Cub

Instructions

There really is nothing like a “Cub”! The C.G. version retains the honest, easy to fly qualities that made the full size airplane famous. With the standard long wing, the model is a very graceful, realistic flyer. It’s aerobatic performance tends to be big,round, and slow.

Like the full size airplane, the model can be modified into an aerobatic version byshortening the wings. This “Clipped Wing” option is a thrilling aerobatic machine that will provide outstanding performance, including point rolls, inside and outside maneuvers, snaps and spins.

Building is easy, but to prevent simple mistakes, the step-by-step instructions should be followed. Many a modeler has made two right fuselage sides instead of one right and one left as a results of not following the directions.

The Cub can be finished in any of the unlimited color schemes of of the original airplane.We show three popular types; standard, sport, and military. Color scheme information's provided later in the instructions.

We’re sure that you will enjoy countless hours of flying fun with your Goldberg Cub, just as generations of pilots have had with theirs!

Additional Items Needed

- ☐ 4-channel (or more) Radio Control Set
- ☐ CA or Epoxy glue (large)
- ☐ 1/2oz. Thin CA glue
- ☐ .40 to .61 (.90 4-cycle) R/C engine
- ☐ 13 running ft of covering material (two 79” rolls of material)
- ☐ Paint (fuel-proof, quantity depends on desired finish)
- ☐ one 1-1/4” and two 3-1/4” Wheels
- ☐ 1/2” x8” x12” CG R/C Foam Rubber

Optional Tools

- ☐ CG Engine Test Stand (no. 293)
- ☐ Propeller balancer
- ☐ Combination prop/glow-plulg wrench
- ☐ CG Hinge Slotting Kit (no. 269)

Engine Mounting Option

- ☐ Drill & Tap, Size No. 43

Optional Parts

For Door Details

- ☐ 1/16” black CG Color-Stripe tape
- ☐ Pilot figure (2” Scale)
- ☐ “Pitts” type muffler (2-cycle only)
- ☐ Small tube silicone caulk
- ☐ Zap Formula 560 canopy glue

For optional “Military L-4” Scheme

- ☐ WWII decals (various manufacturers)

Paint for Fuse Interior

- ☐ Small spray can (gray)

Paint for Engine Detail

- ☐ Artist’s acrylics, etc.

For simulating tail bracewires

- ☐ 1/16” nom. x36” elastic cord

Optional “Scale” Gear Struts

- ☐ .025 x1/4” x2” brass strip
- ☐ CG 1/16” Threaded Couplers (No. 217)
- ☐ CG Mini-Snaps (No. 210)
- ☐ 5/32” O.D. dia. x 10” brass tube
- ☐ 3/32” O.D. dia. x 7” brass tube
- ☐ Soldering iron, etc.

Tools & Supplies Needed
(You probably already have most of these)

- ☐ Miscellaneous rubber bands
- ☐ Wax paper or plastic wrap
- ☐ Modeling knife or single edge razor blade
- ☐ Sandpaper block & sandpaper; any grade 100 to 200, and any grade 240 to 320
- ☐ A few dozen straight pins (“T” pins best)
- ☐ Light power or hand drill & drill bits (sizes 1/16”, 3/32”, 1/8”, 5/32”, 3/16”, & 1/4”)
- ☐ Three Allen wrenches (1/16” for #6 set screw and 3/32” for #4 & 7/64” for #6 socket head screws)
- ☐ Flat building board (that you can push pins into) 24” x 60”
- ☐ Pliers
- ☐ Small screwdrivers (1/8” and 3/16” blade tips)
- ☐ Iron for applying covering (small household or travel iron may be okay.
- ☐ Masking, drafting, or scotch tape (for Holding parts during assembly)

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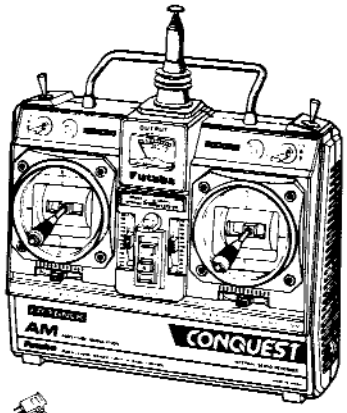
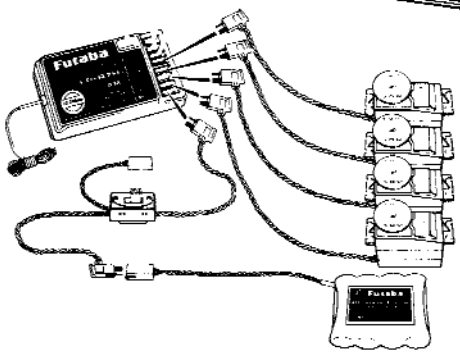
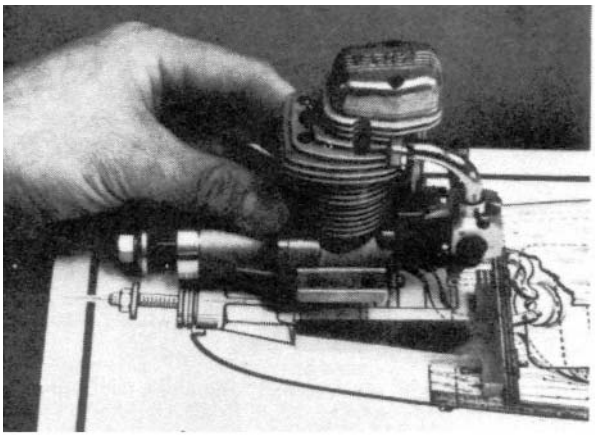
 Pt. #2077 issue #2 4-1-94



Digital proportional
Radio Control



One of many systems available, please see your local dealer or club for advice on selecting your radio.



PROP AND FUEL TANK CHART
NUMBERS IN PARENTHESIS
REFER TO 4-CYCLE ENGINES

FOR ENGINE SIZE	USE PROP SIZE	AND TANK SIZE
.40-.51 (.40-.49)	10/6, 11/4, 11/6 (12/6)	8-10 OUNCE (8)
.60-.61 (.60-.91)	12/6 (14/6)	12 OUNCE (10-12)

Selecting Radio Control Equipment

The Cub is designed for 4-channel radio control equipment. Many of the radio systems now available feature “servo reversing” switches which allow you to reverse the response of the servo. This feature simplifies radio installation and is a worthwhile consideration when selecting a radio system.

Engine & Propeller

The Cub flies well using any engine size from .40 to .61 (.90 4-cycle). cubicinch displacement. If you live in a warm climate, or your flying field is approximately 3,000 feet or more above sea level, you should use a .49 engine or larger. The propeller size must be matched with the engine. For example, a .40 engine may use a 10” diameter prop, while a .61 uses 11”. Refer to the prop and fuel tank chart at lower left.

Balancing your propeller helps to protect your radio from the damaging effects of vibration. Good balancers are on the market, and generally are easy to use. We recommend sanding or scraping the heavy blade on the curved face rather than the flat face, and out near the tip. Try to maintain the normal airfoil curvature. And avoid scratches which might cause the prop to break.

Adhesives

All our test models were built using cyanoacrylate glue(CA) which is specially formulated to firmly glue the plywood, hardwood, plastic, and balsa used in your Cub, and we strongly recommend it. Other good glues to use are“15 Minute Epoxy” or Aliphatic Resin. They will, however, add considerably to the assembly time required (they dry a lot slower than CA). Also, Aliphatic Resin does not glue plastic, so you will need one of the adhesives mentioned above (or similar) for the plastic parts.

IMPORTANT!

In a few specific areas of assembly we suggest the use of thin type of instant glue (CA) for example, sheeting the leading edge of the wing.
Other than when specifically recommended, these thin types of glue should not be used since they do not glue plywood adequately and also require that your work must be near perfect. Be careful when using instant glue to install windows, as applying too much glue can sometimes cause fogging to occur. This can be easily wiped off with a damp rag. A sure way to avoid fogging is to use either epoxy or Zap Formula 560 canopy glue.

After you have finished gluing the model together, go back and re-glue all the joints for added strength, and just in case some joints may have been missed the first time. Be careful not to use too little glue. Too little leaves a model weak. Since CA almost eliminates waiting for glue joints to dry, you can work straight through and finish each assembly by following the step-by -step building sequence. If you use epoxy, you can save time while waiting for one assembly to dry (the stabilizer, for example) by turning a few pages ahead and starting another part (the fuselage, perhaps). Check-off boxes are provided at each step so you can tell at a glance what steps you have completed.

Tack-Cementing. Sometimes it is necessary to temporarily glue a part in place that must later be removed. To provide for easy removal of the part without damage, it should have been glued in place using only a small dab of glue. This is referred to as “tack-cementing” later on in the instructions.

Using Cyanoacrylate Glue. CA lets you b uild almost as fast as your hands can press parts toghether! When pressed into a very thin layer, it sets almost instantly. So be careful, read instrluctions thoroughly and use check-off boxes to avoid errors (like building two right-hand wings-instead of a left and a right)! CA allows only for momentary positioning of parts. So be sure to trial fit parts toghether to check fit and placement before applying glue. After its initial bond, CA continues to strengthen. CA sets up a bit slower with plywood and hardwood, so hold such joints together a little longer than you would for balsa. CA in corners takes a while longer to dry because of its not being a thin layer. The tendency for all instant glues to set slower on hardwood or plywood and when in a thick layer can be elilminated by using Kicker, an accelerator for cyanoacrylate glue. Kicker bridges greater gaps, speeds up slow bonds, and provides strong joint fillets.

Using Epoxy. Epoxy comes in two parts which need to be mixed before using. Paper cups and wood coffee stirrers are useful for ixing. When buying epoxy, check the package to see how long it takes to set (some formulas\ set in 5 minutes, others may take hours). We recommend 15 minute

epoxy. Disposable wood strips, cotton swabs, cheap stiff bristle brushes, or acid brushes from auto stores make good applicators.

Because epoxy is so thick, it's easy to apply too much. If you use epoxy to build the entire model be especially careful to use sparingly when assembling fin, stabilizer, and wing.

Caution

Some people may experience allergic reactions when exposed to fumes from instant glue or epoxy. This is very rare. However, it is always important that such glues, and also paints, thinners and solvents, be used with adeqquate ventilation to carry fumes away.

Windshield

The Cub windshield was carefully designed to realistically duplicate the distinctive lines of the original, yet still be easy to install. For good final appearance, follow instructions carefully, especially those dealing with removing scrap plastic from windshield base and its' installation. If tinted windows are desired, do not try to dye them (the plastic does not dye well).Instead, we recommend "transparent" spray enamels be carefully applied to the inside window surface (they are not fuel proof).

Covering The Model

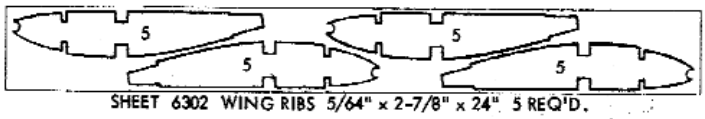
The full size Cub is of wood and metal construction, which is covered with fabric. The fabric is then painted. For your model, fabric types of covering duplicate the fabric appearance of the full size airplane quite realistically. There are many good covering materials available that have good resistance to tearing and punctures. General information on applying iron-on covering can be found on page 22. Because of specific differences in the application of various brands of covering, make sure instructions have been provided by the manufacturer of the covering you select.

Clipped Wing Option

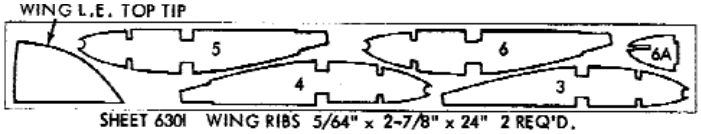
The shortened wing for this option is accomplished by cutting the spars, leadings edges, etc. to the shorter lengths shown on the plan. This is fully described at the beginning of the wing assembly.

Wood Parts Identification

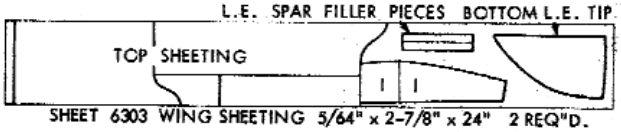
Be careful when removing parts (such as fuselage sides) from die-cut sheets. Long parts are fragile until glued into a structural unit. If necessary, use a razor knife or razor saw to assist in the removal of parts from sheet. Sometimes a little trimming and sanding can improve parts where desired. Save scrap until model is completed, in case you should miss a part. Scrap is used also in some building steps on the plan. Other easily recognized parts, such as engine bearers, are not shown here.



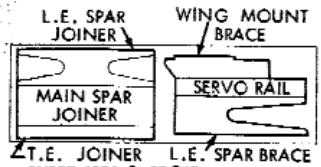
SHEET 6302 WING RIBS 5/64" x 2-7/8" x 24" 5 REQ'D.



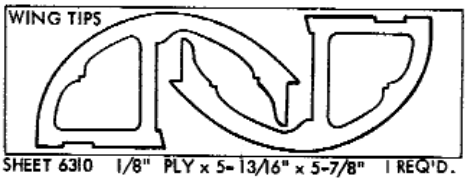
SHEET 6301 WING RIBS 5/64" x 2-7/8" x 24" 2 REQ'D.



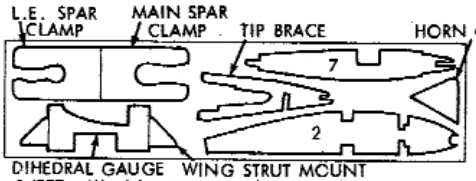
SHEET 6303 WING SHEETING 5/64" x 2-7/8" x 24" 2 REQ'D.



SHEET 6320 2 REQ'D.
1/8" PLY x 3-9/16" x 10- 9/16"

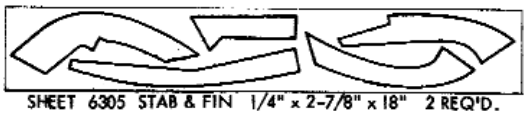


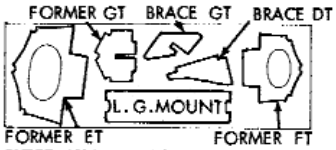
SHEET 6310 1/8" PLY x 5- 13/16" x 5-7/8" 1 REQ'D.



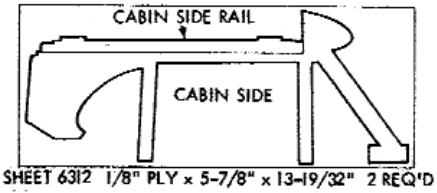
SHEET 6311 1/8" PLY x 4-1/4" x 15-7/8" 2 REQ'D.

SHEET 6306 1/4" x 2-7/8" x 12" 1 REQ'D.

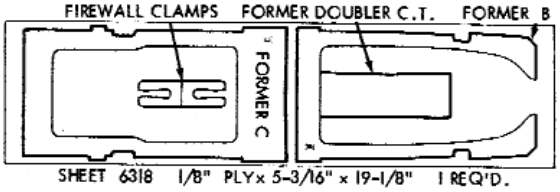

SHEET 6305 STAB & FIN 1/4" x 2-7/8" x 18" 2 REQ'D.



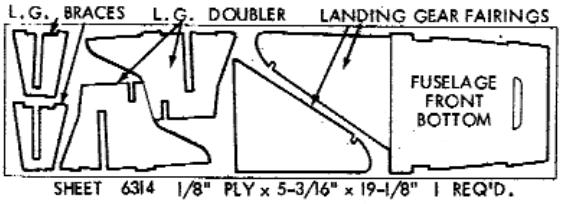
SHEET 6315 1 REQ'D
1/8" PLY x 3-9/16" x 10-17/32"



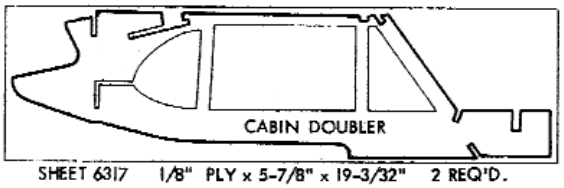
SHEET 6312 1/8" PLY x 5-7/8" x 13-19/32" 2 REQ'D.



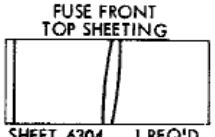
SHEET 6318 1/8" PLYx 5-3/16" x 19-1/8" 1 REQ'D.



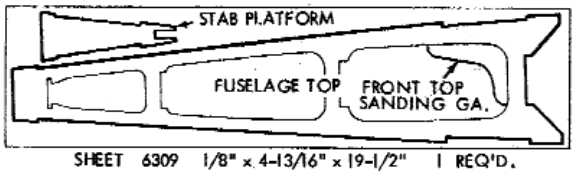
SHEET 6314 1/8" PLY x 5-3/16" x 19-1/8" 1 REQ'D.



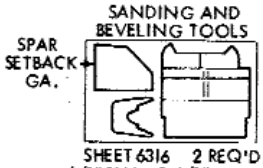
SHEET 6317 1/8" PLY x 5-7/8" x 19-3/32" 2 REQ'D.



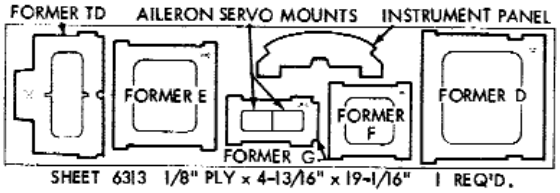
SHEET 6304 1 REQ'D.
1/8" x 2-7/8" x 7"



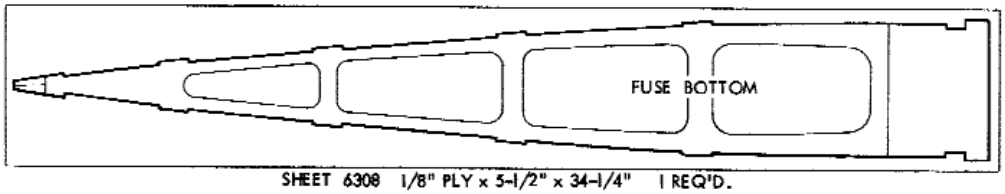
SHEET 6309 1/8" x 4-13/16" x 19-1/2" 1 REQ'D.



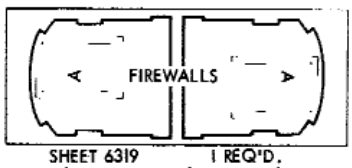
SHEET 6316 2 REQ'D.
1/8" PLY x 3-1/2" x 5-7/8"



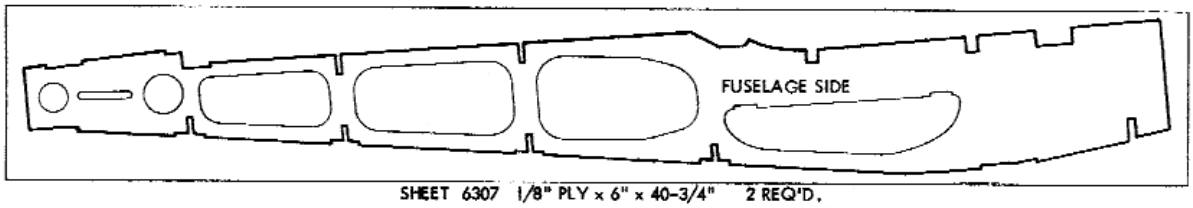
SHEET 6313 1/8" PLY x 4-13/16" x 19-1/16" 1 REQ'D.



SHEET 6308 1/8" PLY x 5-1/2" x 34-1/4" 1 REQ'D.



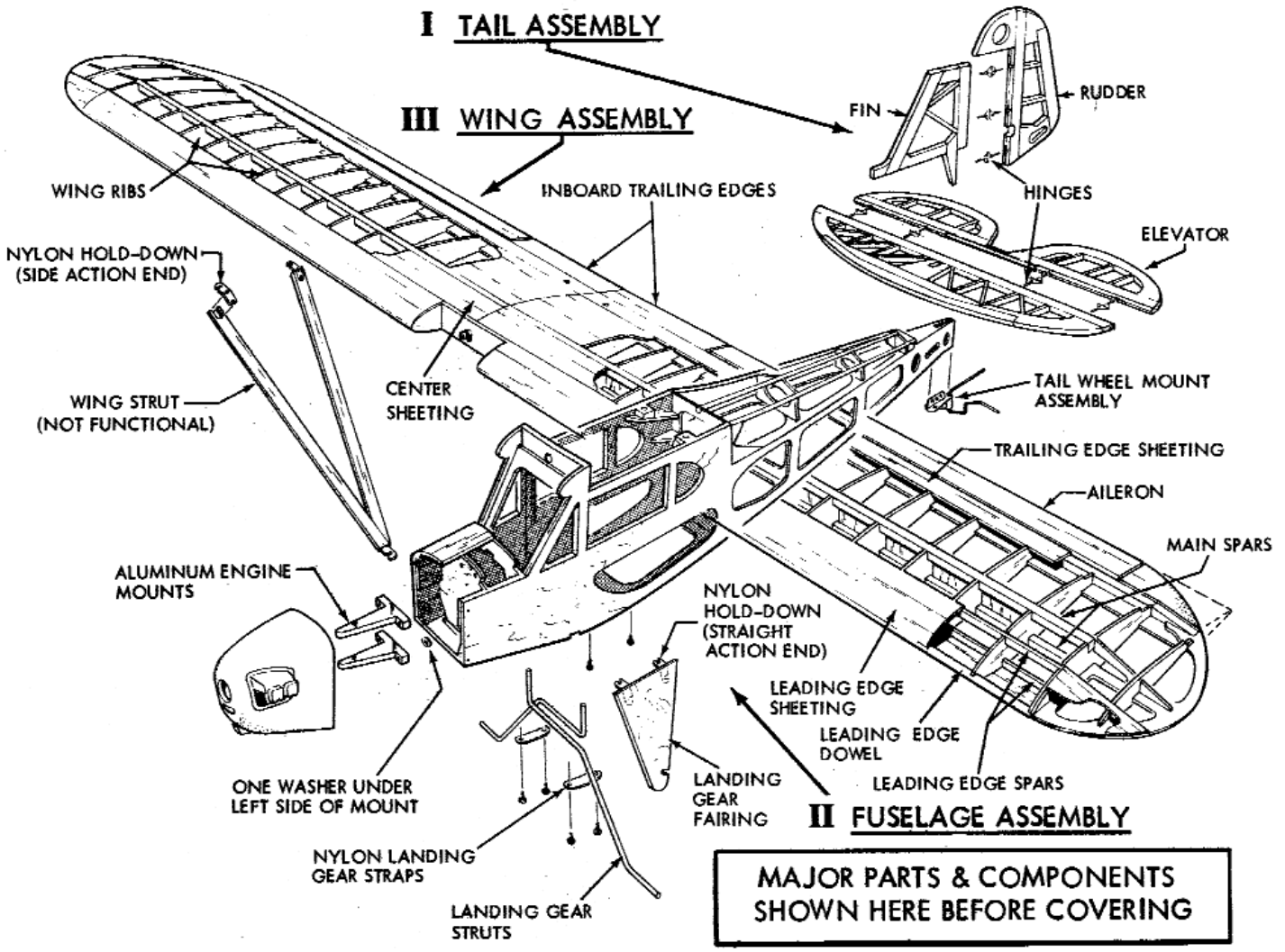
SHEET 6319 1 REQ'D.
1/8" PLY x 4-11/16" x 11-7/8"



SHEET 6307 1/8" PLY x 6" x 40-3/4" 2 REQ'D.

BEFORE STARTING ASSEMBLY OF MODEL, read instructions carefully and construction your model in the following order:

I. TAIL ASSEMBLY (Steps 1 thru 10, Page 6 of this booklet)
II. FUSELAGE (Steps 1 thru 39, Page 8)
III. WING (Steps 1 thru 27, Page 15)
WING JOINING &
COMPLETION (Steps 1 thru 21, Page 18)
IV. COVERING (Page 22)
Hinge Installation (Page 23)
V. FINAL ASSEMBLY (Page 23)
VI. RADIO INSTALLATION (Page 26)
VII. WHERE TO FLY (Page 30)
VIII. RADIO CHECK (Page 30)
IX. WINDSHIELD & WINDOWS (Page 29)
X. FLIGHT PREPARATION &
BASIC AEROBATICS (Page 30)



MAJOR PARTS & COMPONENTS SHOWN HERE BEFORE COVERING

FULL SIZE END VIEWS OF STRIP WOOD PARTS

BASS WOOD SPARS

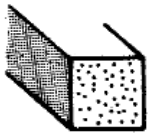
MAIN SPARS
3/8" SQ. x 33-3/4"
(4 REQ'D)

L. E. SPARS
1/8" x 1/4" x 33-3/4"
(4 REQ'D)

TAIL ASSEMBLY

1/4" x 3/4" x 24"
(4 REQ'D)

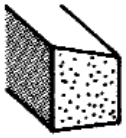
1/8" x 1/4" x 12" (6 REQ'D)



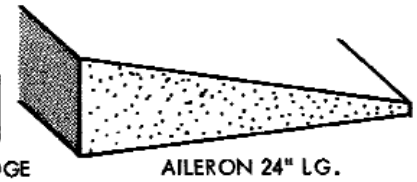
PUSHRODS
3/8" SQ. x 18"
(2 REQ'D)

BALSA

WING TRAILING EDGE PARTS

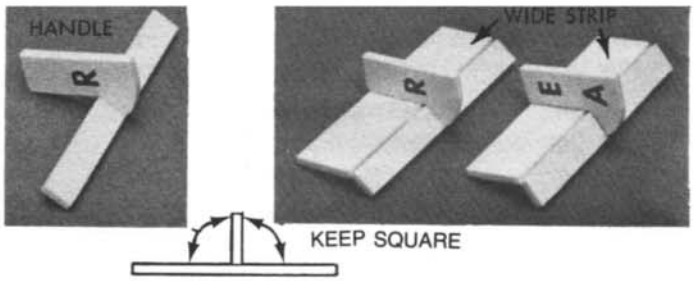


TRAILING EDGE
35-15/16" LG.
(2 REQ'D)

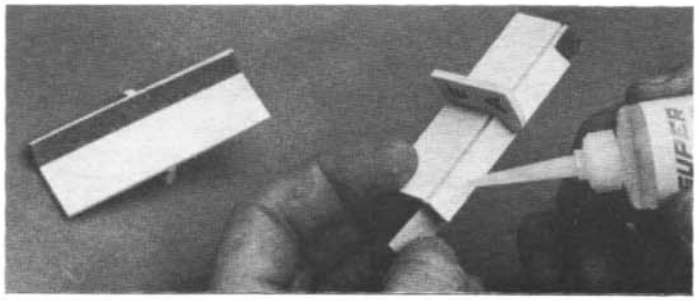


AILERON 24" LG.
(2 REQ'D)

TAIL FILLER 18" LG. (1 REQ'D)

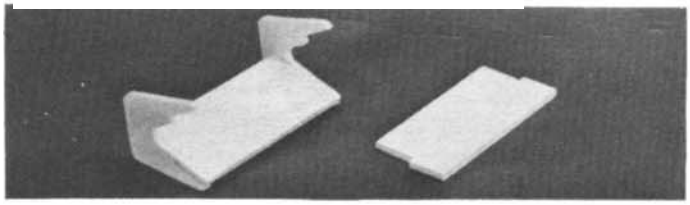


1. ☐ First, glue narrow strip to handle, keeping them square, as shown above left. Then glue wide strip to handle and narrow strip, again keeping things square.



