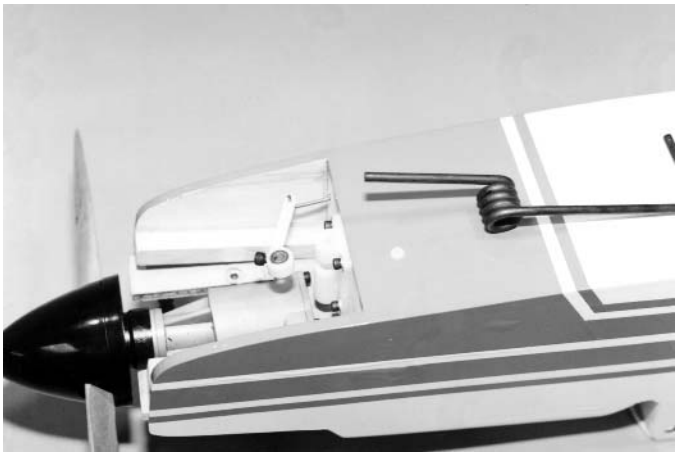
2. Making sure the side holes are aligned, press the steel collar into the pocket in the nylon steering arm.

Thread the #6-32 x 3/16" socket head screw in a few turns.

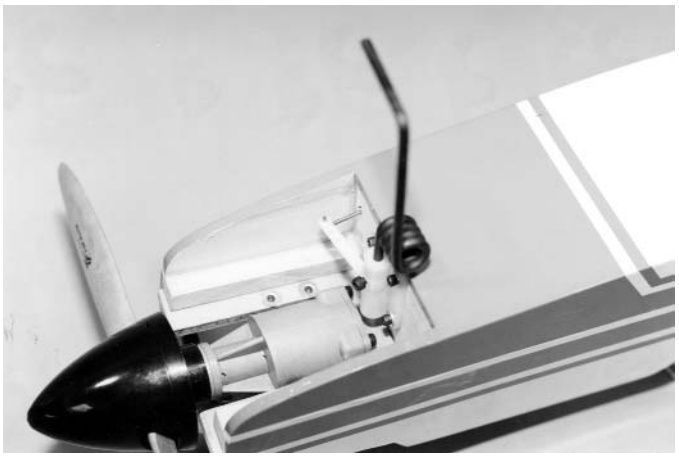
3. Make a ¼" bend at one end of the 16-3/4" wire. Then, referring to the photo, bend the wire at approximately a 20° angle about 1" back from the first bend.

4. With the fuselage bottom-side up, insert the unbent end of the wire into the hole on the opposite side from the throttle pushrod and nearest the bottom of the fuselage.

5. With the fuselage right side up, make sure the pushrod is going through the side slot closest to the fuselage bottom in the front cabin former.

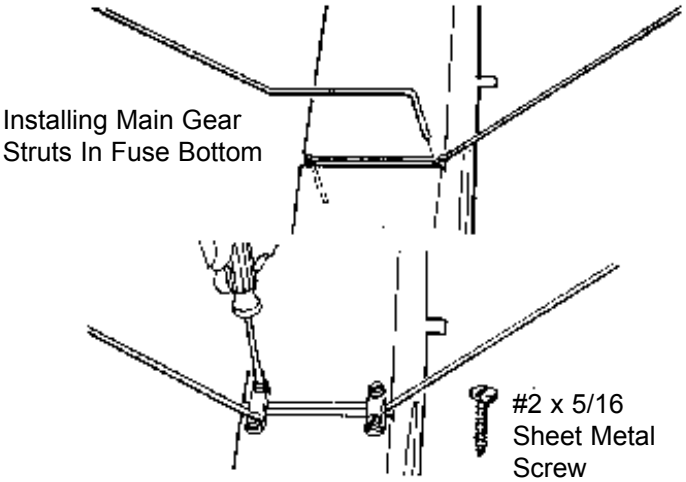


6. With the fuse UPSIDE DOWN, Place the wire on the outermost hole on the nylon steering arm. Fasten the nylon snap nut on the end of the wire to hold the steering arm in place.

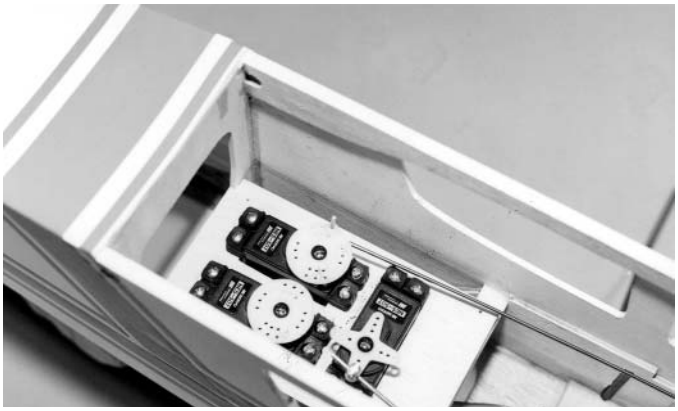


7. Install the steering arm in the bearing. Slide the nosegear strut though both the steering arm and the nosegear bearing. With the fuse bottom-side up, tighten the socket head screw with the Allen wrench.

8. Put the nosegear strut into the nosegear block, pushing it down until the spring is approximately ½" off the bottom of the fuselage. Make sure the nosegear steering arm is approximately ½" away from the firewall and that the nosegear strut is positioned as shown in the photo.



9. Using the 6-32 Allen wrench, tighten down the setscrew in the steering arm to hold the strut in place.



12. Bend the wire towards the correct hole in the rudder servo wheel., but DO NOT CUT IT. Move the pushrod to check for free movement and correct, if necessary.

13. With the nose wheel pointing straight ahead, the end of the steering arm should be ½" away from the firewall. Adjust, if necessary. At the servo, mark where the pushrod meets the hole on the servo wheel and make a 90° bend in the pushrod at that point.

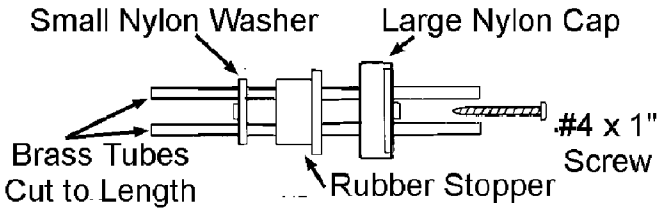
14. Remove the servo wheel to insert the pushrod, and then remount. Later, during taxi tests, you can adjust the nose wheel steering by loosening the steering arm socket head screw.

Fuel Tank

1. □ Collect the following items:

(1) Fuel tank
(2) Brass tube
(1) Large nylon cap
(1) Small nylon washer
(1) Rubber stopper
(1) #4 x 1” screw
(1) Fuel tank klunk
(1) 6” length of white fuel tubing

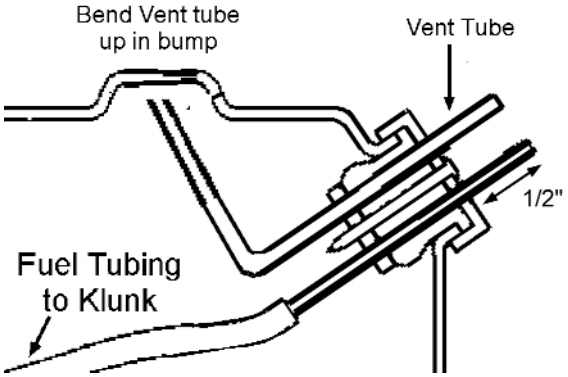
CAUTION! The white neprene stopper and the fuel tubing provided with this kit are **FOR GLOW FUEL ONLY**; DO NOT USE THESE PARTS FOR GASOLINE.



2. □ Insert both brass tubes through the wide end of the rubber stopper. Leave 1/2" extending out the front of the tank.

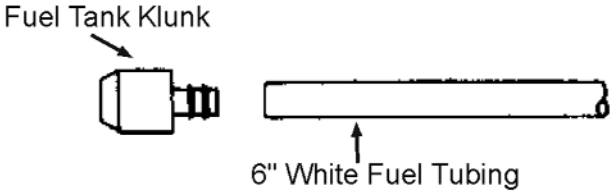
□ Place the small nylon washer on both tubes, as shown, making sure that one of the tubes extends 1" past the washer. This tube will be for the klunk pickup.

□ Cut tube as necessary.



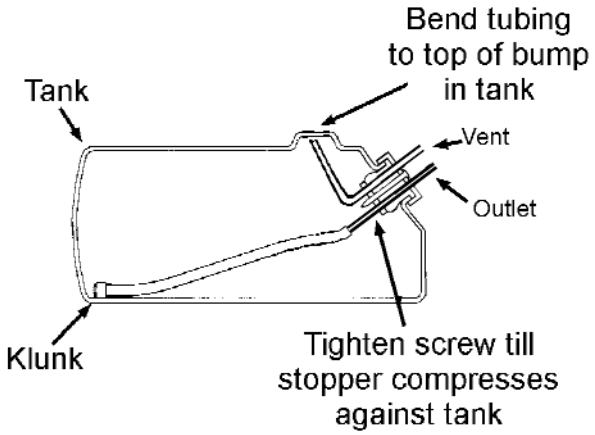
3. □ Bend the other tube, at the angle shown, until it nearly reaches to the fuel tank wall. This is the vent/overflow tube.

4. □ Insert the stopper assembly into the fuel tank until the vent tube is up inside the "bubble" in the fuel tank wall. Remove the assembly and trim the vent tube, if necessary.



5. □ Install the klunk on the white fuel tubing.

□ Mount the other end of the fuel tubing onto the brass outlet tube in the stopper.

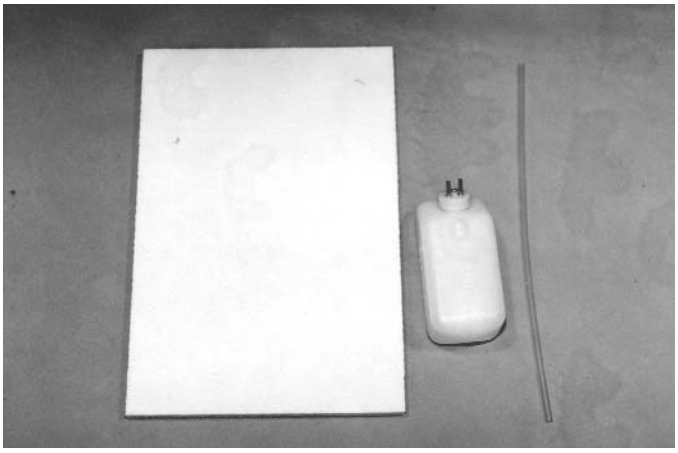


6. □ Again place the stopper assembly into the fuel tank. If the klunk is touching the back wall of the tank, trim it as needed.

