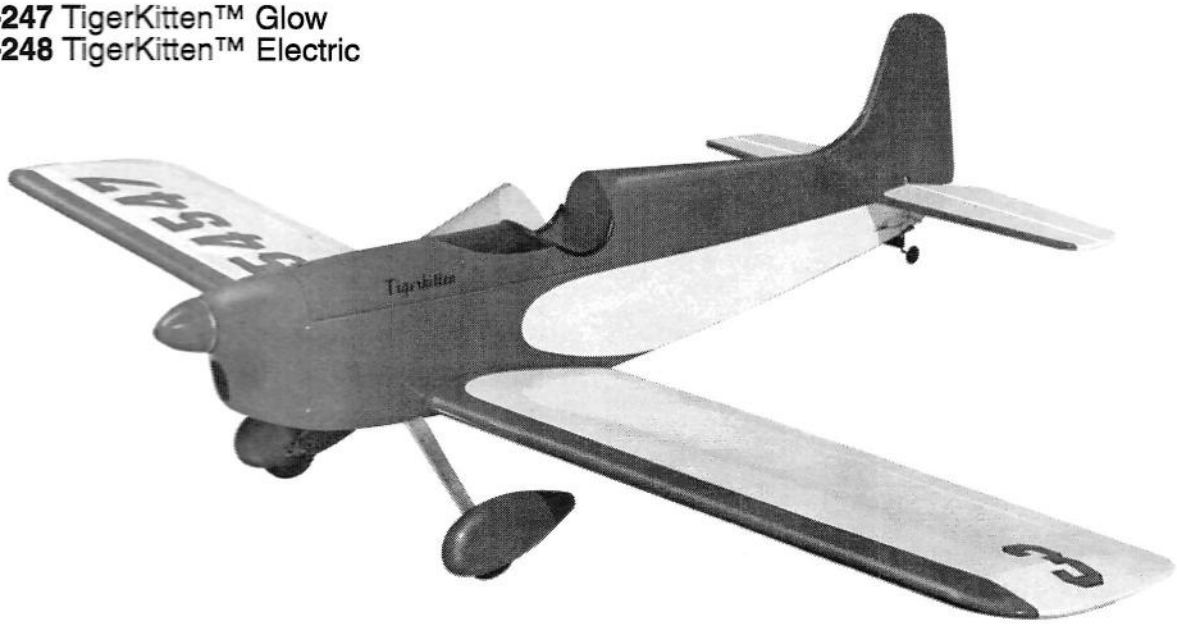
Bob Benjamin's

TIGERKITTEN

50-247 TigerKitten™ Glow
50-248 TigerKitten™ Electric



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WRITTEN BY R. A. BENJAMIN

Introduction

The TigerKitten is a state of the art, high performance airplane which will reward you with great pride in accomplishment and many hours of flying enjoyment. The pleasure you derive from your model will be directly proportional to the care you invest in construction. With this in mind, we would like to offer a few suggestions to make your kit building experience easier and more rewarding.

You cannot build an accurate airplane on an inaccurate building board. A really flat surface is essential. Many modelers have found that a "B" grade door (one with imperfections) from the builders' supply store serves as a reliable, flat work surface when properly supported. A sheet of Homosote, Celotex, or similar soft composition board laid over the door provides a surface into which you can readily stick pins. If you have such a building table already, this would be a good time to clean off all the junk and odd glue blobs, or maybe treat yourself to a fresh sheet of composition board. It may also help to lay in a new supply of knife and/or razor blades, restock your selection of sandpaper, and make sure you have plenty of various types of adhesives. The TigerKitten is a real thoroughbred and the flight performance you get will reflect the care you take right from the very first stages of construction to do the absolute best work you are capable of!

A variety of adhesives are useful in the construction of the TigerKitten. We suggest both thin(fast) and thick Cyanoacrylates. Slow-cure epoxy and aliphatic resin wood glue such as Titebond as well. You might also want to use 3M Spray 77 contact adhesive in the Hot Stuff pinless method of construction, in which you use a light coat of 3M 77 to stick a sheet of Waxed Paper over the plan. A heavier coat of 3M 77 on the waxed paper will allow you to position parts that lie flat right on the surface and have them stay put without pinning. When the completed assembly is ready for removal, running a thin steel ruler under it will separate the work from the tacky paper. It saves a lot of pinning and pulling.

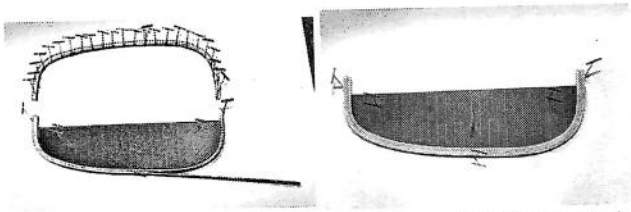
Regardless of the adhesive you choose and the manner in which you get parts to stay put during assembly, always use our special formula for excellent models....."Make it fit, and sand it some more! Don't rush; it's not a race. Take the time to get it right, and you'll have an airplane you can really be proud of!"

If you are building the electric version you may feel the need to make changes to "beef up" what might seem to be a very light structure. DON'T DO IT! Please remember that although the electric power system we have matched to the Tiger Kitten produces the same power as the glow engine you might otherwise use, it is virtually free of vibration! This, and the absence of any oil or fuel residue and any need to withstand the stresses of engine starting, makes it easy to see why an electric airplane can be built more lightly than what you are used to and still be very durable. Take our word for it....It really works. Lets get started.

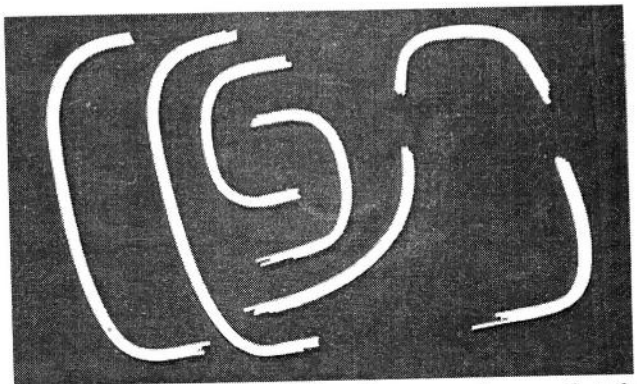
ONE FINAL NOTE; THE PLANS AND MANUAL REFLECT BOTH THE ELECTRIC AND GLOW VERSIONS OF THE TIGER KITTEN. THE SPECIFIC CHANGES FOR THE GLOW VERSION HAVE BEEN ITALICIZED IN THIS MANUAL FOR YOUR CONVENIENCE.

I. MAKING THE TIP LAMINATES

Begin construction by building the laminated wing and tail surface tips. This will allow you to complete what may be a unfamiliar process(and discover that it's really straightforward and enjoyable) and also to have the laminated components ready when you need them for the wing and tail construction. Each of the tip outlines, or bows, is laminated from four thickness of 1/16" x 1/4" balsa. Materials required are eight (8) of the 1/16" x 1/4" x 36 balsa strips. You have several choices of construction techniques. You can lay the printed paper laminate patterns directly on the work surface, cover them with waxed paper, and stick heavy pins at the marked locations, being certain that they are square to the surface, and then form the laminates around the row of pins, or you may choose to glue each outline to a piece of heavy (3/16" or thicker) corrugated cardboard, cut along the printed line, pin this form to the board over waxed paper and laminate around it. The pin method is quicker, while the cardboard form yields a cleaner, more uniform inner edge. Likewise, either slow CyA or aliphatic resin wood glue will work. CyA is quicker, but wood glue is much easier to sand to finished contour.



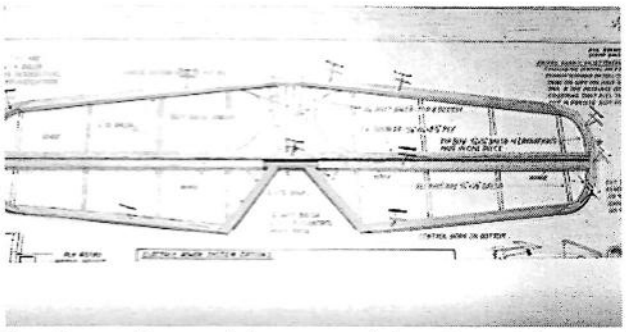
(1) Begin by cutting four strips of 1/16" x 1/4" balsa for each bow to a length at least one inch beyond either end of the pattern and soaking the strips in warm water for a few minutes. Begin with a wing tip bow, as these are larger and easiest to work with. Position the inner most strip around the form and hold it in place temporarily with pins placed as needed. Run a bead of glue along the inner edge of the next strip and lay it in place, beginning at either end, and remove the pins in sequence, replacing them against the outer edge as you work around the from. Be sure that each lamination is pressed firmly in place against the one inside it so that no gaps are left between strips or between the bow and the form. Repeat this process until all four laminations are in place. Build all bows, noting that the horizontal and vertical tail tips are each built in one piece and cut apart later to separate the rudder and elevator.



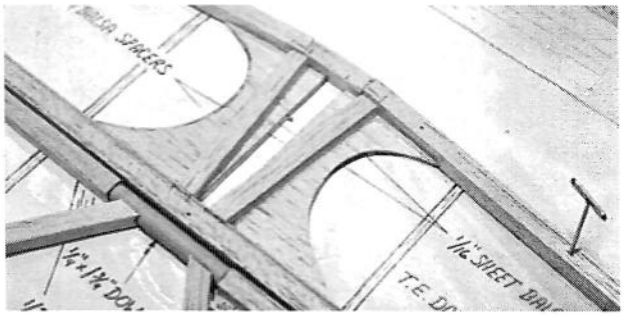
(2) Regardless of the adhesive you choose, let the laminates dry overnight, then remove them from the board and block sand them flat and true on the top and bottom surfaces prior to assembly. Don't attempt to trim the ends off. Sand the outer contour at this point.

II. HORIZONTAL STABILIZER AND ELEVATOR CONSTRUCTION

Materials required; 2 each prebuilt tip laminates, 3 each 1/4" square x 36" balsa, 1 each 1/8" x 1/4" x 36" balsa; 1 each 1/16" x 3" x 36 balsa; 1 each 1/16" x 1/4" x 8-1/2" pre cut plywood stab trailing edge reinforcement; 1 each 1/4" x 1-3/4" elevator joiner dowel and 2 each 1/4" sheet balsa gussets cut from scrap from R-1 parts sheet.



