KING KOBRA

BUILDING AND FLYING INSTRUCTIONS

Sig Mfg. Co., Inc...401-7 South Front Street....Montezuma, Iowa 50171

The King Kobra was designed to fill requests for a .60 sized airplane like our popular .40 - .50 size Kougar. Following the Kougar philosophy, it is a compact model. Because of this efficient size, the King Kobra is capable of excellent aerobatic performance without necessarily needing a tuned pipe and/or retracts. We know there will be some builders who will want to use these high performance extras so a section is included in these instructions to guide them. The kit, however, is intended to produce the fixed gear version as it will be built by the majority of buyers. Any extra parts or materials needed for retracts or tuned pipe installation are not supplied.

It should be obvious that this is not a model for novice fliers. You can't go straight from a high wing trainer like the Sig Kadet to the King Kobra without a lot of assistance from an instructor. But if you travel the full 3-step "Learn To Fly RC The Sig Way" program or its equivalent first, the transition to the King Kobra's high speed and responsive performance will be easy.

Since most builders of this kit will probably have had some experience we were tempted to short cut the instructions. This was not done. Some skilled fliers may not have had much prior building experience and beginners at both building and flying will probably be constructing the model for future use. Other readers with considerable expertise may feel they can skip the instruction book. Our advice is the same as to the amateur. Read it all before beginning. There are some essential facts mixed in with the more elementary, don't get bored and miss these.

ABOUT THE BUILDING SEQUENCE

The quickest and most efficient way to complete a model is to work on several pieces at the same time. While the glue is drying on one section you can start on or proceed with another part. Work can even go forward on several sections of the same assembly at the same time, such as the front and rear of the fuselage. We occasionally get suggestions that our instruction books should be in exact step-by-step building sequence. But this would result in many sentences starting, "While the glue is drying on the fuselage, move to the wing etc." and a lot of jumping back and forth between assemblies with no consistant pictoral progression. Also, our pre-selected building sequence might not suit your workshop space or time allotments.

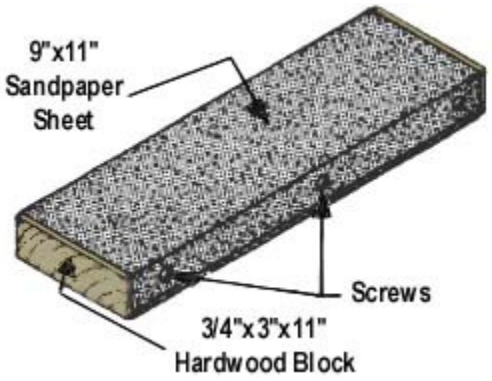
Therefore, we feel the present system of covering main assemblies in a unit works out best for the majority of kit builders.So keep in mind that the numbering sequence used in these instructions were chosen as the best way of explaining the building of each major assembly and is not intended to be followed in exact one-two-three fashion. Start on the wing at No.1 and after doing as many steps as is convenient, flip over to the next main heading of "FUSELAGE CONSTRUCTION" and do a step or two there, then over to "TAIL SURFACES" and so forth. You will, of course, arrive at points where you can go no farther until another component is available. For example, you need a nearly completed wing before the fuselage can be entirely completed. And you will need both the wing and stab to fit the wing and tail saddles on the fuselage and align them to each other. The way to understand these relationships is to read the instructions completely and study the full size plan before beginning to work. Think ahead! Any reference to right or left refers to right or left as if seated in the cockpit.

SOME BUILDING SUGGESTIONS

Cut all long pieces of balsa first, followed by medium lengths before cutting up any full-length strips into short pieces.
A piece of Celotex-type wallboard or foam board makes a handy building board, into which pins can easily be pushed. Lay the building board on a table with a flat and untwisted top. Don't be afraid to use plenty of pins when planking. The holes will fill up during sanding and doping. Use Sig-Bond glue for general construction except where the instructions call for epoxy.

YOU CAN'T GET ALONG WITHOUT A GOOD SANDING BLOCK

An indispensable tool for proper construction is a large sanding block sized to take a full sheet of sandpaper. Use several wood screws along one edge to hold the sheet in place. Use the block to bring all parts and sticks to final, exact fit. We recommend 80-grit garnet paper for use on the block during general construction. You can switch to 100-grit, followed by 220 silicone paper for final finish just before covering.



In addition to the large block, there are places where a smaller one is handy. Also, a sandpaper "file" can be made by gluing sandpaper to a flat spruce stick for working tight-places.

A modeling knife or jig saw can be used for cutting out printed parts. Don't cut too close to the lines - leave some extra wood outside the lines. True up and finish the edges with a sanding block as you are fitting the parts together. Don't force die-cut parts from the sheet. Use a modeling knife to finish freeing them.

ABOUT PRINTED WOOD PARTS

Some years ago we had kits featuring die-cut parts in both thick and thin sizes. If the thick parts were cut from dry wood, the wood often crushed or crinkled on the edges, even when using a brand new die. If the thick parts were cut from wet wood there was an improvement - though many of them still crushed - and the swelled wet wood parts changed shape after drying, making them inaccurate. So we asked modelers if they would rather have the parts printed on the wood instead. They could be cut in a few minutes with a saw or modeling kinife and thus avoid any "die-crunching." Most voted in favour of this idea.

To answer the question we are sometimes asked - no, we do not print parts on wood to save money. It is actually more expensive to print the parts using a silk screen press than it is to run an equivalent sheet through our automatic feed die cutting machine. If we hand-sawed the parts it would be even more expensive and the labor cost would have to be added to the kit price. We believe that most modelers would rather cut their own out and save the cost. Since there are not many thick parts in our average kit, it really doesn't consume a lot of the total building time for the builder to do the parts.

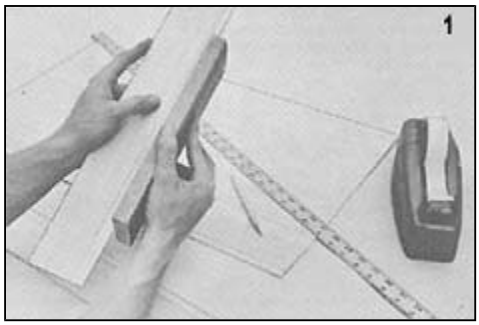
NOTE:
Some of the pictures in the instruction sequence are of the Kougar because the operation being performed is identical on both models. Also, some of the King Kobra pictures may show a retract gear installation in the background. Ignore these areas if you are using a fixed gear, the construction step shown in the picture is the same for both types.

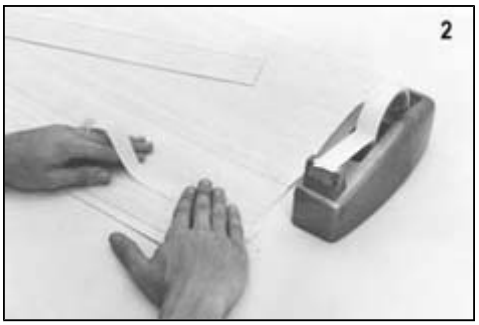
WING CONSTRUCTION

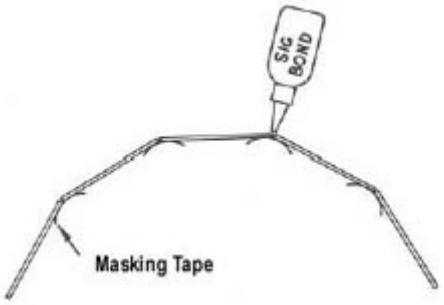
1. True up the edges of the twelve sheets of 1/16"x4"x30" wing planking wood by trimming where necessary, using a metal straightedge as a guide. Use the sanding block for final touch-up.