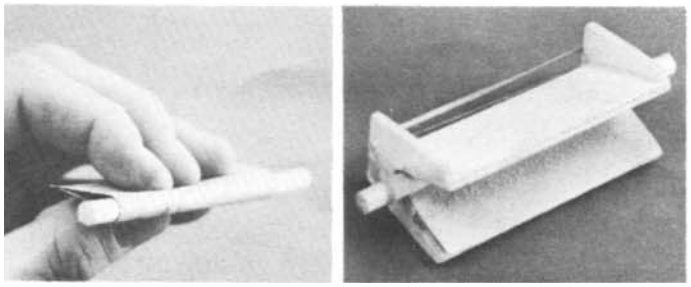
2. ☐ Cut two strips of 100-200 grit sandpaper to size shown above. Tack-cement sandpaper to tools as shown.

Die-Cut Sanding Tool



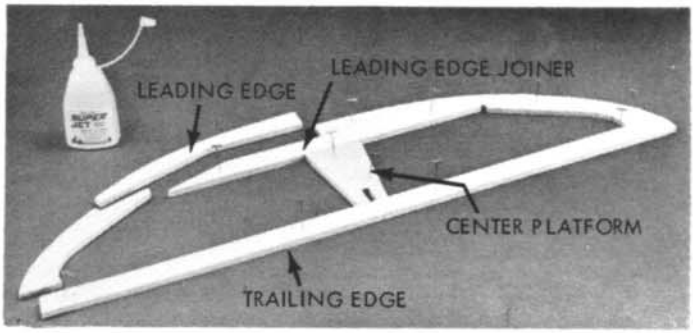
1. ☐ Glue one strip into handles notches keeping them square. Then glue remaining strip to other half of handles.

2. ☐ Cut one piece of 100-200 grit sandpaper to size of 2-1/4" x 3".



☐ Center 1/4" dowel over grit side of sandpaper. Roll sandpaper around it as shown above left.

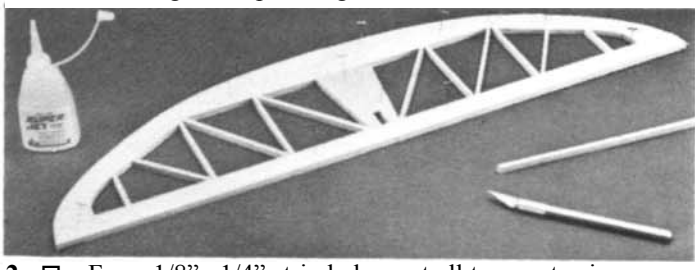
☐ Slide dowel and sandpaper into tool and hold with rubber band as shown at right. Glue sandpaper to tool.



1. ☐ From 1/4" x3/4" balsa stick material, make stabilizer (stab) trailing edge (T.E.). Cut balsa carefully to match with plan at ends. Pin in place.

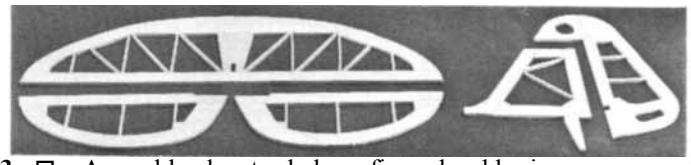
☐ Position and pin die-cut center platform over plan. Cut stab leading edge (L.E.) joiner from 1/4" x 3/4" balsa to match with plan and pin in position.

☐ Assemble die-cut curved L.E. segments to form stab outline, glue all parts together.

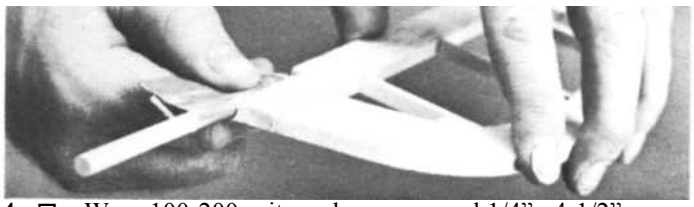


2. ☐ From 1/8"x 1/4" strip balsa, cut all trusses to size over plan. Trim to fit well-don't force into place. Glue in place.

☐ Let dry thoroughly.

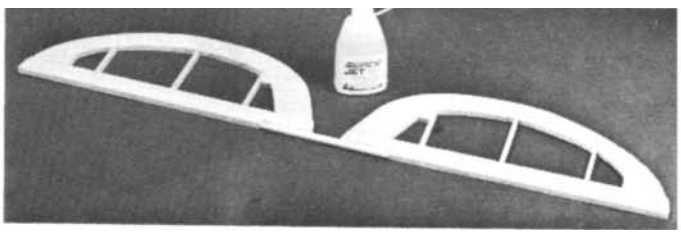


3. ☐ Assemble elevator halves, fin and rudder in same manner as stab, using die-cut and stick parts.

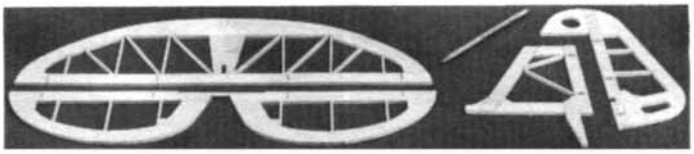


4. ☐ Wrap 100-200 grit sandpaper around 1/4" x4-1/2" dowel. Carefully sand recessed area in elevator L.E. so dowel will fit flush with front of elevator.

☐ Repeat for other elevator half.

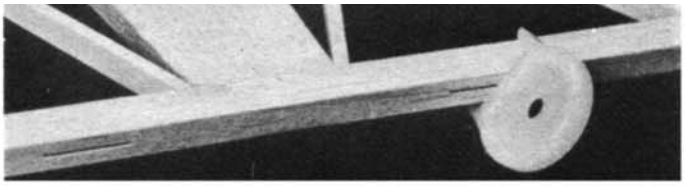


☐ Carefully align L.E.'s of elevators over plan and pin in place. Join them with the 1/4" dowel, glue it securely in place! Let dry thoroughly.



5. ☐ Place fin and rudder over plan and mark hinge location

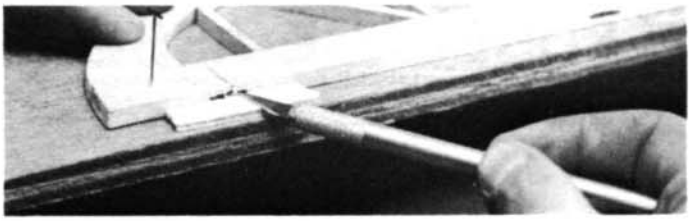
☐ Mark hinge locations for stab and elevator.



On stab & fin, mark center lines at hinge locations

On elevator & rudder, mark center lines along entire L.E.

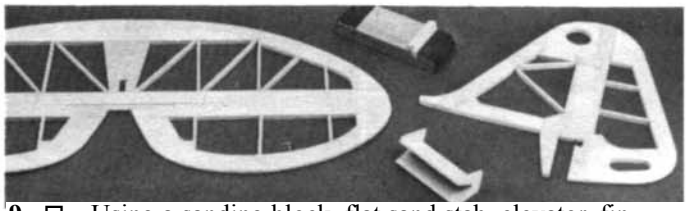
6. ☐ Using CG Center-Line marker provided, mark center-lines along edges of parts as shown above. Tilt marker so guide pegs touch the wood., then lightly pass the marker back and forth. Point will scribe center line.



☐ Using scrap ply from "sanding tool" sheet as a shim, cut slots for hinges as shown. Sand ply if necessary so blade cuts on center.

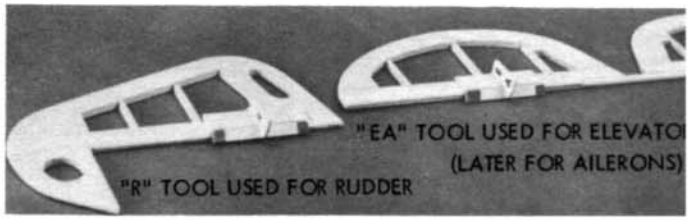
8. ☐ Repeat this method in step 7 for fin and rudder.

☐ First break corners with the sanding block. Then, follow with stab sanding tool, rounding off all outside edges except bottom of fin and the rudder L.E. Blend stab and elevator at tips. ☐ IMPORTANT! The hinges are not



9. ☐ Using a sanding block, flat sand stab, elevator, fin and rudder, smoothing out surfaces.

☐ Using no glue, TEMPORARILY attach elevator to stab and fin to rudder with hinges in place. Hold parts together with tape.

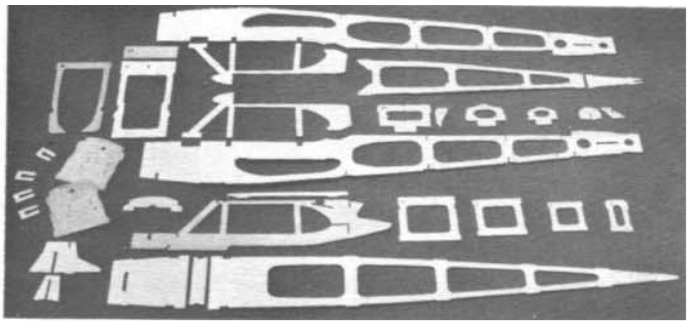


10. ☐ Remove tapes and separate elevator and rudder from stab and fin.

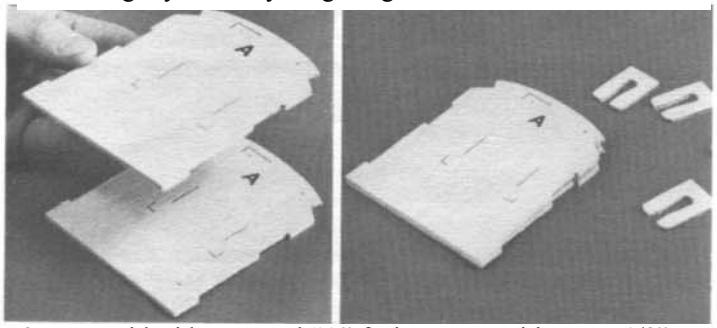
☐ Tape T.E. of elevator and rudder to work surface, using appropriate beveling tool, sand L.E. to center line. Turn parts over and repeat beveling for other side.

THIS COMPLETES THE TAIL ASSEMBLY CONSTRUCTION.

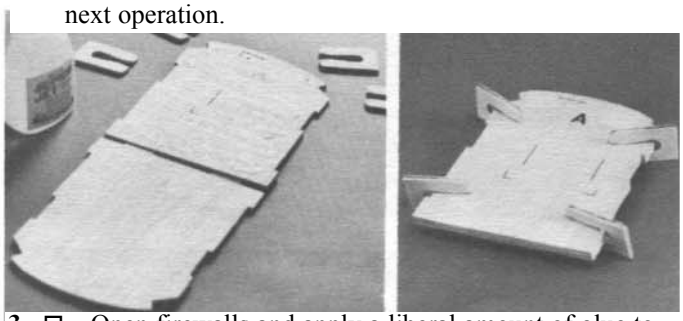
II FUSELAGE ASSEMBLY



1. ☐ Carefully remove all fuselage (fuse) parts from die-cut sheets. Lightly sand any rough edges.

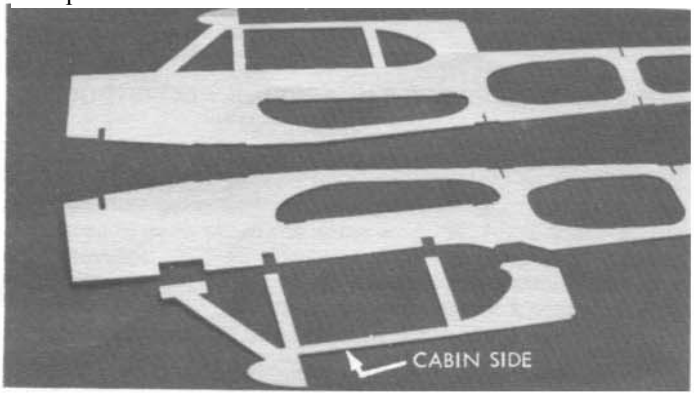


2. ☐ With side stamped "A" facing out, position two 1/8" ply formers (firewall) together, matching all edges. To hold them in alignment, tape them securely together along one edge as shown at right. Have four ply clamps ready for next operation.



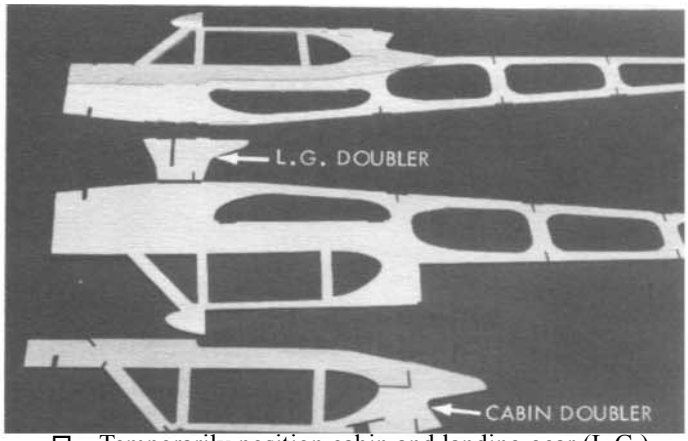
3. ☐ Open firewalls and apply a liberal amount of glue to one part as shown at left.

☐ Keep edges aligned as you close firewalls and tape opposite edges together, squeeze firewalls together using die-cut clamps. When dry, remove clamps and tapes; set clamps aside for use later.



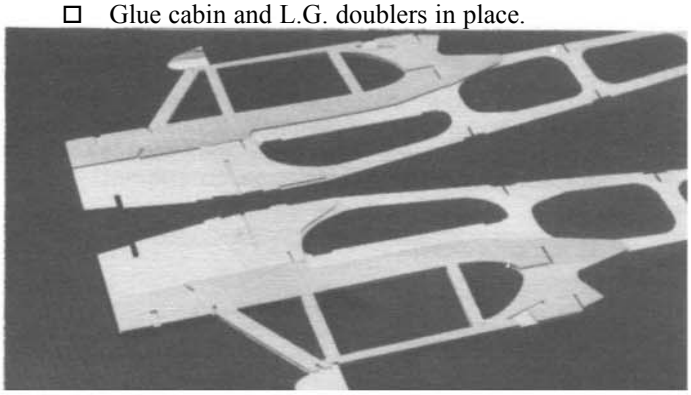
☐ Temporarily position cabin sides in notches. Check f it and ;placement of parts before gluing.

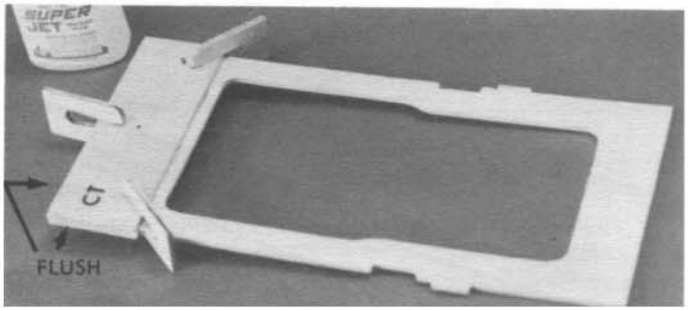
☐ Glue cabin sides to fuse.



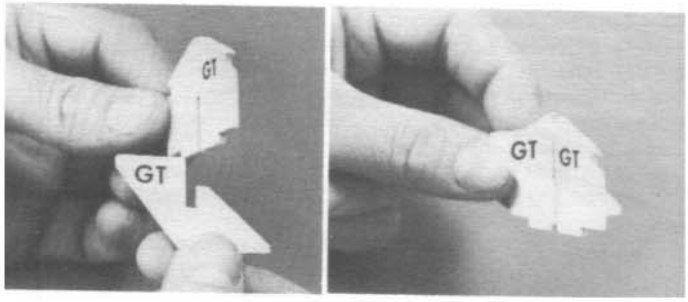
☐ Temporarily position cabin and landing gear (L.G.) doublers on fuse side, checking fit and placement before gluing.

☐ Glue cabin and L.G. doublers in place.

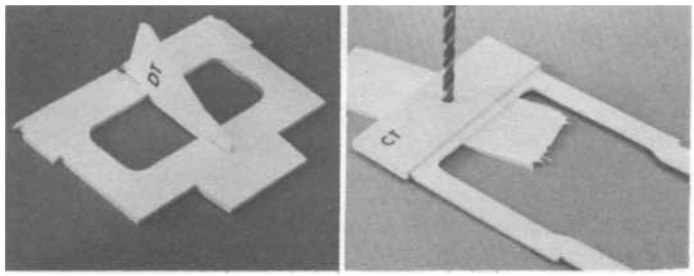




5. ☐ Glue former doubler "CT" to former C.

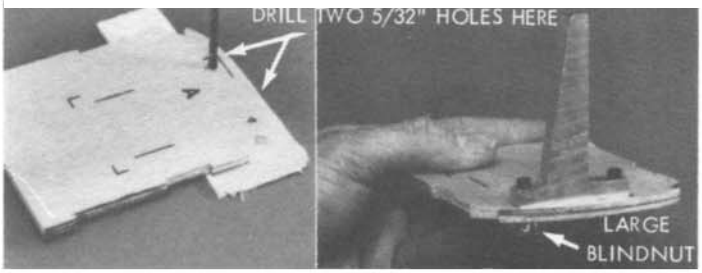


☐ Slide brace GT fully into former GT. Hold brace square to former and glue.



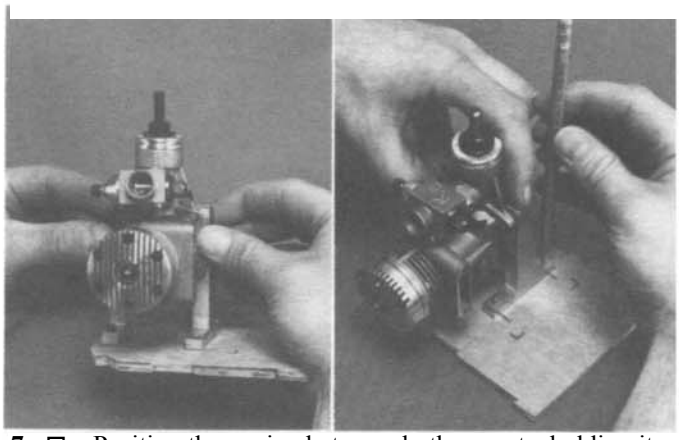
☐ Glue former brace DT to rear of former DT.

☐ Drill a 1/4” diameter hole through CT & C at punch mark location.



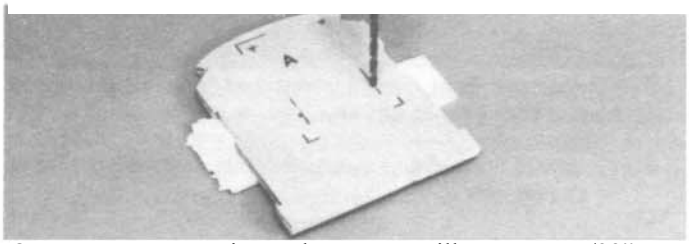
6. ☐ Drill two 5/32” diameter holes through firewall at upper punch mark locations (place scrap wood under backside while drilling to avoid splitout).

☐ Temporarily install one of the motor mounts, using (2) #6x1” socket head bolts and blindnuts. Do not pull the blindnuts into firewall at this time, since they may need to be removed at a later time.



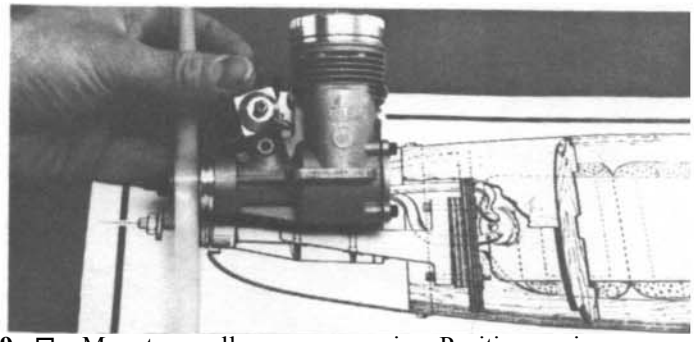
7. ☐ Position the engine between both mounts, holding it vertical to firewall and parallel to mounts. Spread mounts apart to match engine mounting holes (there are two stamped reference lines for positioning mount directly under the upper one.)

☐ Mark straight down through holes in lower mount.

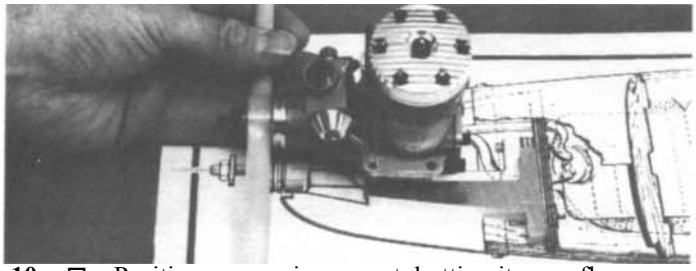


8. ☐ Remove engine and mounts. Drill two more 5/32” holes at lower mount location.

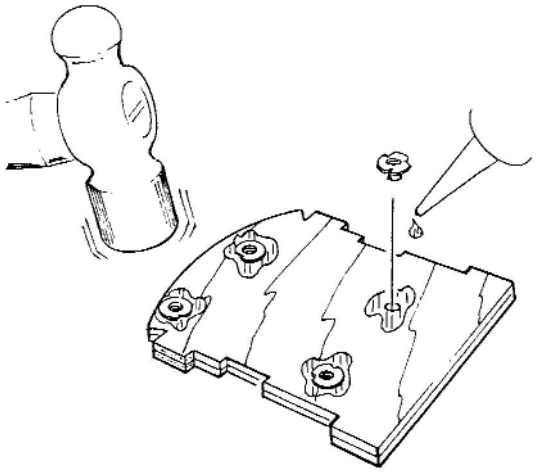
NOTE: Your kit may include an non-updated plan. The 1/4” ply motor mount extension is no longer needed with the change to the fiber filled engine mounts now included with the kit. If you have an older plan, please disregard any reference to the ply extension.



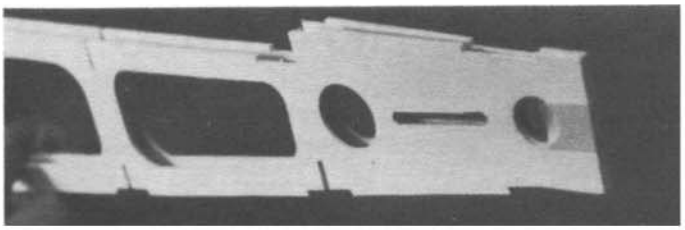
9. ☐ Mount propeller on your engine. Position engine over fuse top view on plan and compare it to the installation shown. Back of your prop should protrude 1/8” to 1/4” beyond the cowl front as shown on the plan. Hold engine in this location.For long 4-cycle engines, check for at least 1/8” clearance between engine rear and firewall; to obtain this clearance the engine may have to be shifted forward as required. Measure the distance from the engine rear to the firewall. Write this measurement down, it will be used later for engine mounting.



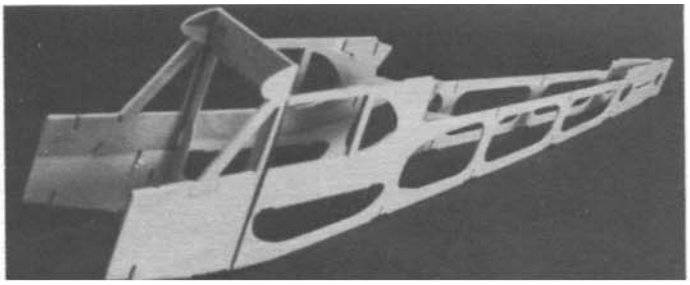
10. ☐ Position one engine mount, butting its rear flange against the firewall location shown on the plan. Observe how the front engine mounting holes relate to the engine mount.