(3) Cover the working area of the plan with waxed paper whether you choose 3M 77 or pins to hold components to the board. Either CyA or aliphatic resin glue will work equally well. Trim the tip bows to exact length using the lines on the plan as a cutting guide. Fix the trimmed bows in place on the plan, cut all the 1/4" square balsa leading and trailing edge pieces to size, and glue them in place along with the 1/4" dowel elevator leading edge joiner.

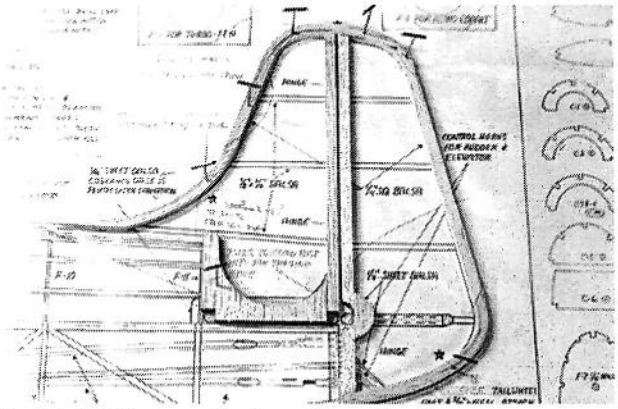


(4) Fit and glue the 1/16 x 1/4" x 8-1/2" ply stabilizer trailing edge reinforcement, followed by the 1/16" sheet balsa bottom center section skin which is cut from 1/16 "x 3" x 36" balsa sheet stock. Note that this is in two pieces with a 1/4" wide opening at the center where R-1 will fit after assembly. Now fit and glue the 1/8" x 1/4" balsa spacers over the bottom center sheet followed by the upper center section sheet and all the 1/8" x 1/4" balsa ribs. Finish by fitting and gluing the 1/4" sheet balsa elevator gussets.

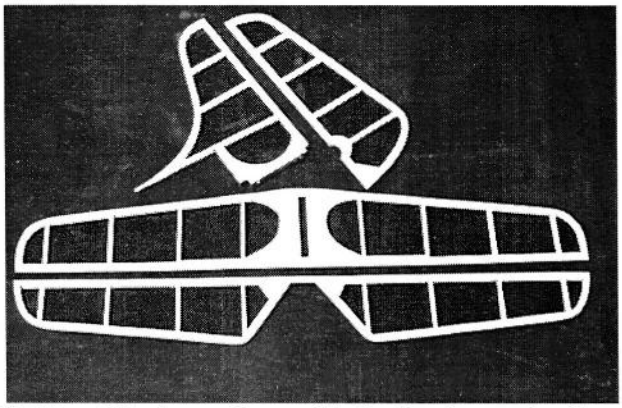
(5) Remove all pins and block sand the entire assembly true on top, then remove from the board and repeat the sanding operation on the bottom surface. Cut the tips bows apart at the elevator hinge line. Round all outer edges to a semi-circular cross section. There is no taper in either the stabilizer or elevator. Now fine sand the entire structure with 220 grit or finer paper, then mark and cut hinge slots and dry fit the hinges.

III. VERTICAL FIN AND RUDDER CONSTRUCTION

Materials required; 1 each laminated tip, dorsal fin and lower rudder trailing edge bow, 1 each 1/4" square x 36" balsa; 1 each 1/8" x 1/4" x 36" balsa; 1 each laser cut R1; rudder leading edge and base gussets cut from scrap R1 sheet.



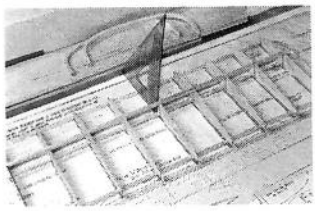
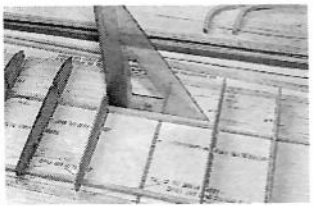
(6) Build the vertical surfaces in the same manner as the horizontal tail, beginning with the dorsal, tip and lower rudder laminates, followed by the 1/4" square balsa leading and trailing edges. Add R1 and all 1/8" x 1/4" balsa ribs. Cut, fit and glue the 1/4" balsa sheet gussets.



(7) Now block sand as with the horizontal tail, cut the tip bow at the rudder hinge line, round all edges and fine sand. Leave the forward portion of the dorsal bow unsanded until after assembly so it can be faired into the dorsal stringer.

IV. WING CONSTRUCTION

Materials required; 2 each laminated tip bows; 6 each 3/16 square x 36" balsa; *(4 each 3/16 square x 36" hardwood spar)*2 each 3/16 square x 36" balsa, 2 each W1,W2,W3; 14 each W4; 2 each W5 ribs; 1 each 1/16 ply leading edge,front spar and rear spar doubler; 6 each 1/16" x 3" x 36" balsa; 2 each 3/16" x 7/16" x 26" balsa trailing edge; 2 each pre-shaped balsa aileron/center section trailing edge; 1 each 1/4" square hardwood servo rail; 5 each 1/16" x 1/8" x 36" balsa; 1 each 1/16" x 2" x 12" balsa; 1 each 1/4" dowel; 1 each 4" x 24" Polymat cloth strip; 2 each pre-bent 3/32" threaded aileron torque rod; 2 each 2-56 aileron puhs rod; 6 each aileron hinges; 2 each nylon aileron horns assemblies; 1 each 10-32 nylon wing bolt.

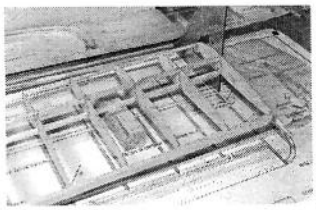
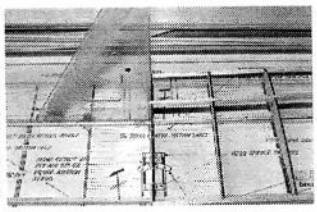



(8) Both the left and right wing panels can be built in place on the plan at the same time. You may build both simultaneously or one after the other as you prefer. We will proceed as though both are being built together. Cover the working portion of the plan with waxed paper. Begin by cutting the upper and lower 3/16" square balsa main spar *(3/16" square hardwood main spar)* to exact length and fixing the lower in place using either the 3M 77 method or pins. Remove all the ribs from the parts sheets and place in position **without gluing. Also, without gluing,** slip the upper 3/16" square balsa *(3/16" square hardwood)* spar in place in the rib slots then place an "extra" piece of 3/16" x 36" balsa (fuselage longeron stock) under the ribs ahead of the trailing edge. Making sure that all ribs are bottomed on the lower spar, move the 3/16" spacer strip forward or back until the upper and lower 3/16" spars are aligned perpendicular to the building board while all ribs rest securely on the spacer strip. Check that the spacer strip is exactly parallel to the spar, fix it in place and remove the upper spar from the ribs. Glue all W2,W3,W4,and W5 ribs to the lower spar checking each in turn to assure that all are perpendicular to the board. **DO NOT GLUE W1** at this time; it is in place to serve as a spacer and will be glued later.

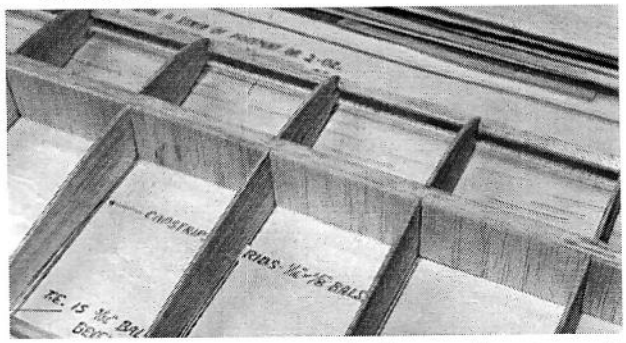
(9) Replace the upper spar and glue to ribs W2 through W5. **DO NOT GLUE TO W1** at this time.

(10) Trim the 3/16" square balsa leading edge to length and glue in place to ribs W2 through W5.

(11) Trim the 3/16" x 7/16" x 26" balsa trailing edges to exact length and trial fit them to the aft ends of the ribs using several pins to insure that all ribs line up evenly with the trailing edge piece parallel to the building board. When all parts are correctly aligned, glue the trailing edges to W2 through W5. **DO NOT GLUE TO W1.**

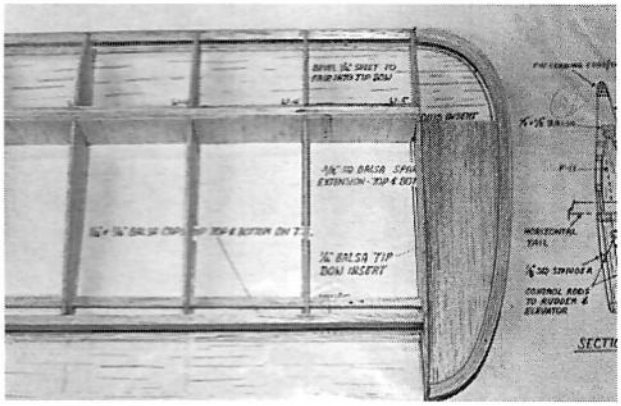
(12) Temporarily remove both wing panels from the building board and block each one up so that the bottom of the lower spar rests on the building board at W1 and is raised 1-3/8" at W5. Now fit the W1 ribs so that they are perpendicular to the board. This will result in the top of each W1 rib being slanted toward the tip of the wing and provides the correct angle of dihedral. **NOW GLUE THE W1 RIBS IN PLACE.**



(13) Replace the wing panels flat on the plan with the 3/16" square spacers still in place to insure that the upper and lower spars remain in line perpendicular to the surface. Cut, fit and glue the 1/16" sheet balsa vertical grain shear webs to fit between the ribs from W1 through W5. Be certain that each web piece fits snugly between its pair of ribs and makes firm contact with the 3/16" square spars. The shear webs are a critical part of the spar, not just fillers, and much of the structural integrity of your airplane depends on the accuracy of the job you do here.