2. Tape 6 sheets tightly together with strips of masking tape.

3. Turn over and open up the joints, with the masking tape serving as a hinge. Put a bead of Sig Bond in each of the seams and close the joint.

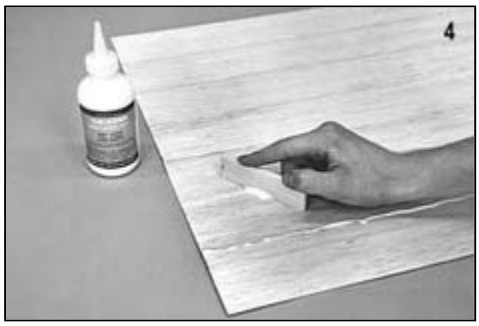


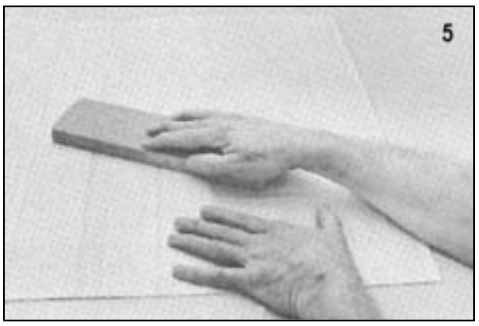




4. Lay the sheets flat. Scrape off the excess glue with a squeegee made from a balsa scrap. Finish glue cleanup with a damp rag. Weight down the sheets on a flat surface and allow to dry thoroughly.

5. Sand the skins smooth with a sanding block.



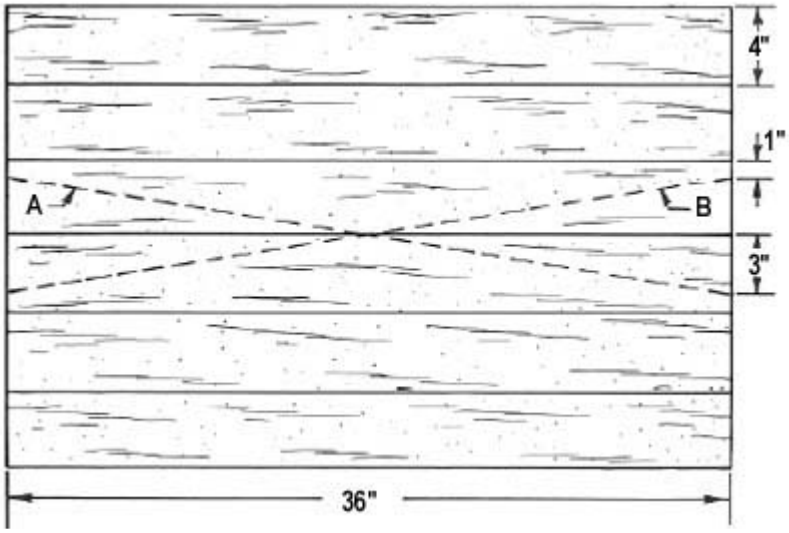


NOTE:
The grain of the wing skin sheet can be on either parallel with the leading edge or with the trailing edge. We have tried it both ways and on this shape wing can see no appreciable difference in ease of application. Both ways are shown. Use your own preference. There is a little more leeway for error in placement on the edges of the piece with the trailing edge method. And, it seems to us easier to keep that critical trailing edge true when it is placed down and rolled parallel to the grain.

6. ## Wing Skin Sheet

Cut one 6-sheet piece diagonally in two, with untaped side up, as shown by the dotted line marked "A".

Cut the other 6-sheet piece diagonally in two, with the untaped side up, in the opposite direction as shown by the dotted line marked "B". This provides 4 wing skins with the untaped, rougher glue seam on the outside surface of the wing. The smoother, taped side should be used against the foam wing for best adhesion of the skin to the foam. The rougher, outer glue seams can be sanded down partially with a sanding block before application of the skins and completed during final sanding of the skin on the wing.

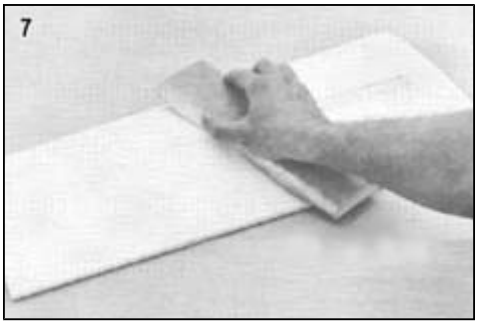


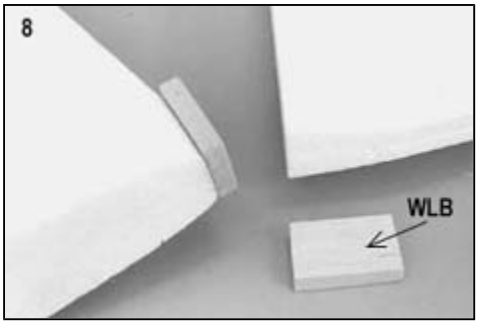
CAUTION: Use only Sig Core Bond, Sig Kwik-Set, Sig Epoxy Glue or Sig-Bond Glue on the foam wing cores. Model cement such as Sig-Ment, dope and fiberglass resin will attack and destroy foam. If you use any product other than those listed, test them on a scrap of foam.

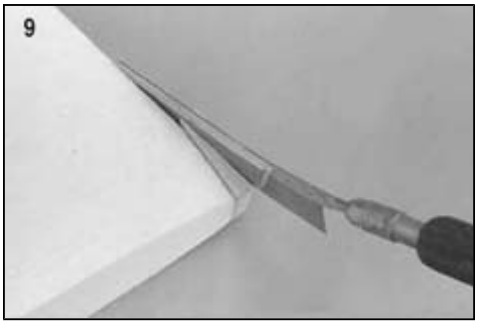
7. Sand any irregularities or cutting wire marks from the cores with a sanding block.

8. Glue the 1/2"x1-1/2"x2" balsa blocks WLB to the flat front of the core.

9. Save the foam blanks to use as a cradle for sanding later. Saw WLB off flush with the core leading edge.



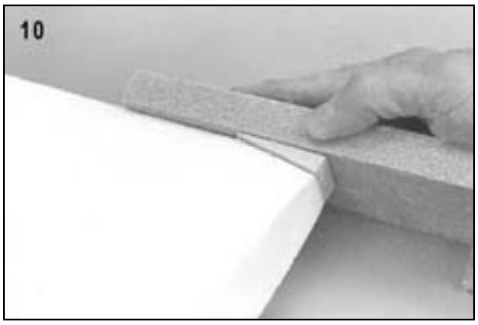




10. Finish WLB with a sanding block.

11. Carve WLB to airfoil contour.

12. Hold the cores together at the center joint. If there is any mismatch in the airfoil shape, sand as required to make them fit smoothly together. Done this way, little matching will be required after planking. Refer to the dihedral view on the plan. Check out the cores as shown there before proceeding. Do not cover the cores until you are certain they match properly. NOTE: If you plan to have retract gears, turn to the section called "Retracts" and install the gear mounts in the wing at this time. Then preceed with step 13.



13.
   a. Sig Core Bond is recommended for applying the wing skins. This is a special adhesive, light and strong, that is ideal for use with foam. As experienced modelers have found, many foam wing glues contain very volatile solvents. When using these glues, if the wing skin is put on before the glue is absolutely dry, the still evaporating solvents are trapped in the assembly and quickly attack and destroy part of the foam core, ruining the wing. Sig Core Bond doesn't cause this type of damage so it is ideal for beginners at foam wing sheeting in addition to being a superior adhesive. If directions on the can and these instructions are followed, it will result in a perfect wing sheeting job.
   b. Shorten the bristles of an ordinary 2" house paint brush to about 1-1/2" in length. This stiffens the brush and makes it easier to spread the glue evenly.
   c. Apply a thin, even, full coverage coat of Core Bond to both sides of the foam cores. Avoid heavy spots. These are inclined to skin over, leaving wet spots underneath that won't stick down properly after the wings are skinned. Stand the cores on end to dry. (The cores should be coated first because they take slightly longer to dry than the wing skins.)
   d. Coat the wing skins with Core Bond.
   e. Allow the cores and skins to dry completely. This generally takes about one hour. In conditions of high humidity it may take somewhat longer. It is best to join the parts as soon as they are dry, since if they are allowed to lay around for a long period, they will not stick together as well.