7. □ Place the large nylon cap onto the two brass tubes.

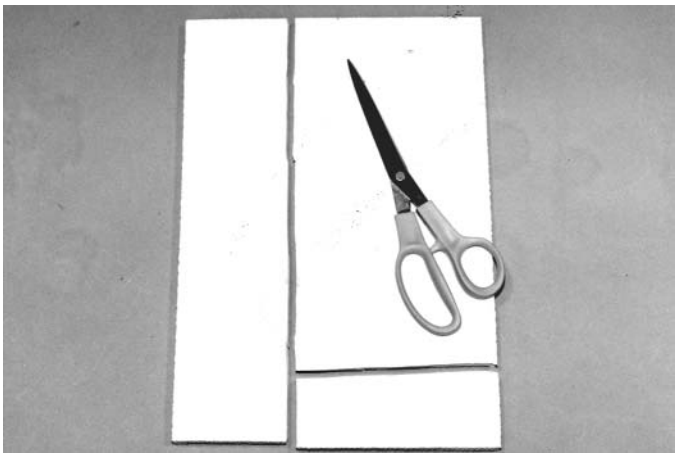
□ When satisfied with the fit of the entire stopper assembly, tighten the #4 x 1" screw into the center of the stopper. Take care to not over-tighten the screw.

FUEL TANK INSTALLATION

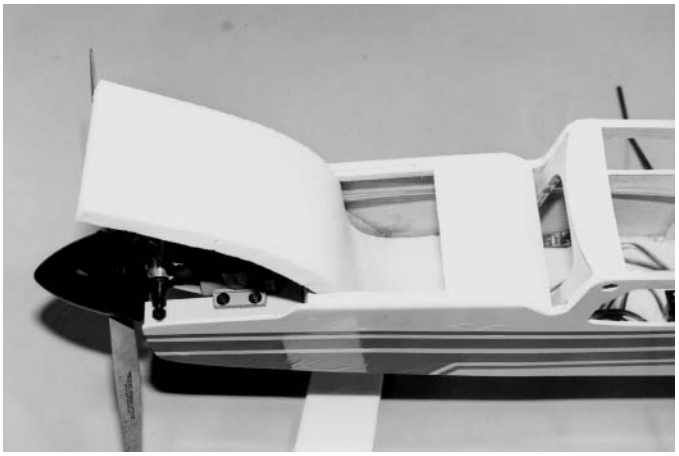


1. Collect the following items::

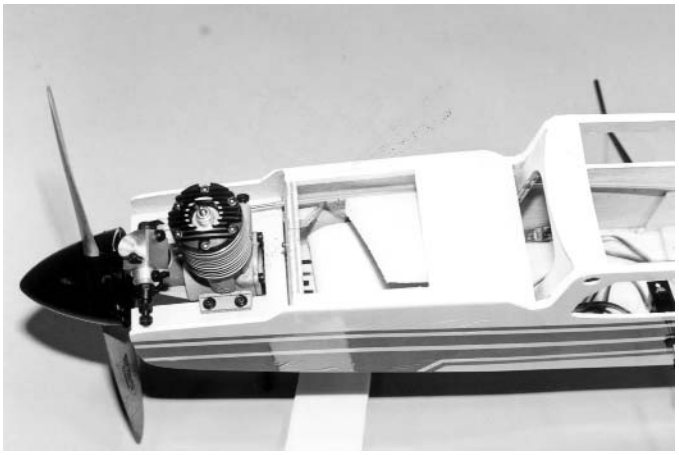
(1) ½ x 8 x 12" foam rubber (Not Included)
(1) Assembled fuel tank
(1) 10" length of fuel tubing



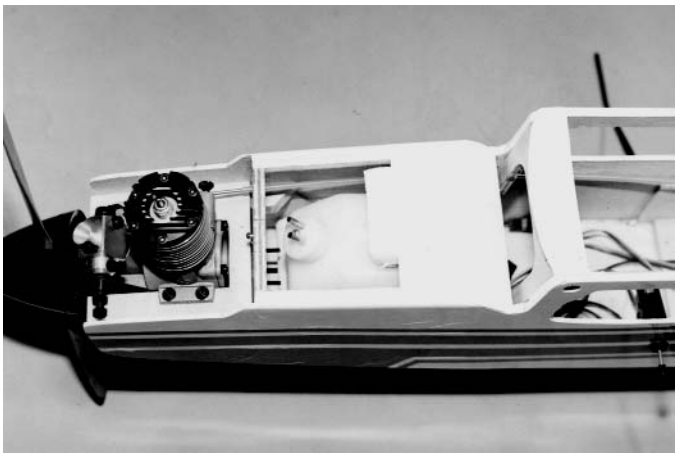
2. From the ½ X 8 X 12", cut a strip 2-1/2" x 12" long. Next, cut a 2" wide strip across the bottom of the leftover piece.



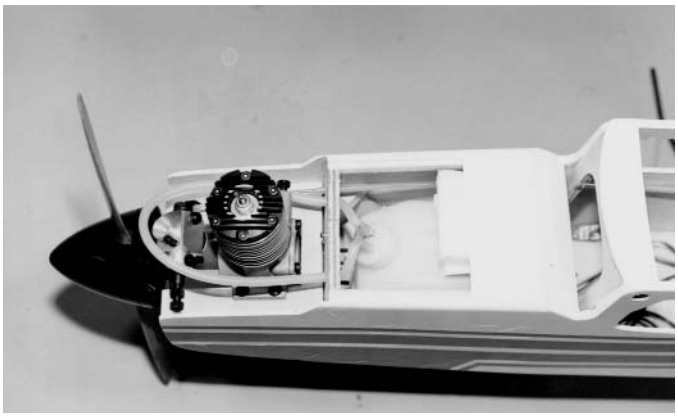
3. Remove the hatch and put the 2-1/2" wide foam in the bottom of the fuel tank compartment in the fuselage.



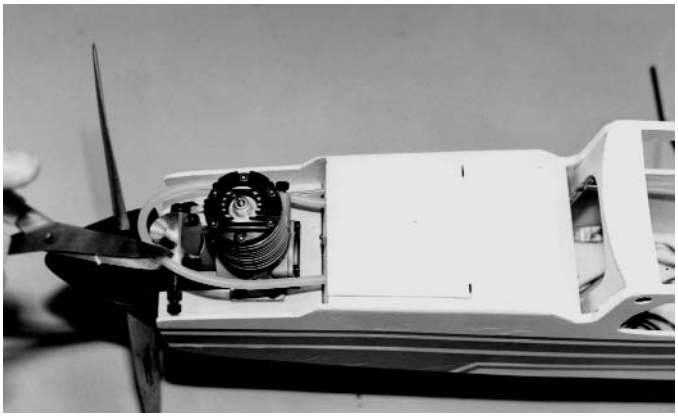
4. Fold the foam in so that it forms a "Z" shape.



5. Place the fuel tank down inside the hole on top of the "Z" folded foam. Fold the 2" foam piece in half and push it down on top of the fuel tank.



6. Insert both fuel line ends through the holes on each side of the firewall, forming a loop around the engine. Place the ends of the fuel tubing on the brass tubes on the front of the fuel tank, as shown above.

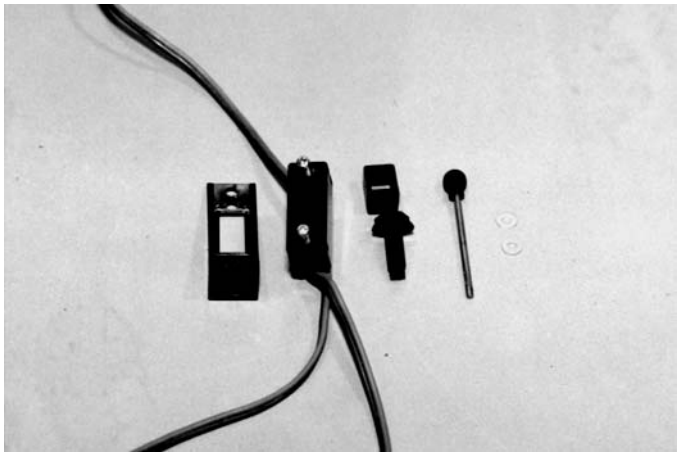


7. With a scissors, cut the fuel line 1" beyond the carburetor. The shorter line connects to the carburetor pick up; the longer line goes to the muffler back-pressure pickup. Replace the hatch.

Replace the hatch on the fuselage.

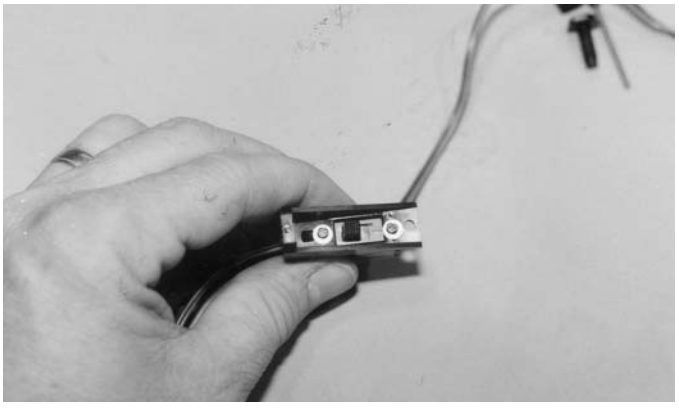
RADIO SWITCH INSTALLATION

The switch holder shown is not included in the kit. You can purchase the switch holder at your local hobby shop. For installation without the switch holder, cut a hole through the side of the fuselage to mount the switch.