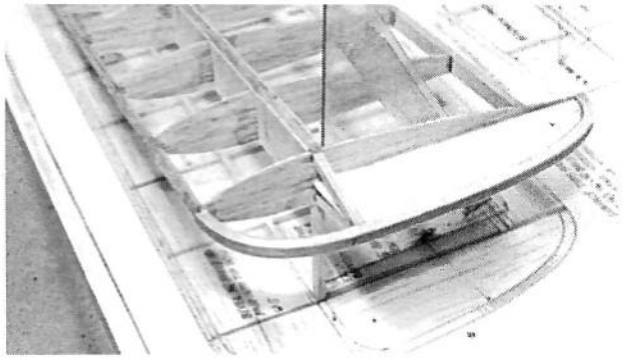
(14) Using the plan and the assembled main wing panel structure as a guide, trim each of the laminated tip bows to exact size. The 1/16" balsa sheet tip bow inserts are left for you to cut so they will fit your tip bows perfectly. Lay the 1/16" x 2" x 12" balsa sheet over the plan of either wing panel with its front (2") edge in line with the front edge of the 3/16" square main

spar extension, and the inner edge in line with the outer edge of W5 then position the previously trimmed up tip bow over the outline on the plan and trace the inside edge of the bow onto the balsa sheet. Cut out the insert and repeat using the remainder of the balsa sheet for the opposite wing panel.



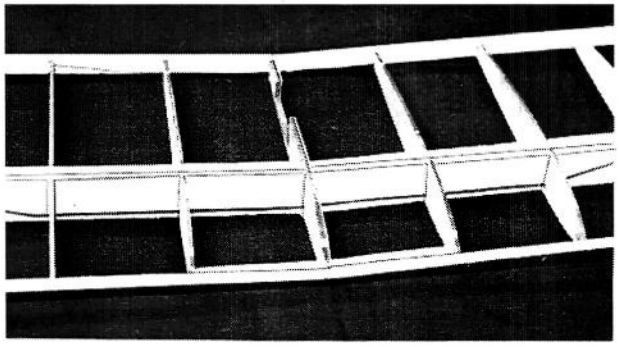
(15) Now you can glue the tip bows in place. The front of each bow is centered on the 3/16" square leading edge, and the rear is centered on the aft tip of W5. Support the bows so that they lie parallel with the board, that is so that when viewed from the front they form an extension of the leading edge and do not angle up or down. When the glue has set, you can fit and glue the tip bow inserts centering them along the inside edge of the bows. Now cut, fit and glue the 3/16" square balsa top and bottom spar extensions. These lie flush with the surface of the main spar and with the inside edges of the tip bows.

(16) Remove either of the wing panels from the board. Check that the laser cut slots in W1, W2 and W3 are opened for the leading edge, main and rear spar doublers and that the 1/16" ply doublers fit into place.



(17) Prepare to join the wing panels by fixing one panel to the building board with the 3/16" square balsa spacer still in position maintaining the spar perpendicular to the board. Fit a spacer that will support the other panel so that the bottom surface of the lower spar is 2-3/4" from the board at W5. Trial fit the plywood doublers with both panels fixed in position for joining and mark their location for reference.

(18) When you are satisfied with the fit of the wing components as described in step (17) glue all three ply doublers in place in the panel that is fixed to the board. We suggest that you use either slow setting epoxy or aliphatic resin glue so that the adhesive has plenty of time to penetrate the wood and assure a good bond. Even slow setting CyA is difficult to use correctly here, as it is likely to "grab" before you can be certain that all parts are in perfect alignment.

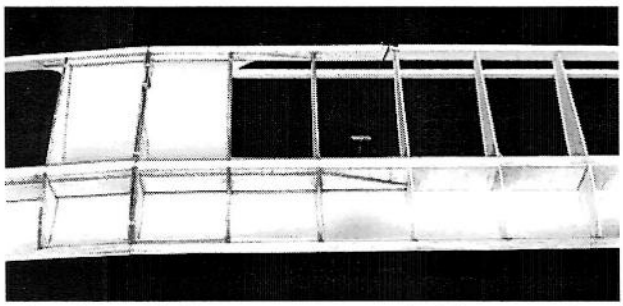


(19) Attach the second wing panel fixing it in position as per step (17) and gluing the doublers as well as the leading and trailing edge ends and the entire surface of the W1's per step (18).

(20) When all glue joints from steps (18) and (19) have set completely, remove the wing from the board and use the wide sanding block to true the top and bottom surfaces. Be certain that the ribs blend smoothly into the leading and trailing edges, and that all the spar web pieces lie flush with the outer faces of the 3/16" square spar caps.

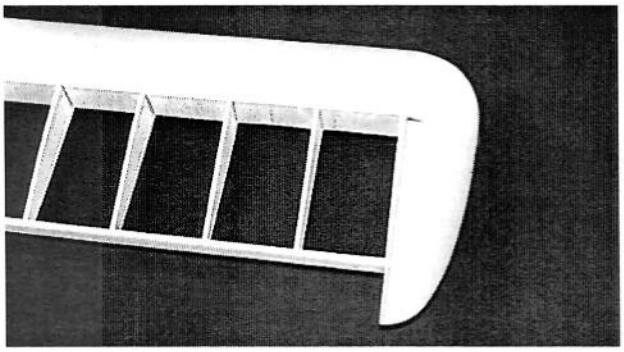
(21) All wing sheet covering and cap strips are attached while the wing panels are fixed to the building board to insure a straight, warp-free wing. Any twists present in the structure when the leading edge sheet is applied will be locked in, so extra care at this stage is justified. Replace the wing on the board as in step (17) and begin by sheeting the panel fixed to the board. Using the 1/16" x 3" x 36" balsa sheet, cut a piece to fit from the center line between W1's to the outer edge of W5 and from the rear of the upper main spar to the front edge of the leading edge. Glue this top skin in place using your choice of adhesive, being certain that it is attached to the tops of all the ribs as well as to the leading edge and spar. Cut and fit a tip bow leading edge skin. This piece should butt against the outer edge of the main skin at W5 and end just short of the outer edge of the tip bow; this outer edge should be feathered to lie firmly against the tip bow. Now sheet the remainder of the center section between W1 and W2 , then add the 1/16" x 3/16" trailing edge cap strip and all the 1/16" x 1/8" balsa rib cap strips. Finish the panel by adding the 1/4 radius inserts of 1/16" balsa sheet at the corners.

(22) When all glue joints in step (21) have set hard, remove the wing from the board and rock it over so the opposite panel is supported as in step (21). When you are satisfied that the alignment is accurate, sheet the second upper panel.



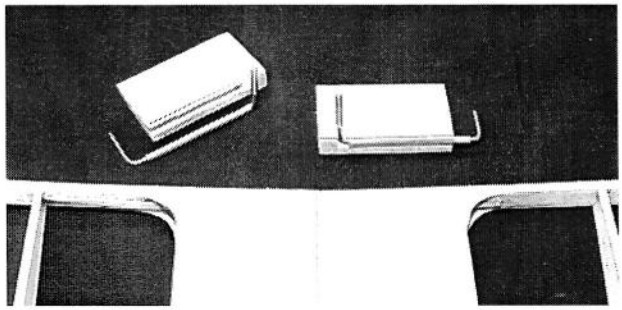
(23) When all glue joints in step (22) have set hard, remove the wing from the board and replace it upside down at the edge of the table so that one panel lies flat with the top spar against the table. Place a 3/16" square balsa spacer under the ribs ahead of the trailing edge to support the panel and fix it in place to prevent distortion. Now sheet the surface in the same sequence as step (21).

(24) Remove the wing from the board, reverse it, and sheet the remaining lower panel as in step (23).

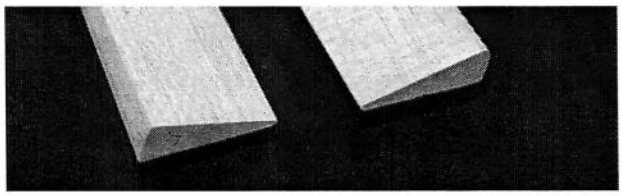


(25) Remove the wing from the board and block sand it smooth overall paying particular attention to blending all sheet and capstrip edges smoothly together. Be sure to keep the trailing edges squared off so that the ailerons will mate squarely. Sand the leading edge to match the radius shown on the plan. The tip bows should be radius to match the leading edge and thinned at the rear to blend smoothly into the aft end of the W5's. Sand with progressively finer paper to at least 220 grit.

(26) Prepare to build the ailerons and center section trailing edge by completing the aileron torque rod assemblies. Using the 6" length of special .100 ID nylon torque rod bushing tube supplied, cut it into two pieces 2-1/4" long to fit over the two pre-bent 3/32" aileron torque rods to serve as bearings. Slip these bushings in place on the torque rods. Lay the two pre-bent 3/32" aileron torque rods and bushing assemblies over the plan and mark on each the location of the right angle bends that will form the arm that projects into the aileron. Bend the torque rods so that the two bends in each rod is exactly 2-1/2" apart center to center **making sure to form a left and right torque rod.** The threaded portion of each torque rod should lie prependicular to the board when the aileron insert arm lies flat. Cut off the excess length and set the torque rod assemblies aside.