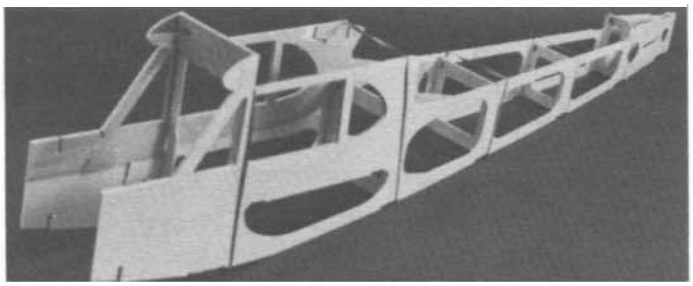
11. ☐ Insert the four blind nuts into the holes on the BACK side of the firewall. CA glue the nuts to the ply and seat them into the firewall with a hammer.



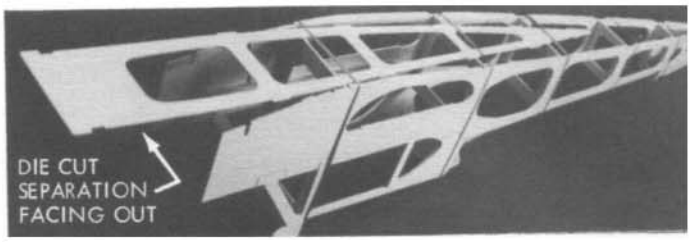
12a. ☐ Place fuse sides one on the other, tape rear together around the back end. Spread fuse fronts apart,



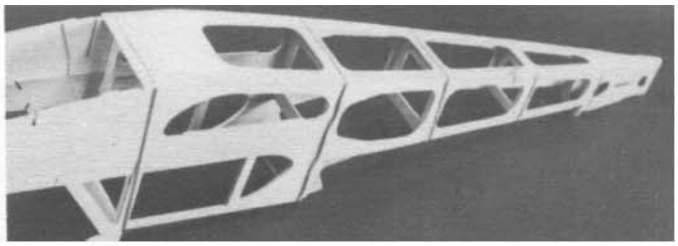
and plug former "C" into holes in body sides. Hold parts together with a rubber band.



12b. ☐ Hold fuse tail end up, carefully spread fuse rear open,and plug former "G" in place, hold with a rubber band. Working towards front, install formers "F", "E" and "D" in same manner, using rubber bands to hold parts.

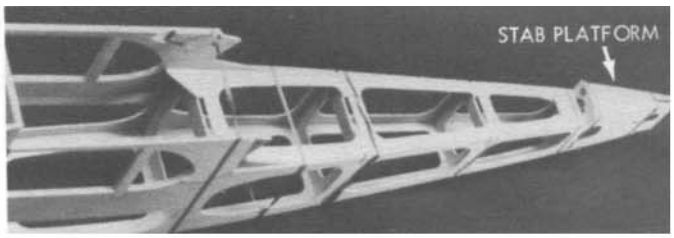


12c. ☐ With die-cut separation facing out, insert bottom sheet under rubber bands at former "C", and work it towards tail, slipping it under bands as you go.

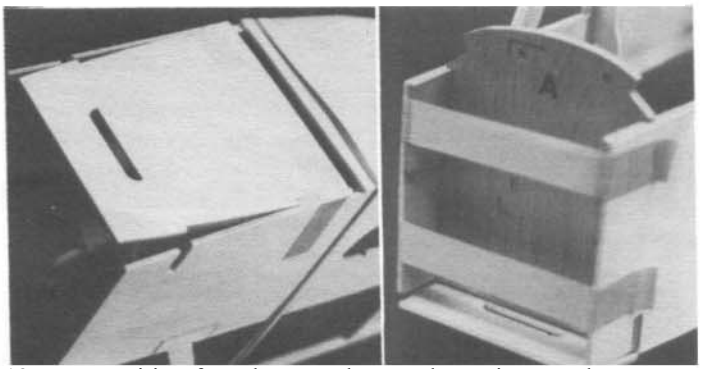


12d. ☐ Lock tabs at sides and ends of bottom sheet into corresponding notches in fuse sides. Hold parts with tape.

12e. ☐ Working through former C, position top sheet in same manner, sliding it towards rear.

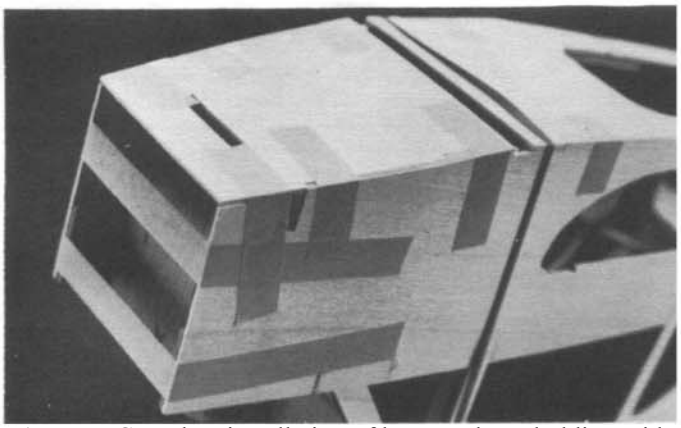


12f. ☐ Position stab platform between fuse ends, and hold parts in place with tape or rubber bands.

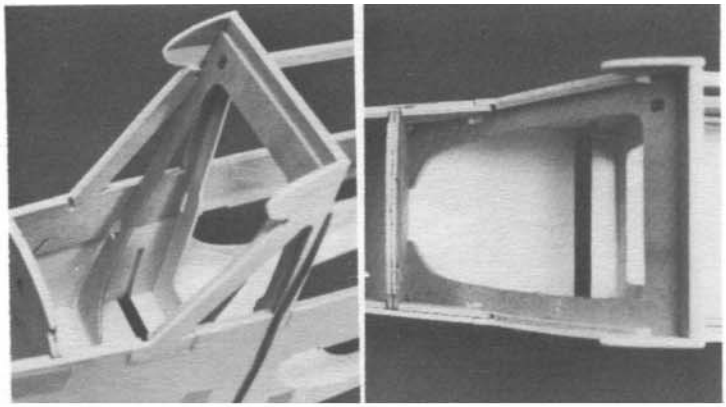


13. ☐ Position front bottom sheet and tape it securely to fuse at rear only as shown.

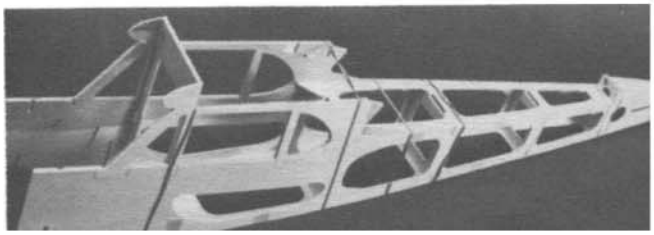
14. ☐ Install firewall and pull fuse fronts toghether with tape as shown.



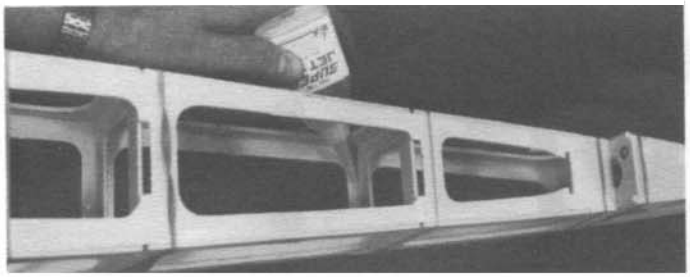
15. ☐ Complete installation of bottom sheet, holding with tape as shown.



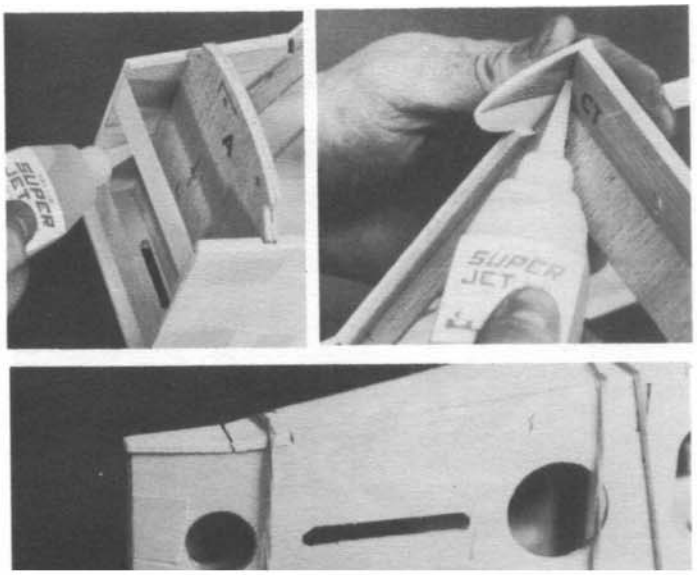
16. ☐ Install former B, gently compressing legs to fit into fuse. Lock top tabs in place, then plug lower legs in position.



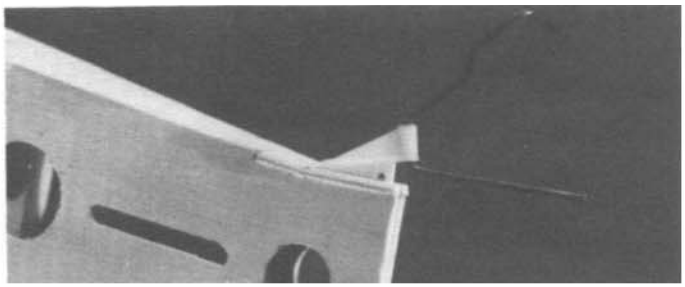
17. ☐ Place fuse over TOP VIEW on plan sheet. Viewing from above, carefully align the fuse to match plan out line. If an area of the fuse is off, adjust that portion in the direction required. Tape parts to hold in position.



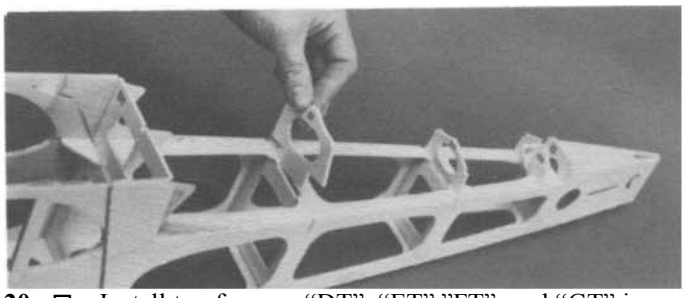
18. ☐ When satisfied with alignment, permanently glue sides, formers and sheet parts in place. Apply a bead of A along all joints inside and outside, or from both sides in the case of formers-it will penetrate the joint and leave a slight reinforcing fillet.



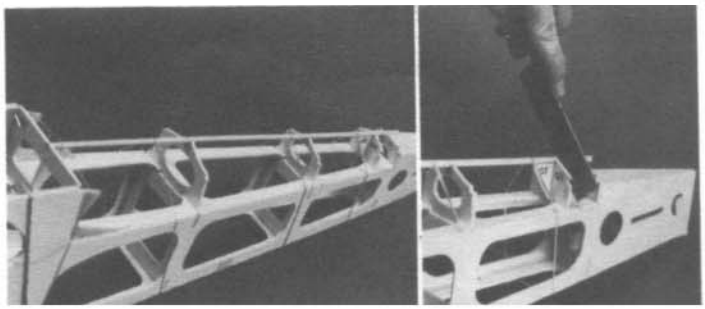
☐ At tail end, glue bottom sheet to conform to slight bend in fuse sides.



19. ☐ Trial fit the tail wheel bracket at die-cut separation in bottom sheet. The bracket flange will probably not fit the slot. Using a small saw, enlarge slot as required for correct fit. DO NOT GLUE bracket in place at this time.

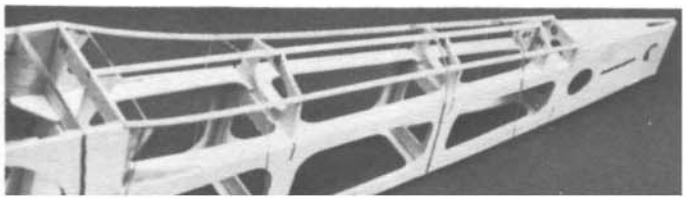


20. ☐ Install top formers “DT”, “ET”,”FT”, and “GT” in their respective slots in fuse top (braces DT and GT must face each other).

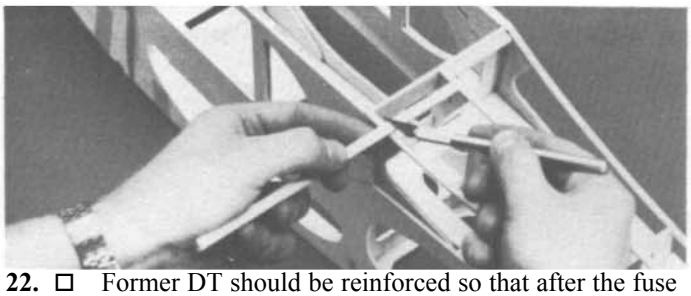


☐ Install a 3/16” diameter x 18” dowel in top center slots. Flush dowel with former DT. Glue in place.

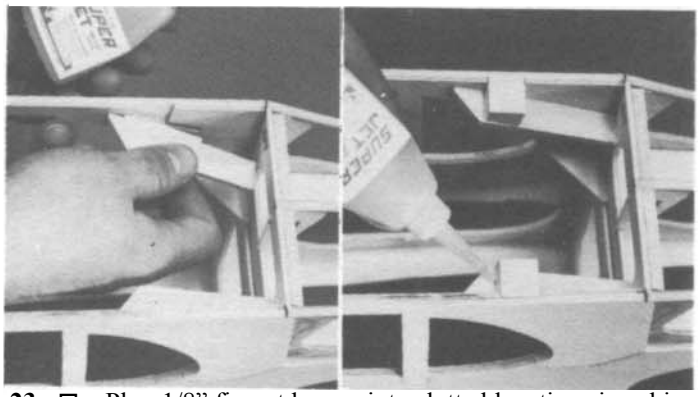
☐ Cut rear end of dowel flush with back of former GT.



21. ☐ Install remaining two dowels, positioning them in slots at top cabin sides. Pull dowels down in place into former slots and hold with tape or rubber bands. Glue in place. Trim dowels flush with rear of former G.

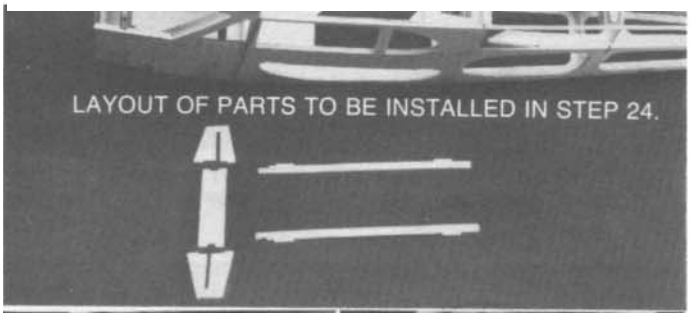


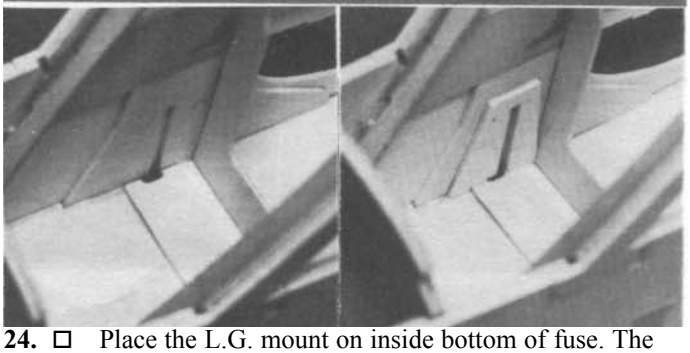
22. ☐ Former DT should be reinforced so that after the fuse is covered it will not bend. From 1/8" x1/4" tail truss scrap, cut reinforcement pieces and glue to rear of former.



23. ☐ Plug 1/8" fie-cut braces into slotted locations in cabin doublers and glue securely in place.

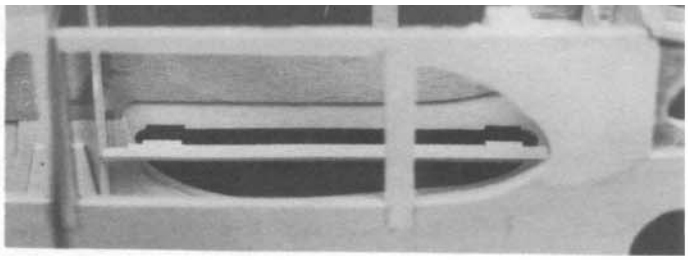
☐ Position and glue wing mounting blocks. Reglue these joints thoroughly, the wing attaches here-it must be strong.



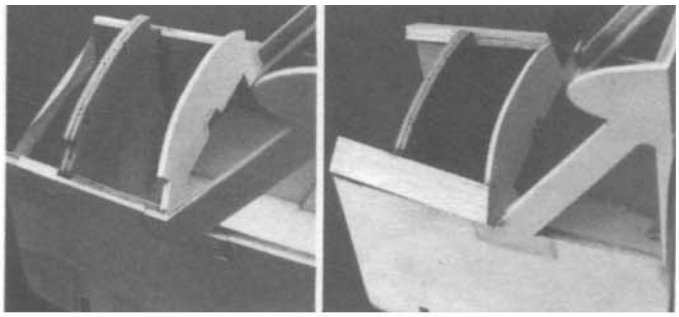


24. ☐ Place the L.G. mount on inside bottom of fuse. The cutouts at each end of mount must be positioned evenly over the slot in the fuse bottom. Glue mount in place.

☐ The L.G. braces interlock with L.G.mount, and the slots must be matched to those in the fuse sides. IMPORTANT: the arrow stamped on each braced must be positioned towards the front of the model. Glue in place.

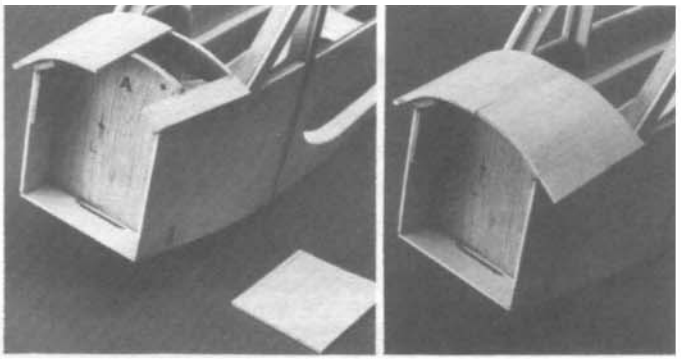


☐ Position side rail tabs in fuse notches and glue in place.

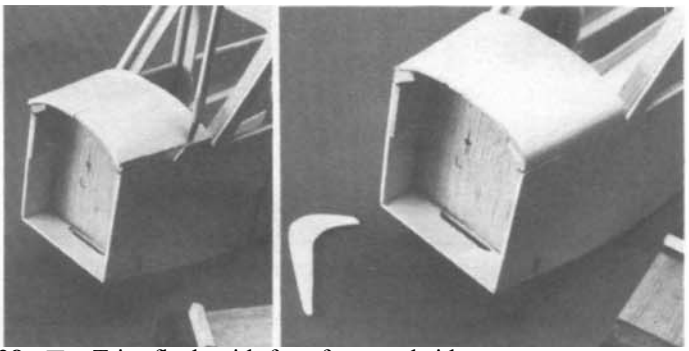


25. ☐ Glue instrument panel solidly in place.

26. ☐ From scrap 1/4" x 3x4" stab material, cut pieces as shown. Glue into panel and firewall notches and to fuse sides. Trim flush with panel.

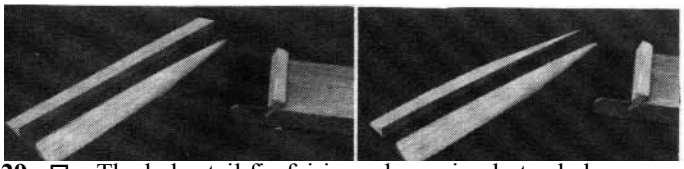


27. ☐ Match curved edge of 1/8" balsa top sheet with instru ment panel, and align edge with fuse center. Glue in place. Glue other half in place.

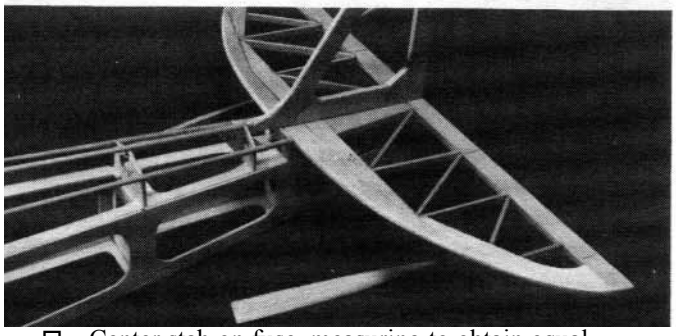


28. ☐ Trim flush with fuse front and sides.

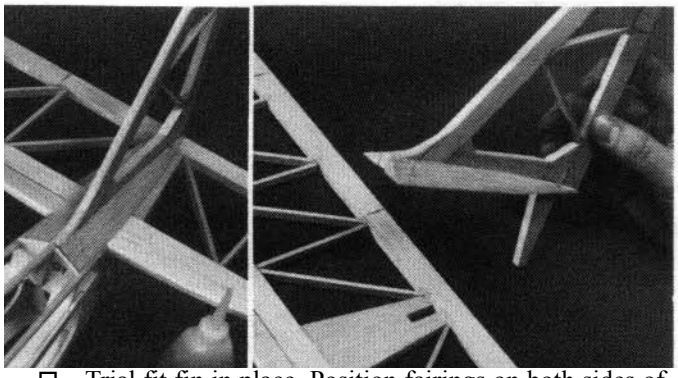
☐ Using a sanding block, first flat sand sides. Then, round the corners, blending surfaces-check your sanding with the template.



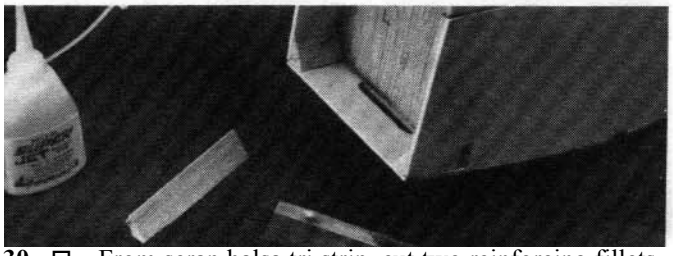
29. ☐ The balsa tail fin fairings shown in photos below are cut from triangle strip. First, cut two 6-3/4" lengths. Then, taper-sand fairings to curved pointed shape as shown on fuse views on plan.



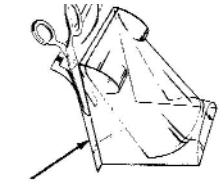
☐ Center stab on fuse, measuring to obtain equal distance from side to side, and from nose of fuse to rear corner of each stab tip (see dimension "A" page 23).



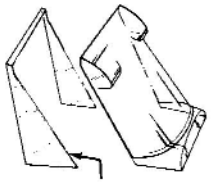
☐ Trial fit fin in place. Position fairings on both sides of fin and butted against former GT. Glue fairings to fin ONLY at this time.



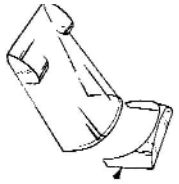
30. ☐ From scrap balsa tri strip, cut two reinforcing fillets and glue in place at lower corners of fuse front.



CAREFULLY REMOVE FLASHING AT WIND-SHIELD REAR

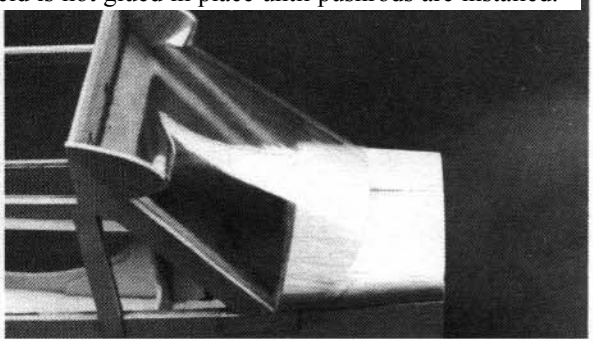


TRIM SCRAP FROM REAR BY CUTTING ON MARKED LINE

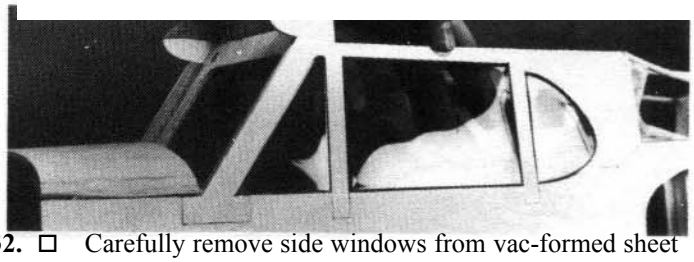


TRIM SCRAP FROM FRONT BY CUTTING ON MARKED LINE

31. ☐ Remove windshield from vac-formed sheet by cutting on lines as shown in sketches above. Temporarily set Windshield is not glued in place until pushrods are installed.