14. Hold the trailing edge of the foam core in position just above the wing skin and lower the edge only onto the skin. Make sure it is properly aligned before contact is made because it cannot be removed and repositioned after contact is made. Press down along the trailing edge to make sure it is making good contact and is flat against the table.

THE SECRET OF A PERFECT FOAM WING

It's a simple matter of a FLAT table. Most tables are not flat, as can be seen by checking them with a good straightedge. If a foam core is covered on a bowed or twisted surface, then the wing will be bowed or twisted. And a table that checks out true but is flexible and will yield as you press on it will also spoil a wing. The ideal working surface is a sheet of plate glass. Or, it is possible to find a thick piece of plywood that is perfectly true. Like balsa blocks, foam blocks sometimes have built-in internal stresses and the core bows slightly when cut out of the block. Skinning on a flat surface, in the sequence shown in the pictures, will correct minor bows.

Incidently, the washout in the King Kobra wing is cut right into the foam core. The tip section is higher at the trailing edge compared to the center section trailing edge. The washout will take care of itself. No blocking up or other steps are required of the builder. Proceed with wing construction as if it were a standard wing.

15. Roll the core down onto the sheet with a rocking motion.

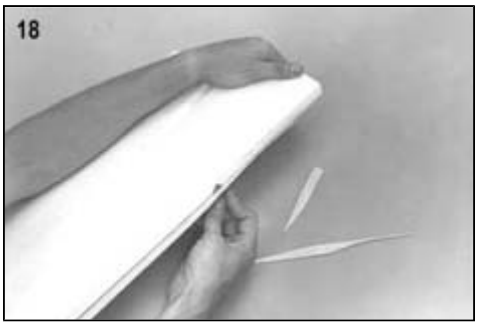
16. Continue rolling the core onto the sheet until the leading edge is attached.

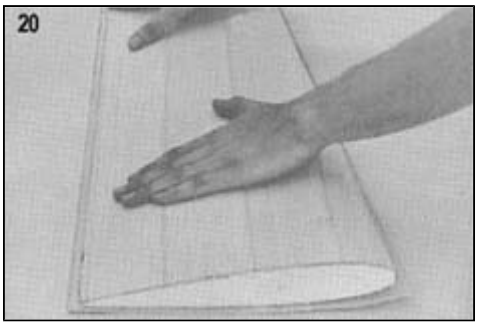
A builder wrote in and suggested it was easier to see and keep the trailing edge true if you stood on that side of the work instead of the side shown in the picture.

17. Turn the core over and firmly rub down the wing skin sheeting with the flat of your hands to insure that the balsa skin is firmly attached to the core. Repeat this process from time to time as you proceed with the next steps. This seals down any areas that may have separated during handling. After sheeting the first side of a core, check for straightness. A bow can sometimes be corrected by hand pressure and twisting the assembly before proceeding.

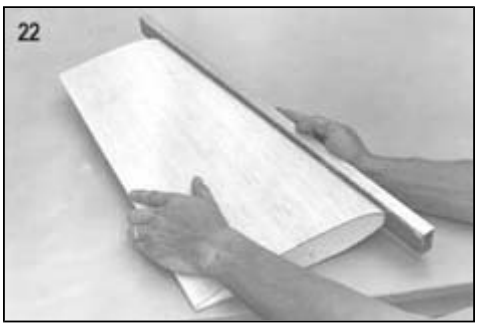
18. Rough trim around the edge.

19 Repeat Step 14, 15, 16 and 17 on the other side as steps 19 to 21.





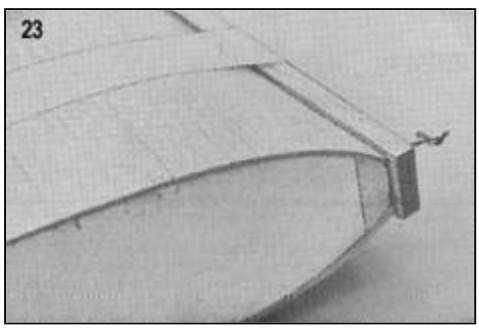
22. Trim and sand the edges of the sheeted foam cores. While the regular sanding block can be used, note how useful an extra long block is for this purpose. The one shown is made from a section of aluminum channel extrusion - with sandpaper glued on using sanding disc adhesive. This handy specialized glue is available at hardware stores and lumber yards.

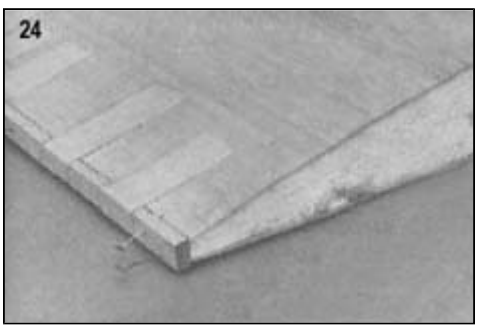


23. Glue on the 5/16"x1" leading edge.

24. Glue on the 1/4" x 5/8" trailing edge.

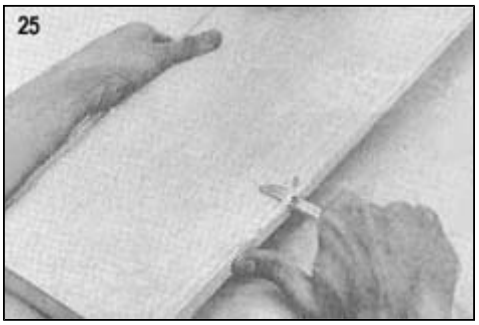
25. Carve the leading edge and trailing edge roughly to contour.

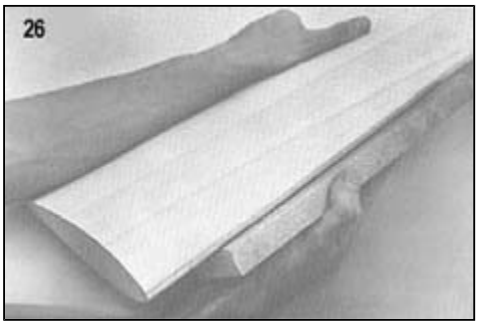


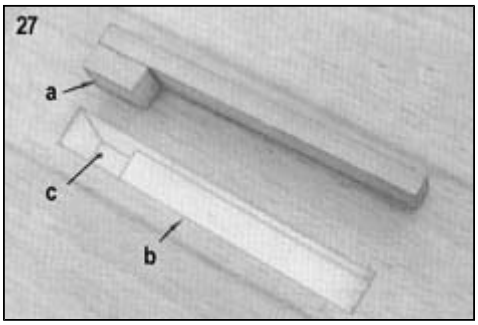


26. Sand to exact shape with the sanding block. A pencil line drawn down the center of the leading edge from root to tip will help get the shape true all along the wing.
NOTE: If you are using retracts, skip Steps 27 and 28.