(27) Locate the two 1/2" x 1-1/2" x 36" pieces of formed aileron stock. Cut one 2-1/2" long section from each making certain that the cuts are at right angles to the long edge. These will become the center section trailing edges. Orient these so that the front edge is perpendicular to the building board when the aileron lies flat. With one panel of the wing fixed to the board so that the trailing edge is tight against the surface, trim the front edge of the center section so that they fit snugly against the wing trailing edge. Sand the inner face of each trailing edge piece to match the dihedral angle of the W1's so that they will meet at the centerline in a gap free joint. Now cut a grove centered 3/32" down from the top of each trailing edge piece to allow for the torque rod assemblies to fit flush with the mating surface of the wing trailing edge. Notch the trailing edge assemblies and the wing trailing edge about 1/2" from the center to clear the torque rod arm. Do a trial assembly using pins making sure the trailing edge assemblies fits in place with freedom of movement of the torque rods that will permit the ailerons to have full range of motion. When you are satisfied glue the entire assembly in place being certain that the bearings are solidly supported so that the torque rods won't slip or wobble. **MAKE SURE YOU DO NOT GET GLUE IN THE BUSHINGS AND BIND UP THE LINKAGE.**

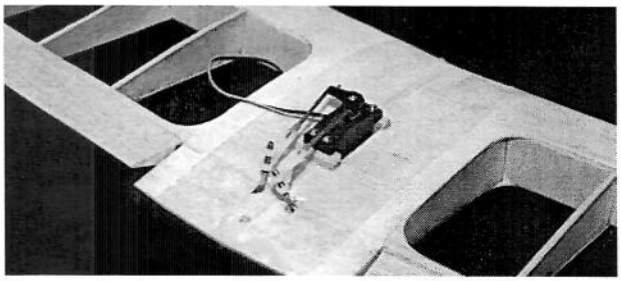


(28) Orient the two large pieces of aileron stock so that the 90 degree angle between the wide surfaces and front edge is on the bottom, then

mark and trim each as left and right ailerons leaving a 1/16" gap between each inner end of the aileron and the center sections. Mark a line the full length of each 1/8" back from the leading edge on the bottom surface and use a block plane or sanding block to cut a taper from the front/top edge to the line. This will allow the ailerons to rotate down when hinged at the top edge. Sand or plane a flat face about 1/8" wide at the top/front edge to receive hinge slots.

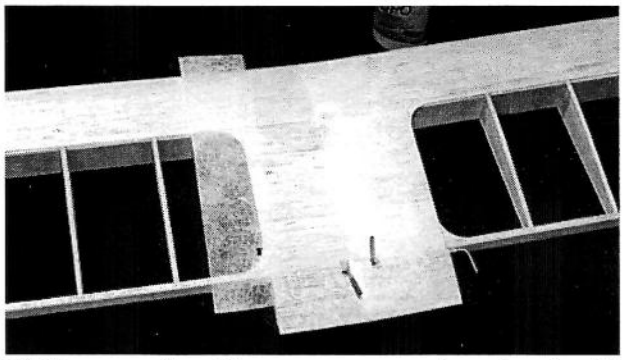
(29) Carefully mark the location of the projecting aileron torque rod tiller arm on the respective ailerons and drill a 3/32" hole in each aileron. If these holes are drilled parallel to the top surface of the ailerons, the threaded portion of the torque rod assemblies will lie at a right angle to the top wing skin with the ailerons in neutral. In fact the arm that the aileron horn attaches to will appear to tilt somewhat toward the trailing edge of the wing giving aileron differential needed by this model. Now mark and cut hinge slots, dry fit the hinges and assemble the aileron in place without glue, and block sand the ailerons and center section to match the rest of the wing.

(30) Open up the top center section sheet to correspond to the servo cutout in the W1's wide enough to fit the aileron servo you are using. Cut, fit and glue in place 1/4" square hardwood servo rail material and then drill for mounting screws and trial mount your servo.



(31) Fit the aileron linkage using the 2-56 rods and nylon fittings provided. Check the note on the plan describing aileron differential and determine whether you wish to use it. Select and fit a servo output wheel correspondingly. Hook up and test the ailerons, using the furnished mini links at the aileron horns and "Z" bends in the rod material at the aileron servo output.

(32) Trim a 1-5/8" long piece from the end of one of the 1/64" x 4-1/2" x 18" ply nose doubler sheets and cut from it the semi-circular wing bolt reinforcement plate. Glue the plate in place on the bottom of the wing. For a finished appearance you can feather sand the edges of the plate before attaching it.



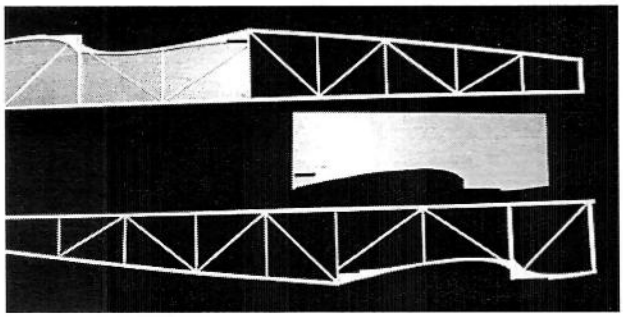
(33) Remove the ailerons, servo and pushrods. Cut the sheet of Polymat fiberglass reinforcing material into 2" wide strips, then cut lengths sufficient to cover the wing center section with a slight overlap at the leading and trailing edges. Attach the Polymat strips with about 1/2" overlap along the W1's using thin CyA, epoxy, or polyester resin.

V. FUSELAGE CONSTRUCTION

Materials required; 4 each 3/16" square x 36" balsa; *(2 each 3/16" square x 36" hardwood)* 12 each 1/8" x 3/16" x 36 balsa; 2 each 1/8" square x 36" balsa; 4 each 1/16" x 3/16" x 36" balsa; 2 each 1/16" x 1/8" x 36" balsa, 2 each F4 and F5 laser cut balsa; 1 each F1,F2,F3,F6A; 1 each C1,C2,C3,C4,C5,F7,F8,F9,F10,F11 laser cut balsa; *(C1,C2,C3,C4,C5,F7,laser cut lite ply)*, 1 each 1/4" square x 36" hardwood; 2 each and additional 1/16" x 3" x 36" balsa sheet, 1 each 1/8" x 3" x 6" balsa, 1 each 1/16" ply battery tray, 1 each 1/8" ply tail wheel mount and F1; *(1 each 1/8" ply F1 doubler)*; *(1each 1/4" x 1/4" x 8 tri stock balsa)*, 1 each 1/64" ply hatch base and C6; 2 each 1/64" x 4-1/2" x 18" ply; 1 each 3/8" x 3/8" x 2" hardwood landing gear mount reinforcements; 1 each formed alloy landing gear and mounting/axle hardware; 1 each inner and outer nyrod; 1 each formed plastic cowl and wheel pant set.

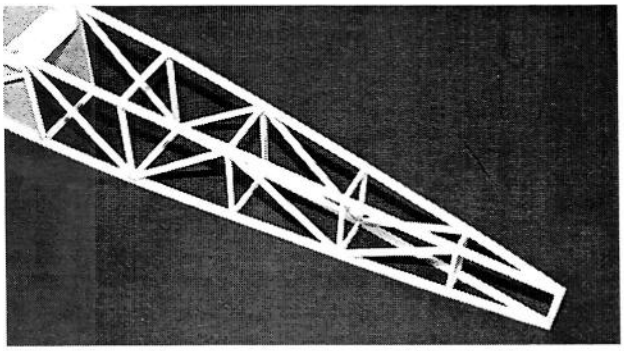
(34) Cover the fuselage side drawings with waxed paper and build one fuselage side consisting of 3/16" square balsa longerons,*(3/16"square hardwood upper longeron)*, 1/8" x 3/16" balsa uprights and diagonals, F4 and F5. Note that the top 3/16" square longerons extends forward to fit later into the cutout in F1 and that the two uprights at the nose and the one at the tail are 3/16" square balsa. Before removing the side from the plan, remove any pins, block sand the upper surface true and free of glue blobs and other bumps. If you prefer, you can remove the first side from the board and build the second in its place. A more accurate method is to cover the first side IN POSITION ON THE PLAN with waxed paper and build the second side directly over it. When both

sides are completed, remove from the plan and block sand true on both surfaces.

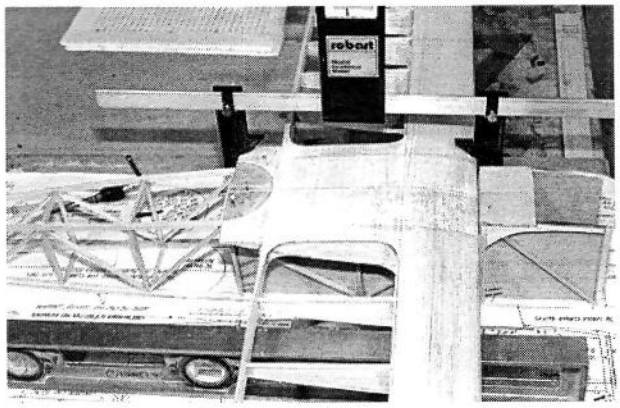


(35) Make the inside fuselage doublers from the 1/64" ply material provided. These extend from the top of the upper longeron to the bottom of the side frame and from the front edge of the upright at F1 to the rear edge of the upright at F6A. Study the plan until you are sure of the dimension, then cut once! Cut a rectangular hole in each doubler matching the cutout at the rear of the F5's to allow F6 to pass through and lie flush with the outside face of the F5's. Glue the doublers in place against the side frames, **BEING CERTAIN THAT YOU MAKE A RIGHT AND A LEFT FUSE SIDE.** The doublers go on what will become the inside of each fuse side frame.

(36) Pin the fuselage sides in place on the plan top view with the top longerons against the plan. This allows you to align the fuse structure using a flat surface as a reference. Using F2 and F6 as spacers extending to the outside face of the side frames, cut the 1/8" x 3/16" cross pieces exactly matching the inside width to fit between the top longerons at F3 and C4 and F6A. Join the side frames using your choice of adhesive at F2 and F6 and the top cross pieces. Use a carpenter's square or other alignment device to make absolutely certain that the sides are parallel to each other and perpendicular to the board, then add F3 flush with the rear edge of F2 and F6A against the rear edge of F6 with its lower edge flush with the bottom of the longerons. Note F3 and F6A are identical in shape and are interchangeable.

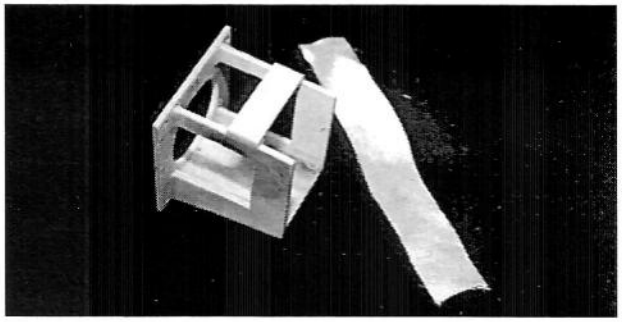


(37) With the fuselage still in place on the plans sand a taper into the inner faces of the fuselage sides at the rear most upright (tail post) so that the sides will join to match the 1/4" vertical fin trailing edge. When this is done, join the fuselage sides at the rear then cut, fit and glue all the 1/8" x 3/16" balsa cross braces between F6 and the tail.