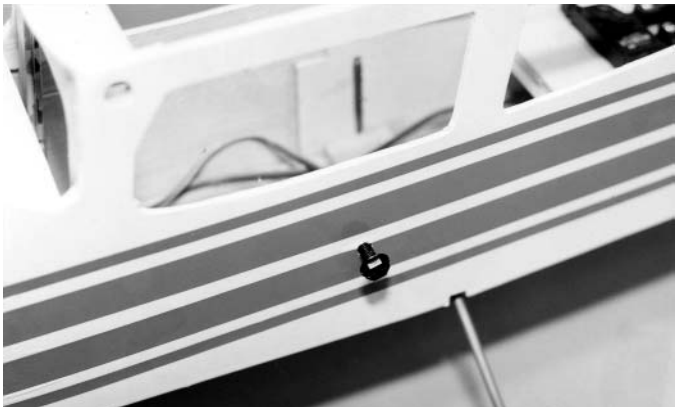
1. Gather the necessary parts:
   - (1) Radio switch
   - (1) Switch mount
   - (1) Switch cap
   - (1) Switch mount bolt
   - (1) Switch push-pull
   - (2) #2 washer

2. Remove the screws and the switch cover (if your radio has one) from the top of the switch.

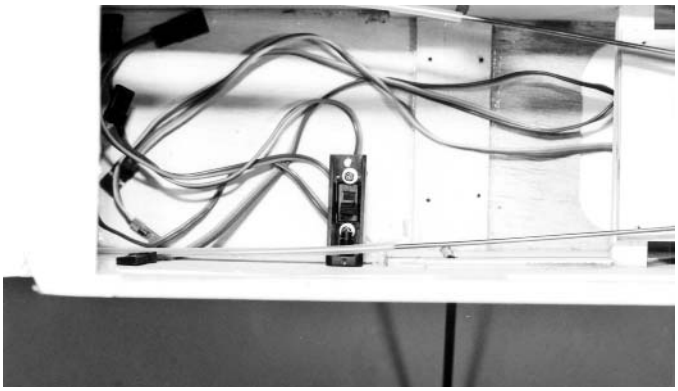


3. Using the screw that you just removed and the #2 washer, put the switch mount together, as shown.

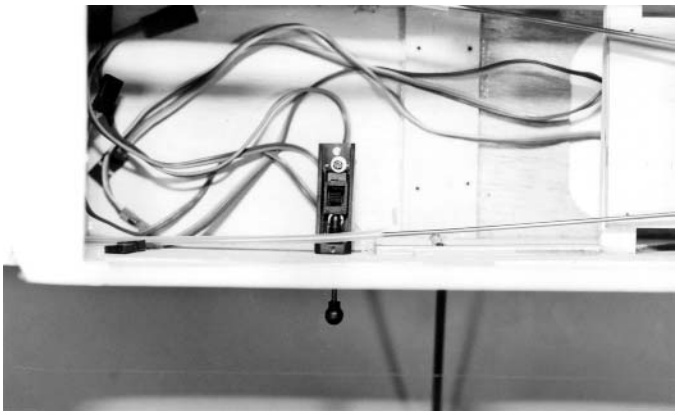
The switch mount has one slotted hole and two holes on the other side. Mount your switch so that the switch itself will move back and forth and you can feel and hear the click.



4. Locate the hole on the left side (as you look out the windshield) of the fuselage and make an "X" cut in the covering. Push the switch mount bolt through the hole.



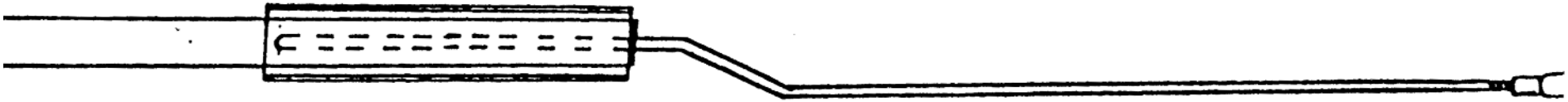
5. Place the switch unit on the screw on the inside of the fuselage, as shown.



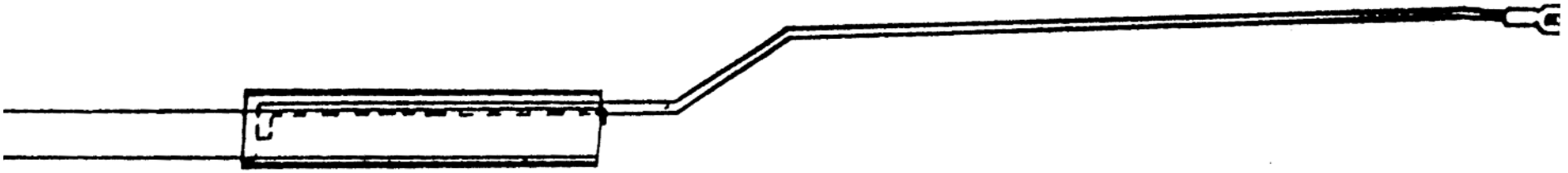
6. Insert the push-pull mechanism through the center hole in the switch mounting bolt and place the switch cap over the switch. Screw the push-pull into the cap. Test for good movement.

NOTE: There is a small hole on the side of the switch cap for the push-pull to screw into. Also, the switch has two different size holes in the top and bottom to enable it to fit over large or small switches. Choose the opening that best fits your switch and allows it to move easily in and out.

Rudder Pushrod Drawing #1

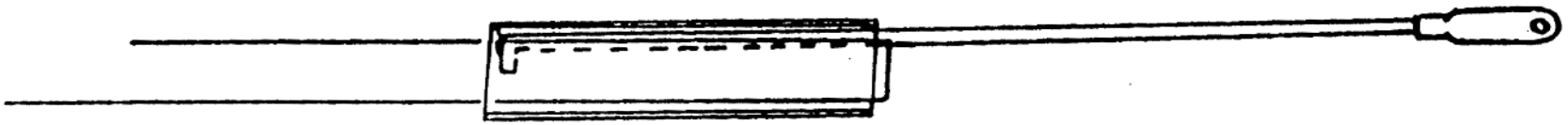


Top View



Side View

Elevator Pushrod Drawing #2



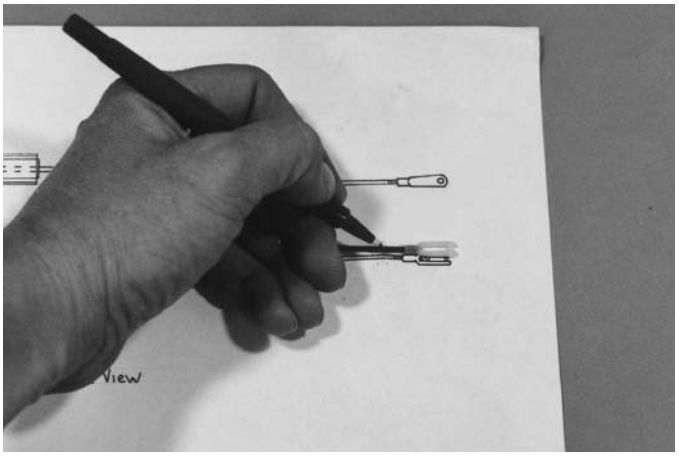
Part # 200700

PUSHROD INSTALLATION

1. Collect the pieces:

(1) LONG wooden pushrod dowels with wires attached
(1) SHORT wooden pushrod dowels with wires attached
(2) 10" threaded rod
(2) Black shrink tubing, not shown
(2) Mini snap link
(1) Full-scale pushrod drawing

2. Thread the snap link onto one of the threaded rods. The end of the rod should show in the middle of the snap link.

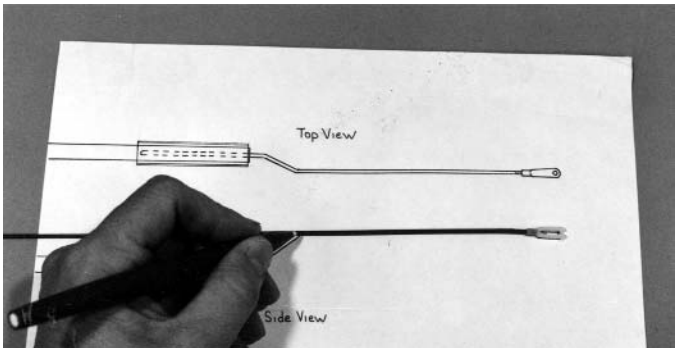


NOTE: In the following steps, take care to match each bend as closely as possible to the drawing.

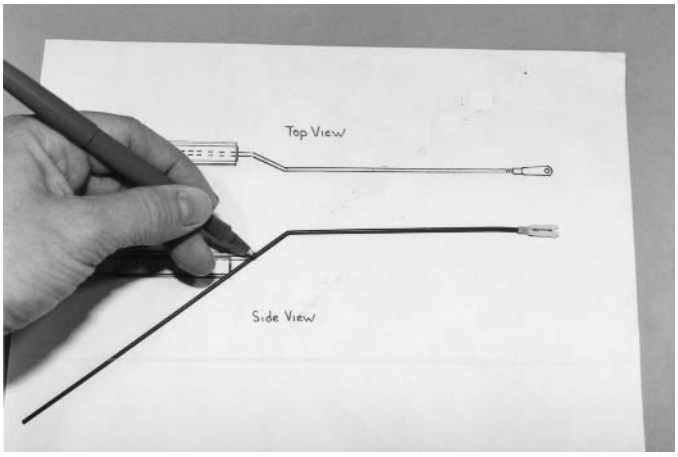
NOTE: in the following steps, take care to match each bend as closely as possible to the drawing.

3. Using the Rudder Pushrod Drawing #1, place the threaded rod over the SIDE VIEW and mark the location of the first bend next to the snap link.

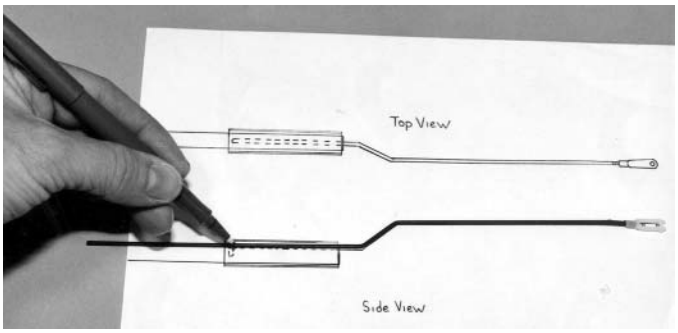
4. Make a slight bend at the mark and compare it to the drawing.

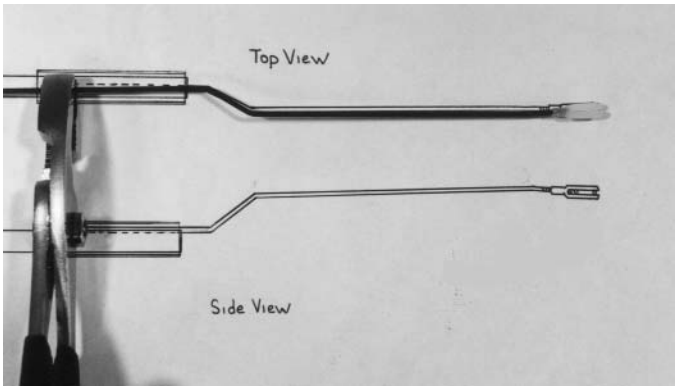


5. When satisfied with the bend, mark the next bend location and make the bend accordingly.

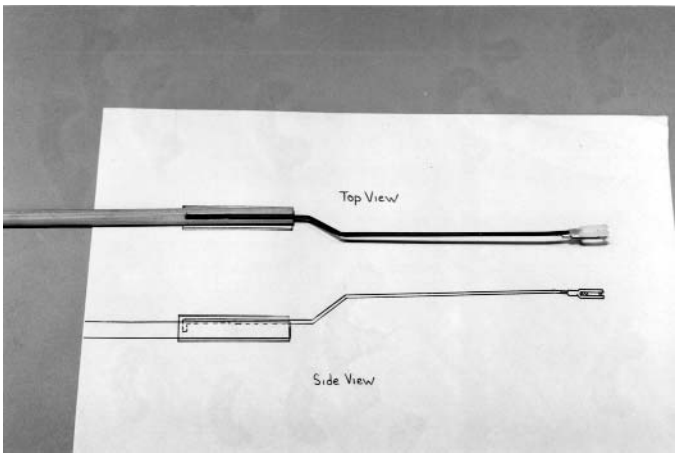


6. Repeat the process for the next bend, as shown.





7. Mark the fourth bend and then, holding the wire over the TOP VIEW on the drawing with pliers, twist the wire until it matches the drawing. Then bend the final angle down.