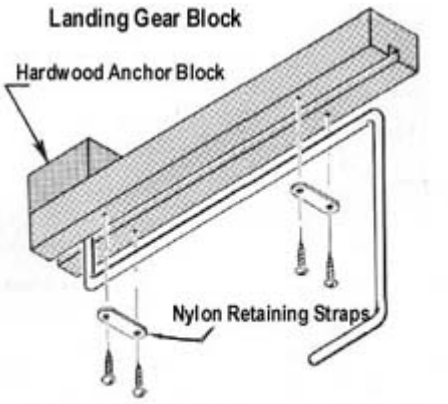
27.
a. Epoxy glue the anchor block to the grooved block.
b. Cut out the balsa sheeting above the landing gear block slots in the foam core. The slots may be located by pressing on the sheeting or by use of the waste block from the foam core. Cut the holes in the sheeting out undersize at first so that the opening can be trimmed down carefully for an exact fit around the landing gear blocks.
c. Excavate the foam out of the pre-cut cavity to accomodate the anchor block. The best way to cut foam is with a brand new, sharp modeling knife whittling blade. Or you can heat an old blade in a flame and hot cut the hole.
d. Epoxy glue the landing gear blocks into the wing. Should there be any areas in the cavities which do not fit snugly against the blocks, fill these voids with a mixture of epoxy glue and scrap foam which has been crumbled into bits.







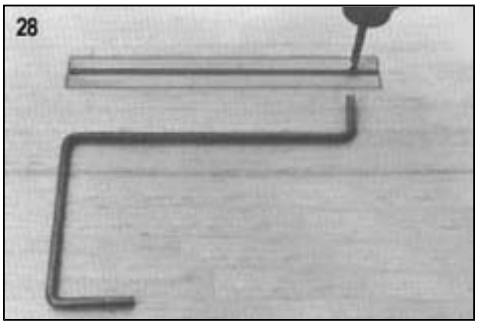
28. Position the landing gear and drill a 5/32" diameter hole into the gear block and anchor block. CAREFUL! It is easy to slip and go clear through the wing. (Put a collar of tape on the bit as a guide.) Trim the edge of the hole so that the radius of the wire at the bend will fit down into it. The gear should fit into the block snugly, but not so tightly that it will jam in the block. You may want to remove it later for straightening after a hard landing. Place a nylon landing gear strap held on by NO.2 screws across the gear at each end to retain the gear in the groove.

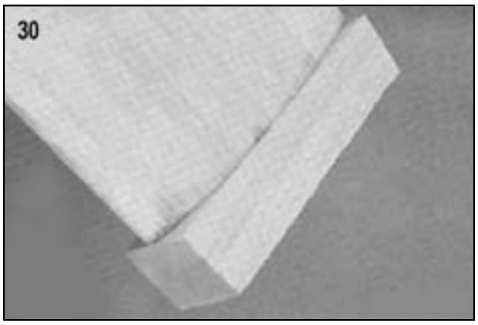


Do not glue the gear into the grooved block. Leave it free to twist inside the gear straps.

29. The angle already cut into the ends of the foam wing halves sets an approximately correct dihedral angle. To check it, set up the wing halves as shown in the drawing on the plan. Sand the wing ends (Photo 29) as required to make the center joint fit correctly together. Glue the halves together with Sig Epoxy Glue or Sig Kwik-Set Glue. Use plenty of glue where the balsa sheeting meets so that the joint between the two halves is completely filled. Be certain that the leading and trailing edges are lined up exactly so that no twist between the two halves is built into the wing. Mark center lines on the ends of each panel before joining and match the lines when joining. If you have the wing sitting on a true, flat surface, a further check on twist can be made by putting center marks on the tips also and measuring from them to the table as a second reference.

30. Glue the wing tip block in place. If you wish to save weight, tack glue it on so it can be removed for hollowing.

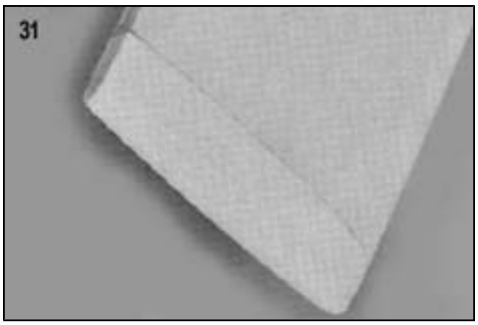


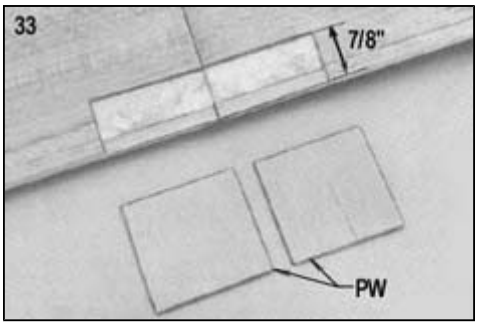


31. Carve the tip block to contour. (Seen from TE side).

32. Hollow the tip with a router.

33. Cut out the inset holes in the top wing sheeting for the 1/16"x2-1/4"x2-1/4" plywood tabs called PW.

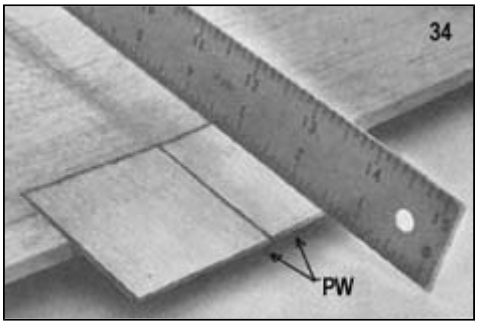


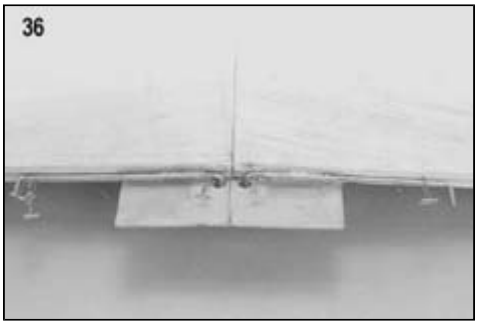


34. Epoxy the PW tabs in place, using a ruler to line them up with the wing top surface.

35. Drill holes in PW for aileron horn.

36. Epoxy the brass tubes to the wing trailing edge, using pins to hold the horn wires in alignment. I find that gluing the tubes directly to the wing puts the horn a little too close. A small scab of 1/64" plywood was used behind the brass tubing in the photo to move them out a bit. Or, you can shim out the horn wires with pieces of balsa or cardboard and fill the small gap behind the tubing with epoxy glue.



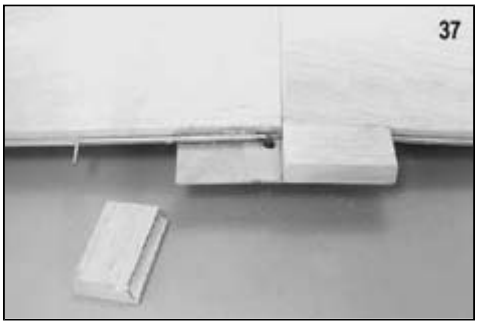


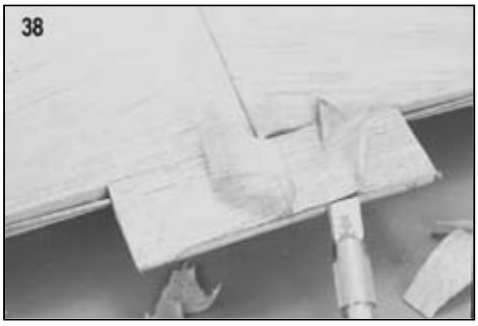
37. Hollow the fronts of 1/2"x1-5/16"x2-5/16" balsa blocks WTB to fit over the brass lube bearing and horn wire. Epoxy in place. Don't get glue into the bearing.
NOTE: Before the next step is done you will need the fuselage with the rear bottom just behind the wing shaped and the wing mounted in final position.