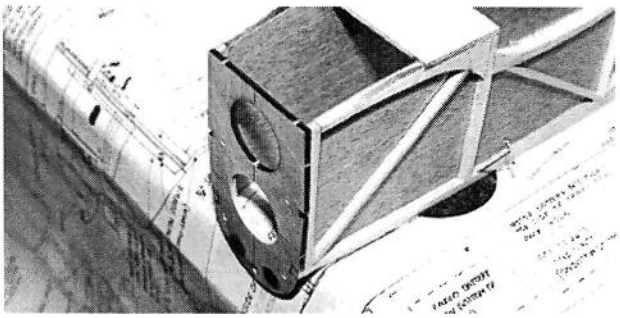


(38) The best time to align the wing and fit the wing mounting hardware is while the fuselage is still upside down on the building board. Begin by sanding the wing saddle (F5's) until the wing fits neatly, with no gaps. Use an incidence meter to insure that the wing is mounted at an incidence angle of 3 degrees, as shown on the plans, remember that the wing is now upside down. If you don't have an incidence meter, you can accomplish the same job by making an accurate template that will fit against the top surface of the wing using the top longeron as a reference. In either case, use a level to establish that the top longeron is set at "zero" degrees and then measure (and correct as necessary) to insure that the wing is set correctly. **DO NOT FAIL** to check the wing incidence, misalignments during assembly can introduce changes in incidence with the result that the airplane may be impossible to trim properly in pitch. When the incidence is correct, draw a line on the plan or use a large square to insure that the wing rests at right angles to the fuselage, and then insure that both tips are equidistant from the building surface. Now pin or tape the wing to the fuselage to prevent accidental movement and drill through the trailing edge at the location shown on the plan with a 5/32" bit; be sure the drill goes all the way through the wing and F6. Run a 10-32 tap all the way through F6 then open up the hole in the wing only with an 11/64" bit. Screw the 10-32 nylon wing bolt from the hardware package in place to hold the wing firmly in position. Now mark and drill two holes from the front of F3 back through the leading edge and doubler for the wing attachment dowels. These holes are off set 1" to either side of the centerline and are located vertically per the plan side view. Use a 1/8" bit to drill pilot holes, then follow the a 1/4" bit. Cut two lengths of 1/4" dowel long enough to rest against the front of the main spar doubler and protrude 1/8" ahead

of F3. Remove the wing and glue the dowels in place. Reinstall the wing temporarily before the glue sets to check the fit. Saturate the threads cut in F6 with thin CyA and re-tap.



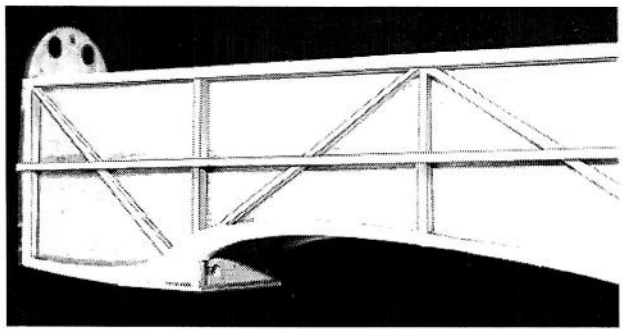
(39) Prepare F1 to mount your motor. *(Glue the lightening holes solidly into F1 and laminate the F1 doubler to F1 with epoxy making sure glue does not get into the notches for the longerons. Mark, drill and install the motor mount of your choice to match your engine selection making sure to maintain the thrust line shown on the plans.)* If you are using the MEC Turbo10 or an Astro Cobalt motor, you can cut the motor clearance hole per the layout shown on the plan. If you are using the Turbo 10, build up the motor mount from the lite ply parts provided using the assembly sequence illustrated on the plan, and **reinforce all joints with short lengths of fiberglass tape cut to size from the 3/4" x 6" strip furnished and attached with thin CyA or epoxy.** Align the Turbo 10 and mount flange with the cutout in F1 and drill 1/8" holes through both parts using the punch marks in the flange as a guide. If you are using an Astro motor, orient the motor-gear box assembly with the gear box "up," mark and cut F1 to clear the brush holders, then glue the mount ring in place on the front of F1. The Astro brush holders are intended to butt against the back of the mount ring. Now remove the gear box, and slip the motor into the Astro factory mount, align, mark and drill 1/8" holes in F1. If you are using a motor/gear box other than the Turbo 10 or Astro align the assembly so the prop shaft matches the plan arrange a spacer as necessary to preserve the relationship of prop, spinner and cowl.



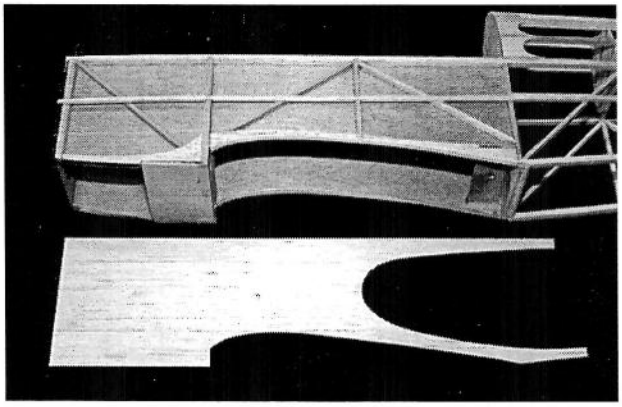
(40) Mark a vertical centerline on F1. Move the plan sheet temporarily so that you can mount the fuselage upside down on the top view with the front protruding just off the edge of the table, in order to assemble F1 with the fuselage fixed on the plan. Glue F1 in place, keeping it square to the fuselage centerline. The extensions of the top longerons fit into the slots in the top of F1. *(Note:the F1 doubler will cap off the longerons. Add the 1/4" x 1/4" balsa tri stock reinforcement to the inside of the fuselage up against F1 and the 1/64" ply fuse doubler.)*

(41) Remove the fuselage from the plan, replace the plan in its normal working position and fit and glue F7 through F11 perpendicular to the top longeron. Add the 3/16" square balsa top longeron and the 1/8" x 3/16" balsa side stringers.

(42) Cut, fit and glue the 1/8" square balsa side stringers that run all the way form F1 to the tail post.

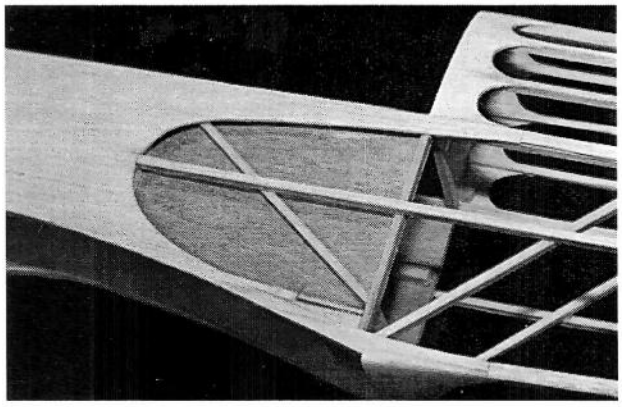


(43) Cut fit and glue the triangular spacers cut from 1/8" x 3/16" balsa on the uprights at locations C3 and C4. These taper from the 1/8" square stringer to match the edge of the top stringer and the bottom edge of the fuselage. See section at C-3/F-3.

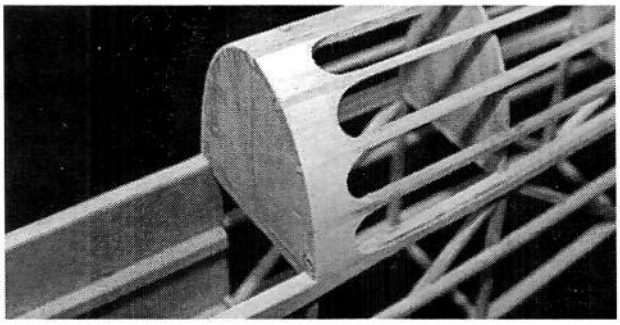


(44) Begin making the 1/16" balsa sheet nose skin pieces by tracing the outline from the plan onto a sheet of paper. You will need to edge join a full 1/16" x 3" wide piece of balsa and a narrower piece to be able to cut each nose skin from a single piece. Make this joint while the sheet of balsa is flat on the building table. DO NOT ATTEMPT TO JOIN THE EDGES IN PLACE ON THE FUSELAGE! To get a perfect fit, cut the skins to lie flush along the top of the upper longeron and the front of F1 and allow some overhang at the bottom of the fuselage

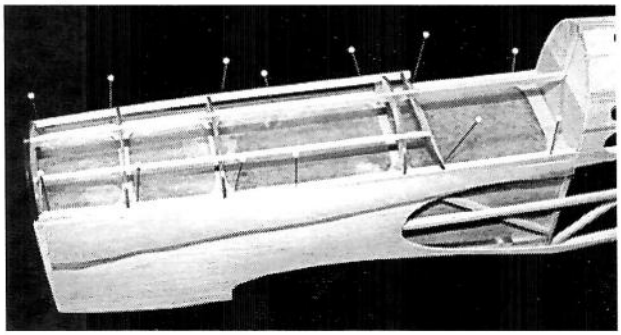
which can be trimmed after assembly. Glue both side skins in place and trim as needed.