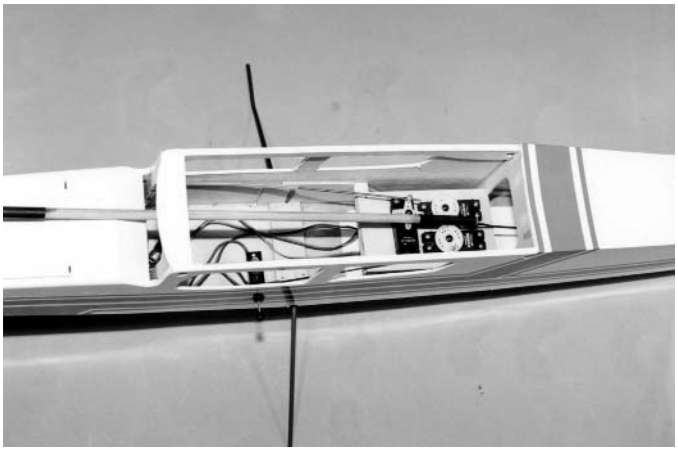
8. Cut off the wire to the length in the SIDE VIEW drawing.

9. Referring to the above photo, insert the bent wire end into the hole and slot in the SHORT wooden pushrod and CA glue in place.

10. Slide the black shrink tubing over the wire and wooden rod assembly and shrink with a hair dryer. Once the tubing is tightly shrunk, glue the edges of the shrink tubing with thin CA glue.

11. Examine the top of the fuselage and locate the hole on the LEFT SIDE, under the covering, 1-1/2" in front of the stab.

Study the photo. Making sure you are working on the LEFT SIDE of the aircraft, carefully remove the covering over the hole.



12. Remove the mini snap link and, inserting the pushrod assembly through the windshield opening, thread it down into the tail section. Twist the rod so that it exits through the hole in the top of the fuselage.

13. Replace the mini-snap on the rod, screwing it in until the end of the rod is just showing in the middle of the snap-link. Attach the snap link to the outside hole on the control horn.

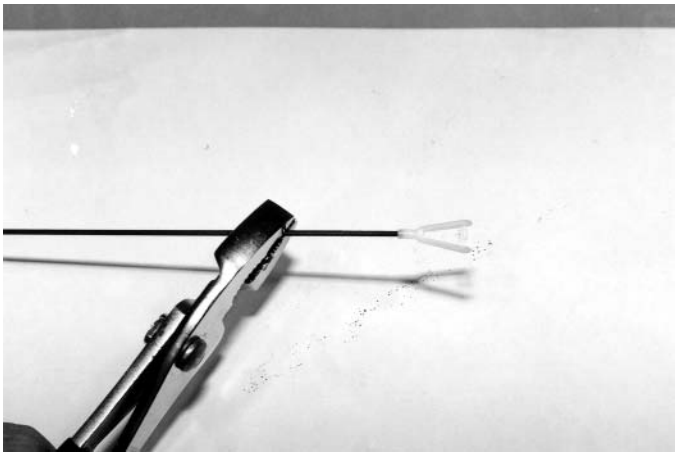
14. Referring to the above photo, drill a 1/16" hole in the servo wheel opposite where the nosegear pushrod will be installed.

15. Remove the center screw from the servo wheel and twist the pushrod end onto the servo wheel

16. Looking down at the top of the fin, make sure the rudder is in a straight line with the fin. Adjust if necessary by twisting the snap link in and out.

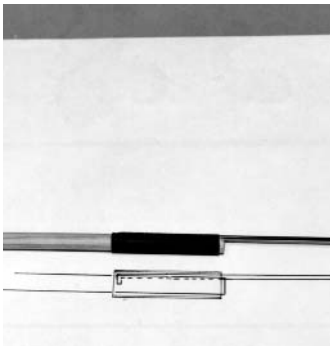
Examine the nosegear to make sure the wheel position is straight forward. Adjust, if necessary.

Install the snap nut on the nosegear pushrod at the servo end.

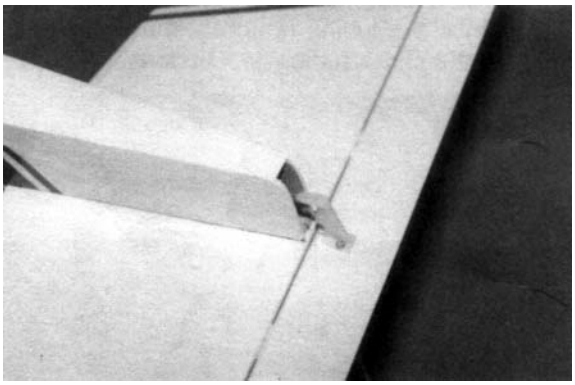


17. Mount the snap-link onto the remaining threaded rod. The end of the rod should show in the middle of the snap-link.

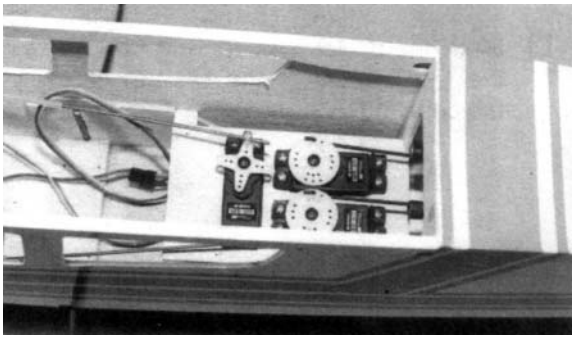
18. Lay the wire over the Elevator Pushrod Drawing #2 and mark the location of the bend. Bend the wire at the mark and cut off to the length on the drawing.



19. As with the rudder pushrod assembly, insert the bent wire end into the hole and slot in the remaining (LONG) wooden pushrod. CA glue the wire in place and slide the black shrink tubing over the pushrod assembly. Shrink with a hair dryer and, when the tubing is tight, glue the edges of the shrink tubing using thin CA glue.



20. Thread the pushrod assembly through the fuselage and exiting out the end, as shown. Attach the snap link to the outside hole on the elevator control horn.



21. As before, drill a 1/16" hole in the elevator wheel. Remove the center screw from the elevator servo arm and twist the pushrod onto the servo arm.

22. Check the stab and elevator to make sure they are in a straight line. If necessary, adjust the elevator up or down by screwing the snap link in or out. Replace the center screw into the servo.

RECEIVER & BATTERY INSTALLATION

1. Collect the following required items :
   - (1) Radio receiver
   - (1) Aileron extension WIRE
   - (1) Receiver battery
   - (1) Remaining piece of foam rubber
   - (2) Rubbers bands
   - (1) T-pin

2. Place the receiver near the edge of the foam rubber and mark a cut line, so the foam area is ½" larger than the receiver.
3. Open the antenna and stretch it out.

NOTE: Never change the antenna length. The length is tuned to the receiver.

4. Cut the foam and wrap it around the receiver, securing with a rubber band. Leave the receiver sticking out, so that you are able to plug the servos in without interference.

5. Following the instructions and diagrams for your radio, plug all the servo wires into the receiver. Take care to connect each servo wire to the proper device, i.e. to connect the rudder servo to the rudder plug, the elevator servo to the elevator plug, and the aileron extension wire to the aileron plug.
6. Connect one switch plug to the battery location on the receiver.

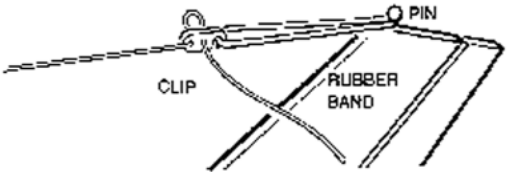
7. With the remaining foam, cut and wrap the battery pack, just as you did with the receiver.

8. Plug the battery wire into the switch wire.

NOTE: The remaining wire on the switch is the charging jack and needs to be KEPT ACCESSIBLE.

9. Tuck the battery and the receiver all the way into the foam wrapping.

Place both the receiver and the battery pack into the bottom of the fuselage just behind the front cabin former. Route the receiver antenna through the fuselage cabin and out the top of the fuselage behind the wing. Both the aileron extension wire and the charging jack wire should be sticking outside of the fuselage.

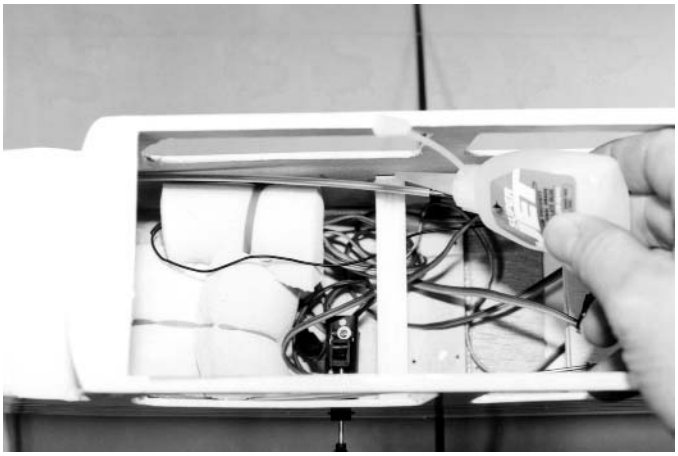


10. Take a pin and push it into the top of your fin with a slight lean towards the back. Attach the rubber band to the end of the antenna and put the rubber band around the pin. Pull tight on the antenna.