38.
    a. Set the wing into the fuselage and mark a line on the back of the WTB blocks to indicate the fuselage outline.
    b. Carve the WTB blocks to shape.

(NOTE: Pictures 40 and 41 show the fuselage bottom block in place on the fuselage but it is best NOT to have it installed when Step 40 and 41are done. Access to the dowels is much easier when it is not in the way.)

39. Replace the wing on the fuselage and finish sanding the joint so that they blend together smoothly.

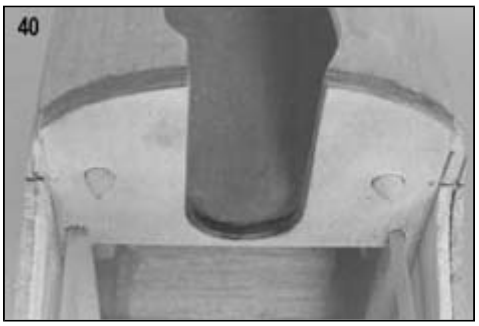


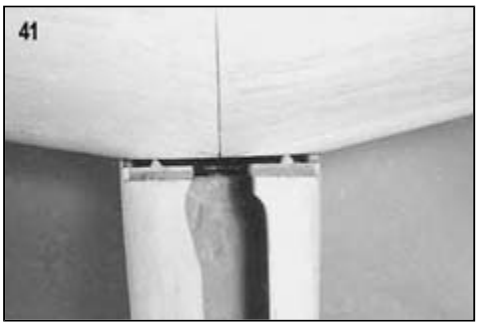


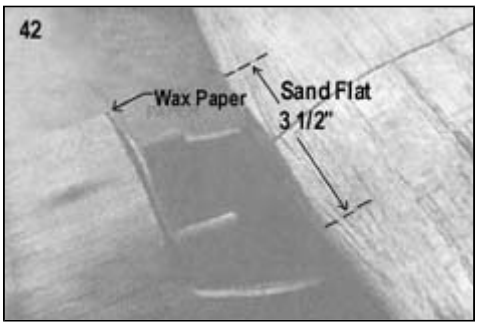
40. Put a point on the 1/4" diameter wing dowels and install in the fuselage.

41. Put the wing on and push the points into the leading edge.

42. a. Drill the holes in the wing out oversize - about 9/32" diameter - to allow some "wiggle" room during the final positioning and gluing in of the dowels. Dig out a little foam just behind the leading edge so the glue will form a "collar" to lock the dowel to the balsa.
    b. Put a piece of wax paper over the face of F-2 and insert the dowels through the paper into F-2.
    c. Coat the holes in the wing with Kwik-Set Glue and put enough extra glue in the holes to fill the gap between the oversize holes and the dowels. Don't overdo the amount of glue.
    d. Put the wing in place and secure it in position with masking tape. Hold the fuselage vertically to keep the glue from running out of the dowel holes. We mix some micro-balloons with the glue so it is not so runny. Allow the glue to set up firm, but not fully cure, just in case it may have stuck the wing to the fuselage in some leaky spot. Remove the wing. If the dowel holes are not completely filled with glue, fill them. If necessary, now that the dowels are set in place, you can cut away the wood around them to provide room for filling any remaining crack with glue.







This step must be done before the fuselage top is glued to the fuselage.

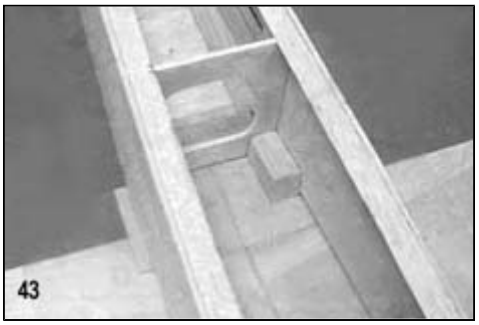
43. a. Put the wing on the fuselage again with a piece of wax paper between it and the fuselage at the back.
    b. Epoxy the wing bolt anchor blocks in place against the fuselage sides.

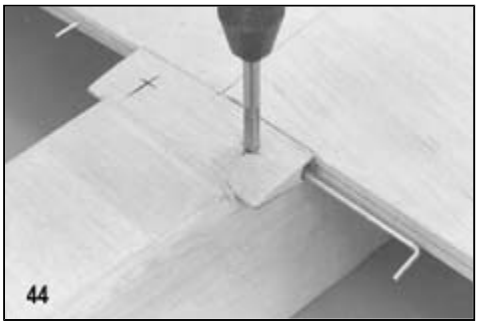
NOTE: We tried the block farther forward on some prototypes so you may see it in a slightly different location in other pictures. The way shown here, in the corner, is strongest.

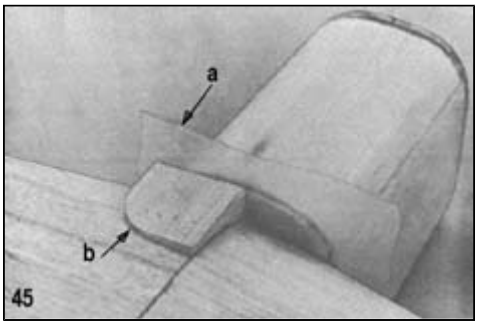
44. a. Locate the positions of the wing bolt anchor blocks on the bottom of the wing. (Remember that the wing bolt holes are drilled at an angle so that the heads of the bolts will end up flush with the surface of the bottom of the wing.
    b. Drill a hole through the wing and on through the anchor blocks with a NO.7 drill. (13/64" is the nearest inch size equivalent.)
    c. Run a 1/4-20 tap through the hole to cut threads in the wing bolt anchor blocks.
    d. Remove the wing and drill out the holes in the wing only with a 1/4" diameter drill to pass the nylon wing bolts.

NOTE: An alternate method of making the area covered in Steps 45, 46 and 47 is shown in the "Retracts" section. If you do not like carving and fitting balsa blocks, the alternate method can be adapted to the wing fairing shape needed here.

45. a. Put a piece of wax paper between the wing and fuselage (which now has the bottom front block installed and shaped) at the front.
    b. Shape a piece of scrap balsa block to fit down into half of the cavity. Make a matching block for the other half.



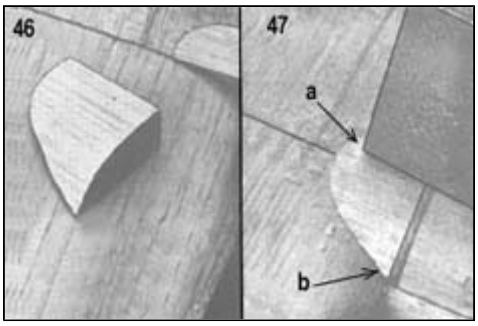




46. Carve the blocks roughly to shape so that the contour of the fuselage is carried on to the wing.

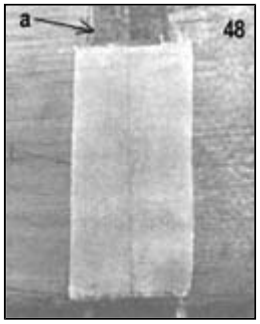
47. a. Glue the blocks to the wing and fine sand the shape as shown.
    b. Fill any small remaining gaps with Sig Epoxolite or a mixture of Sig Kwik-Set glue and micro-balloons or talcum powder.

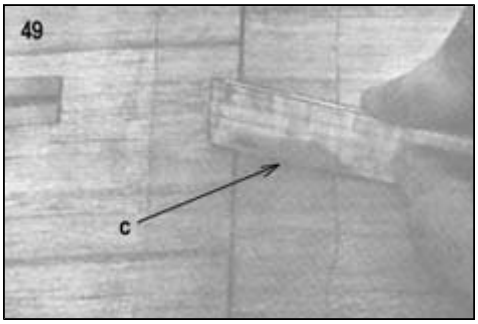
48. a. Cut a cavity in the wing for the servo. Size will depend on the servo and/or mount.
    b. Cut strips of 2" fiberglass tape for both sides of the wing center joint.