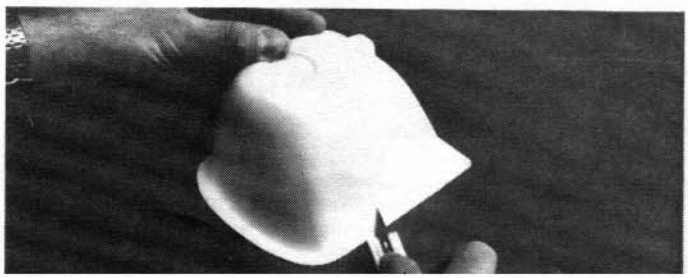
windshield in place on fuse to check fit.



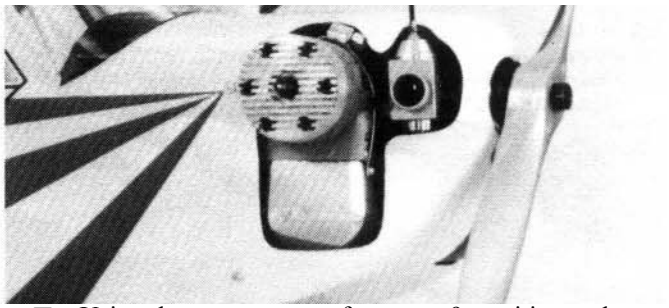
32. ☐ Carefully remove side windows from vac-formed sheet by cutting on lines (about 1/4" all around windows). Cut front triangle window from others along center of connecting flange.

☐ Using no glue at this time, temporarily fit windows into fuse openings. if they fit too tight, remove and lightly sand openings the minimum required for good fit. Remove windows and set aside until later.

33. ☐ To protect the engine area from becoming oil soaked, it needs to be "fuel-proofed." Either polyurethane, CA, or epoxy is good for this. Apply your fuel proofer to entire engine area, firewall,sides and fues front. Open up screw holes with toothpick while paint is wet. Let dry thoroughly.



34. ☐ Carefully cut flashing material from base of cowl. Cut out the opening for the prop shaft.

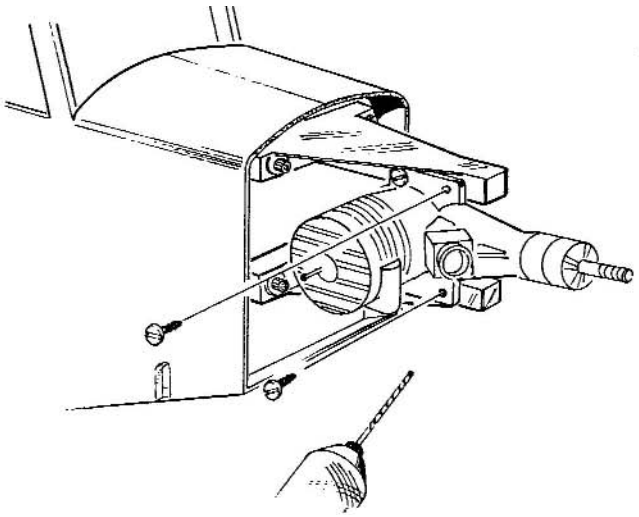


☐ Using the measurement from step 9, position and tack-cement engine on mounts (engine must parallel mounts and point straight out from firewall).

☐ Carefully cut cowl for engine cylinder clearance. Work slowly, fitting and trimming until cowl overlaps the fuse front by about 1/4", hold with tape.

☐ Loosely install prop on engine. There should be 1/8” to 1/4” clearance between back of prop and cowl.

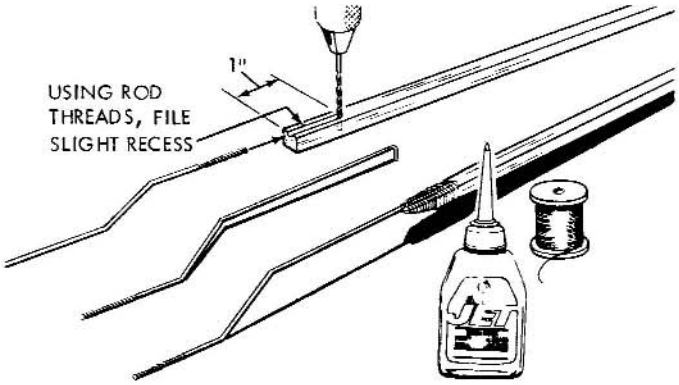
☐ Attach cowl to fuse using #2 x 3/8” screws and washers. Remove prop and cowl. With engine still on mounts proceed directly to step 35.



35. ☐ Bolt the motor mounts to the firewall, using the four 4-40 x 1” bolts with a #4 flat washer.

Mount the engine, refer to the plan for the correct thrust orientation. Drill a 1/16” pilot hole for each #6 x 3/4” mounting screw. Check the cowl fit-up after you install the engine.

36. ☐ For rear end of elevator and rudder pushrods, bend both 10” threaded rods as accurately as possible over plan.. Cut off excess, leaving about 1/4” at right angle.

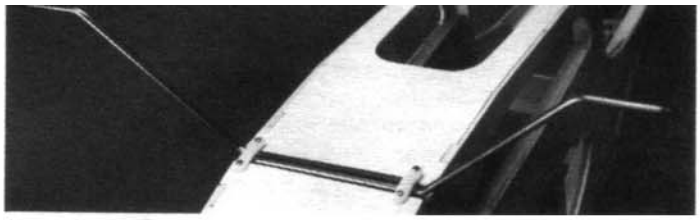


☐ Using threaded end of a rod, file a slight recess 1-1/4” long at one end of each 3/8” square balsa pushrod. (The other end of the pushrod is completed later during radio installation).

☐ Drill a 1/16” dia. hole at end of recess in both pushrods.

☐ Glue rods into balsa pushrods as shown.

☐ When dry, taper ends of pushrods and round off corners. bind with strong thread, coat with glue and let dry.

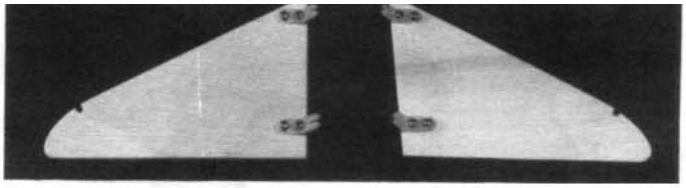


#2 x3/8” SHEET METAL SCREW

TO INSTALL #2 SCREW, FIRST DRILL 1/16” DIA HOLES.

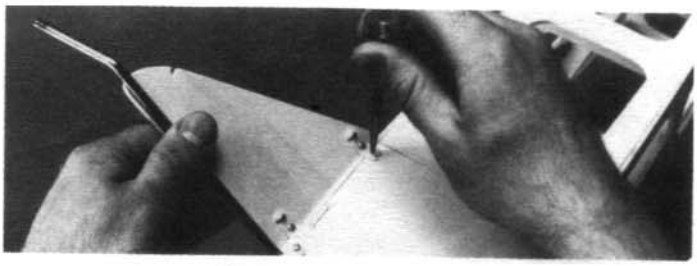
37. ☐ Insert formed wire L.G. struts in fuse. Position nylon landing gear straps; then mark, drill, and mount with #2 x 3/8” screws (see above and illustration on page 5).

38. ☐ Cut open straight action end of four nylon hold-downs. Grasp at center hole and bend it over (it will spring back to proper angle).



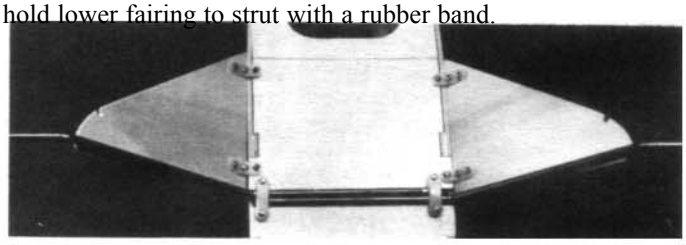
#2 x3/16” SHEET METAL SCREW.

☐ Lay L.G. fairings down left and right as shown and install hold downs using #2 x 3/16” sheet metal screws at punch mark locations. Position them with straight action end facing up towards center.



#2 SHOULDER SCREW

39. ☐ Align fairing front with L.G. strut and adjust so hold downs project over fuse bottom. Mark, drill, and mount fairings with #2 shoulder screws (exposing enough un-threaded shank to engage hold-down). Later when flying, hold lower fairing to strut with a rubber band.

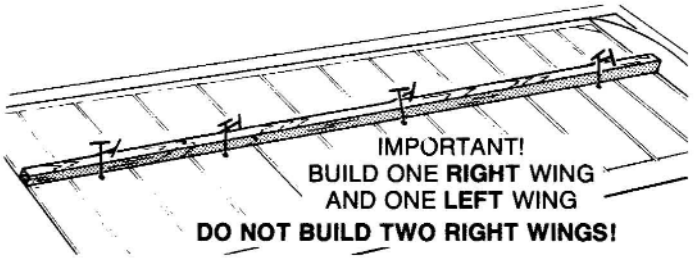


III WING ASSEMBLY

SINCE THE WING IS BUILT IN TWO HALVES, AND STEPS 1 TO 27 ARE REPEATED IN THE PROCESS, TWO CHECK BOXES ARE PROVIDED WITH EACH OF THESE STEPS. ONE FOR RIGHT WING AND ONE FOR THE LEFT. THE RIGHT WING IS BUILT FIRST.

1. ☐☐ **This step for clipped (short) wing only** (for long wing start with Step 2). On plan sheet 2 between the wings is a template. Carefully match wing parts to corresponding lengths indicated on the template. Mark and cut them to new length.

☐☐ Carefully cut wing tip panels as indicated on plan sheet 2. Move panels two rib spaces inboard (match arrows on plan) and tape in position,. Note: from step 2 on in the wing assembly photos, the long wing is shown, but the assembly procedure is the same for the short wing,.

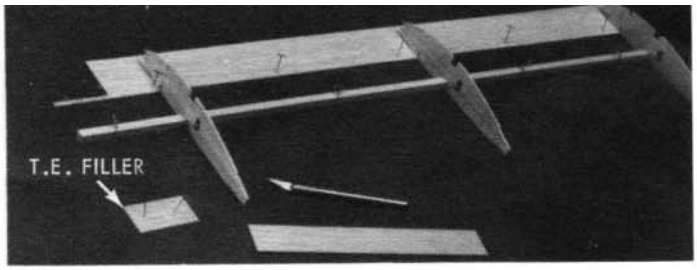


2. ☐☐ Position one main spar in place over RIGHT WING (or LEFT WING) on plan. Align spar end at center of wing on plan. Hold spar in exact position by cross pinning at circled locations on plan. CAUTION: Do not build two RIGHT WINGS!

☐☐ Using no glue, place one No. 5 over rib 3 location on plan, and two more ribs 5 as shown.

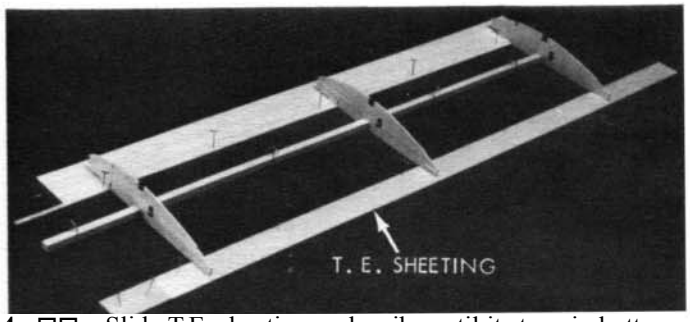
☐☐ Position :L.E. sheeting over plan and pin in place.

☐☐ Slide L.E. sheeting in place under rib fronts until it stops at rib notch. Butt sheet next to L.E. filler (rib No. 2 location over plan). Pin in place.

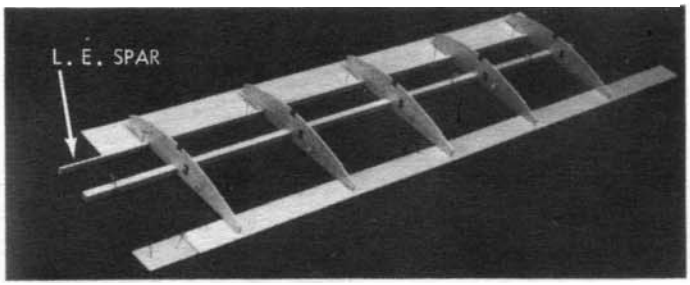


3. ☐☐ For short wing, proceed directly to step 4.

☐☐ For long wing, cut a T.E. filler piece from 11-7/8" sheet. Cut filler to fit from center of wing to center of rib 2 location. Pin in place.



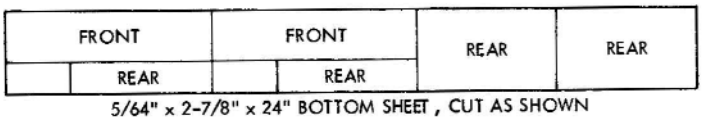
4. ☐☐ Slide T.E. sheeting under ribs until it stops in bottom notches. Butt sheet against T.E. filler (for short wing, align sheet end at wing center). Pin in place.



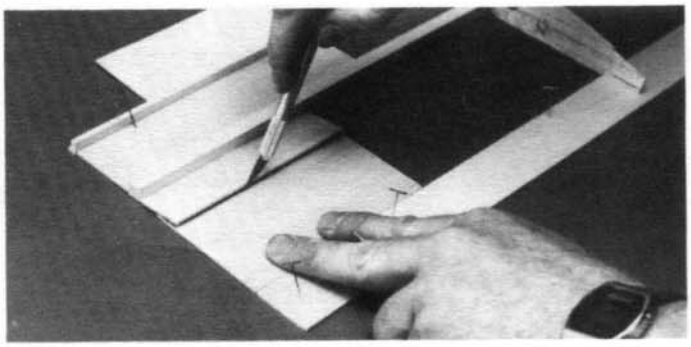
5. ☐☐ Remove No.5 rib from rib 3 location.

☐☐ Raise rib fronts high enough to slide L.E. spar in position. Align spar at wing center and press ribs back down on spar.

☐☐ Temporarily set rib 3 in place to locate L.E. spar.

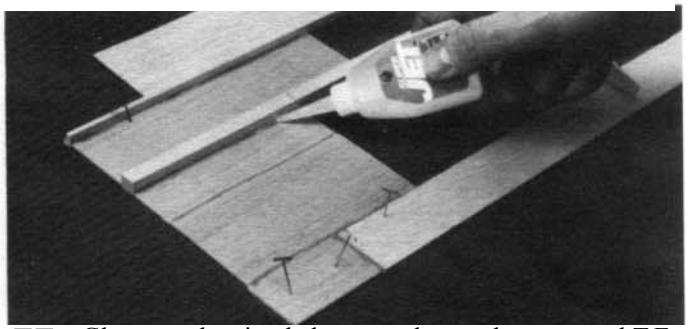


5/64" x 2-7/8" x 24" BOTTOM SHEET , CUT AS SHOWN

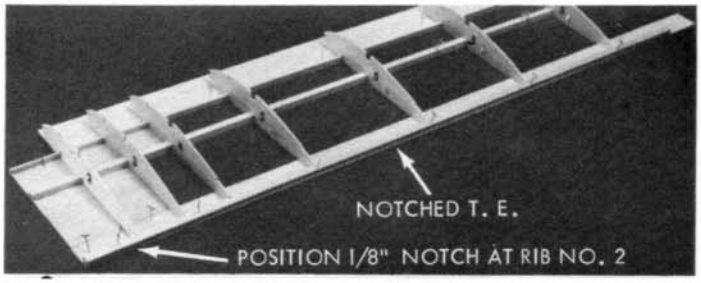


7. ☐☐ Remove rib No.3 and fit front bottom sheet in position. Pin in place.

☐☐ Position one rear bottom sheet against T.E. Place other sheet at rear of main spar overlapping the first one. Holding both sheets in place, trim first sheet even with edge of second sheet.



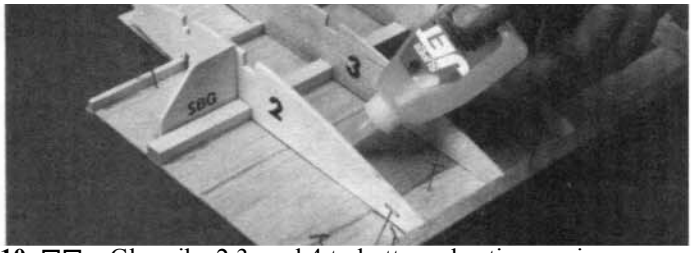
8. ☐☐ Glue rear sheeting halves together, and to spar and T.E.- do not glue front sheeting at this time.



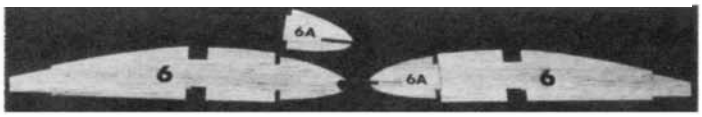
9. ☐☐ Using no glue, position ribs 2,3, and 4 in place over-plan.

☐☐ Position notched T.E. on T.E. sheeting, align at wing center. IMPORTANT: the T.E. has a 1/8" wide notch at one end-match this notch with rib 2.

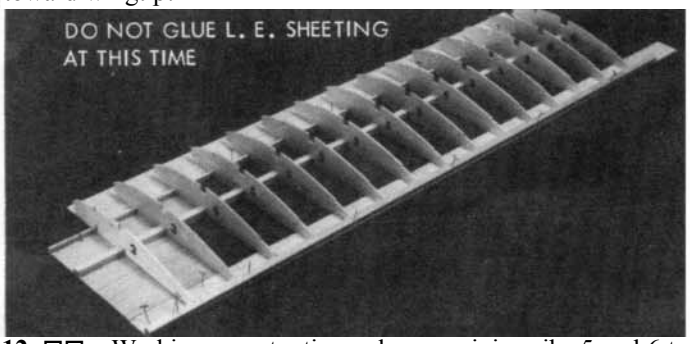
☐☐ Starting with rib 2, press ribs into their respective T.E. notches. Pin T.E. in place.



10. ☐☐ Glue ribs 2,3, and 4 to bottom sheeting, main spar, and T.E. (when gluing rib 2, tilt it very slightly using the set-back gauge as shown).

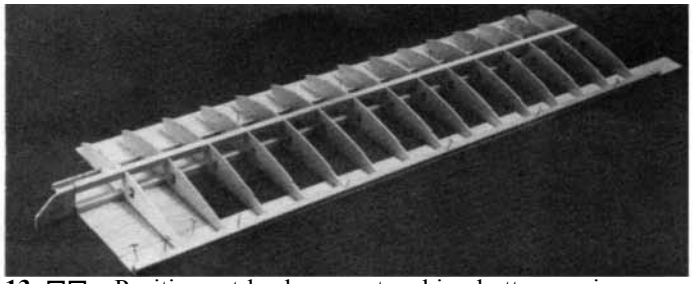


11. ☐☐ Lay parts out as shown. Glue rib doubler 6a to rib 6, make one left and one right rib 6. IMPORTANT: when installing rib 6 in next step, position rib so doubler 6a faces out toward wingtip!

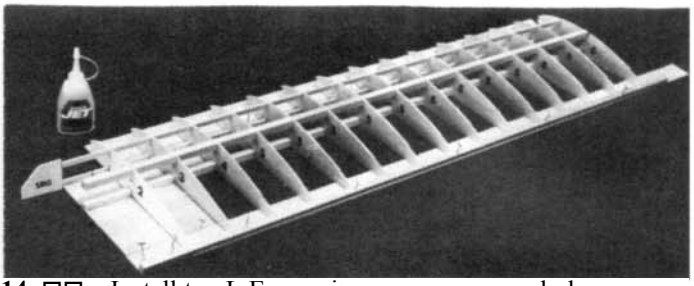


12. ☐☐ Working one at a time, glue remaining ribs 5 and 6 to main and L.E. spars and T.E. (do not glue L.E. sheeting at this time!). Hold each rib up straight as it dries.

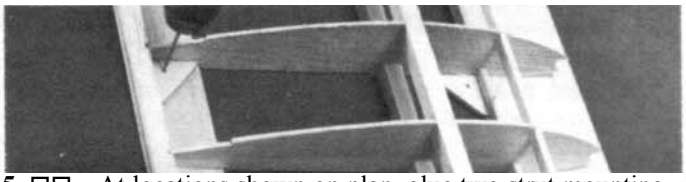
☐☐ Glue T.E. and T.E. sheeting.



13. ☐☐ Position set-back gauge touching bottom main spar. Touch end of top spar to gauge, and set spar in rib slots. Glue top spar to all ribs.

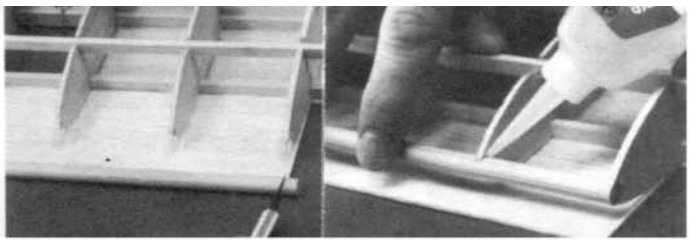


14. ☐☐ Install top L.E. spar in same manner and glue.



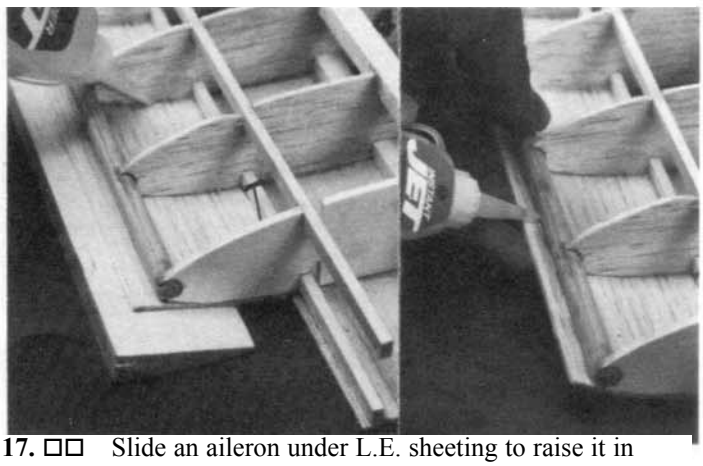
15. ☐☐ At locations shown on plan, glue two strut mounting plates in place., Rear plate is glued directly over T.E. sheeting (for short wing-move mounts one rib bay inboard as indicated on plan).

☐☐ Drill a 1/16" hole through each mount at punch mark location.



16. ☐☐ Position L.E. dowel, butting it against rib 6a and checking it to be flush with rib No. 2. If the dowel in your kit is over length, trim it to fit as shown below. Roll your knife over the dowel in gradually deepening cuts.

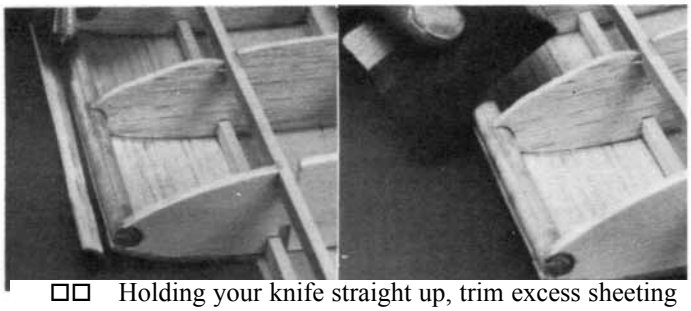
☐☐ Working a few ribs at a time, apply CA to glue ribs to L.E. Gently squeeze L.E. into ribs and hold until set. Repeat until all ribs are glued to L.E.



17. ☐☐ Slide an aileron under L.E. sheeting to raise it in contact with ribs. Only the rear half of the sheeting will be touching the ribs. At this time glue only that portion of sheeting in contact with the ribs. Move aileron on down the wing as you go. Note: Instant CA is recommended here, since being watery thin, a drop readily flows into the tight fitted joints and dries instantly.

18. ☐☐ Working a few ribs at a time, carefully pull the remaining sheeting up against the L.E. dowel and glue in place.

☐☐ Using CA, go back and reglue L.E. spar and all ribs securely to sheeting.



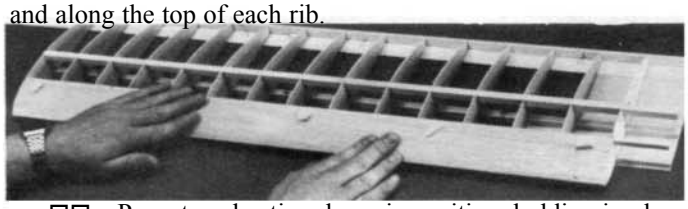
☐☐ Holding your knife straight up, trim excess sheeting flush with dowel.

19. ☐☐ Lightly sand rib joints along top of dowel, for smooth fit of top sheeting.

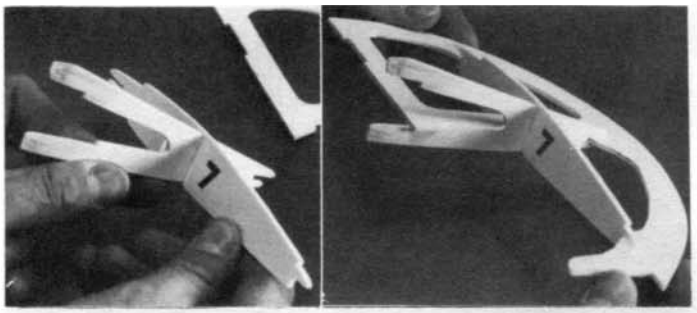
☐☐ Align one edge of top sheet with L.E. spar, then flush one end with rib No.2 (the other end should fall over the joint between rib 6 and 6al). Tape sheeting to spar at several points along the wing.