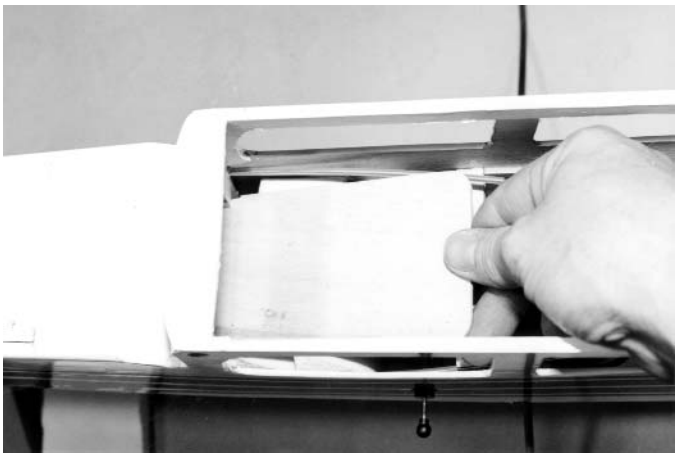
PILOT PLATFORM INSTALLATION

1. Collect the following required Items:

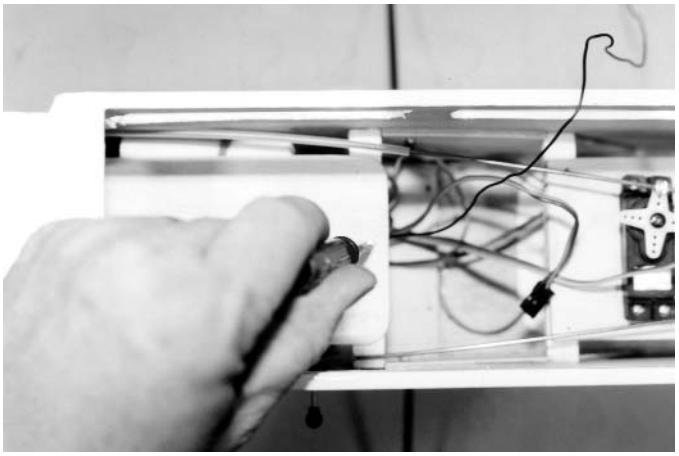
   - (1) ¼" x ½" x 3-5/8" wood rail
   - (1) Plywood pilot platform
   - (1) #2 x 5/16 sheet metal screw



2. Place the ¼" x ½" x 3-5/8" wood rail inside the fuselage, fitting it into the notch on the side doublers. CA glue in place.



3. Insert the front of the pilot platform into the notches in the front cabin former with the back resting on the wood rail.



4. Drill a 1/16" hold through the pilot platform and the rail.

Screw the back of the platform to the support rail, using the #2 x 5/16" screw.

PILOT ASSEMBLY AND INSTALLATION

The pilot figure included with your airplane adds an extra touch of realism.

1. Cut pilot halves apart at the bottom and trim off scrap. Gently sand the edges of each half, so that they will be smooth for joining. Carefully align the front and back pieces and hold together with tape, as shown.

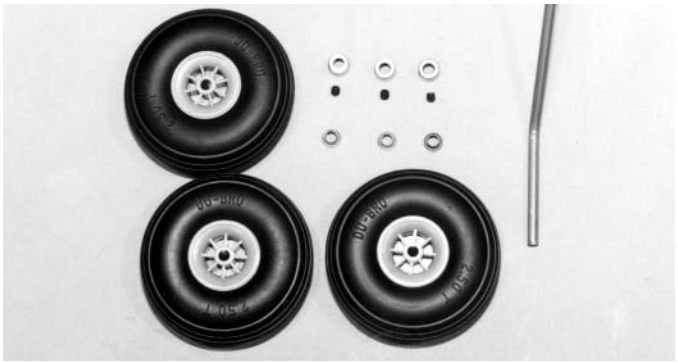
2. Tack glue the figure by applying a few drops of CA glue at key joint areas. When dry, remove tape and apply a small amount of glue all along the seam.

3. Using artist's acrylics or modeling enamels, which are available in many colors without needing to mixing required, paint the pilot to suit your fancy. WARNING: Do not use lacquer-based paints, which will destroy the plastic.

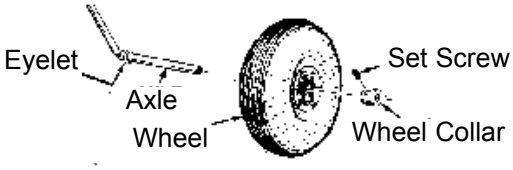
4. When dry, CA glue the pilot in place on the platform. You also may paint the interior of the cockpit, if added realism is desired.

HINT: When painting the pilot's face, leave the eyes white. Later, when the face has dried, carefully add eye details with a fine bush or toothpick.

WHEEL INSTALLATION



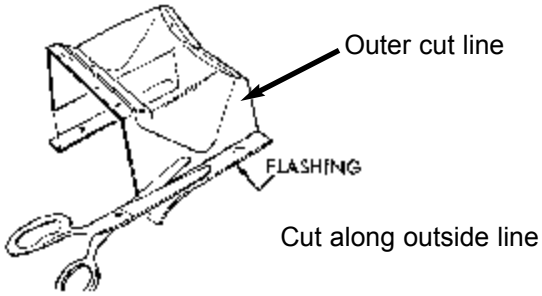
1. Collect the following items:
   - (3) 2-1/2" wheels
   - (3) 5/32 wheel collars
   - (3) 6-32 x 1/8" Allen head set screw
   - (3) 5/32 eyelet
   - (1) .050 Allen wrench (Not Included)



2. Install the wheels on the axles, as shown: eyelet first, then wheel, wheel collar, and set screw. Glue the eyelet in place with a drop of CA glue.

INSTALLING THE WINDSHIELD & SIDE WINDOW

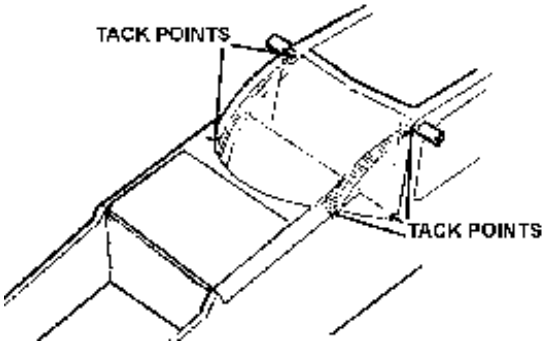
CAUTION: Follow these instructions carefully to avoid cutting errors or other damage to the plastic.



1. Carefully trim the windshield, as shown, along the OUTER cut lines provided.

2. Temporarily set the windshield in place on the fuselage. Make sure the wing dowels do not interfere with the correct placement of the windshield, and note where it contacts the fuse.

OPTIONAL: For added gluing strength, make a series of pinhole punctures through the covering, at the contact points. This will allow the glue to penetrate to the wood underneath.



3. Making sure the windshield is properly centered, tack glue in place at each of the tack points shown above.

4. After the windshield has been tacked in place, go slowly around the entire windshield, applying a VERY THIN line of glue at the edge of the plastic. (It will "wick" under and secure the windshield.) Glue a small area at a time, using minimal amount of glue, keeping hands clean, and taking care that no glue is smeared on the plastic. When the CA glue has dried, if a trace of white film appears inside the windshield, wipe off with a damp cloth.

6. Carefully remove the side windows from the plastic sheet, again making sure to follow the cut lines provided. Cut front and back windows apart for ease of installation.

7. Test fit the windows. When satisfied with the fit, tack glue in place and then glue around the entire edge, as described above. Again, use only a thin bead of glue and take care to avoid smearing any glue on the plastic.

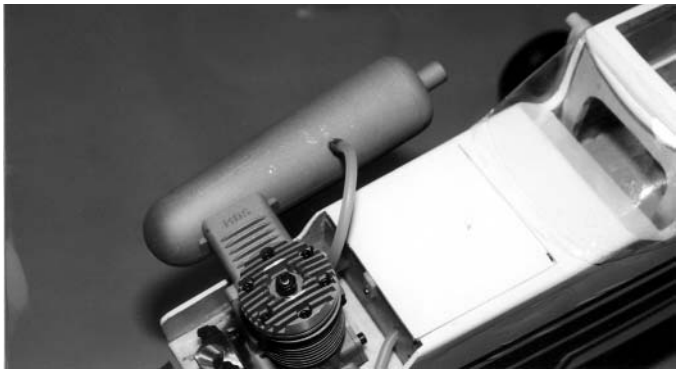
APPLYING DECAL

1. Using glass cleaner and a soft cloth, clean model surface thoroughly before applying the decal.

2. Cut the decal sheets apart in sections, as needed. Fold the decal in half, front to rear. Open at the fold and lay the decal out straight. The protective backing will bubble away from the decal at the fold.

3. Using a scissors, cut the backing along the bubble, removing a strip of backing about 1" wide. Carefully position the decal on the model and stick it in place. Then, working from the center, rub the decal down while peeling off the remainder of the backing.

MUFFLER INSTALLATION

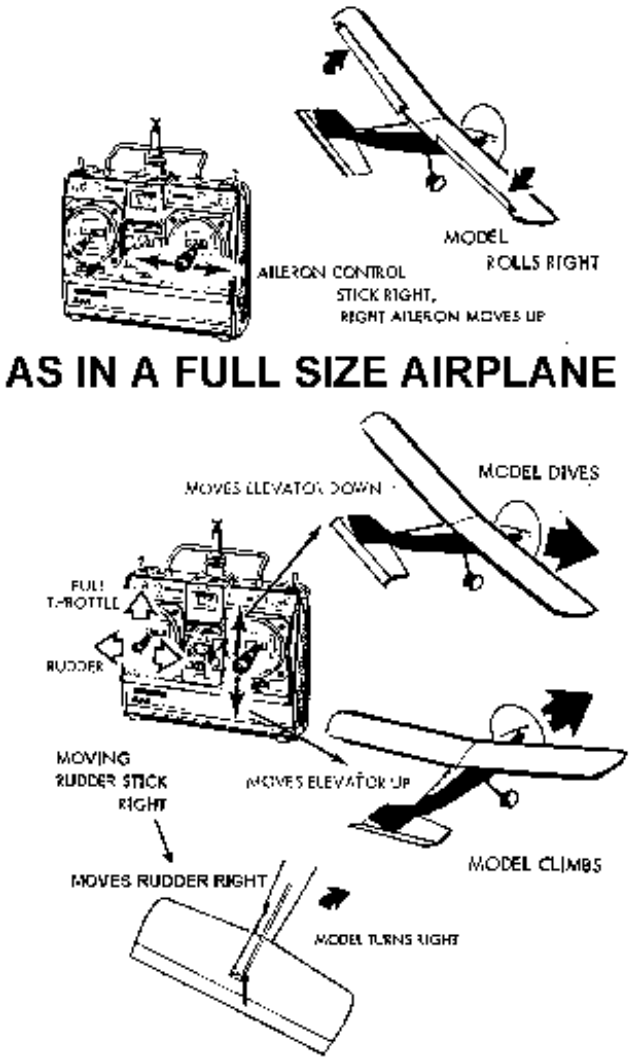


1. Following your engine manufacturer's instructions, mount the muffler on the engine.

2. If your muffler has a fuel-line type fitting on it, use it to "pressure feed" fuel to the engine for smoother and more reliable running. In this case, the vent line is connected to the muffler fitting

RADIO, ENGINE & AIRCRAFT SET-UP

The transmitter is the part of the radio that the pilot holds. It usually consists of two sticks that can be moved in 360° circles, along with slide tabs that help center each movement of the stick for each servo. The following diagrams illustrate how the radio stick movements control the servos and the movements of the control surfaces on the aircraft.