49. We use regular Sig Epoxy Glue (not Kwik-Set Glue) for applying the fiberglass tape, since it is thinner and easier to spread out smoothly. It will be even easier to spread if you warm the mixing container by setting it in hot water for a few minutes to raise the temperature of the glue. But work quickly, for the glue will set up much faster than normally when warmed.

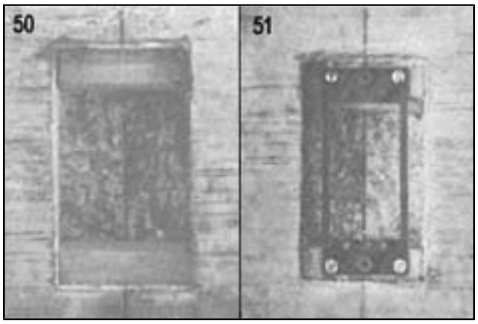
    a. Coat the wing center with glue.
    b. Lay the tape on top of the glue.



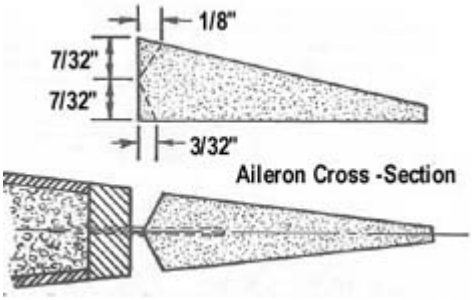


50. Glue hardwood mounts for the servo into the cavity. Coat the entire inside of the cavity with epoxy glue to prevent the foam from being damaged by fuel or dope.

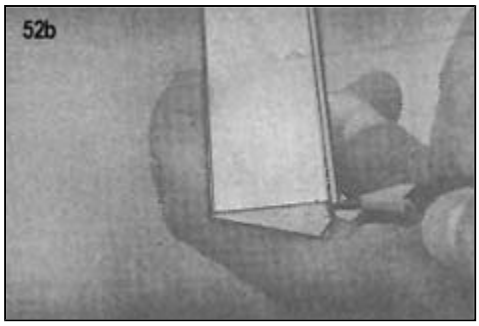
51. The plastic servo mount in the photo is fastened to hardwood mounts with No.2 screws. Other brands may need a different arrangement.

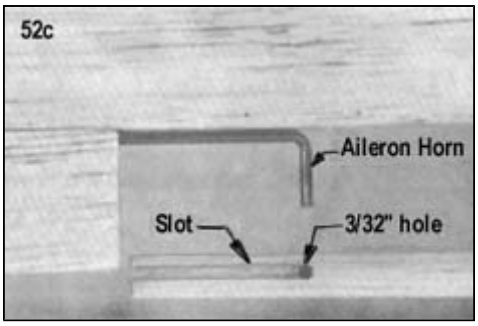


52. a. Draw a centerline on the front of the 7/16"x1-1/4" shaped aileron stock and shaping lines on top and bottom, as indicated.
    b. Carve and sand the front of the aileron stock to shape, so that it can move without bumping the aileron. (Check before gluing.)
    c. Slot the aileron to receive the aileron horn wire.
    d. Drill a 3/32" hole in the aileron to take the arm of the wire.



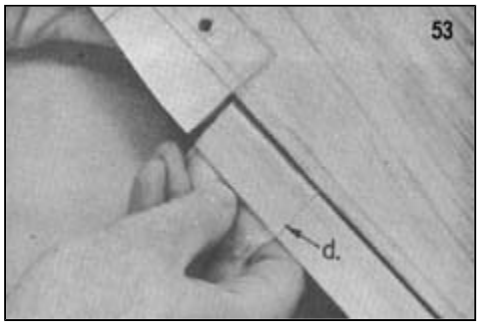
NOTE:
At this point it is best to cover both the wing and the ailerons before gluing the ailerons to the wing. This is particularly advisable in the case of plastic film covering so that access to the edges of the parts is open to the iron.

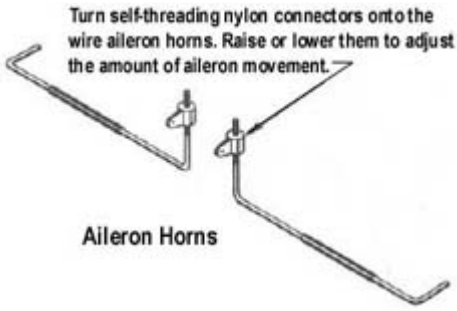


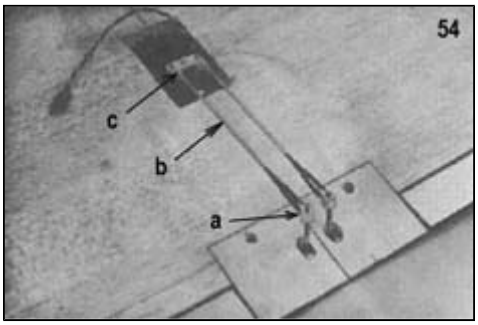


53.
a. Glue the hinges into the ailerons and allow the glue to set up.
b. Put a 1-1/2" wide strip of wax paper about 3" long, between the wing and the aileron horn wire to keep the epoxy glue that is put into the slot and hole in the aileron from being squeezed onto the wing during assembly. Then proceed with gluing the aileron hinges into the wing at the same time the horn wire is glued into the aileron.
c. Check positioning and clearance carefully before the glue sets, making sure the aileron is correctly located.
d. Just before the glue sets up, pull the ends of the strip of wax paper over the horn wire, squeezing the glue into a rounded shape and forming a skin over the wire.
e. After the glue stiffens, any excess that is squeezed up over the aileron when the wax paper strip was pulled back over the horn can be picked or trimmed off before it is fully cured.

54.
a. Screw the nylon connectors supplied in the kit onto the threaded aileron horns.
b. Hook the servo to the aileron horns with the rods and RC links.
c. A servo connector can be used at the other end instead of a "Z" bend, if desired. The Sig SIGSHl84 connector is shown here but is not furnished in the kit.

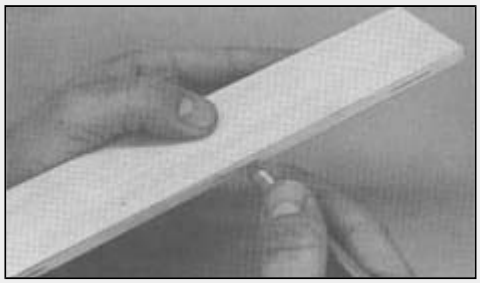


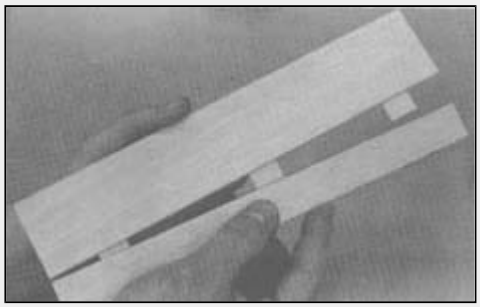




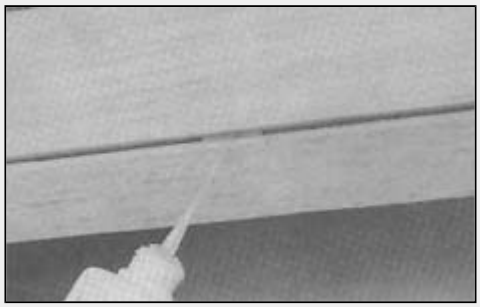
INSTALLING EASY HINGES

Using a No.11 X-Acto blade (or similar) cut a slot approximately 1/2" in depth and slightly wider than the hinge. After all slots have been cut, insert an Easy Hinge halfway into each slot in one of the pieces to be hinged. Then carefully slide the matching model part onto the other half of the hinges. You'll find it easiest to slide the part onto the hinges at an angle, one hinge at a time.