20. ☐☐ With a damp rag, moisten the top of the sheeting (this will curve the sheeting slightly making it easier to glue to the ribs in the next step).

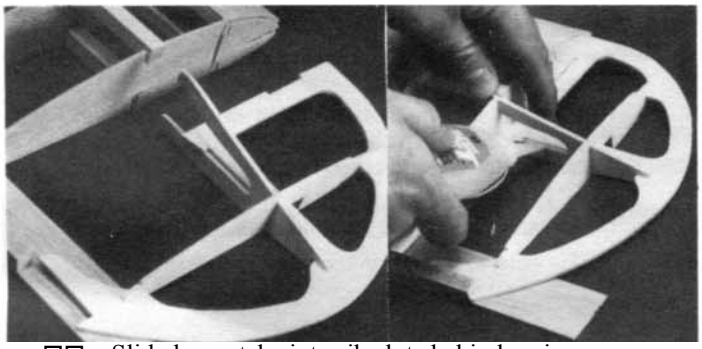
21. ☐☐ With the taped edge as a hinge, lift the sheeting. Apply a bead of CA along the entire lengths of dowel and spar, and along the top of each rib.



☐☐ Press top sheeting down in position, holding in place until dry.

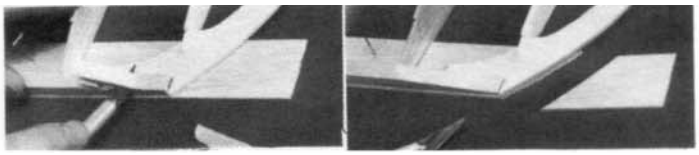


22. ☐☐ Wing tip is made from three interlocking ply parts. Slide ply rib 7 into brace. Install this assembly in wing tip.



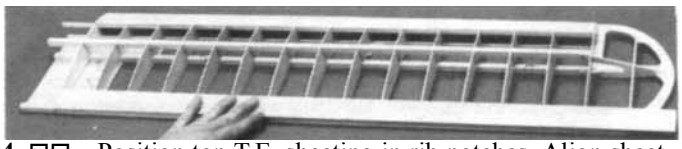
☐☐ Slide brace tabs into rib slots behind main spar.

Push tip fully in, engaging front in rib 6a slot. Glue tip securely in place. Glue tip rear to T.E. sheeting and T.E.



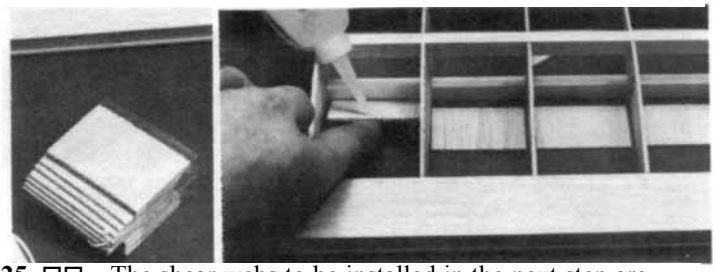
23. ☐☐ Starting at rib 6, taper T.E. down to level of ply tip. Try to keep taper straight. Lightly sand.

☐☐ Cut T.E. sheeting flush with tip.

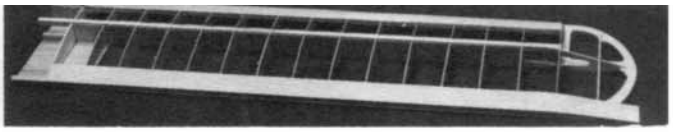


24. ☐☐ Position top T.E. sheeting in rib notches. Align sheet end at center of rib 2. Remove sheet, apply a bead of CA to top of T.E. and ribs, and glue sheet in place.

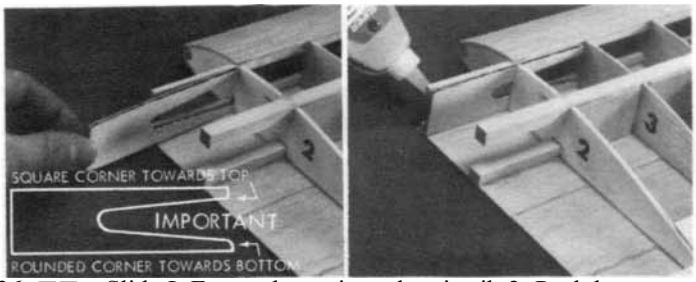
☐☐ At wing tip, bend sheeting down and glue to tip.



25. ☐☐ The shear webs to be installed in the next step are packaged in a plastic wrap as shown in photo above.



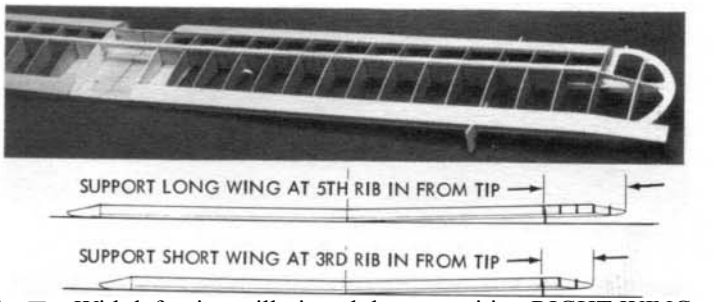
☐☐ Install webs in wing positions shown on the plan as follows: Apply two ribbons of glue (near top and bottom), position webs equally on spars until set. The web between ribs 2 and 3 must be cut 1/16” lower for top sheeting clearance.



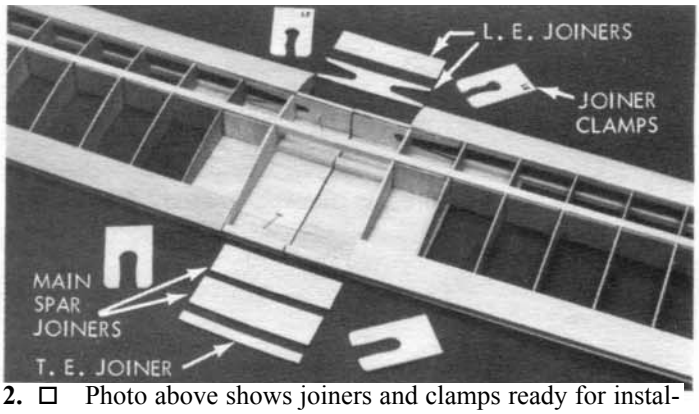
26. ☐☐ Slide L.E. spar brace into slots in rib 2. Push brace fully into wing until it is flush with wing center. Glue brace securely to spar.

27. ☐☐ Repeat steps 2 through 26 for left wing.

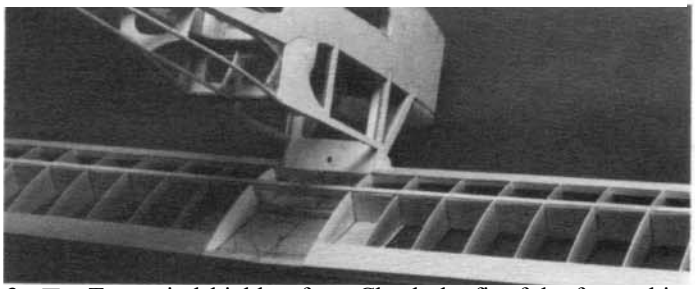
WING JOINING & COMPLETION



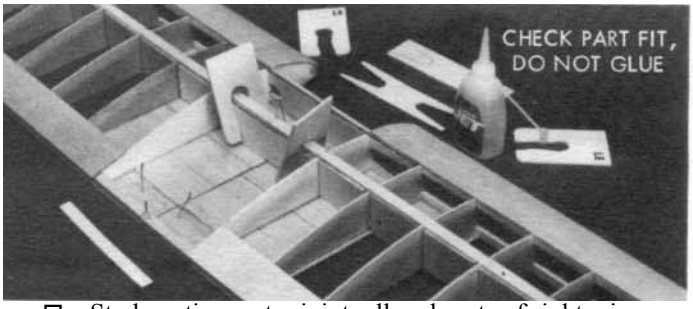
1. ☐ With left wing still pinned down, position RIGHT WING in place next to it. Raise RIGHT WING tip and support it using die-cut gauges; for long wing-support wing at 5th rib in from tip (as shown above) for short wing-support under 3rd rib (as shown). Note: gauges are shaped to fit under curved L.E. and flat T.E. position accordingly. Hold gauges firmly to the ribs by tack-cementing or stationery clamps, clothespins, etc.



2. ☐ Photo above shows joiners and clamps ready for installation in next step. Remove the die-cut areas from one L.E. joiner, this joiner goes behind the L.E. Also , when installing the clamps, position the stamped markings on the L.E. clamps towards the front of the wing.



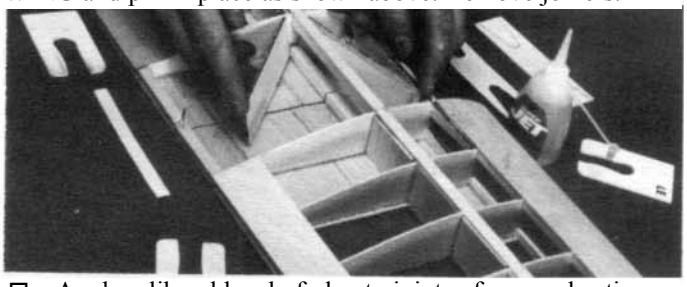
3. ☐ Tape windshield to fuse. Check the fit of the fuse cabin front in place at L.E. opening it. It should fit just loose enough to allow room for covering material.



☐ Study entire center joint; all end parts of right wing should just touch those of the left (tiny gaps are all right). If the fit between most parts is a little loose because one part protrudes too much, slightly sand only the protruding part for better fit. When sanding it is better to take off too little than too much!

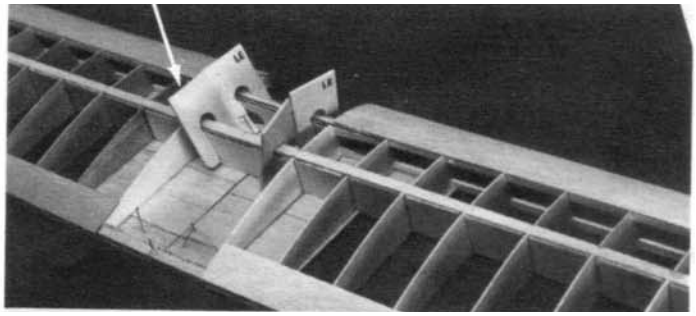
☐ TEMPORARILY set dihedral joiners in place using die cut clamps provided to hold joiners tight against spars.

☐ Be sure RIGHT WING is held firmly against LEFT WING and pin in place as shown above. Remove joiners.



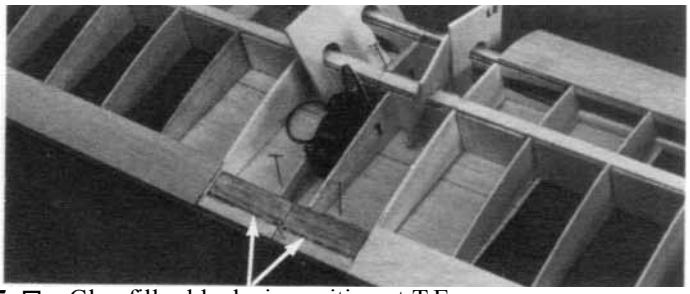
4. ☐ Apply a liberal bead of glue to joints of spars, sheeting and T.E.

☐ Apply two ribbons of glue to one side of both main spar joiners, near the top and the bottom. Position one end of joiner in place and swing the other end up against spars-hold momentarily. Repeat for other joiner-immediately reinstall clamps to hold both joiners tight on spars.



☐ Install L.E. joiners in same manner (joiner with side cut-outs at rear of spar). When installing the clamps, position the "L.E." markings toward the wing front.

☐ Glue T.E. joiner in space.



5. ☐ Glue filler blocks in position at T.E.

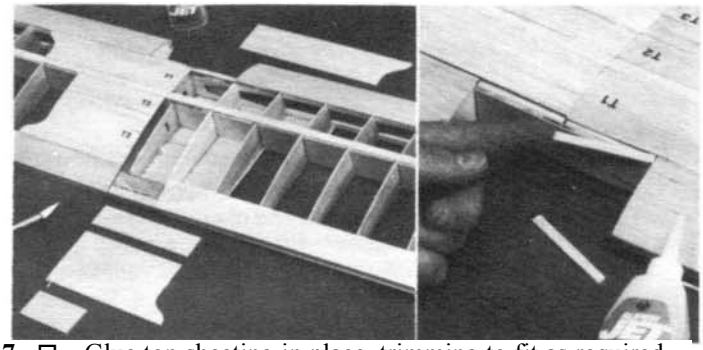
☐ Refer to location shown on plan and center your aileron servo over bottom sheeting joint.Allowing 1/16" clearance, position rear ribs No. 1 on both sides of the servo. Glue ribs in place, being careful not to glue servo. Remove servo.

☐ Position one half of one front rib No. 1 so one side aligns with center line of wing. Adjust rib to align with spar center joints,. Glue in place.

Glue remaining No. 1 rib to first rib, making double thickness center rib at center joints.

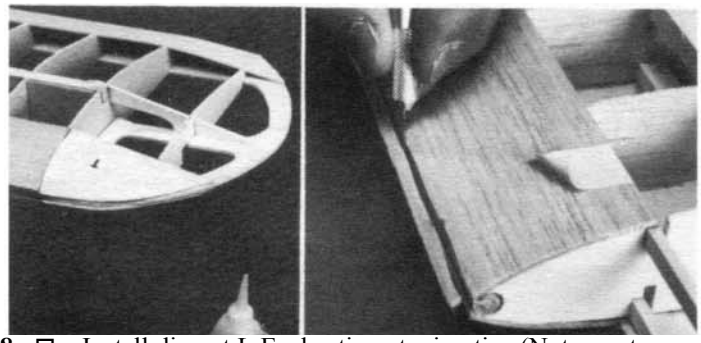
☐ Be sure to glue any joints still needing glue.

6. ☐ Remove all clamps, gauges, and pins from wing structure.

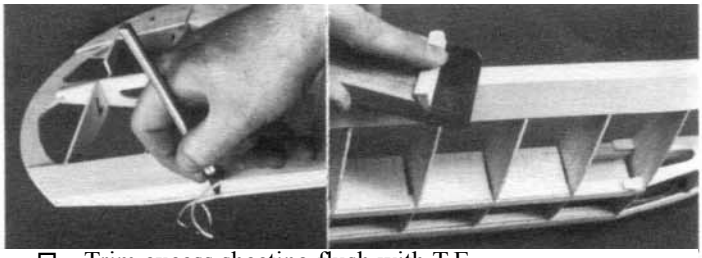


7. ☐ Glue top sheeting in place, trimming to fit as required.

☐ Glue L.E. to filler pieces in place.



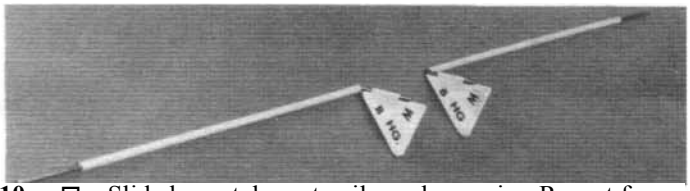
8. ☐ Install die-cut L.E. sheeting at wing tips (Note: parts are marked for top and bottom).



☐ Trim excess sheeting flush with T.E.

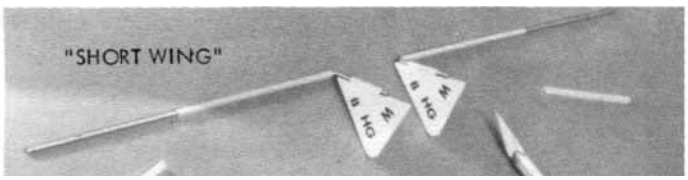
☐ Flat sand T.E. along its entire length.

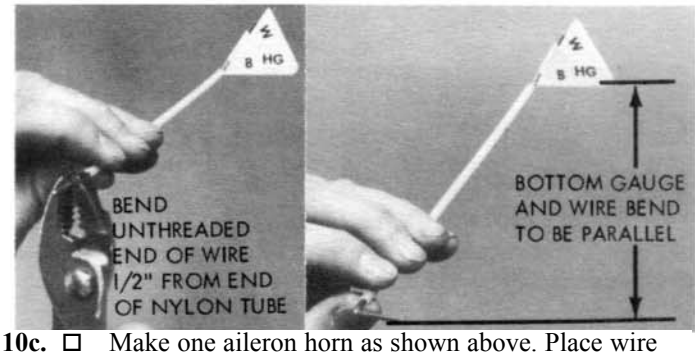
9. ☐ For short wing only, cut 7-3/8" long nylon tube to 3-1/8" long. Repeat for other tube.



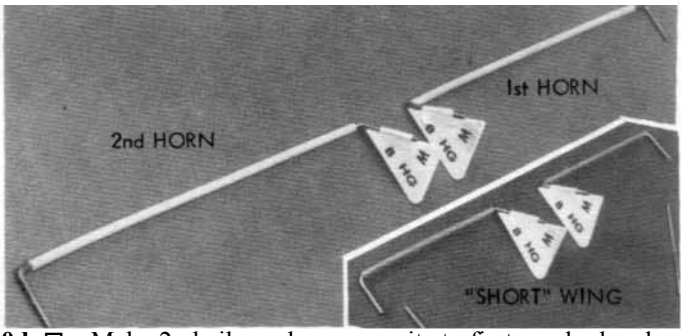
10a. ☐ Slide brass tube onto aileron horn wire. Repeat for other tube and wire.

10b. ☐ Tape horn angle gauges securely to THREADED ends of strip aileron horns as shown (corner stamped "B" at bottom).





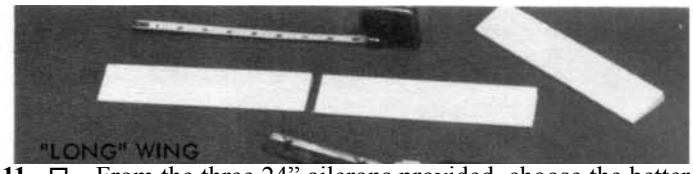
10c. ☐ Make one aileron horn as shown above. Place wire over wing plan to get correct length.Hold wire so bottom of gauge is horizontal. Firmly grasp UNTHREADED end of wire at bend location on plans (see above) and bend wire horizontally 90degrees, Check on table, adjust as necessary.



10d. ☐ Make 2nd aileron horn opposite to first one by bending UNTHREADED end as shown above.

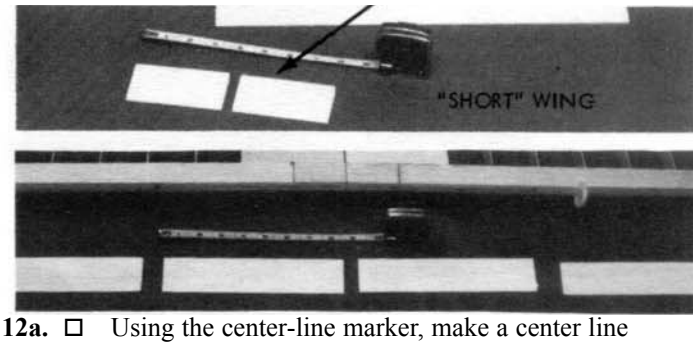
☐ For short wing, after bending, measure and cut wires so only 3/4" length remains.

10e. ☐ File bent ends of wire to a pointed shape for easier mounting of ailerons later on.



11. ☐ From the three 24" ailerons provided, choose the better two for the ailerons, the remaining one to be cut up for inboard and wing tip T.E.s.

☐ For long wing-cut aileron into two 8" pieces (as shown above) for short wing-cut into two 3-5/8" pieces. These are the inboard T.E.

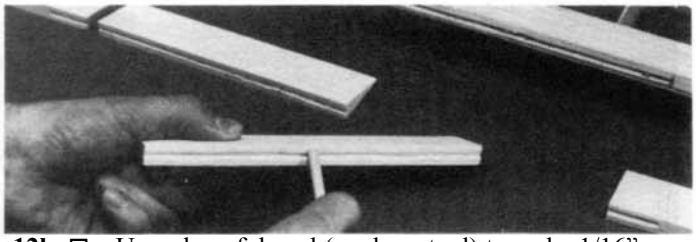


12a. ☐ Using the center-line marker, make a center line along entire lengths of T.E. inboard section, and ailerons.

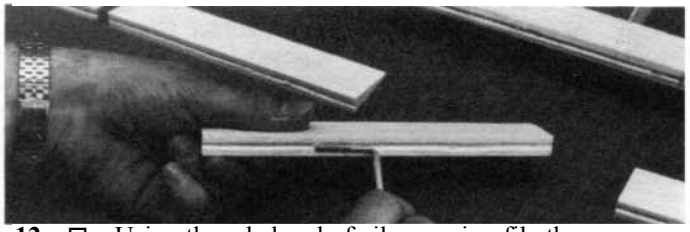
☐ For long wing only; mark each T.E. 9" from center joint.

☐ For short wing only; mark each T.E. 4-3/4" from center joint.

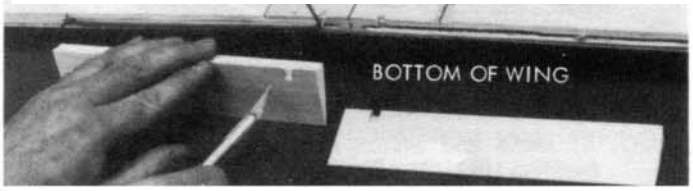
☐ Mark front of ailerons about 1" from inner ends.



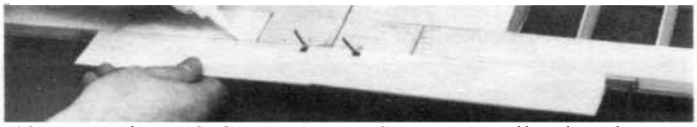
12b. ☐ Use edge of dowel (or sharp tool) to make 1/16" deep grooves 9" long in T.E. (4-3/4" for short wing), 1" long in ailerons, and full length in inboard sections, for both wing halves.



12c. ☐ Using threaded end of aileron wire, file the grooves to a rounded shape so half of the nylon tubing will lie recessed in both the aileron and the T.E.

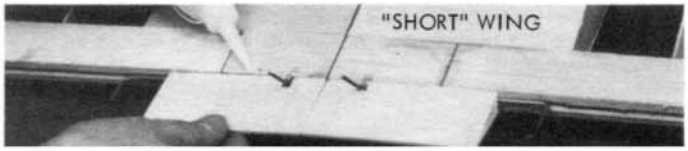


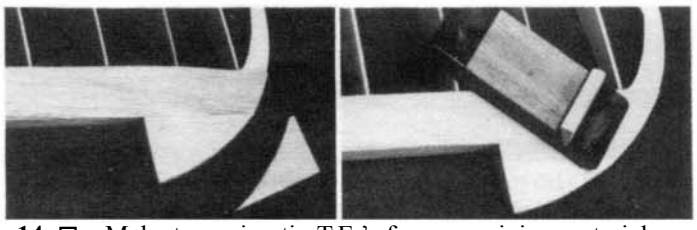
12d. ☐ Cut two clearance slots 3/4" from center joint in wing T.E., and 3/4" from inner ends of T.E. inboard sections.



13. ☐ Using NO GLUE AT FIRST, temporarily place horns in wing grooves, position both T.E.inboard sections and check for horn movement-top to move about 3/4" total fore and aft.

☐ Remove T.E. inboard sections, and carefully glue horn wire tubing and T.E. inboard section in place (CAUTION: keep glue off wires).

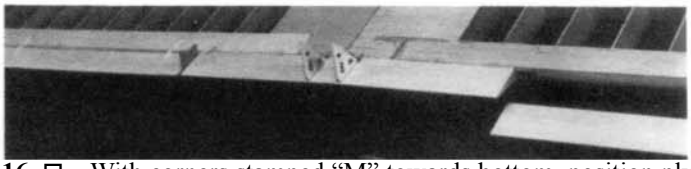




14. ☐ Make two wing tip T.E.'s from remaining material from step 11.

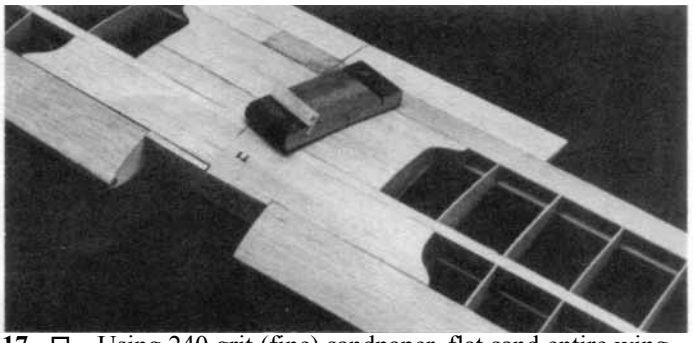
☐ Temporarily hold aileron at T.E., and position wing tip T.E. (allow 1/16" between end of aileron and tip T.E.). Glue tip T.E. pieces in place.

☐ Carefully cut tip to shape. Repeat for opposite tip.