SERVO MOVEMENTS

As mentioned in the introductory section of this book, radio systems with "servo reversing" simplify radio installation. With a non-reversing system, each pushrod must match its corresponding servo's rotation. With "servo reversing," pushrods can be hooked up to either side of the servo's output wheel, and after checking the control response, a servo responding in the wrong direction is easily switched to the correct action. See your radio manufacturer's instructions for more detailed information.

The following procedure will help you set up and fine tune your radio system.

First, remove all servo arms and wheels.

THROTTLE SERVO

1. Turn on the transmitter (Tx) and receiver (Rx).

2. Move the left stick of your Tx all the way up to the top of its movement. This stick should have a ratchet feel to it and will stay in any position, up or down, in which it is placed. In addition, move the trim tab, located to the right of the throttle stick, all the way to the top of its movement.

3. Move the throttle pushrod until the engine carburetor is open all the way.

4. Remount the servo arm back on the throttle servo, but do not put the screw back in the center of the arm at this time.

5. Move the transmitter throttle stick all the way to the bottom of its movement and observe the opening in the carburetor. The opening should be 1/16" to 1/8". If, on the other hand, the carburetor is full open, find the radio's servo reversing switch (see radio instructions) and switch it.

If the servo is moving in the right direction, but the movement is not enough, change where the pushrod is mounted on the servo arm so that the amount of movement that the pushrod gets from the servo is more or less. The farther out from the center of the arm that the pushrod is mounted, the greater the movement. For example, if the carburetor opening was greater than 1/8" when the throttle stick was all the way down, the pushrod needs to be mounted further out on the servo arm; if the opening was less than 1/16", the pushrod needs to be further in on the servo arm.

In addition, most engines have two holes on the throttle arm, where the pushrod is hooked up to the carburetor. The farthest out hole gives the least movement when the pushrod is moved.

6. When the carburetor is opening correctly, move the trim tab all the way down to the bottom of its movement. The carburetor open should be completely closed. This safety feature allows the running motor to be turned off

7. When you are satisfied with the responses, replace the center screw back into the throttle servo.

RUDDER SERVO

The same Tx stick that regulates the throttle, when the stick is moved up and down, also moves the rudder and the nosegear steering, when the stick is moved to the right or to the left. The stick will spring back to the center position when it is released. Also, note that under the rudder/throttle stick is another trim tab. This trim tab moves from right to left and will help center the rudder and keep it in place.

1. Move the rudder trim tab into the center of its movement range.

2. Remount the servo wheel onto the servo, making sure the wheel placement allows the pushrods to be centered on the servo, just as they were earlier, when the pushrods were mounted.

3. Hold the rudder stick to the left and see if the rudder trailing edge, when viewed from behind the plane, has moved to the left. If it has moved to the right, then push the servo-reversing switch to correct the movement.

4. Once the rudder is correctly responding to the stick movements, look down from the top of the rudder/fin and make sure they are in a straight line with each other. If not, adjust the snap link in or out on the pushrod that is hooked to the rudder control horn.

The rudder should move approximately ½" to each side of center when the transmitter stick is moved. If your rudder needs more movement, move the snap link on the control horn toward the inside holes.

When all adjustments have been made, replace the center screw into the servo wheel.

5. The nosegear must also be centered. If adjustments are necessary, loosen the setscrew in the steering arm and twist the nosegear until it is straight. When satisfied, retighten the setscrew.

ELEVATOR SERVO

The right stick on the transmitter controls the elevator servo. Pulling down on this stick will make the plane climb and pushing up on the stick will put the model into a dive.

1. Move the trim tab to the right of the stick, so that it is centered

2. Remount the servo wheel onto the servo, making sure the wheel placement allows the pushrod to be centered on the servo, just as it was earlier, when the pushrod was mounted.

3. Pulling down on the stick should cause the elevator to point up. If it goes down, use your reversing switch to correct the problem.

4. View the edge of the stab and the elevator to see that they are in a straight line with each other. Twist the snap link on the elevator control horn in or out, to adjust the elevator level with the stab.

5. The full range of elevator movement is approximately 3/8" up and 3/8" down. If more movement is needed, move the snap link on the control horn toward the inside holes.

6. When all necessary adjustments have been made, replace the center screw into the servo wheel.

AILERON SERVO

The same stick that moves the elevator also controls the ailerons. Moving this stick to the right or left will turn the aircraft to the right or left. The aileron trim tab, located beneath the aileron stick, helps the model maintain straight, level flight.

1. Move the aileron trim tab to the center position.

2. Remove the center screw and the servo arm.

3. With the wing resting up against the fuselage, plug the aileron servo into the extension wire coming out of the receiver.

4. Remount the servo arm onto the aileron servo, making sure the arm placement allows the pushrods to be centered on the servo, just as they were earlier, when they were mounted.

5. Set the wing on the fuselage, by do not secure it with rubber bands.

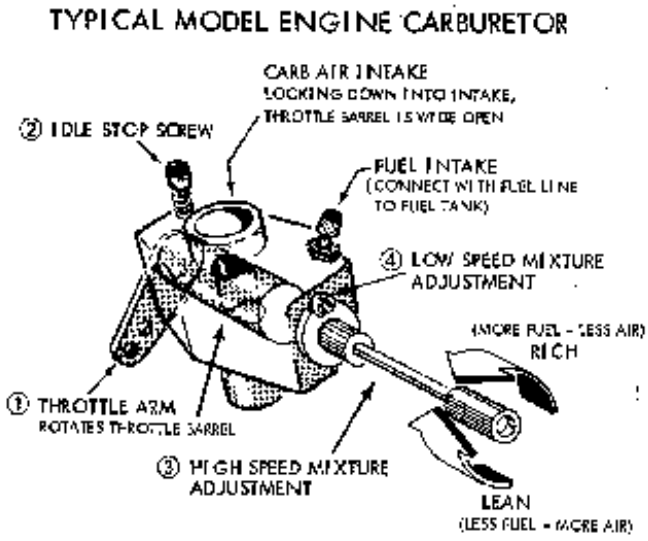
6. Holding the aileron stick to the left, check to see that the left aileron trailing edge is pointing up and the right aileron trailing edge is pointing down. If your ailerons are reversed, use your servo-reversing switch to make the correction.

7. The correct range of motion for the ailerons is approximately ¼" up or down. If more movement is needed, screw the adjustable horn brackets (into which the snap links are hooked) down on the wires, toward the wing.

8. When all adjustments have been made, replace the center screw into the servo arm.

ENGINE SET-UP
DO NOT ATTEMPT TO FLY YOUR MODEL UNTIL THE ENGINE RUNS DEPENDABLY. It should idle without stopping, and the transition through all engine speeds should be smooth.

WARNING: The turning propeller can cause serious injury, such as deep cuts. Avoid wearing loose clothing (such as baggie shirts or neckties) or jewelry which could be caught by or could fall into the spinning propeller. Children and spectators should be kept away from a running engine. No one should stand in line with the propeller. A broken propeller blade becomes a bullet and can seriously hurt someone.



There are four basic adjustments which contribute to making your engine run well. First, familiarize yourself with the above drawing, locating the following four parts.

1. Throttle "barrel" opening. The rotating cylinder inside the carburetor is called the "throttle barrel." It has a hole in the middle to admit air. By rotating the barrel, the throttle can be "wide open" or completely "closed."

2. Idle/Slow Speed/Stop screw. This screw allows you to set how much the barrel can close.

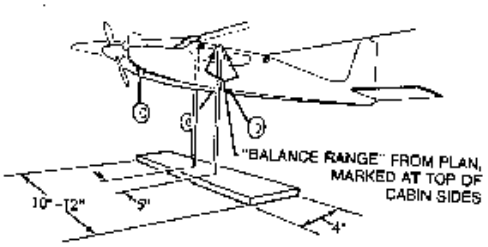
3. High Speed Mixer or Needle Valve. This control regulates the mixture of fuel and air at high engine speeds.

4. Low Speed Mixer. This control regulates the fuel/air mixture at idle engine speed.

Follow the break-in instructions included with your engine make sure it is running well before you go out to fly

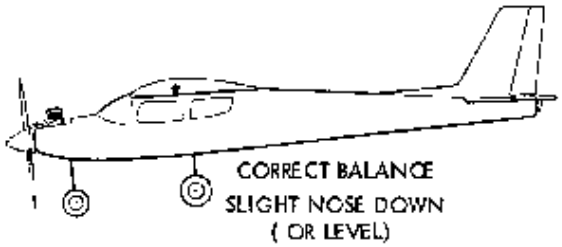
BALANCING YOUR MODEL

IMPORTANT: NEVER NEGLECT THIS STEP WITH ANY AIRPLANE. If you try to fly a plane with the balance point behind the recommended range, you run the risk of having an unstable aircraft and the strong likelihood of a crash. TAKE THE TIME TO PROPERLY BALANCE YOUR MODEL!



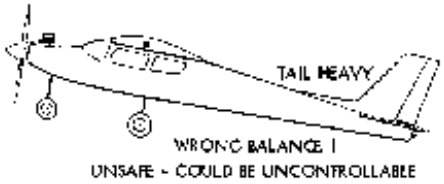
1. Place the fully assembled aircraft on a model balancing stand, as shown above. You can make this simple set-up with a couple of ¼" dowels with rounded tops, spaced 5" apart. Alternatively, lift the model under the wing near the fuse by your finger tips.

NOTE: Attach the wing to the fuselage with #64 rubber bands. Use seven rubber bands on each side of the fuselage. Always check rubber bands prior to each flight.



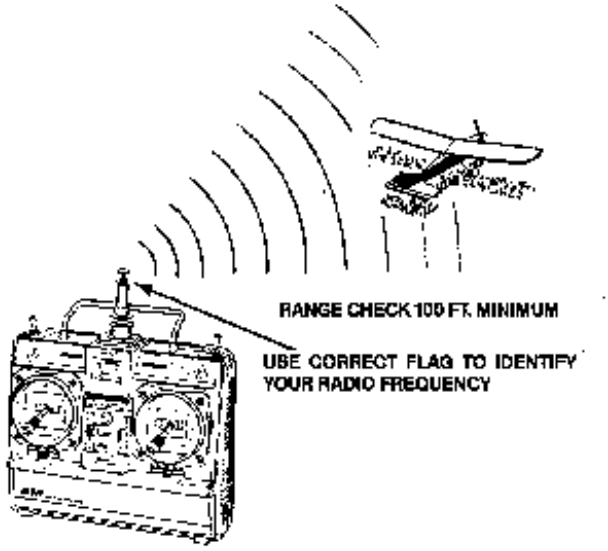
2. Referring to the recommended balance range (4" back from the L.E.) move the position of the plane on the balance stand until the model is level.