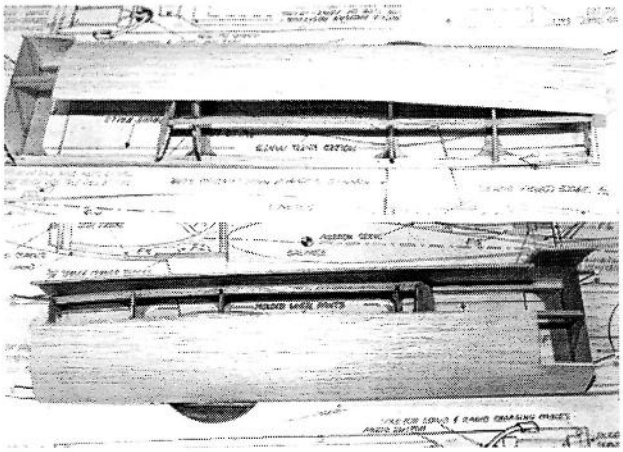
(45) Fit and glue the 1/16" x 3/16" longeron caps to the upper and lower longerons from the rear of the 1/16" sheet nose skins to the tail post then add the 1/16" x 1/8" stringer caps in the same manner.



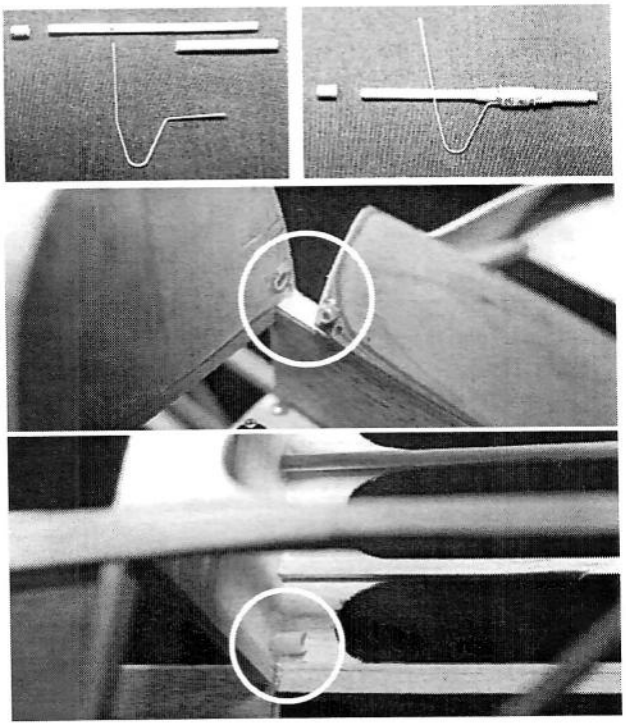
(46) Cut, fit and glue the 1/16" balsa sheet fillers between the stringers to and behind F7. The best way to get a neat job here is to leave a little extra material when cutting the inside curves. After the inserts are glued in place between the stringers sand flush with F7 . To sand the inside curves, fit a piece of 220 grit paper around an appropriate diameter dowel or tool handle and sand to shape. These curved cut outs will show through the final covering so take your time and get it right.



(47) Construct the hatch using the 1/16" balsa C1 through C5, *(3mm lite ply C1 through C5)* the 1/64" ply C6 and hatch base, 1/8" x 3/16" stringer material and 1/16" x 3 balsa sheet. Test fit the 1/64" ply base plate to the fuselage and trim to fit exactly between F1 and F7. Mark the locations of the "C" formers on the base plate. Fit a piece of waxed paper over the fuselage top between F1 and F7 and lay the hatch base plate in position, then glue the 1/8" x 3/16" balsa base stringers in place along the edges taking care that they are inset from the edges of the fuselage by 1/16". Glue C1 through C6 in position making sure that C5 lies at the angle shown. Cut, fit and glue the remaining 1/8" x 3/16" balsa stringers. Extend the top stringer temporarily back to C6 to support it during construction. When the glue is hard, remove the hatch from the fuselage and pin it in place over waxed paper on the plan top view, as an aid to maintaining alignment.



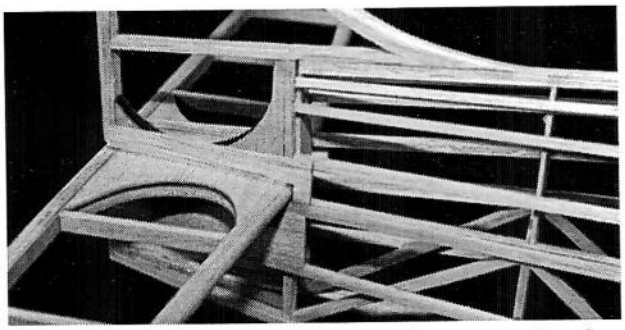
Cut a piece of 1/16" balsa sheet long enough to extend from C6 to about 1/4" ahead of C1, it will later be trimed to lie flush with the front of F1. Make a cut in the sheet in the area between C5 and C6 to allow it to roll around C5 and match the profile of C6 without breaking, then wet the outside of the sheet with warm water. Glue the sheet in place along the edge of the hatch at the lower 1/8" x 3/16" stringer and the edge of the base plate. When the glue is hard, carefully bend the sheet around the hatch frame until it lies against the top center stringer. If it has been properly wetted, it should accept the compound curve readily. When it fits correctly, glue it in place then mark and trim it along the top stringer centerline. Sheet the remaining side of the hatch in the same way using extra care to fit and trim the sheet edges tightly at the center stringer. When the entire assembly is dry, remove it from the board and trim out the cockpit opening. The exact shape is not critical and you can modify it to suit your own preference as long as there is sufficient opening to permit a good cooling air outlet and access to the switches mounted in the cockpit. An instrument panel may be added later at your discretion. No material is provided in the kit but modelers ingenuity should suffice. *(Remove the 1/64" ply hatch base between C2 and C3 to clear the fuel tank).*



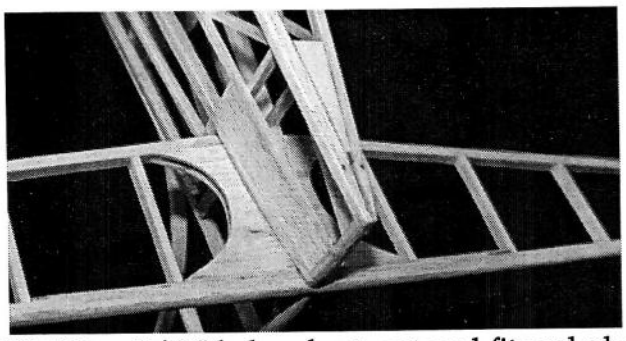
(48) Construct the rear hatch hold down pins and front hatch latch per the plan. The rear hold down consists of two short pieces of inner nyrod glued into the bottom corners of C6 just above the 1/64" ply base plate and extending back just far enough to clear F7. Make over sized holes in F7, then cut short lengths of outer nyrod and slip them over the inner pieces putting the hatch and rear latch assembly through the holes in F7 centering the hatch in place and tack glue the outer nyrod with a bit of CyA or epoxy being careful not to glue the inner nyrods to the outer nyrods. Remove the hatch and glue the outer nyrods securely in place. When the front latch is completed per the layout on the plan, cut the access slot for the protruding release wire. Shim the assembly as needed to align the front tube with the pre-drill hole in F1, then glue the latch assembly in place using thick CyA or epoxy. Fit the hatch in place and position the short outer tube that fits into the hole in F1. This hole should be slightly over sized to allow you to align the hatch as you did when setting up the rear hold down pins. Glue the short outer tube into F1.

(49) Install the horizontal stabilizer which rests flat on top of the longerons with no incidence angle, and butt it against the rear face of F11. It is important that the back of the trailing edge lie flush with the back of the tail post. Measure and mark to insure that the trailing edge is perpendicular to the fuselage centerline and that the tips are equidistant from the building board. You have the option of gluing with slow epoxy and aligning the stabilizer before the glue sets, or fitting everything in place and gluing with thin CyA.

(50) Install the vertical fin so that the tab portion of R1 fits into the slot at the center of the horizontal tail and the forward portion of the leading edge laminate lies flush along the top of the 3/16" square top stringer while the trailing edge is perpendicular to the top longeron. Adjust and trim as necessary, then glue in place as described in step (49).

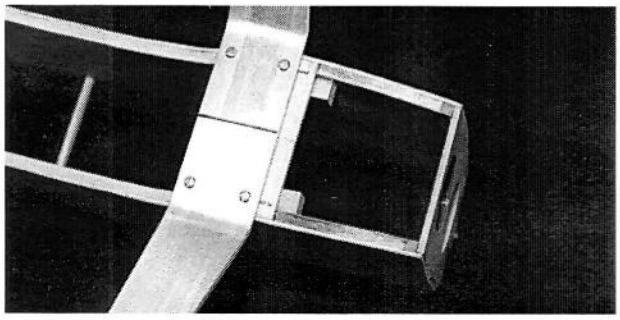


(51) Fit and glue the 1/16" balsa sheet covering base inserts along the top of the horizontal tail flush with the outside surface of the top longeron and the lower 1/8" x 3/16" stringer. You will need to trim the end of the lower stringer slightly to allow the insert to fit flush. The inserts will need to be taper sanded at the rear edge to fair smoothly into the vertical fin trailing edge. Look at the fabric fairing covering note at the center of the plan to see how these inserts function. Their outer face provides a smooth, uninterrupted surface for the covering to attach to.

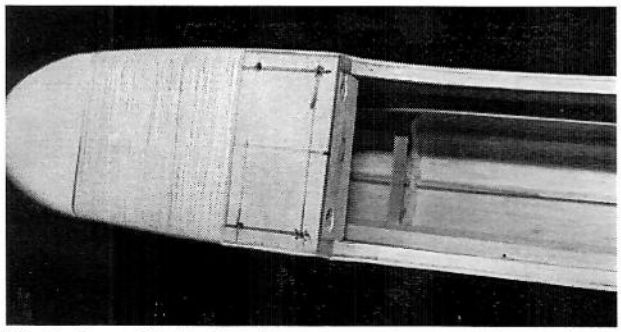


(52) Using 1/16" balsa sheet, cut and fit and glue the pushrod exit guide inserts between the upper and lower longerons and the 1/8" square stringer.

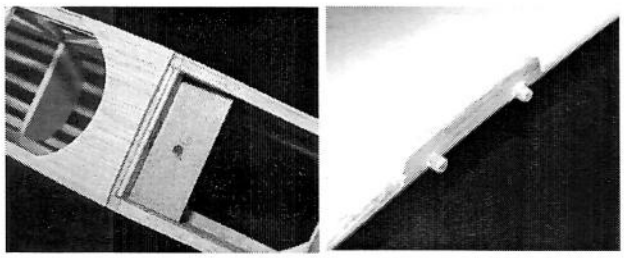
(53) Fit and glue the 3/8" square hardwood corner blocks against the top of F2, the front of F3 and the inside faces of the 1/64" ply nose doublers to reinforce the landing gear installation. You may have to open up the 1/4" wing dowel holes in F3 as the corner blocks may obstruct them.