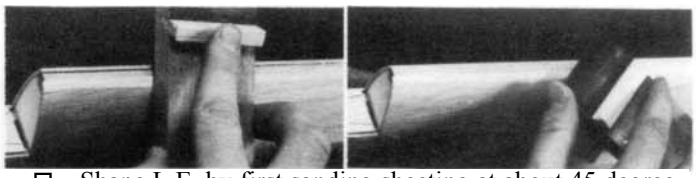


16. ☐ With corners stamped "M" towards bottom, position ply horn angle gauge at threaded end of one horn wire, slowly press aileron on other 3/4" end of wire to make a mark. With a small nail, make a hole for the wire. Work carefully, keeping the hole centered inside the aileron. Repeat for other aileron. When fitting aileron, keep it centered to allow clearance at ends. Mark hinge location over plan and drill hinge holes.

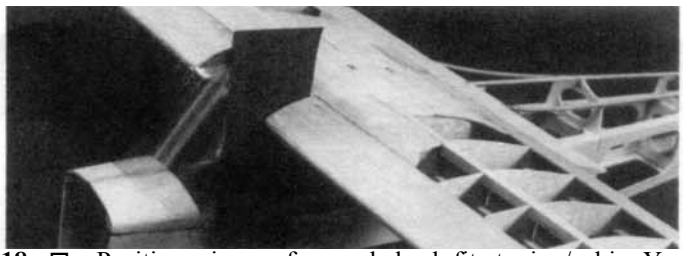
☐ Using beveling tool "EA", bevel front edge of aileron to centerline. Turn aileron over and repeat sanding. Repeat for other aileron.



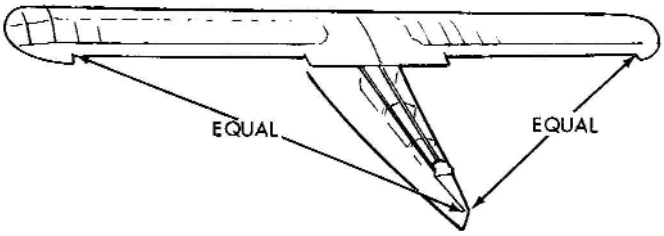
17. ☐ Using 240 grit (fine) sandpaper, flat sand entire wing to blend surfaces and remove high spots.



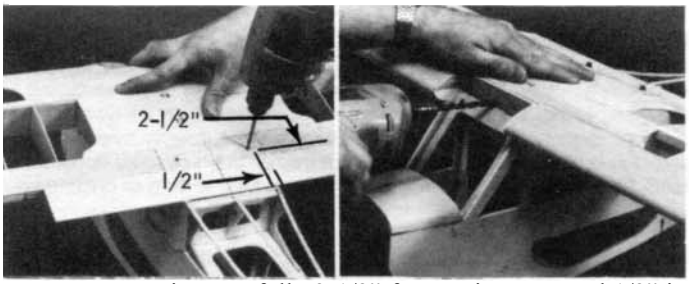
☐ Shape L.E. by first sanding sheeting at about 45 degree angle, then carefully round off and blend surfaces.



18. ☐ Position wing on fuse and check fit at wing/cabin. You should be able to insert a sheet of sandpaper into the joint as shown. If too tight, work the sandpaper into the joint with a sawing action. This allows clearance for covering material.



19. ☐ Set wing in place on fuse, then check and adjust until wing tips are equidistance from rear end.

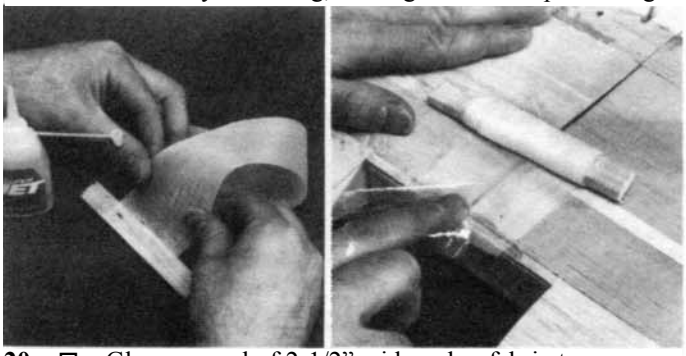


☐ Measuring carefully 2-1/2" from, wing T.E. and 1/2" in from fuse sides, drill two holes 5/32" dia. down through wing and bolt mounting blocks.

☐ Remove wing from fuse. Install blindnuts in bottom of mounting blocks, pulling them up in place using screws and washers.

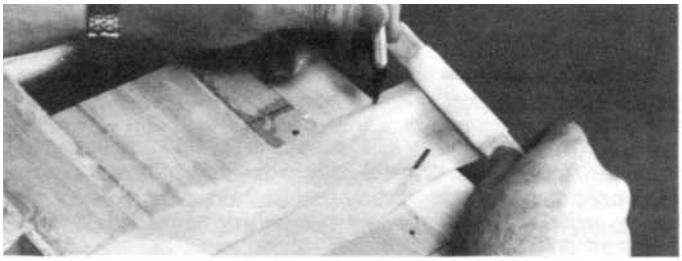
☐ Install bolts. Check alignment of wing and fuse at front. At hole in former C, drill a 1/4" dia. hole about 3" deep into wing.

☐ Cut remaining 1/4"x4-1/2" dowel to 2-7/8" length. Glue this dowel securely into wing, leaving about 1/4" protruding.

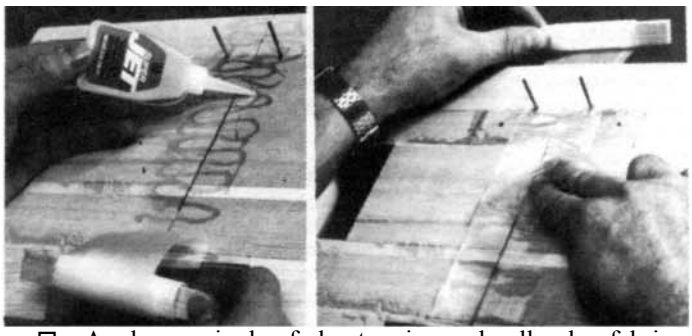


20a. ☐ Glue one end of 2-1/2" wide nylon fabric to scrap wood. Let dry until the nylon is glued solidly to the balsa. Then roll up nylon on to wood.

☐ Apply a line of CA across center joint on wing tip and stick one end of 1-1/2" wide nylon to it. Let dry until the nylon is glued solidly to the balsa.



21b. ☐ Cut openings in nylon for aileron horns.

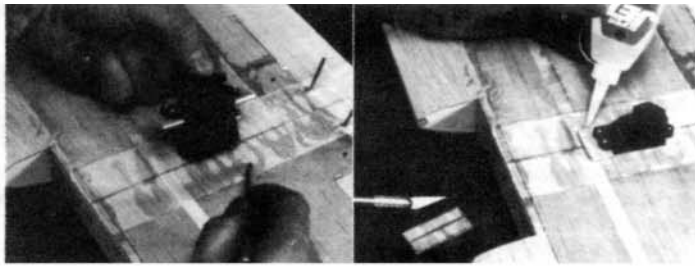


☐ Apply a squiggle of glue to wing and pull nylon fabric down into it. Rub nylon into glue with your finger (cover finger with plastic bag or similar).

20c. ☐ Repeat gluing procedure and apply nylon around T.E., across top of wing and out past the L.E. spar (do not apply nylon to front of joiner). Trim nylon flush with joiner.

☐ After entire center joint has been wrapped with nylon, apply another coat of glue and force it down through the nylon. Let dry thoroughly.

21a. ☐ Temporarily mount servo on die cut rails. See wing side view on plan for added details of aileron servo installation.



21b. ☐ Position servo behind bottom main spar and mark size for opening.

☐ Cut out bottom sheeting as required to suit your servo.

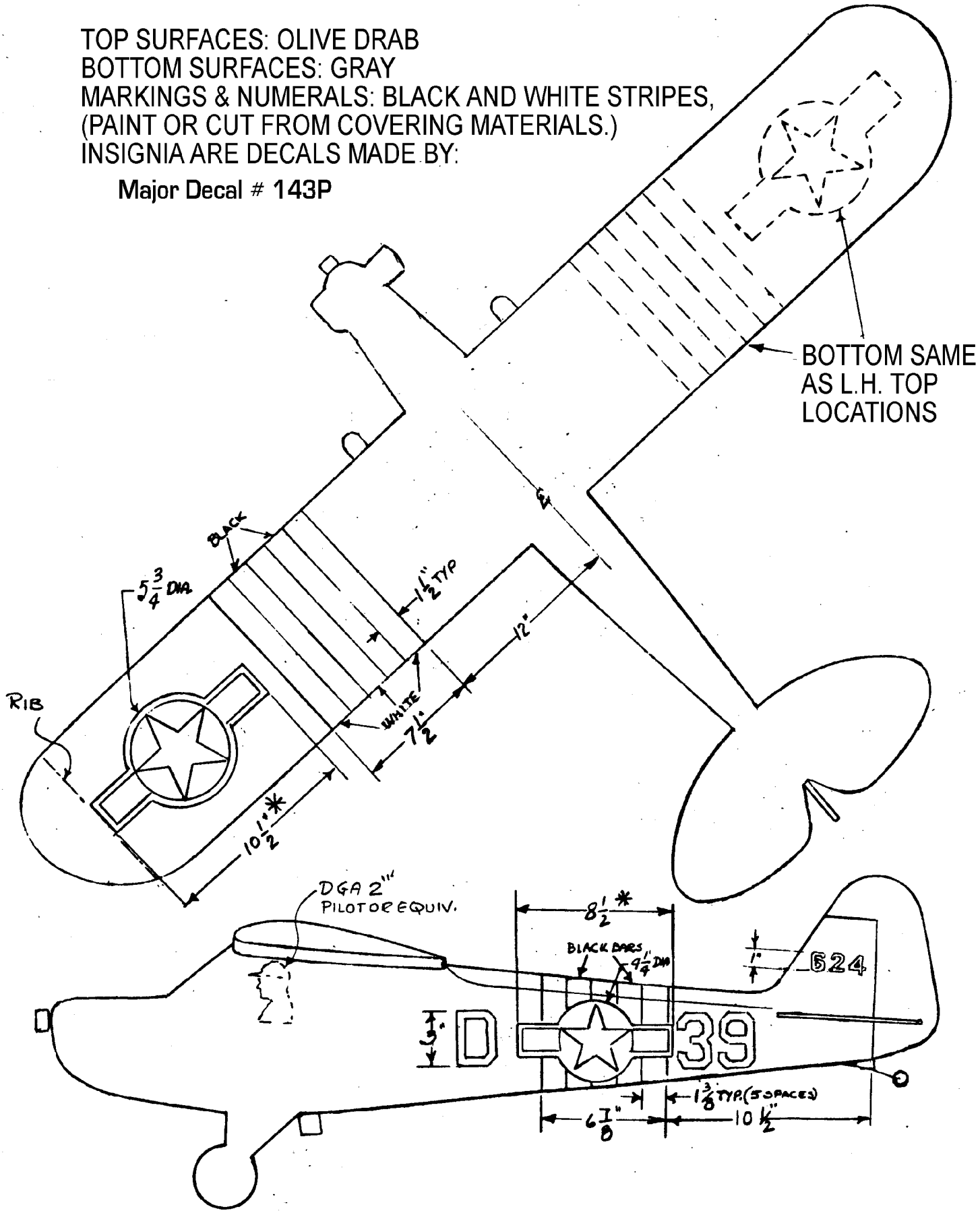
☐ Glue servo rails to wing. Avoid getting glue on servo. The servo should be removed before covering,

THIS COMPLETES THE WING ASSEMBLY.

L - 4 CUB MILITARY COLOR SCHEME REFERENCE

TOP SURFACES: OLIVE DRAB
BOTTOM SURFACES: GRAY
MARKINGS & NUMERALS: BLACK AND WHITE STRIPES,
(PAINT OR CUT FROM COVERING MATERIALS.)
INSIGNIA ARE DECALS MADE BY:

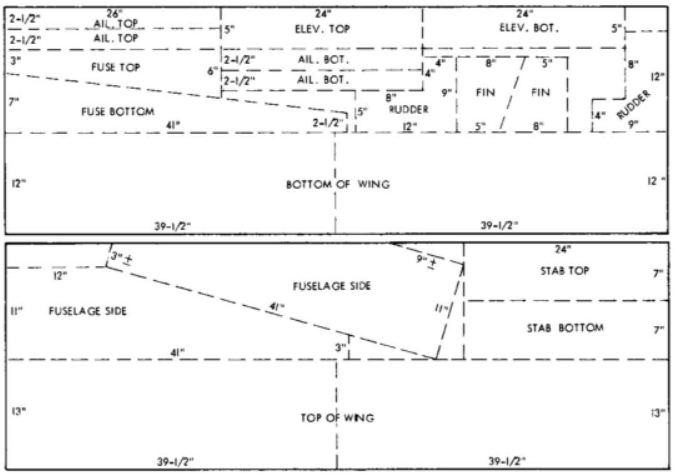
Major Decal # 143P



IV COVERING

GENERAL. A good covering job should be preceded by careful sanding, filling nicks and dents, then more sanding. Use filler appropriate for balsa. Any irregularities in the wood surface will show on the covering, so a smooth sanding job is a must for good appearance. For final sanding, use fine sandpaper (grade 240 to 320) and a sandpaper block.

IMPORTANT! Raw fuel and engine oil residue, if allowed to puddle or stand, can eventually deteriorate the finish, resulting in loose edges of the covering and striping, peeling paint, etc. Wiping the model down after each flight will help maintain your plane's finish for years. Engine exhaust often affects details such as door striping, etc. Careful applications of Instant Jet along the edges will hold them down securely in place.



The diagrams above suggest how to use two rolls of 27″ wide × 79″ long material to cover your model in one color (follow diagrams carefully—there's not much scrap material). Three different color schemes are show on the box label, the stock yellow Cub, a sunburst scheme for the Clipped Wing, and a military L-4. In duplicating any of these color schemes you have two options: 1) cover the model in one color and then paint the remaining color details; or 2) cover the model in one color material and create the color scheme by overlapping different colors. We finished all our models using the former method and below briefly describe how they were done.

STOCK YELLOW. This model was covered entirely with "Cub Yellow" ColorTex. It was then given a few light coats of yellow paint to make the covering slightly more opaque and to provide a masking tape "ground" for painting the lightning stripes on the fuse sides. The lightning stripes on the full size Cub were applied rather casually at the factory. Whoever was working the masking that day was responsible for laying out the shape and position of the stripes. So don't sweat trying to scale them—they varied on the originals too!

SUNBURST. This model was covered entirely with white ColorTex. It was then given a few light coats of white paint to make it slightly more opaque and provide a ground for masking tape. The red sunbursts were masked off and then painted. Instead of painting the sunburst design, an alternate way is to cut them from red ColorTex and apply them directly over the white. ColorTex is ideal for this since it will not trap air bubbles when applied over itself. The design should be applied at a lower heat setting as prescribed in the Color Tex instructions.

MILITARY. This model was covered entirely with yellow ColorTex and then painted. Olive drab dope was used as the primary color. White and black dope for the numbers and stripe markings. The insignia are hobby shop items.

PAINTING FABRIC COVERING. Modeling grade polyurethane, epoxy paints and dopes are recommended finishes. These are fuel proof and are readily available in may popular colors. Spray paints yield more uniform results, but even brushed-on paints can look good if applied with care. Be sure to follow the finishing instructions that came with your covering.

PAINTING PLASTIC FILMS. Modeling grade polyurethane or epoxy paints are recommended. To assure good paint adhesion to the plastic covering, the area to be painted should be washed with soap and water to remove surface grease and oil. Then dry thoroughly. The design is then carefully masked; vinyl tape is best for this. Optional: gently wipe masked area with 000 steel wool to dull plastic surface for increased paint adhesion, being careful not to disturb the masking tape.

COVERING THE WING

☐Using a fresh razor knife or blade, cut a piece of covering 1″ larger in each dimension than one-half of the wing bottom. Strip clear protective backing from adhesive side.

☐With iron at proper working temperature, tack covering to perimeter edges of the panel, gently pulling out the main wrinkles as you go. For a drum tight finish, it is important to pull the covering flat and smooth before applying heat for final shrinking. Pull the covering slightly taut as you go. Don't rely entirely on shrinkage to eliminate wrinkles and sagging.

☐Seal all around edges.

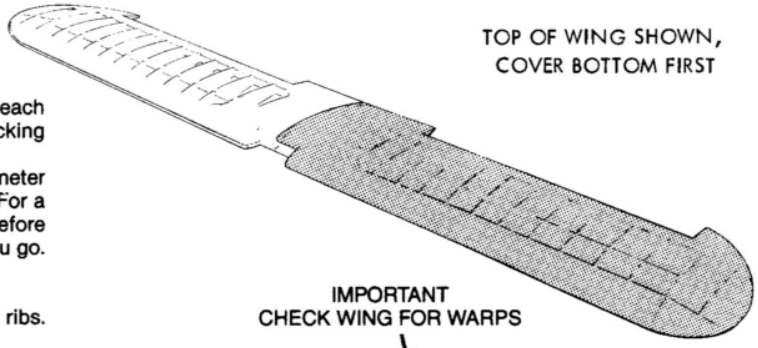
☐Glide iron over interior to tighten covering. Seal covering to all ribs. Trim edges.

Following same procedure, cover entire bottom, then top. Immediately go back and slit covering to open aileron hinge slots while the locations are still fresh in your memory. Also, open the four strut mount holes in wing bottom. See plan for help in locating slots and holes.

☐Cover the ailerons in same manner, first the bottom, then the top, overlapping the covering around the edges.

COVERING THE TAIL

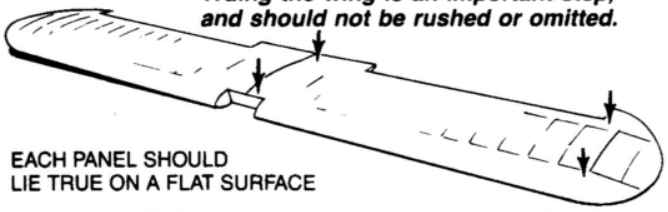
Following same procedure as the wing, cover the stab/elevator and fin/rudder. Do not cover any areas of the stab or fin which will later be glued (the fin bottom for example). After covering over hinge slots, go back and slit covering to open slots while the locations are still fresh in your memory.



IMPORTANT
CHECK WING FOR WARPS

TRUING WING

Truing the wing is an important step, and should not be rushed or omitted.

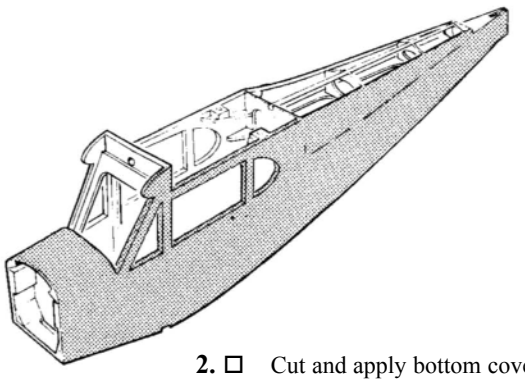


☐ Set one half of wing on a flat surface to detect warp. To counter any warp found, twist panel slightly in direction opposite to warp, and hold position while gliding iron over covering to re-tension structure. Repeat process until panel is true.

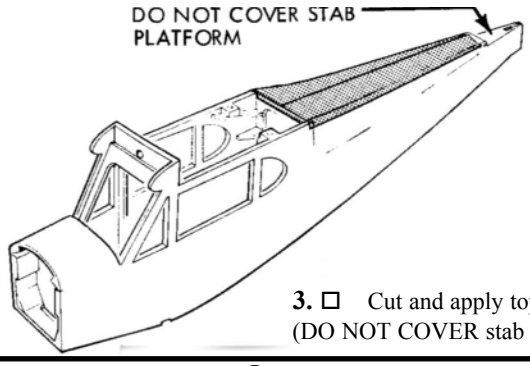
☐ Follow same procedure with other half of wing.

COVERING THE FUSELAGE

1. For added realism, the cabin interior may be painted: this is easily done now, before covering, using spray paint such as gray auto primer.



2. ☐ Cut and apply bottom covering to fuse.
☐ Cut and apply side covering to fuse.
☐ Carefully cut out window openings.



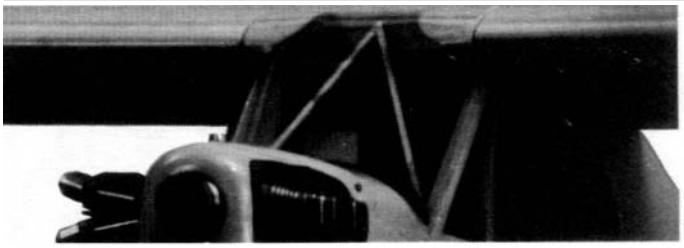
3. ☐ Cut and apply top covering (DO NOT COVER stab platform).

Important
THE WINDSHIELD IS NOT PERMANENTLY GLUED IN PLACE UNTIL AFTER THE PUSH RODS ARE INSTALLED.

DECAL INSTRUCTIONS

For the instrument panel decal only, when cutting it from decal sheet carefully trim it even with the black printed area to provide a good fit on the dashboard. Apply panel and remaining decals as described below.

☐ Clean model surfaces thoroughly before applying decals Cut decal sheets apart in sections as needed. Using scissors, trim to within 1/8". Carefully position decal on model and stick in place. Working from center, rub decal down while peeling off backing.



Cabin Front Trussing. For added scale detail, glue two 1/8" x 4-15/16" dowels in the cabin front as shown on the label photo.

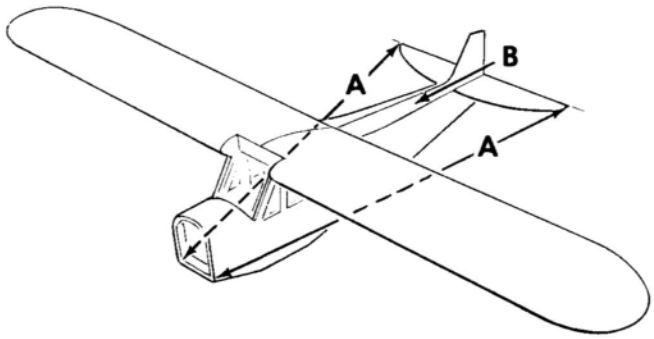
FINAL ASSEMBLY

☐ When the wing is in place, a seal is needed to protect against the entry of exhaust oil and dirt into the radio compartment. Also the seal acts as a cushion between wing and fuse to prevent abrasion of the covering. For this seal we recommend the use of silicone caulk. Since it dries slowly, save this step as the last of a building session. Tape plastic kitchen wrap around the wing center section. Apply a thin ribbon of caulk to the wing rest surface on top of the fuse. Install wing and bolt down moderately-do no wipe off the silicone that squeezes out. Let dry overnight. Remove wing and using a sharp blade, trim excess flush with fuse sides.

☐ Bolt wing in place on fuse. Using no glue, trial fit stab in place on fuse, adjusting as necessary to line up with wing. Then measure from stab tips to fuse front (arrows 'A') to make sure stab is square with fuse.

☐ To provide a firm wood-to-wood glue joint, strip covering from bottom of stab center where stab contacts fuse. Avoid cutting structure underneath. Be certain to leave enough covering firmly bonded to stab center (minimum 1/8" to 3/16"). Likewise, if stab area on fuse was covered, remove covering. Glue stab firmly to fuse and let dry.

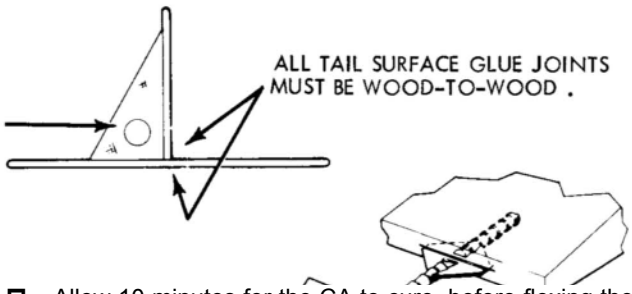
☐ Trial fit fin in place on stab (arrows 'B'). Strip covering from fin in bottom (if covered) and respective area on fuse/stab. Glue fin firmly in place, and square with stab.



INSTALLING HINGES

IMPORTANT! Read and follow hinging instructions carefully. All hinges must be firmly glued in place. Loose hinges can allow a control surface to fall off, resulting in a crash! Tug hard on each hinge to check bond.

☐ When all the parts are ready for hinging then re-mount the hinge with a pin inserted in the center. when satisfied that all parts are aligned properly, remove pin. Apply 3 to 4 drops of thin CA glue to the exposed hinge line. Turn over and apply another 3 to 4 drops to the hinge line of the other surface.

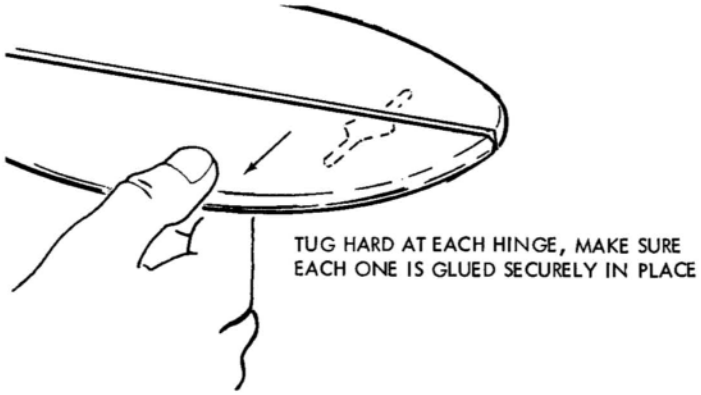


☐ Allow 10 minutes for the CA to cure, before flexing the surface.