If you need to support the model outside the recommended balance range, remove the wing and shift the R/C equipment away from the heavy end of the model and recheck until the model will balance within the acceptable range.



3. If shifting the R/C gear still doesn't balance the model, add weight to the far end of the nose or tail, respectively, until the model is correctly balanced. The least weight is needed when added as far back or forward as possible. Fasten the weight permanently in place.

FLYING YOUR AIRPLANE



WHAT TO TAKE TO THE FIELD

Flight batteries, fresh or fully charged
Radio transmitter
Fresh 1 ½ volt starting battery & glo- plug clip
Fuel bulb or pump
Tools for tightening any parts that can vibrate and loosen
Paper toweling for clean up
Extra #64 rubber bands
Extra props and an extra spinner
Prop wrench

WHERE TO FLY

Fly only in areas sanctioned for R/C and known to be free of radio interference. Ask your hobby dealer or other modelers if there is an R/C flying field that is used by a local R/C club. This is the ideal place to fly. If you don't know of an R/C club nearby, contact the Academy of Model Aeronautics (AMA), at the address on the front of this booklet, for information on a club in your area. Remember: R/C flying fields need to have rules to help prevent accidents, so ask about them before you turn on any of your equipment! DO NOT TEST your transmitter in the parking lot or anywhere nearby until you are sure no one else is using your radio frequency. This could cause another flyer to crash and make you very unpopular!

If there is no club or other R/C flying site available, locate a square area (preferably a grassy field), at least four or five football fields long, which is free of power lines, trees, poles, houses, busy streets and other obstructions. It must be at least three miles away from any areas where other R/C models, such as boats or cars, are operated. It should also have a relatively smooth surface, as it will take practice to learn precision landings. If you find a suitable location, turn your receiver on for 2 or 3 minutes to check that no one in the vicinity is operating an R/C device which could affect your receiver and cause your plane to crash.

LEARNING TO FLY

Your chances of success are enormously increased if you have an instructor. Learning to fly is harder than it looks, and a mistake can seriously damage or destroy your model. Even full-scale pilots have problems learning to fly models because it's different-they're not in the cockpit. It's worth real effort to find someone to teach you. Many clubs have authorized instructors and there are even some R/C flight schools. Ask your dealer, or even check on the Internet to see if there is someone who can help. Only if there is no other way should you attempt to learn on your own.

CHECK YOUR EQUIPMENT

Prior to going to the flying field, with radio batteries fully charged, turn on both receiver (Rx) and transmitter (Tx) and actuate all controls many times until you are satisfied with all functions. Before beginning each day's flying, make a range check of your equipment in accordance with the manufacturer's instructions. In general, with transmitter antenna collapsed to 6"-8", you should have an at least 100 foot range on the ground. To check this, turn on both the transmitter and the receiver switches, set the model heading away from you, and walk away while transmitting signals. Watch to see that no signals are missed until you are at least 100 feet away. Only if the equipment works perfectly should any flights be attempted. Again, be careful to not use your transmitter when anyone else at the field is flying or testing on the same frequency!

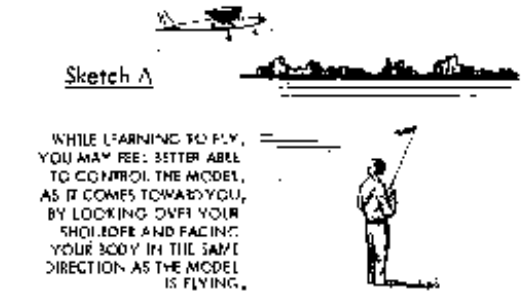
After the range check, stand behind the model and make sure the control responses are correct. Moving the control stick to the right should give right rudder (on a 3-channel set-up) or the right aileron should go up (on a 4-channel set-up). Moving the stick back or down on the Tx should move the elevator up, and vice versa.

Check also to see that your nose wheel turns to the right when you give right rudder. Your throttle should open to permit full power when the stick or tab is moved forward or up. Finally, make sure that everything on your aircraft is neatly and firmly in place-motor fastened down, servos snugged down, receiver and battery wrapped in foam rubber, tank properly supported, etc. Prop and spinner must be tight. The receiver antenna must be extended, not coiled up inside the model. Nothing should be loose, or unfinished, or unchecked.

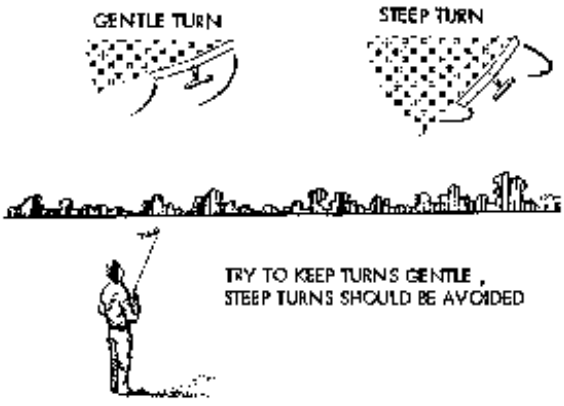
With everything ready, the engine should be started and broken in for a least a tank or two at no more than moderate speed. While the engine is running, make sure the control surfaces do not jitter or move until you command them and that the throttle also responds properly to your command.

GROUND STEERING PRACTICE

For a couple of hours, practice taxiing the model around at low speed. This is a very helpful step in making you feel more at ease in controlling the model. Do not rush it. Use a parking lot rather than a street where you are likely to run into a curb and damage your model. Practice taxiing in light breezes or when the air is calm; as strong or gusty winds can catch a wing and flip your plane over. Apply minimum throttle that just keeps the model moving at a walking pace. With the rudder stick and rudder trim in neutral position, the model should move straight ahead. If it constantly turns left or right, the nose wheel is not pointing straight forward and should be adjusted by loosening the steering arm.



When the plane is pointing at you, the steering will seem "reversed." When you give right rudder, the plane turns to your left-but the model actually is turning to its right. With practice, you will become accustomed to this. When the model comes toward you, simply push the stick left or right, in whichever direction the ship is turning. Another helpful technique is shown in Sketch A. "Head-on disorientation" is dangerous in the air, where things can happen pretty quickly. Before flying, it is wise to spend some time familiarizing yourself with orientation by operating the controls, with the plane set on a table, while you view it from different positions. The more familiar you become with the behavior of the model as you control it on the ground, the better prepared you will be for flying.



After taxi runs are completed, thoroughly examine the model and tighten any loose screws, etc. First flights should be made on a day that is not very windy or gusty. There should be very few people or other distractions around; you will need to concentrate. Your success doesn't depend on following the instructions here to perfection, but you should have a flight sequence in mind. Think ahead of the model ¾ don't chase it around the sky, always one though and one control command behind it.

GENERAL FLIGHT TECHNIQUES

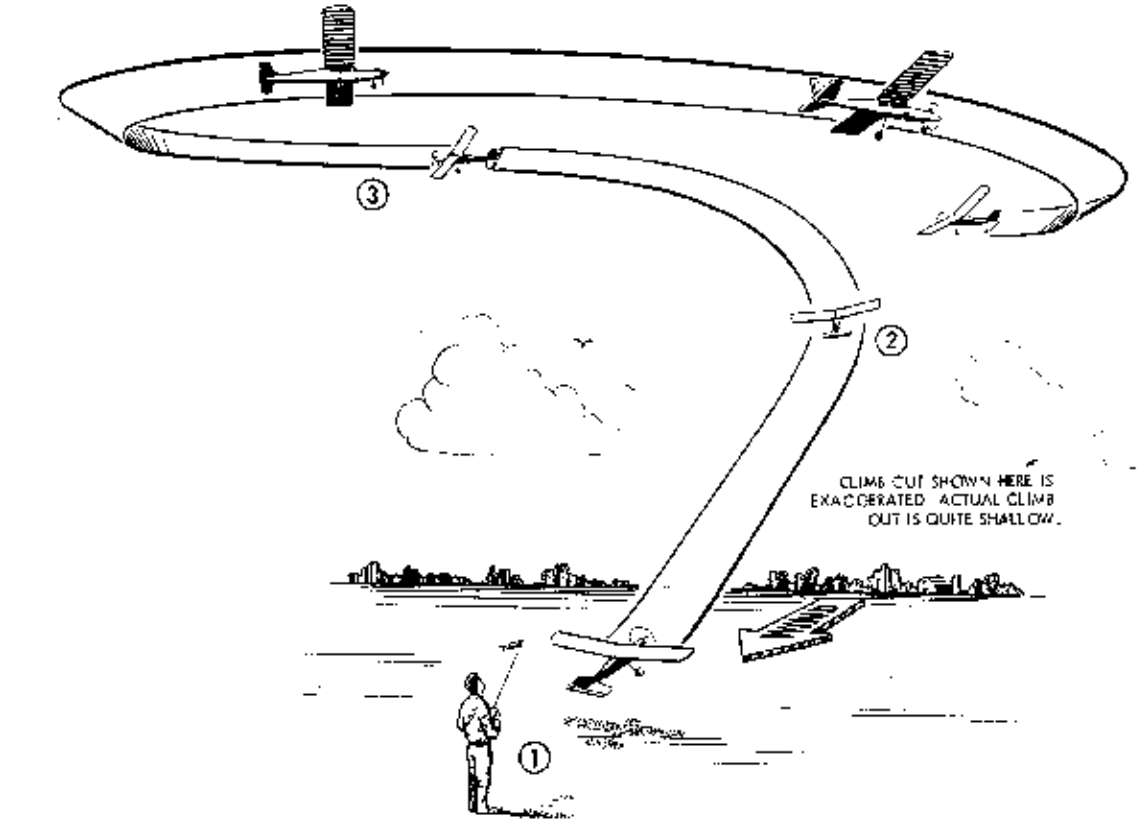
In flying, it is very important to make all your control movements slow and measured. Rapid movements tend to throw the model out of control. Try to make all turns gentle, not tilting (banking) the wing very much. If you increase the bank, making the turn steeper, there will be a corresponding weight increase and reduction of lift. Therefore, when you bank your plane, it will start to descend. To maintain altitude in a turn, add enough back stick (up elevator) to hold the nose "up" through the turn

FIRST FLIGHT

There is no way to fully explain the principals of flight and the techniques of flying in a few pages. Entire books have been written about apparently simple subjects, such as the shape of the wing. Furthermore, there is no substitute for an experienced R/C flight instructor. The following information is not intended to replace your instructor, but to help give you understanding of basic flight concepts and techniques.