(54) Temporarily fix the landing gear in place aligning it exactly square to the fuselage, then mark F2 to match the pre-drilled holes of the landing gear. Drill F2 with a 5/64" bit for the retaining screws. Install the gear with four #4 x 3/8" screws. Remove the gear and harden the threads in F2 with thin CyA.

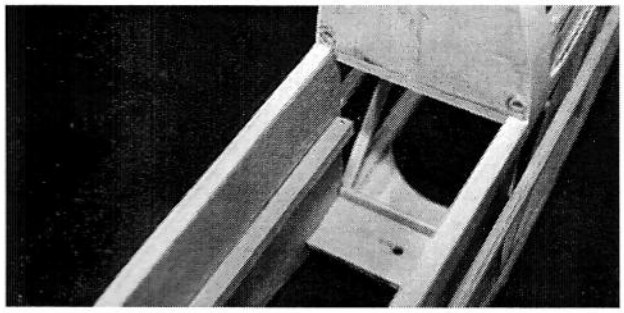


(55) Reinstall the landing gear then cut fit and glue the 1/8" balsa cross grain nose chin sheeting. This extends flush with the outside of the 1/16" balsa nose skins.

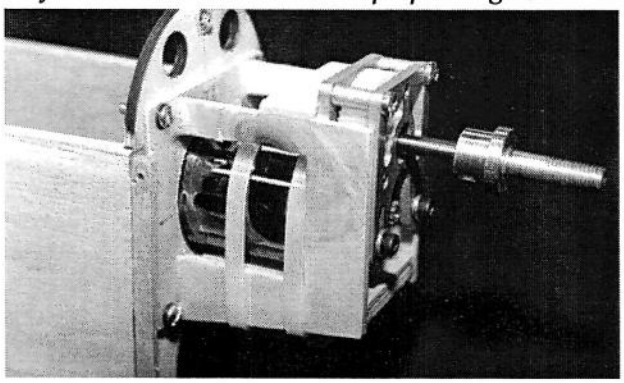


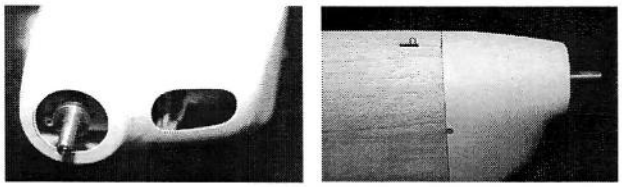
(56) Temporarily install the wing. Cut and fit the 1/2" x 2" x 3" balsa fairing block that extends back behind F2 below the leading edge. Glue in place to the wing when the fit is right. Cut, fit and glue the 1/16" balsa sheet fairing behind the trailing edge of the wing on the fuselage belly.

(57) Trim the 1/8" ply tail wheel mount plate to fit between the lower rear fuse longerons and the cross brace at its front edge. Cut and fit a slot for the tail wheel bracket in the 1/8" ply plate and lower longerons. Install the tail wheel mounting bracket with the furnished #2 x 3/8" screws. As these screws go into the balsa longeron it will be necessary to remove the bracket and harden the threads of the screws with thin CyA.



(58) Remove the temporary 1/8" X 3/16" balsa cross-braces at C3 and C4; these where installed for alignment purposes only. Trim, fit and glue the 1/4" square hardwood battery tray rails to the inside of the fuselage, then trim the 1/16" ply battery tray as needed to fit neatly on top of the rails. Mark the positions of the six #2 x 3/8" screws and drill through the tray into the rails with a 1/16" bit then trial mount the tray.*(Note the battery tray serves as a base plate for the fuel tank to set on. Drill F1 and F1 doubler for the fuel lines. A piece of foam rubber all around the fuel tank will raise it to the proper height).*



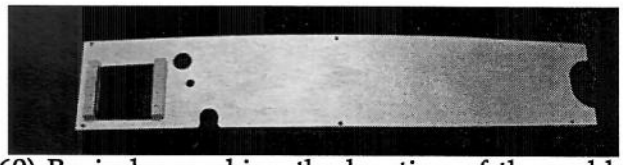


(59) Mount the motor/gear box assembly *(engine/motor mount)* to F1 to serve as a position reference for mounting the cowl. Cover the motor and gear box with masking tape to prevent sanding dust from getting inside. Cut, fit and glue 1/8" x 3/16" balsa cowl mounting flanges to the front of F1*(F1 doubler)*. These should be recessed from the outside of the nose sheet by the thickness of the cowl. Now trim the cowl to fit snugly over the flanges, against the front of F1, and cut and trim the openings for the prop shaft and air intake *(and muffler)*. Mount the spinner back plate and further adjust the fit of the cowl as needed to line up with it allowing 1/16" clearance between the cowl and spinner. When everything fits correctly, use a 1/16" bit to drill the flanges for the #2 x 3/8" cowl mount screws. After the cowl is removed, these holes can be impregnated with thin CyA

for durability. With the cowl in place, mount the top hatch and using progressively finer grades of sand paper, sand to blend all of the fuselage stringers and sheet covering together. Fine sand down to 320 grit paper then remove the cowl, motor/gear box, hatch and battery tray.

VI. FINAL ASSEMBLY AND EQUIPMENT INSTALLATION

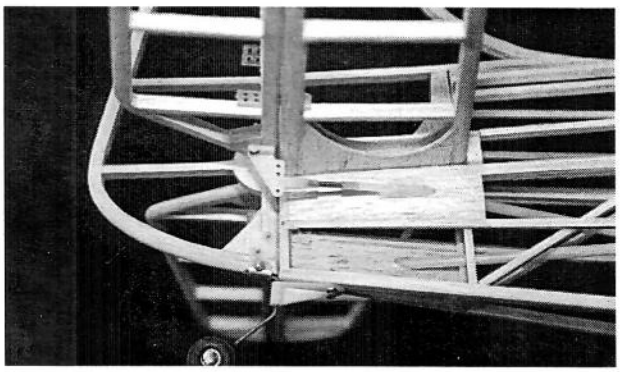
Regardless of the type of covering and finish you choose, we suggest that you complete the installation of your power and radio systems before covering, so that anything that needs to be adjusted will not interfere with a completed finish.



(60) Begin by marking the location of the rudder and elevator servo cutout on the battery tray using the layout shown on the plan as a guide and modifying the cutout as needed to suit your equipment. Cut and install two lengths of 1/4" square hardwood to accept the servo mounting screws then drill appropriate screw holes and mount the servos. Determine where the motor battery, speed control, receiver and receiver battery (if used) will go and make cut outs at the edge of the tray as needed to allow wires to pass neatly above or below the tray. *(Using similar techniques as for the rudder/elevator servo, mount the throttle servo and install the throttle push rod to suit your engine. Note that the Ace "No Noise" Flex Throttle works well here.)*

(61) Mount the control horns to the rudder and elevator in the positions shown on the plan.

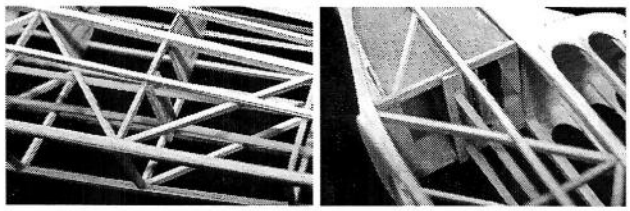
(62) Temporarily install hinges in the rudder and elevator and trial mount both in position.



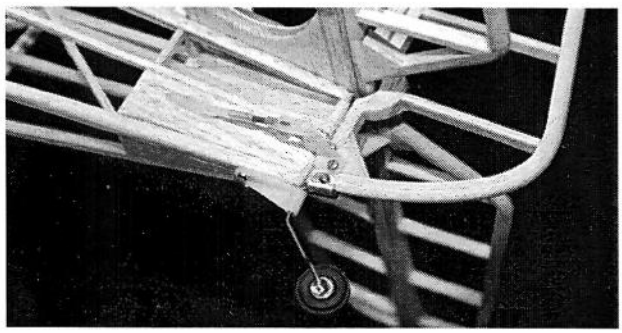
(63) Using the Nyrod™ provided, determine the best routing for the elevator control rod from the servo to the horn and mark the position where the rod will pass through the exit guide sheet at the tail. Drill a 3/16" hole at this location, angling the drill back sharply to elongate the hole. Repeat this procedure to locate the nyrod from the rudder servo to the horn.

(64) Cut a piece of outer nyrod enough to reach from the exit guide sheet for the elevator and rudder to just behind the servo leaving sufficient room at the servo end or the threaded metal rod.

(65) Using scrap 1/8" balsa sheet make anti-flex braces that fit snugly over the outer nyrod and install as shown on the plan at stations F6A and F9 but **DO NOT GLUE** them in place at this time. Roughen the outer surface of the outer nyrod and glue it in place where it passes through the exit guide sheet. Repeat the above process with the rudder control nyrod.