☐ Work the surface up and down to remove any stiffness you may feel.

☐ Hinge elevator to stab. When dry, tug hard on each hinge to check bond.

CONTINUED ON NEXT PAGE



☐ Hinge rudder to fin.

☐ Hinge ailerons to wing (IMPORTANT! When hinging ailerons to wing, be sure to glue strip aileron horn wires into ailerons, but DO NOT GLUE ailerons to nylon tubing!).

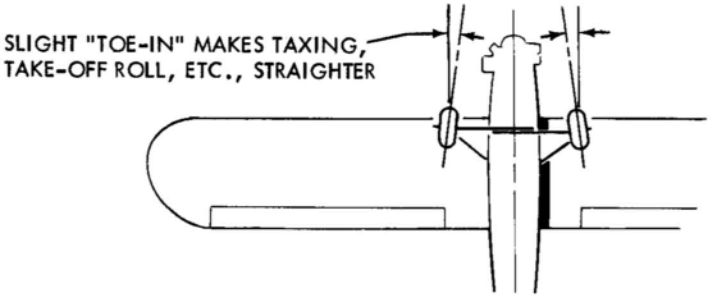
☐ Tug hard on each hinge to check bond.

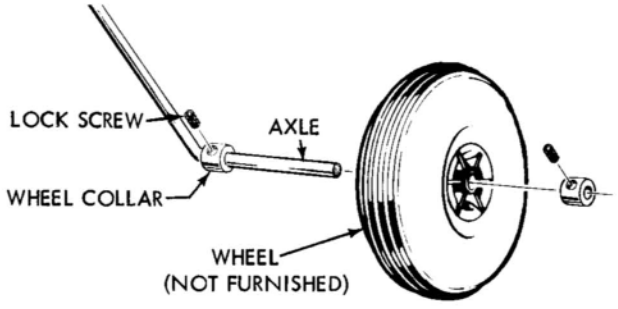
FUEL SYSTEM

☐ Install your fuel tank, hold it level by supporting the rear end with foam rubber as shown on the plan.

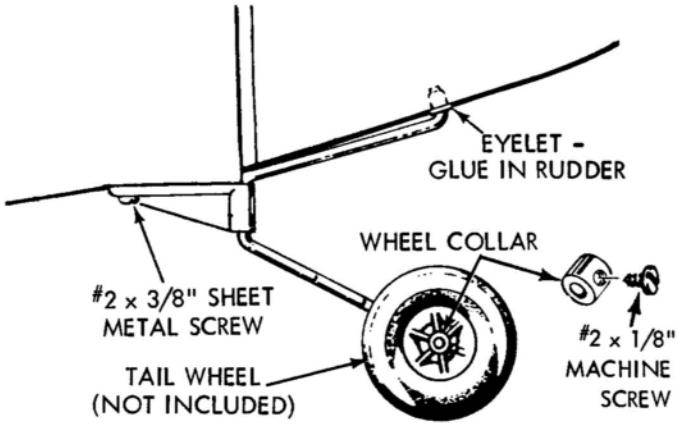
OPTIONAL PRESSURE FEED

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

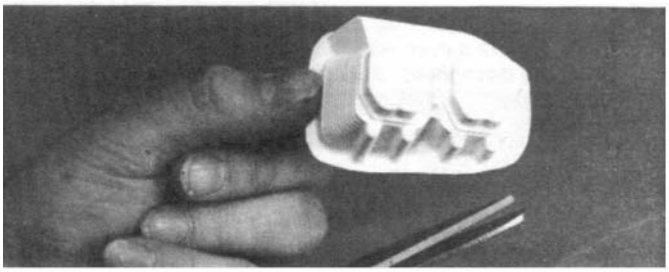


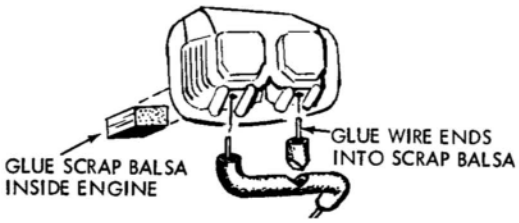


☐ Install wheels on axles as shown: wheel collar and set screw first, wheel, then second wheel collar. If the axle hole in your wheels do not fit the L.G. wire, enlarge holes with a 3/16" drill. Hold wheel loosely so it will center itself while drilling, and use slow drill speeds if possible.

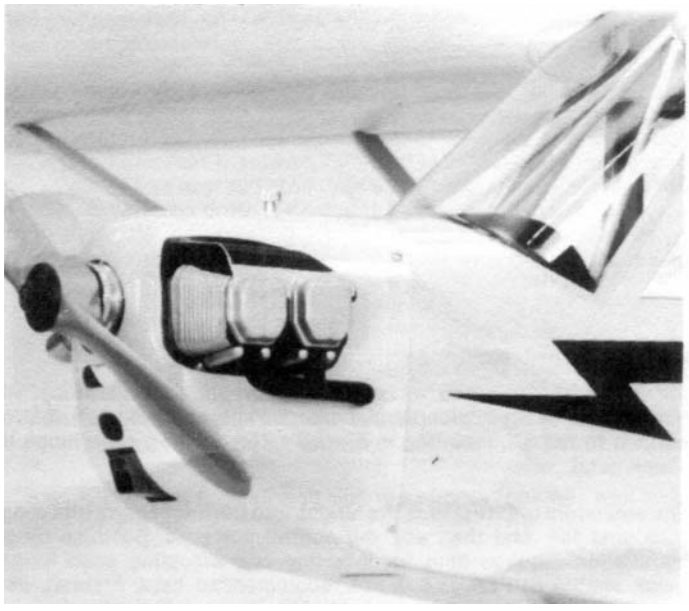


☐ Refer to plan and bend up 1/4" of tail wheel wire. Glue eyelet into rudder bottom to match bend. Plug wire into rudder eyelet., then glue and screw nylon bracket securely to fuse. OPTIONAL: Instead of bending the wire into the rudder, glue scrap tubing to rudder bottom and insert straight tail wire into it.

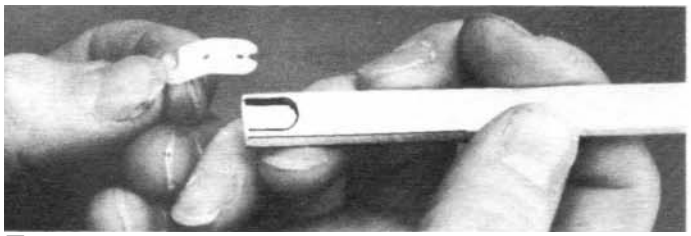




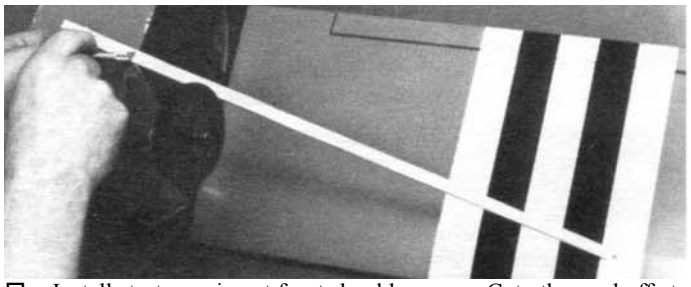
ENGINE DETAIL. A formed engine detail is furnished for the left side of the cowl only (the R/C engine will be on the right side. Carefully remove scrap flashing from around the engine by cutting along marked outline. Paint engine as desired (do no use lacquer based paints on the engine). Exhaust pipes are simulated with5/16" dia. black automotive vacuum tube. Insert 14 gauge solid wire into tube (to hold shape). Assemble parts as shown in sketch and glue in position to cowl (materials not included).



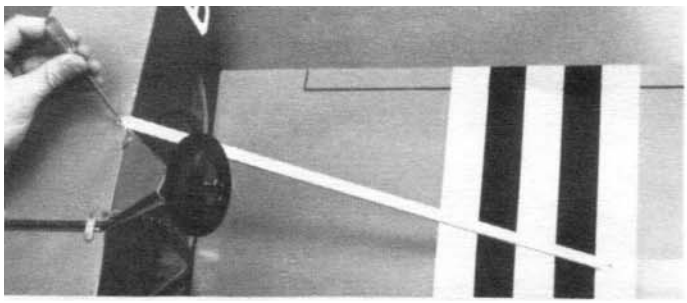
WING STRUTS. The wing was designed to be flown without wing struts. The struts are intended for scale appearance only and use snap fittings for quick set-up at the flying field. Before fitting struts, the wing must be covered and checked for trueness (all warps removed), once fitted in place, the struts are set and not adjustable.



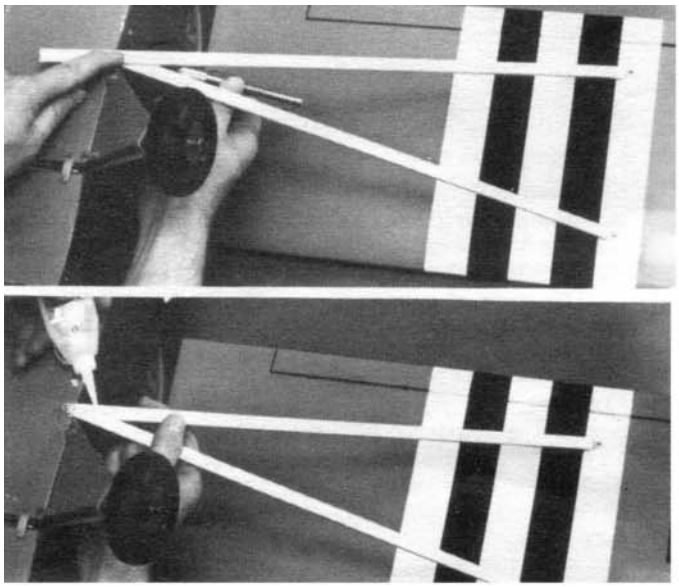
☐ Install #2 shoulder screws in wing at four strut mount locations. When assembling struts, orient all hold-downs so side openings face towards front of model (see photos above and illustration on page 5). Bend one hold-down at center. Cut a recess in strut end and glue hold-down flush in strut



☐ Install strut on wing at front shoulder screw. Cut other end off at the fuse, behind the L.G. fairing.

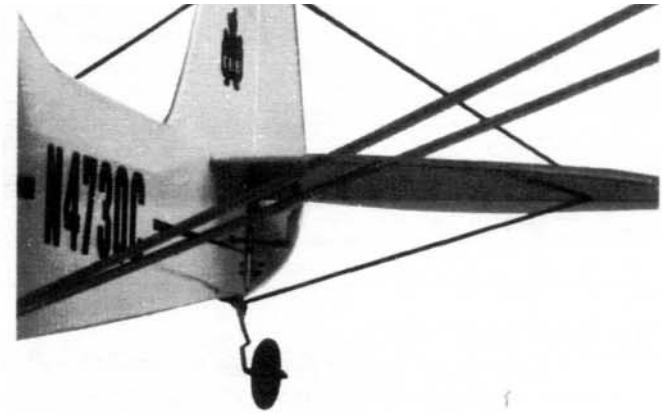


☐ Bend, recess and glue second hold-down in bottom of strut end. Attach this hold-down to fuse bottom using a #2 shoulder screw.

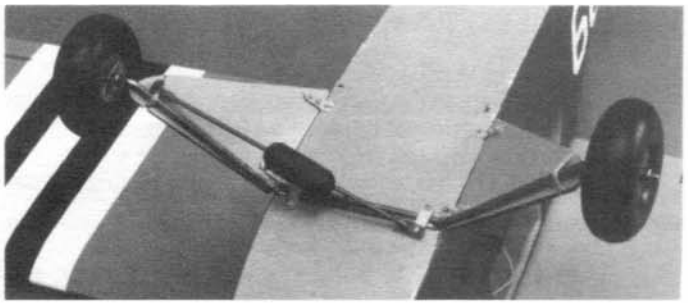


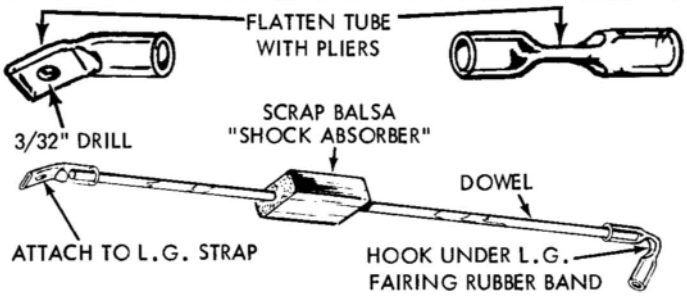
☐ Install rear strut in same manner.

☐ Cut rear strut to butt against front strut and glue. IMPORTANT: the struts must not alter or twist the wing.

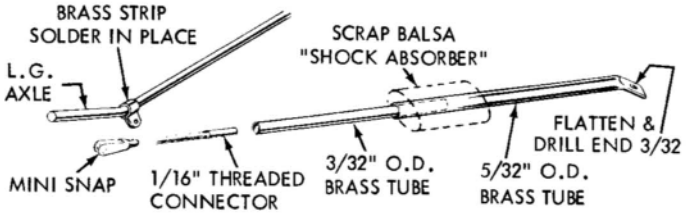


TAIL WIRE BRACING. To simulate bracing, use 1/16" elastic cord (from sewing shop). Drill holes through tailwheel bracket, stab, and fin at locations shown on plan (refer to label photos for more details). Lace cord through holes and tie it off at tailwheel bracket, secure knot with CA (apply a drop to cord ends for easier lacing).





LANDING GEAR SHOCK STRUTS. Clear plastic tubing and two 1/8" dia. × 7-1/2" dowels are furnished to simulate the L.G. shock struts. Cut and flatten tube as shown in sketches above. Glue together and mount as shown in photo. A more scale treatment of the struts is illustrated below and on the label photo (materials not included).



PILOT FIGURE. A pilot figure adds a final touch of realism to the Cub, especially during those low & slow fly-bys. Assemble and paint the pilot per manufacturer. From scrap ply, make pilot platform and install it in model as shown on plan sheet 1.

VI PREPARATION AND INSTALLATION OF RADIO

- ☐ Model is fully covered and painted wherever necessary (Page 22).
- ☐ Control surfaces are covered, and hinged in place (Page 23).
- ☐ Tail assembly is glued solidly to fuse (Page23).
- ☐ Engine screwed in place (Page 14).
- ☐ Muffler on.
- ☐ Prop in place.
- ☐ Fuel tank installed, with foam rubber supports to hold it level.
- ☐ Stab and rudder pushrods complete, rear end only (Page 14).
- ☐ Landing gear and wheels installed.

2. BALANCING THE MODEL

☐ Tape stab and rudder pushrods to side of fuse with rear ends in approximate final position (refer to full size view on plan).

☐ Set R/C airborne equipment temporarily in fuse (refer to plan for approximate location).

a) Battery most forward.
b)Receiver (RX) next.
c)Servos rearmost.
d) Install aileron servo in wing.

☐ Refer to fuse side view on plan for "BALANCE RANGE," then measure and mark this range at top of cabin sides.

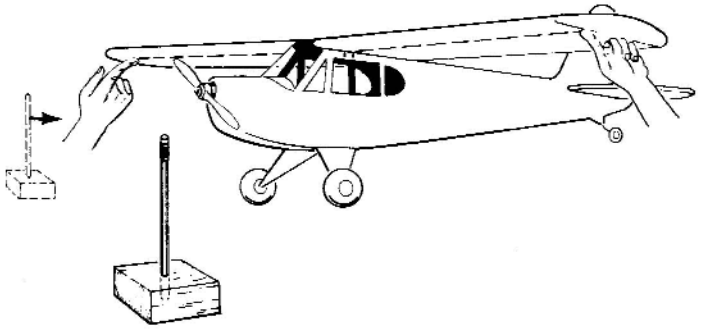
☐ Bolt wing in place on top of fuse.

☐ Enlist someone's aid to help you balance the model as shown. If you must balance it alone, make the simple balance stand at left from scrap lumber (2x4, etc.) to assist you Lift the model under the wing by finger tips.

a) Move finger tips or balance stand through the balance range until model is level.

b) If you need to support the model outside the balance range to get it level, remove wing and shift R/C equipment away from heavy end of model until model will balance within the range. The pre ferred location is at the main wing spar.

c) If shifting the R/C gear still doesn't balance the model, add weight to extreme nose or tail respectively until it's right. The least weight is needed when added as far forward.or back as possible.



Fasten weight permanently in place.

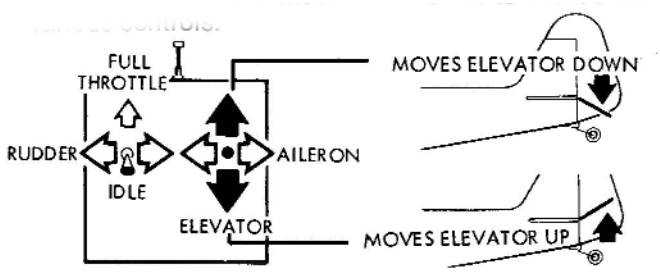
☐ Carefully remove the wing, and mark on fuse interior the locations of all R/C parts.

☐ Completing elevator and rudder pushrods.

a) Measure about 2" from the backsides of the servos to the balsa pushrods, and mark them at this point.
b) Remove pushrods from fuse, and cut them at marks.
c) Cut one 1/16" x12" wire in half, and use these pieces to complete forward end of pushrods.

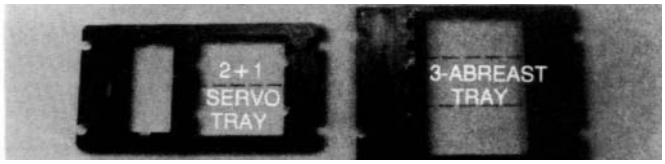
3. Radio installation.

A. Read and follow the instructions that come with your radio.
B. Your batteries should be fully charged.
C. Refer to "Transmitter Function Sketch" and observe which servo wheels move when stick is moved for various controls.



☐ Apply tape (which you can write on) to each servo. Identify each servo for its control function. Mark the plug to each servo the same way: "R" for rudder, "E" for elevator, "T" for throttle, "A" for ailerons. If your receiver doesn't have separate plugs for each servo, but places for the servos to plug in, apply a piece of tape nearby that you can mark for each application.

4. Servo arrangement.



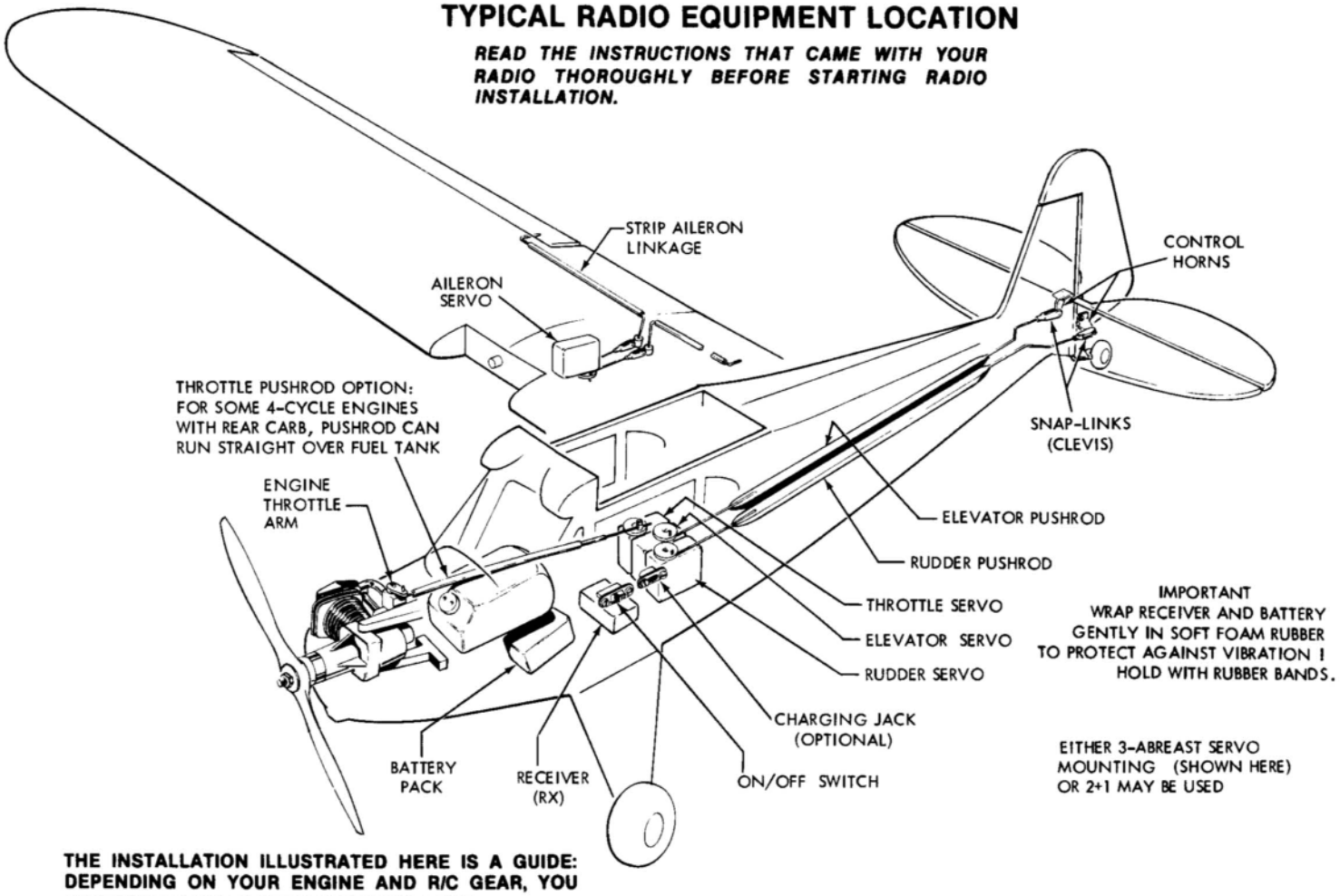
If a servo mounting tray is furnished with your radio, it makes it easier to mount servos. The most common tray is a "2+1" type (as shown above left and in the main plan view).Either a 2+1 or a 3-abreast can be used in the CUB because of its wide roomy interior. Note: if a tray is not used, the 3-abreast mounting is recommended with servos mounted directly on plywood rails (as shown below the main plan view).

☐ For "2+1" mounting, with throttle servo at forward position, place servo so output wheel is on same side as engine throttle arm. For 3-abreast mounting, place throttle servo on same side of model as throttle arm.

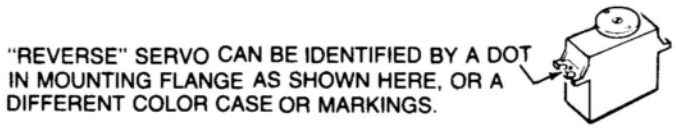
☐ Rudder servo should be on side opposite to throttle servo.

TYPICAL RADIO EQUIPMENT LOCATION

READ THE INSTRUCTIONS THAT CAME WITH YOUR RADIO THOROUGHLY BEFORE STARTING RADIO INSTALLATION.



THE INSTALLATION ILLUSTRATED HERE IS A GUIDE: DEPENDING ON YOUR ENGINE AND R/C GEAR, YOU MAY NOT BE ABLE TO FOLLOW IT EXACTLY.



In radio sets without "servo reversing" feature, the rudder servo is usually a "reverse" servo. A "reverse" servo can be identified by a dot (see above), or a different color case or markings.

☐ Elevator servo occupies remaining rear position for "2 + 1", and is in the center for 3-abreast.

5. Servo Movements.

As mentioned in the introduction on page 2, radio systems with "servo reversing" simplify radio installation. With a **regular non-reversing** system, you must match each pushrod to 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 correct action (see your radio manufacturers instructions).

The 2 + 1 arrangement on the plan shows standard servo placement for a "servo reversible" system. The 3-abreast arrangement shows the elevator pushrod hooked up on the other side of the servo wheel, as required on regular radios. For **either** type of radio system, check your equipment out with the following procedure.

☐ Push the transmitter (Tx) throttle lever up away from you, and observe where throttle servo wheel should connect to the throttle pushrod to give full throttle. mark this on the servo wheel (write on tape). Return throttle lever to full down (idle position).

☐ Move rudder stick to the right, and observe where rudder servo wheel should connect to give right rudder. Mark this on the servo wheel.

Remember, for non-reversing radios, that the rudder servo usually needs to be a "reverse" servo.

☐ Move the elevator stick up, and observe where the elevator pushrod must be attached to the elevator servo to pull the elevator down. Mark servo.

☐ Move the aileron stick to the right, and observe that the right aileron must be connected so it moves up.

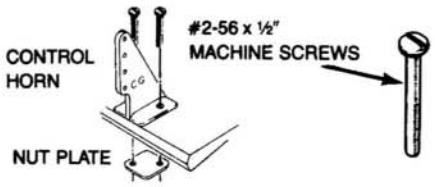
6. Mounting The Control Horns and Pushrods.

Rudder Horn

☐ Remove covering from die-cut exit holes in fuse sides for pushrods.

☐ Refer to fuse side view on plan for correct location.

☐ Tack-cement control horn on correct side of rudder.



☐ Drill through holes in horn, and mount nut plate on other side using screws as shown. Trim screws flush with nut plate.
☐ Working from cabin, feed rudder pushrod (threaded end) through fuse rear and out thrugh exit hole.