One of the most important, yet sometimes forgotten pre-flight checks to always make sure the wing is securely banded to the fuselage. Use at least seven #64 rubber bands on each side of the wing.

Plan to make your first flight a short one. You will be surprised how exhausting beginning flights can be. Plan to spend no more than 2-3 minutes in the air the first few times you fly.



NOW THAT YOU'RE READY...

It is important to have a total flight plan in mind. Look at the flying sketches here to get an idea of the take-off direction and space you will need when flying at your field.

1. Start your engine. Point the model directly into the wind and advance the throttle smoothly, steering on the ground with rudder. The plane will gain speed rapidly.

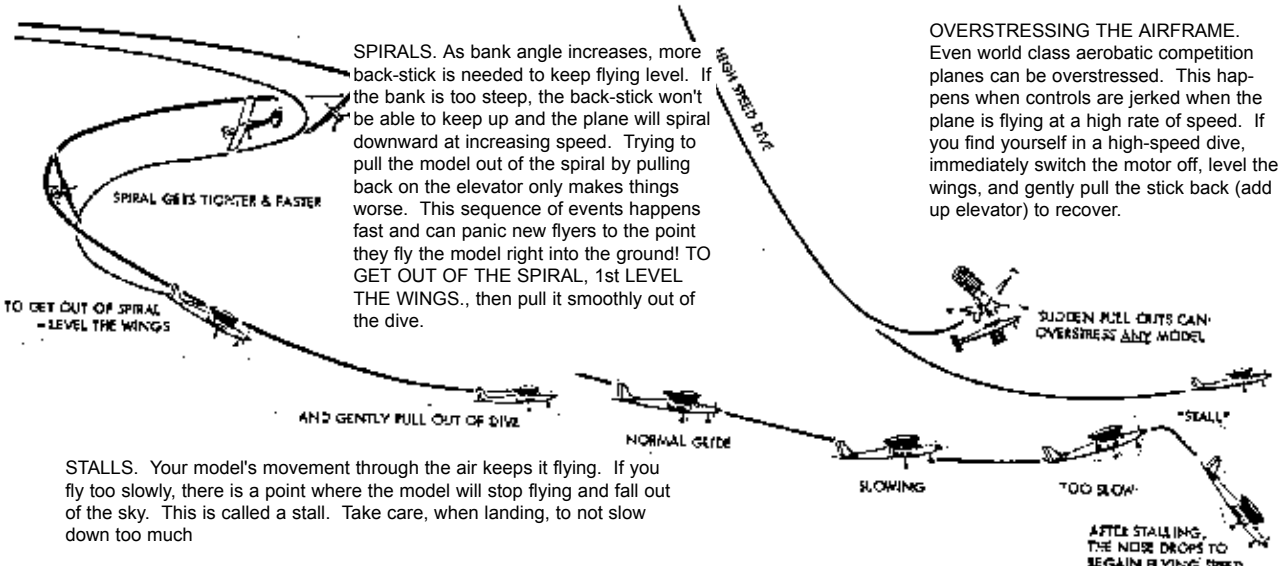
Remembering to operate the controls smoothly, add slight back stick pressure, if necessary, to keep the model from descending. When it is about 100 feet away from you, it will start to gently climb. Be patient; let it climb slowly, as a steep climb will cause it to stall. Most crashes are due to moving the controls too much, so be slow and gentle on the controls during "climb out" and throughout the flight. Over-controlling tends to throw the plane out of control and wastes power. Just keep the model flying in a gentle 5° to 10° climb into the wind. Keep the wings level until you have reached an altitude of about 150 feet.

2. Patiently allow the model to slowly climb to 150-200 feet, adding just a touch of left or right aileron stick pressure until the model begins a very shallow turn in the direction you want to go.

3. Try to maintain this shallow turn. Do not let the turn get too steep. The wind will tend to blow your plane further downwind. Try to keep it upwind at all times prior to your landing approach. It is more difficult to fly a model when it is downwind, and if a mistake is made, the model will end up further away, making it harder to fly back to the field. To compensate for wind, continue making upwind turns shallow, but make downwind turns a little steeper.

The drawings on the next page illustrate some of the problems that may occur in flight, as well as the proper corrective maneuvers.

DANGER: SPIRALS, STALLS, OVERSTRESSING

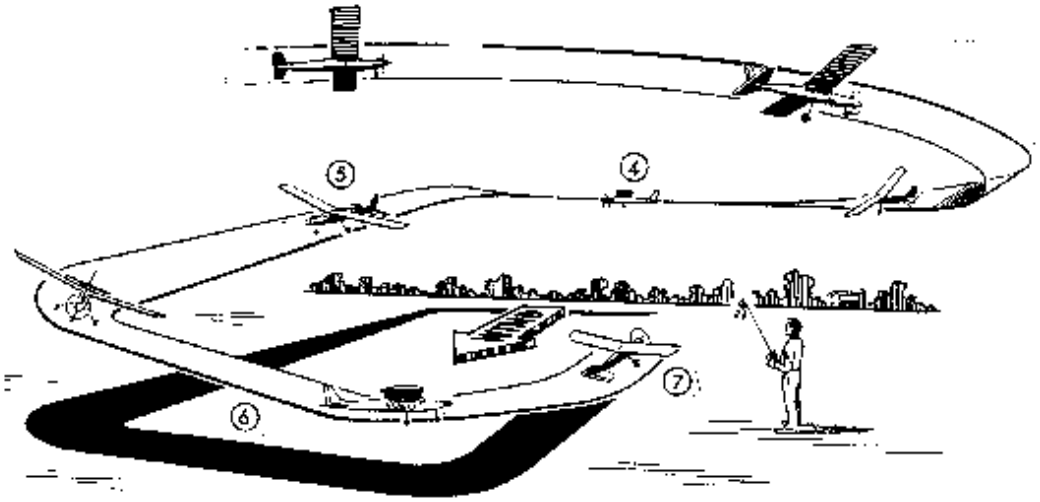


SPIRALS. As bank angle increases, more back-stick is needed to keep flying level. If the bank is too steep, the back-stick won't be able to keep up and the plane will spiral downward at increasing speed. Trying to pull the model out of the spiral by pulling back on the elevator only makes things worse. This sequence of events happens fast and can panic new flyers to the point they fly the model right into the ground! TO GET OUT OF THE SPIRAL, 1st LEVEL THE WINGS., then pull it smoothly out of the dive.

OVERSTRESSING THE AIRFRAME. Even world class aerobatic competition planes can be overstressed. This happens when controls are jerked when the plane is flying at a high rate of speed. If you find yourself in a high-speed dive, immediately switch the motor off, level the wings, and gently pull the stick back (add up elevator) to recover.

STALLS. Your model's movement through the air keeps it flying. If you fly too slowly, there is a point where the model will stop flying and fall out of the sky. This is called a stall. Take care, when landing, to not slow down too much

GENERAL FIELD PROCEDURE



FLYING A PATTERN

At most flying fields, models fly in a rectangular path around the runway. This is called the "pattern." The most important reason for flying the pattern is that, as the model flies in different directions in the wind, the pilot will be better prepared for landing conditions when the flight ends. Full-scale aircraft fly a landing pattern for this same reason. Another important reason for flying the pattern is to organize the take-off and landing traffic, reducing confusion. The "traffic" pattern consists of PATTERN ENTRY, DOWNWIND LEG, BASE LEG, AND FINAL APPROACH & LANDING.

When you have reached an altitude of 150-200 feet, add just a touch of left or right stick until the model begins a very shallow turn. Try to maintain this shallow turn, keeping it gentle, and not tilting (banking) the wings very much. If you increase the bank, making the turn steeper, there will be a corresponding weight increase and reduction of lift Therefore, your plane will start to descend. To maintain altitude in a turn, you will have to add enough back stick (up elevator) to hold the nose up through the turn.

Plan to enter the pattern upwind at about 150 feet altitude. Make the Downwind Leg far enough away to allow for gentle turns to Base Leg and Final Approach. Avoid tight "panic" turns, particularly when landing.

The wind will tend to blow your plane and pattern further downwind. Try to keep it flying upwind at all times prior to your landing approach. It is more difficult to fly a model when it is downwind, and if a mistake is made, the model will end up even further away, making it more difficult to fly back to the field. To compensate for wind, continue making your upwind turns shallow, but make your downwind (with the wind) turns a little steeper.

LANDING

For your first landings, don't be concerned about trying to land in a particular spot. Just land safely, without damage to your model. At first, concentrate on flying in wide circles, as shown, and then simply glide down straight into the wind.

With a 2-channel system, when the battery begins to run out, the model will start a gradual descent. Continue circling and start calculating how much longer the model will glide. After imagining how much glide you have, you can start planning ahead for landing.

For 3-channels, if you have a helper, he can time your flight and tell when you have about four minutes of flight time. If you turn the motor off at that point, there will be one or two minutes of battery power left.

With the power off and the plane gliding downward, plan your approach for landing. When the model is about 45º downwind of the landing area, turn to Base Leg. Continue your descent, letting the model slowly lose more altitude. (If you are not happy with the approach, turn the power back on, climb out, and set up for another pass.) Remember, "a good approach is a good landing." Don't rush it.

For your FINAL APPROACH & LANDING, make a gentle turn to point the model in the direction of the landing area. Keep the nose of the plane slightly down, so you don't stall. Steer the plane into the wind as it glides, keeping the wing level. Let the model settle in toward the ground and land. Just before the model touches down, you can add just a bit of back stick (up elevator) to "flare" and soften the landing.

Walk over to your plane and <u>turn off the receiver first</u>, and then the transmitter. Congratulations! You've just completed your first flight.

GROUND TAKE-OFFS

As you gain flying experience and confidence, you will want to try to take off from the grass or runway. First, point the model directly into the wind. Switch the motor on and gently steer the model straight with rudder as the model gains speed rapidly. After it rolls about 50-75 feet, add slight back stick) up elevator) pressure, so that the model rises smoothly from the ground. Only hold as much back stick as necessary to keep the plane in a 5º to 10º gentle climb. If you try to pull the model up too steeply, it may slow down and then stall and crash.

SETTING ADJUSTMENTS

As you get used to the controls, you probably will notice the model turning somewhat, or climbing or descending, without any stick pressure on your part. These tendencies can be corrected in the air by moving the trim tabs on the Tx. After landing, the setting of the rudder or elevator should be similarly adjusted as best you can by means of the clevises. This, in turn, permits the Tx trim tabs to be re-centered. Further flights will show if more adjustment is required. A severely out-of-trim condition (caused by a warped wing, for example) might not be correctable using the above trim techniques. In that case, taking the model home and straightening the warp with heat is necessary.