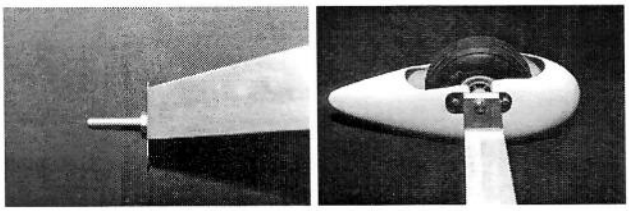


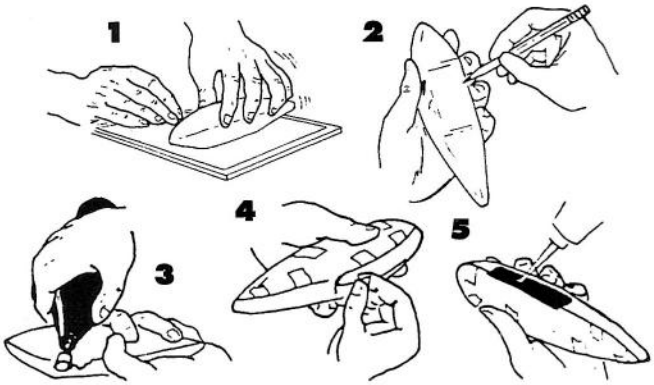
(66) Cut the inner nyrod in half and use one piece to connect the elevator servo to the elevator horn. Thread approximately half of one of the 1" threaded rods into one end of the inner nyrod, then install a mini snap link on the protruding end. Now slip this partially completed nyrod into the elevator tube, and connect the snap link to the elevator horn and pin the elevator in neutral. Using another 1" threaded rods install a mini snap link with approximately one half of the threads protruding out the end. Attach this second snap link assembly to the elevator servo arm and modify the inner nyrod as needed to connect it to the elevator inner nyrod with one half of the protruding threaded rod screwed into the inner nyrod. Test for correct operation with the radio operating, then glue the anti-flex braces in the position that allows the smoothest control motion. Repeat the above procedure to hook up the rudder servo.



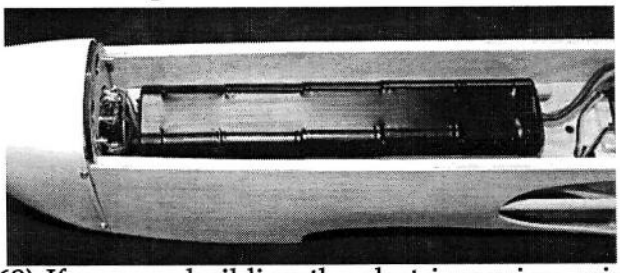
(67) Bend the 1/16" wire tail wheel strut/axle to shape. There are several ways of attaching the strut to the rudder. The tiller arm portion of the top of the strut can lie along the bottom of

the rudder and attached to it by either a piece of fiberglass tape glued in place or by a narrow strip of sheet metal (tin can) fixed to the base of the rudder with a short screw or you can bend the strut so that the tiller arm lies higher up and fits into a hole drilled in the rudder between the two rudder horn mounting screws. The latter method is neater looking while the former is more easily removable for maintenance. Mount the tail wheel in place on the axle by soldering washers in place as retainers. Trial mount the completed assembly in place and test for proper operation.





(68) The proven way to assure good ground handling of a tail wheel airplane, that is, to eliminate uncontrolled swerving or "ground looping" is to incorporate toe-in of the main wheels. Here's an easy way to do it. Remove the alloy landing gear from the airplane and fix the lower tab (the part the axle bolt screws into) on either side in a vise. Remembering that the angled edge of the landing gear is the front, bend the entire landing gear so that the front edge of the lower tab is angled "in" (toward the fuselage) about one degree, or just enough to see without measuring. Now fix the other axle tab in the vise and bend it in at the front an equal amount. When the axles and wheels are in place, you should be able to look down at the landing gear assembly and just notice that the front edges of the wheels are closer to the fuselage than the rear edge. Now you can mount the wheels using the 8-32 x 1-1/2" bolt and jam nut/aircraft lock nut assemblies. If you are going to use the wheel pants, prepare the mounting brackets using the 1/2" x 1-1/2" brass sheet blanks provided. Round off the corners, drill at the center to fit over the axle and at either end per the plan with a 1/16" bit to accept the 1/4" screws provided. These brackets are trapped between the axle tab portion of the landing gear and the jam nut. A bit of "workable" or light grade thread locker will keep them from rotating at random, but will allow movement under load and prevent damage in a bad landing. Finish the wheel pants by trimming the molded plastic halves to shape, then holding them in assembled position mark for the wheel cutout on the bottom of the pants for the wheels you plan to use. Using an X-acto knife or Dremel tool with a sanding or cutting drum make the cutouts in the wheel pant halves. Tape the halves together making sure the surfaces line up as best they can and making sure the tape covers the whole outside seam of the pant. Now, from the inside of the pant, run a bead of thin CyA into the joint. Reinforce the inside of the joint with the cloth tape furnished. The easiest way to do this is to spray a length of the tape with Spray 77 and then apply the tape to the inside of the joint. Now impregnate the tape with thin CyA. Remove the tape and finish the seam with plastic model surfacing putty or your favorite equivalent. Drill small pilot holes to accept the 1/4" screws that are installed from the fuselage side of the mounting brackets and install the pants.



(69) If you are building the electric version, reinstall the motor/gear box assembly. Trial mount the entire radio and electric power system. We strongly recommend the prewired Model Electronics Turbo 10 system. This provides you with all wiring and connectors pre-cut to fit this airplane with all the connections already soldered and has proven to be the best performing system available for the Tiger Kitten at the time of this writing. If you are using an Astro motor, use an Astro wiring harness or make one up per the wiring diagrams shown on the plan. With all equipment in plane and **no propeller installed,** test run the motor and check all servo operations until you are satisfied that everything works the way it is intended to. Now remove all the radio and power systems, along with everything else that can be taken apart, in preparation for covering and finish.

VII. COVERING AND FINISH

(70) Any of the popular covering and finish operations will work well on the TigerKitten. Most builders will probably opt for a film covering. Our only suggestion in that respect would be to choose a film that offers the greatest stiffness and strength, as a slight increase in weight will not be a problem with this model. You might also want to choose a product that offers a companion matching paint so that the cowl and wheel pants can be easily finished to match. The TigerKitten will easily handle the slight extra weight of a painted fabric finish, this approach offers the benefit of substantially greater strength and durability at the expense of a little extra effort. The red and cream model in the Ace R/C catalog is covered with Sig Koverall and finished in Sig butyrate dope. At 70 ounces, it flies aggressively and has been doing so for four years at the time of this writing. The model illustrated in this manual is finished with Super Coverite and 21st Century paint from spray cans at a nearly identical weight. The original TigerKitten, built in 1988, is finished in silk and dope, and is still in excellent flying condition.

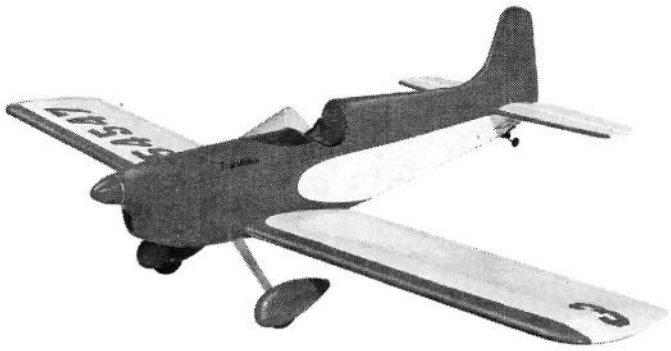
Regardless of the covering you choose, fill all cracks and dings with a light filler such as Model Magic or a commercially vinyl spackle and sand everything as smooth as you can get it. Re-sand with progressively finer paper, down to at least 320 grit, as the final finish on the airplane will be only as good as your surface preparation. Give the battery tray a coat of clear dope or Balsarite to seal it so the Velcro used to attach the battery, receiver and speed control will stay stuck. The windshield can be trimmed to shape using the pattern on the plan and attached after covering using a flexible adhesive such as Zap-A-Dap-A-Goo or Pic Flex White Aliphatic Glue. If you are using a painted finish, you might want to try putting the windshield on after the covering is on, clear doped and primed. The area that will appear "inside" the windshield is painted the color you want; this can be flat black as per full scale "antiglare" practice. Mask off the entire windshield leaving about 3/16" of exposed plastic at the lower edge where it will attach to the airplane and glue it in place using thick Hot Stuff UFO, or other "non-fogging" adhesive, while holding it in position with narrow strips of masking tape. A fillet of non-shrinking material such as Epoxolite is built up along the seam between the hatch and windshield, sanded smooth and primed, and then painted along with the trest of the mode. When the final coat is dry and the masking tape removed, the windshield appears to have been molded into the hatch.

VIII. FINAL ASSEMBLY AND TEST FLYING

(71) When all the covering and finish is in place and dry, reinstall all the radio and power system *(engine's)* components. If you are using the Turbo 10 motor, install two medium size nylon cable ties around the motor and the lower portion of the built-up mount to serve as a safety restraints to insure that the motor/gear box assembly cannot shift under power. Permanently install all control surfaces using a slow setting epoxy to allow yourself time to get the alignment perfect. Reattach pushrods to the ailerons, elevator and rudder and double check for correct direction and full range of motion as called out on the plan.

(72) Suspend the model from the balance location shown on the plan and shift the motor battery *(receiver battery)* unit until it hangs exactly level. If you have built and finished the TigerKitten according to the instructions, very little balance adjustment should be required. In any event, once the correct location for the motor battery is established, make a mark inside the airplane that will allow you to replace the battery in the proper location every time! **NEVER ATTEMPT TO FLY UNLESS THE AIRPLANE BALANCES AS SHOWN REGARDLESS OF THE SHIFTING OF EQUIPMENT THAT MIGHT BE NECESSARY TO ACHIEVE THE CORRECT BALANCE.**

(73) Check again for correct direction of control surface motion, that is "Up Elevator is back stick" on the transmitter and should move the elevator "up" and so on. Recheck that the control throws are as called out on the plan and adjust as necessary by moving the clevis linkages into appropriate holes in the servo outputs and or control horns. Never rely on trim adjustments made with the transmitter trim levers, these will invariably be moved at random and then you will be in trouble. Of course, if you have a computer radio all this can be done electronically.



(74) Do an antenna-down range check according to your radio manufacturer's instruction with the motor off, then re-check with the motor running at partial and at full power. A reduction of 10% to 20% of antenna-down range at full power is OK. If you experience more than this, find the problem and fix it before you attempt to fly!

(75) You are now ready to fly one of the very best sport/aerobatic R/C airplanes designs available anywhere in the world! We at Ace R/C are proud to have been able to bring the TigerKitten to you and are confident that you will be equally proud of the airplane you have just completed. Wait for a good day to test fly, and take your time getting used to the model. Properly trimmed, the TigerKitten will fly the length of your field hands-off, yet when you add power and call for action, it will display speed and aerobatic performance that will astound and amaze other modelers wherever you fly!