At this point the surface to be hinged is attached but not glued. Align the two surfaces and adjust the gap between them as required. For best control response, the gap should be as small as possible but big enough to allow the control surface to move to the maximum deflection that you will require.



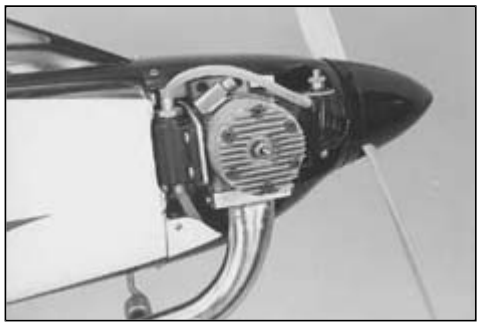
Place three or four drops of any brand of cyanoacrylate adhesive (thinnest variety) directly onto the Easy Hinge in the gap. You will notice that the glue is quickly wicked into the slot as it penetrates both the wood and the hinge. Continue this process, gluing the same side of all of the hinges. Then turn the surfaces over and repeat the gluing process on the other side of each hinge. After the glue has cured, approximately three minutes, the joint can be flexed. You may notice a slight stiffness in the joint. This can be eliminated by flexing the surface to full deflection each direction a couple of dozen times. Don't worry about shortening the life of the hinge as they are almost indestructible.

KING KOBRA RC54 FUSELAGE CONSTRUCTION

Before beginning the fuselage, give some thought to your engine installation. The following instructions show an angled installation with the nose gear bearing installed. The angle puts the engine muffler close to the fuselage and places the needle valve of the engine at an ideal level in relation to the fuel tank. We recommend this location unless you have some good reason for changing it.

On one of the prototypes the engine was mounted horizontally, which had the advantage of making it easy to run the tuned pipe under the wing. This horizontal position is only possible if you are using a retract gear and won't have the nose gear bearing in the way on the front of the firewall. A tuned pipe located on the side of the fuselage may require a nearly vertical or vertical position to work out properly, depending on what shape headers are available for your engine and pipe. For engine locations that put the needle valve above the recommended position it might be advisable to fit a fuel pump, such as the Perry Micro-Oscillating Pump, to minimize fuel level change effects and obtain optimum engine operation. However, the amount of variation from the ideal level is not very large so this may not be a problem. If a fuel pump is not used, a muffler or pipe pressure tap to the tank is recommended.

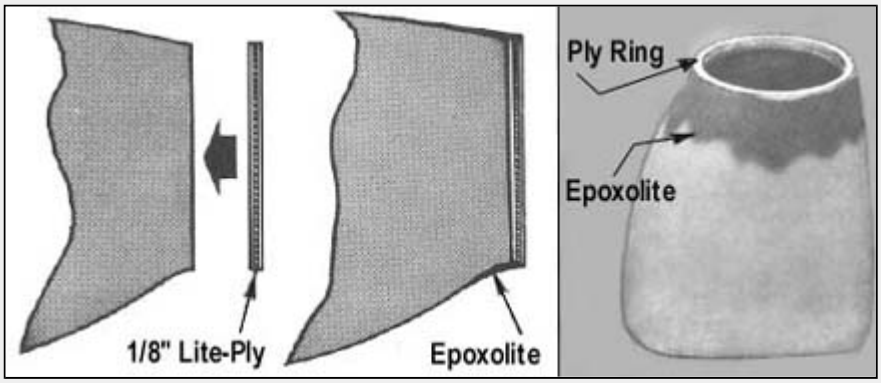
The photo shows a horizontally mounted engine with a Perry Micro Pump installed in the King Kobra. Note that the firewall had to be ground away a bit with a Dremel tool to clear the pump mounted on the back of the engine. Since the firewall is 3 laminations thick, this was no big deal, there was still plenty of wood left to do the job. However, other engines may be bulky enough to require more room in the rear. We suggest here an easy method of getting more clearance behind the engine by lengthening the cowling.



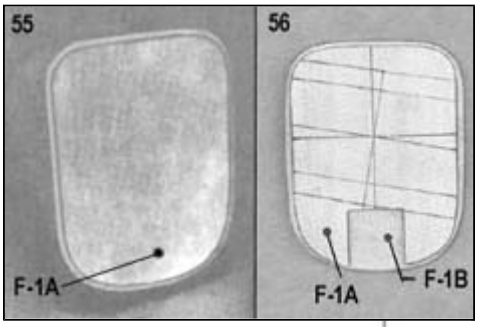
Optional Cowl Extension

The average .60 will not need this addition to the cowl. We show it here for your information should extra room be required.

Sand the gloss off and roughen the plastic in the areas where the Sig Epoxolite putty will be applied. (The putty will almost become an integral part of the plastic if this procedure is followed.) Glue a plywood ring - in this case it was one of 1/8" Lite Ply - to the front of the cowl. Fill the joint with Epoxolite and blend it into the lines of the cowl.



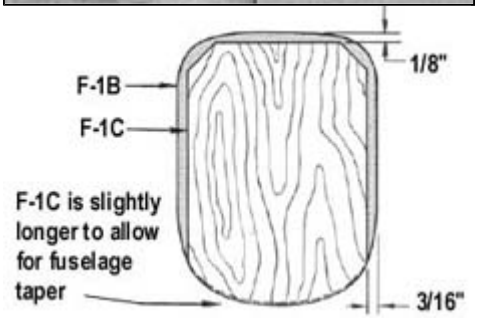
55. Sand any rough edges of F-1A, F-lB and F-lC. Fit F-lA inside the cowling.



56. Draw layout lines on F-1A ot the proper width for the mounts and engine to be used and at the angle chosen for mounting. Glue F-1A to the front of F-1B. Use the cowl to check for correct position. If they should happen to be warped (a congenital problem with plywood), clamp them together between two flat plates in a vise while the glue is setting up.
NOTE: Leave the cut-out for the nose gear bearing in F-1A on for retract versions.

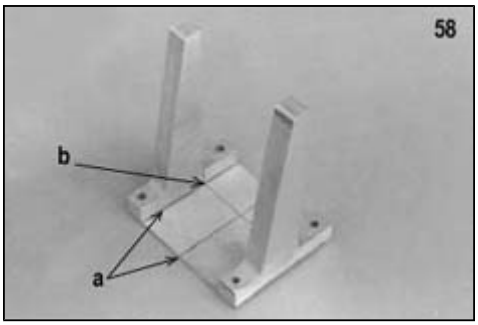
57. Glue F-1C to the back of F-1B with epoxy.

58. Here's a handy way to fit the mounts to your engine. It temporarily turns them into a one piece mount.



   a. Layout guide lines on a piece of scrap 1/16" plywood of the proper width and height.
   b. Mark the top of the mounts on the sides so they can be accurately located.
   c. Glue them in place on the scrap scab.

59. a. Bolt the spinner backplate to the motor. (This must be done to allow for differences in spinners. For example, the Goldberg spinner has a recessed backplate which requires the motor to be farther forward than a spinner without a recess. This is a good thing, giving more clearance behind the motor for fuel lines or pumps, and is one reason other than the pleasing shape - that we recommend the Goldberg for the King Kobra.
    b. Position the motor on the mounts so the spinner backplate will be 4-7/32" from the face of the firewall (or in this case, the face of the scrap back). It is handy to tack the motor in position with some spots of epoxy, brought up over the edge of engine to grip it good or put a strip of double-faced masking tape between the engine and the mounts. This will keep it from slipping during the next step.