☐ Twist snap-link (clevis) onto threaded rod. Hold pushrod wire with pliers while installing snap-link. Connect to rudder horn.

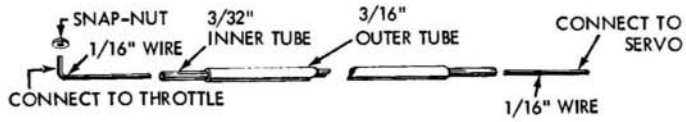
Elevator Horn

☐ Position horn under elevator — refer to plan for correct location.
☐ Insert threaded end of elevator pushrod from cabin through fuse rear and out exit hole.
☐ Install snap-link on rod, and connect to elevator horn.

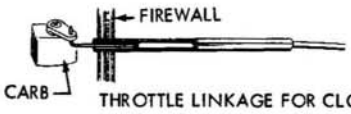
7. Mounting Servos, using a tray (for mounting without tray, follow instructions as applicable.)

☐ Tape front end of rudder and elevator pushrods up out of the way near cabin windows.
☐ Insert the soft rubber grommets into the mounting holes of your servos and tray.
☐ Correctly position servos in tray and gently fasten them in place with screws provided with radio system.
☐ At servo locations previously marked during balancing, try fitting a 5/8″ × 4-1/2″ ply rail at the rear rail location. If the rail is too long to fit inside fuse, sand one end until it fits snug. Glue in place.
☐ Place servo tray between rails, and adjust the forward rail for mounting tray. Glue this rail in place. (IMPORTANT: for mounting servos directly on rails without a tray, allow 1/16″ clearance all around each servo — only servo grommets to contact rails, and glue forward rail in place.) Mark through the grommets for the location of the mounting screws.
☐ Remove the tray or servos. With a 1/16″ drill bit, drill holes in rails, and fasten tray in place with screws provided with your radio system.
When mounting servos without tray, gently fasten them with #2 × 3/8″ sheet metal screws.

8. Installing The Throttle Pushrod.

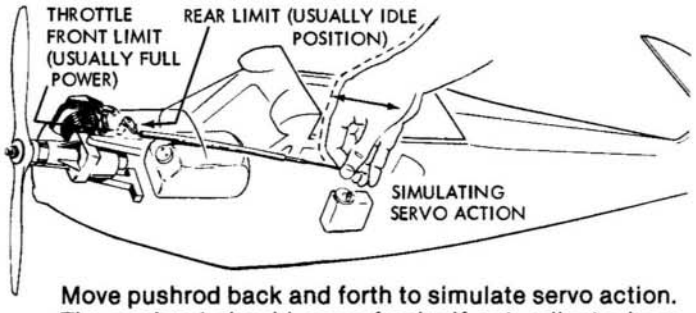


☐ Determine the most direct practical route from the throttle servo to the engine throttle arm. Mark and drill a 3/16″ hole through firewall for outer pushrod tube. Cut 3/16″ tube to a length that is 4″ shorter than the distance between the servo throttle actuating arm and throttle arm. Place tube in fuse, and slide 3/32″ inner tubing through it. Cut inner tube so it protrudes 1″ beyond each end of the 5/32″ tubing. For throttle hookup, cut a 1-3/4″ length from scrap 1/16″ wire. Make a 1/4″ square bend at one end. Roughen the other end with sandpaper and Super Jet about 1/2″ inside the 3/32″ tube.
☐ At rear end, make connection to servo by gluing a second 1-3/4″ straight length of 1/16″ wire into the 3/32″ tube. Glue about 1/2″ of the wire into the tubing.
☐ Remove servo wheel, and install the C.G. pushrod connector as shown above. This device lets you easily adjust throttle pushrod movement. Remount servo wheel and connect throttle pushrod.

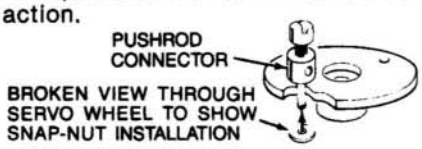


THROTTLE LINKAGE FOR CLOSE CARB INSTALLATIONS

☐ On long 4-cycle engines with rear mounted carbs, the throttle arm may be very close to the firewall. In this case, the pushrod installation shown on the main plan view should not be used. Instead, substitute this method. Install the outer pushrod flush with the firewall as shown in sketch above. Cut the inner tube to a shorter length so that it lies recessed inside the outer tube and only the wire protrudes for hookup to throttle arm. This results in a very direct, neat installation.



Move pushrod back and forth to simulate servo action. The pushrod should move freely; if not, adjust where necessary. Feel the front and rear "limits" of the throttle arm. Later, when setting controls, be sure to set the throttle servo linkage within the range of throttle arm movement. Glue guide tube to firewall, former B, C and fuse side. If the guide tube needs support, make a "stand-off" from 1/4″ scrap balsa (see plan). Tailor the stand-off to suit the curvature of your installation, glue it only as required so it doesn't interfere with pushrod sliding action.



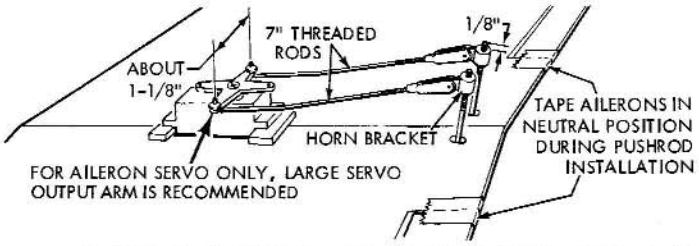
☐ Remove servo wheel, and install the CG Pushrod Connector as shown below. This device lets you easily adjust throttle pushrod movement. Remount servo wheel.

Make sure throttle servo is at idle position. Engine throttle arm also should be at rear or idel position. Align and cut the pushrod wire so it extends 1/4″ to the rear of the pushrod connector, and attach. Check action with radio, and if OK, throttle pushrod hookup is completed.

10a. Hooking Up Elevator and Rudder Pushrods.

☐ Position elevator pushrod so that the top of elevator is about flat with top of stab. Allow additional 5/16″ past servo wheel hole, then cut and bend forward end of pushrod. Roughen bent-up wire with sandpaper, remove servo wheel and insert wire, and retain with snap-nut.
☐ Position rudder pushrod so that the rudder is aligned with fin. Cut and bend forward end of pushrod as above, and attach to rudder servo wheel.

10b. Hooking Up Aileron Pushrods.



☐ Re-install aileron servo in wing. Tape ailerons in neutral position (so flat bottom of wing and ailerons are flush).

☐ Install horn brackets on aileron horns as shown. Install snap-links on each 7″ True 1/16″ threaded rod, then connect snap-links to horn brackets. Align each rod to its respective hole in servo wheel. Allow additional 5/16″ past servo wheel holes, then cut and bend forward end of pushrods, same as elevator pushrod procedure.

11. Installing Switch and Charging Jack.

☐ Temporarily set battery and Rx in fuse. Position switch and charging jack cover plates on outside of fuse on side opposite to engine exhaust as shown on plan side view. Mark through cover plates for holes and openings.

Refer to side view on plan, and see location of antenna exit through fuse bottom — a 1/8″ hole between battery and receiver. Mark this location for hole. Remove battery and Rx.

☐ Make holes through fuse side. Make sure hole for switch button is long enough for it to move to ON and OFF position.

☐ Install switch and jack.

☐ Later, when radio is operating, identify ON and OFF position with decals provided.

12. Battery Pack.

☐ You must have fully charged nicads for flying.

☐ Wrap battery in 1/2″ very soft foam rubber to cushion it from vibration and shock. Use rubber bands or tape to hold the foam around the battery. It is also good to place battery and Rx in individual plastic bags to protect against fuel and oil.

☐ Position battery in fuse, and hold in place with additional foam rubber.

13. Receiver (Rx).

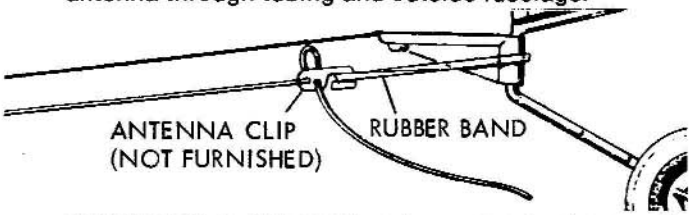
☐ Do not cut the antenna wire attached to the Rx.

☐ Wrap Rx carefully in foam like the battery.

☐ Re-connect all cables so R/C system is operational; be sure that each servo is plugged into its respective Rx terminal.

☐ Place Rx in fuse behind the battery.

☐ Glue a 1″ length of small diameter fuel tubing into antenna exit hole as shown on plan. Install strain relief (supplied with radio) on antenna about 2″ from Rx. Lead antenna through tubing and outside fuselage.



☐ Using clip supplied with radio, suspend antenna with rubberband from tail-wheel mount as shown above. Adjust antenna in clip so it is just slightly taut, not tight. Let excess wire hang loose from clip.

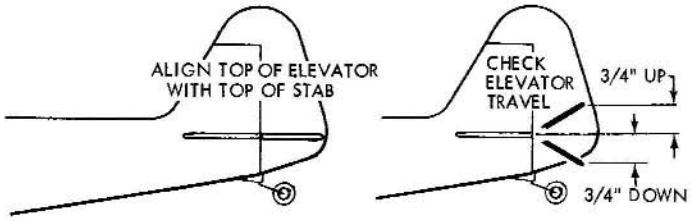
☐ Gather all excess cables together behind Rx, and hold them down with foam.

☐ Apply "ON/OFF" decals to outside of fuse to identify switch positions.

14. Setting Control Surfaces.

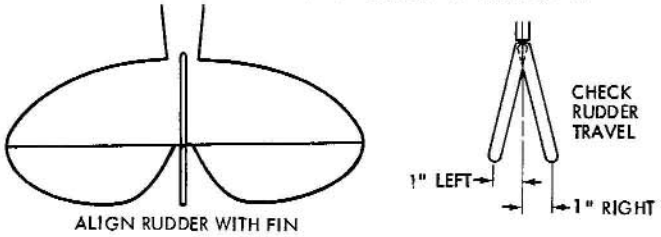
All pushrods must move freely, without binding; adjust if required for smooth operation. When setting control travel, be cautious that no servo is hooked to a control in a manner that prevents the servo wheel from moving through its complete range of rotation. For example, if the throttle servo "buzzes" when moved to "full-throttle" position, the servo still has movement left, but is jammed against the engine's full-throttle limit position. This can damage the servo and drain the battery, leading to loss of control, and a crash.

The following instructions describe how to set the to control surfaces measuring up and down movement. A more precise measurement method is the use of the angle gauge described at the end of this section. Figures in parenthesis (see sketches) are the angular deflections for respective surfaces.



☐ With elevator trim tab on Tx set in center, adjust elevator mini-snap until top of elevator is flat with top of stab as shown above.

☐ Move the elevator stick on Tx full up and down. The elevator should move down about ¾″ and up ¾″.

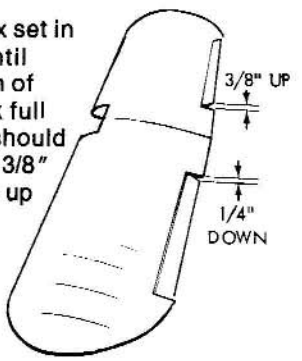


☐ With rudder trim tab on Tx set in center, adjust mini-snap until rudder aligns perfectly with fin. Tail wheel should point straight ahead.

☐ Move the rudder stick on Tx full right and left. The rudder should move to the right about 1" and left 1" .

☐ Move throttle lever on Tx to cycle the throttle from idle to full power. Minor adjustments can be made by shifting the mini-snap location on the engine throttle arm.

☐ With aileron trim tab on Tx set in center, adjust mini-snaps until ailerons are flat with bottom of wing. Move the aileron stick full right and left. The ailerons should move respectively up about 3/8″ and down 1/4" (slightly more up than down is desirable).



THIS COMPLETES THE RADIO INSTALLATION

WINDOW INSTALLATION

☐ Temporarily set windshield in place on fuse and note where its outline contacts fuse. For better gluing, lightly sand covering in this area—light sanding only, just dulling the surface. Glue windshield in place.

☐ Lightly sand gluing flange around the side windows for good bond to fuse. Permanently glue windows in fuse.

PRE-FLIGHT & BASIC AEROBATICS

The following is presented as a pre-flight review for safe and enjoyable flying. If you have been flying only tricycle gear models, you should have little, if any problem getting used to take offs and landings with a tail wheel. For take off, remember to feed in right rudder as required to keep the model rolling straight ahead. Very little right rudder is needed.

If you have never successfully flown an R/C model before, do not try to teach yourself to fly this higher performance model. Even full-scale pilots have problems learning to fly models, because it's different - they're not in the cockpit. We strongly recommend that you learn with a high wing trainer, such as the EAGLE 63 or EAGLET 50, and that you ask your dealer for guidance.

VII WHERE TO FLY YOUR MODEL

Fly only in areas sanctioned for R/C and known to be free of radio interference. If you don't know the whereabouts of an R/C club near you, write the Academy of Model Aeronautics (AMA) and ask if they have a club on file in your area. Most clubs are chartered with the AMA, and we recommend you become a member. Their address:

Academy of Model Aeronautics
1810 Samuel Morse Drive
Reston, VA 22090

VIII RADIO CHECK

Before going to the field to fly, with batteries fully charged, turn on receiver and transmitter and actuate all controls many times until you are satisfied with all functions. Stand behind the model, and make sure that the control responses are correct. Move the control stick to the right and the right aileron should go up. Moving the stick back or down on the Tx should move the elevator up, and vice versa.

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

Prior to the beginning of 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" to 8", you should have at least 100 feet range on the ground. To check this, turn on both the transmitter and 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. **Be careful not to use your transmitter** when someone else on the field is flying *or* testing on the same frequency.

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

CHECK STEERING THE MODEL ON THE GROUND

Apply minimum throttle so that it just keeps the model moving at a walking pace. With rudder stick and rudder trim in neutral position, the model should move straight ahead. If it constantly turns left or right, the tail wheel is not pointing straight ahead, and should be adjusted until it is correct. After taxi runs are completed, thoroughly examine the model, and tighten loose screws, etc.

PRE-FLIGHT CHECK LIST, THINGS TO DO, AND THINGS TO TAKE TO THE FIELD

- ☐ Flight batteries fully charged
- ☐ Radio transmitter (DON'T LEAVE IT AT HOME!)
- ☐ Fresh 1-½ volt starting battery & Glo plug clip
- ☐ Tools to tighten anything that can vibrate loose
- ☐ Fuel and fuel bulb or pump
- ☐ Extra props
- ☐ Paper toweling (for clean up)
- ☐ Prop wrench
- ☐ SUPER JET

AEROBATICS

We highly recommend the book **Flight Training Course, Volume II,** published by **R/C Modeler Magzine**, a small portion of which they have graciously permitted us to reprint here.

On your previous R/C plane, you probably have already tried some of the maneuvers shown here. We present them as an introduction and review of a rewarding aspect of R/C flying — carefully planned and executed flying technique. It's something even expert pattern flyers must practice diligently. An apparently simple thing such as "Touch and Goes," and flying a tight, well-defined traffic pattern are really basic to performing accurate and precise advanced maneuvers.

"Touch and Goes"are an exercise in approach planning, airspeed control, and smooth use of the throttle. These are important elements for all advanced maneuvers. And they will be flown only as crisp and graceful as you want them to be since "practice does make perfect!"

"Which Side is Up?" The business about learning to recognize which side is up may sound foolish, but many a plane has bitten the dust because the pilot thought it was flying one way and it was going another. Other than learning to recognize the plane's silhouette at different angles and attitudes, the best insurance is to learn to keep your head on what you're doing. That is, force yourself to remember where you've come from as well as where you're going. For example, if you concentrate on the fact that you're making a left turn, you'll probably never mix up that silhouette in the sky. If you look away though or forget what the plane is doing, coming back to it can cause a few new grey hairs!

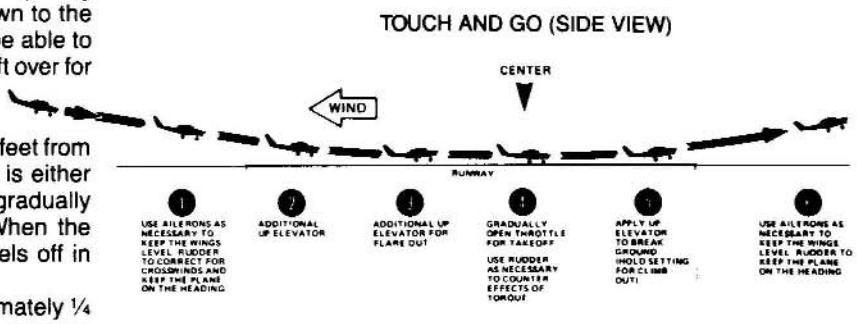
TOUCH AND GOES

In doing a Touch and Go you'll be putting three things together that you've already worked on: the final leg of the Traffic Pattern Approach, the Landing Perfection, and the Takeoff. The only thing that's added is making the transition from the touchdown to the takeoff while the plane is still rolling. And, you have to be able to put your plane down on the runway with enough room left over for a smooth takeoff and gradual climb out.

What The Touch And Go Looks Like.

The plane is flying at about 25-feet altitude at about 200 feet from the end of the runway flying into the wind. The engine is either running at an idle or nearly so with the plane sinking gradually toward the runway in a slightly nose-down attitude. When the plane reaches about 6-feet altitude, the glide path levels off in preparation for the flare out and final touchdown.

When the plane touches down, it slows down to approximately ¼ the flight speed. Without stopping, the plane begins accelerating and lifts off. The lift off and climbout is gradual and smooth.



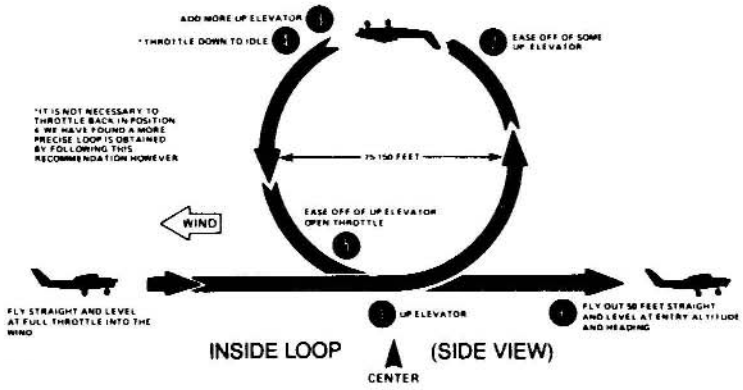
THE LOOP

This is a good one to start with because it's usually the first "stunt" the new pilot has the guts to try. Another reason is that, at first glance, there seems to be nothing to it.

What The Maneuver Looks Like.

The model starts the maneuver flying straight and level into the wind. Then it pulls up into a smooth, round loop. The up and down portions should be straight up and down with reference to the ground. That is, the plane shouldn't fall off to the left or right. The speed of the plane should be constant throughout the loop.

As the plane finishes the loop, it should pull out in a straight and level flight at the same heading and altitude as it entered the loop and fly off for 50 feet.



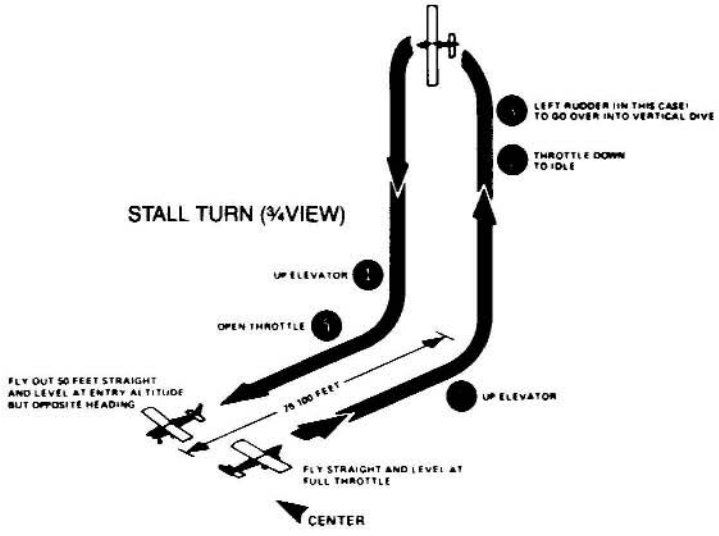
THE STALL TURN

Getting the plane in a vertical climb and applying rudder at the proper time is what the Stall Turn is all about. Too soon, and you'll only wag your tail. Too late, and it won't do any good — the plane will just stall out and fall off. So, to get the Stall Turn to happen as it should, you have to be able to get the vertical climb vertical. Recognize that second or two just before the plane stalls out — while there is still enough air moving over the rudder and apply the rudder. That gets the tail moving so it will continue to coast around while the plane stalls out.

What The Stall Turn Looks Like

The Stall turn, or hammerhead, is one of those smooth, pretty maneuvers. Flying straight and level, past center about 100 feet, the plane pulls up sharply into a vertical climb. As it climbs, the engine idles down and the plane begins to slow down as if it has run out of gas. When it looks as though there's no more oomph left, the plane pivots 180° on its left or right wing tip and heads straight down. Under control all the way.

When the plane gets to the entry altitude, it pulls out, heading in a direction opposite the entry and levels off. The throttle opens up and the plane flies off. Neat.

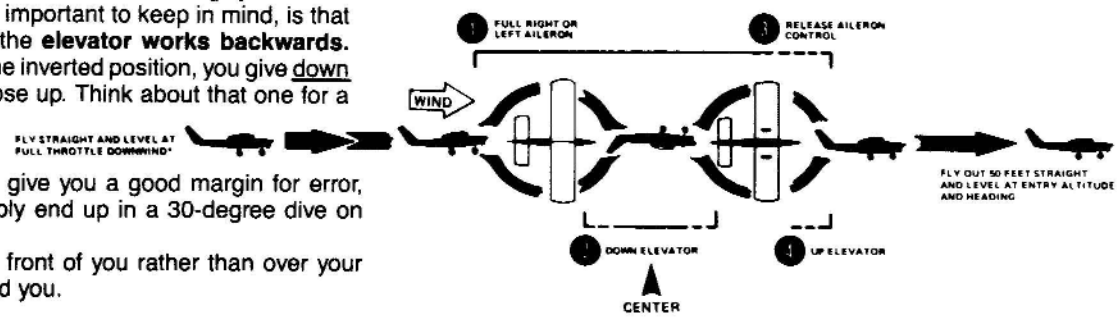


THE HORIZONTAL ROLL

Before you get going on this one, here are some things you should know. First, and perhaps most important to keep in mind, is that **when the plane is inverted** the **elevator works backwards.** When the plane rolls through the inverted position, you give down elevator to keep the plane's nose up. Think about that one for a minute. It's important.

And don't forget:

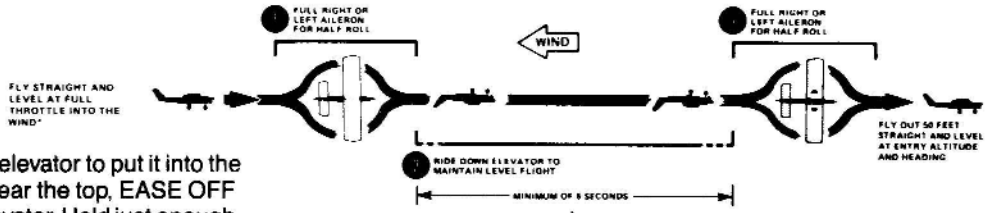
1. Fly at an altitude that will give you a good margin for error, especially since you'll probably end up in a 30-degree dive on your first tries.
2. Practice with the plane in front of you rather than over your head, and with the sun behind you.



HORIZONTAL ROLL (SIDE VIEW)

INVERTED FLIGHT

Perhaps the easiest and safest way of getting your plane inverted the first time is through the "stretched loop." You just fly into the first part of a loop. When the plane gets to the top, it's inverted. Then to come out of it, finish the loop. That's all there is to it. Get your plane out a bit. Then make a turn so it's flying full throttle downwind toward you.



*NOTE FOR YOUR FIRST TRIES WE RECOMMEND GETTING INVERTED THROUGH WHAT WE CALL THE STRETCHED LOOP IN TEXT.

INVERTED FLIGHT (SIDE VIEW)

As the plane passes in front of you pull up elevator to put it into the "up" side of a loop. When the plane gets near the top, EASE OFF of the up elevator and put in some down elevator. Hold just enough down elevator to keep the plane level. The plane should be flying away from you inverted. If the plane banks to the right or left, use the ailerons to straighten out. Aileron response is the same inverted as right-side-up. If the plane loses altitude while it's inverted, put in some more down elevator. If it climbs, because you're giving it too much down, ease off of some down elevator. Find the right amount of down elevator to hold for a level inverted flight path. After the plane has flown inverted a couple of seconds or so, reduce throttle and finish your loop. Ease off of the down elevator and pull up elevator. The plane should dive down to finish the loop you started earlier and come out in straight and level flight toward you.

Fly only a couple of seconds or so on your first times until you get used to seeing what the plane is doing up there. Practice flying inverted using the stretched loop entry until you feel comfortable keeping pressure on that down elevator and can hold straight and level flight inverted. As you get it working for you, increase the length of your inverted flight.

After you're more comfortable with flying the plane inverted, try getting into it using a half roll to the left or right to get inverted, fly inverted, then, half roll to the left or right to come out of it. To get into it, get your plane up to a safe altitude. Pull up a bit into about a 30 degree climb for more insurance.