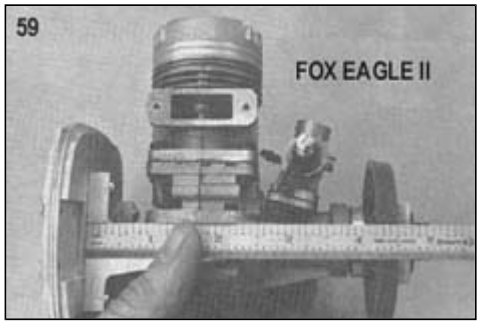


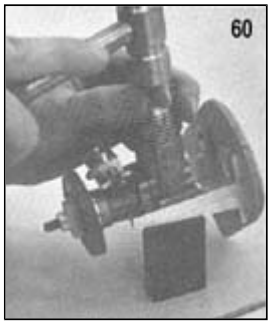
60. With a punch or sharpened piece of 1/8" wire, center punch the motor mounting holes. (Hint: If you are not used to doing this sort of job, don't try to punch and drill all 4 holes at once. Punch and drill only one hole. Then put the motor back on the mounts, secured by the first bolt. Punch and drill a 2nd hole, repeat the procedure, then a third hole, etc. With this process you are much less likely to make a drilling mistake that will ruin the mounts.) Drilling our mounts will not be a problem if a good quality highspeed drill bit is used, operated at neither too fast nor too slow a speed, lubricated and with moderate pressure.
Remove the scrap back from the engine mounts.

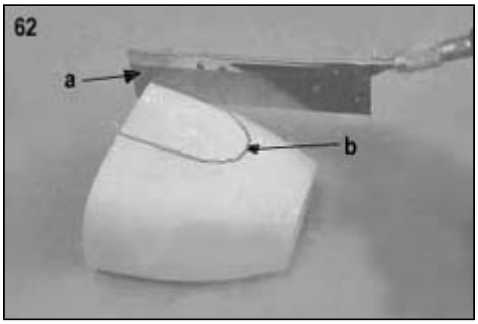
61. a. Position the nose gear bearing on the face of the firewall and drill out the holes with a 7/64" bit to pass the bolts.
    b. Turn the firewall over and drill out the backs of the 7/64" nosegear bearing holes with a 9/64" bit to take the shanks of the 4-40 blind nuts. To complete the holes, take a modeling knife and round off the edges on the back of the firewall so that the rounded off part of the blind nut will fit down into the hole when it is pulled tight against the firewall.

Fit the cowl to the firewall next, before the engine mounts are permanently fastened to the firewall. This allows checking out the placement of the mounts in relation to the cowling. Take the carburetor off the engine and tape over the hole. Having it out of the way makes it easier to make the openings with proper fit.

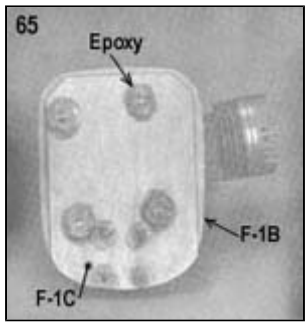
62. a. Start the opening with a saw.
    b. The curved part is done by drilling a series of holes about 1/8" in diameter around the area to be removed, then cutting through the bits of plastic between with a knife.







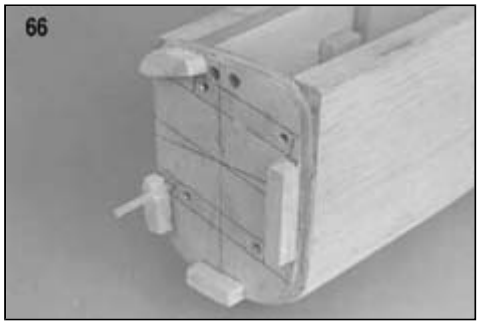
63. Try for a slightly undersized opening at first, then open it up slowly as you fit it to the engine. Go around the edge with an "apple peeling" motion, paring off a small amount of plastic at a time. Remember, it's easier to take off a dozen more chips than it is to put one back on.

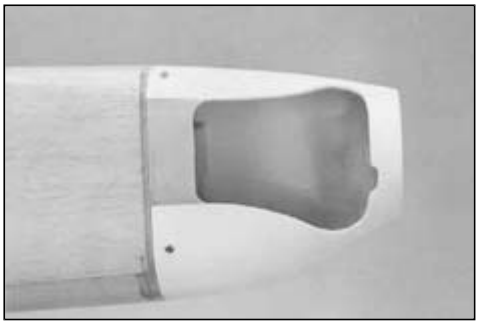


64. Sit the mounted engine in place. Put the cowl over it and add the spinner backplate. If the backplate is not centered on the cowl, shift the engine-mount unit as required to make the spinner center. Carefully remove the cowl and tack glue the engine mount in place. (We tack glue it partially so it won't move before removing the cowl. Drill through the mounting holes and install 6-32 blind nuts on the back of the firewall.

65. Be sure and epoxy the blind nuts to the back of the firewall so they will not come out later when it may be necessary to take off the mounts. Work some under the nuts but don't get epoxy into the threads of the bolts. Pull the blind nut points tight into the wood with the bolts before the glue sets up. With the mounts and nose gear bracket in place, cut off the mounting bolts for both flush with the face of the blind nuts on the back of the firewall. This is to prevent any chance of the bolt ends puncturing the tank.

66. Since the cowl is now finally placed, you can add the 3/8" sq. hardwood mounting blocks to the firewall whenever it is convenient. Shape the blocks to fit snugly against the cowl.

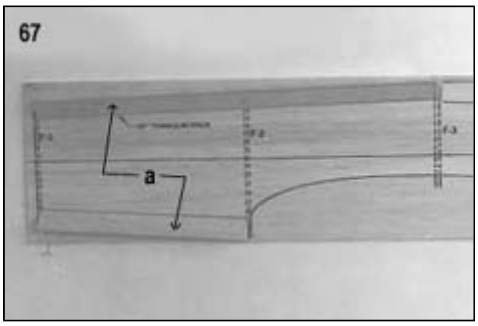


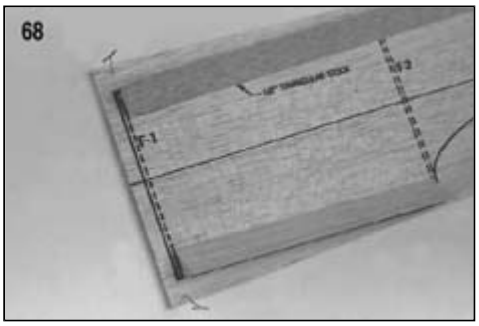


For a neater opening on the prototype, we saved the sawn out portion of the back of the cowl and glued a piece of it permanently onto the fuselage. This filled in the opening behind the engine and gave a more finished look to the installation.

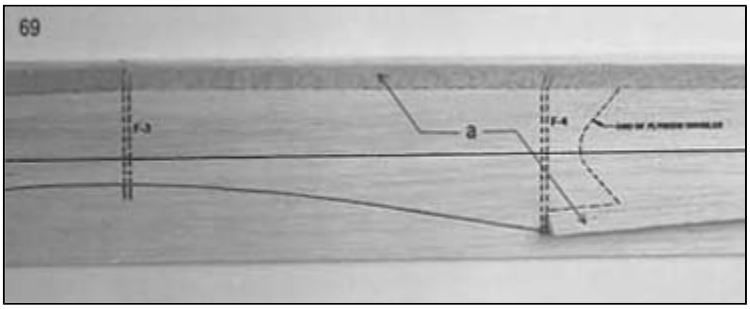
67. a. Cut the front pieces of 1/2" triangular stock to size and glue on the fuselage sides

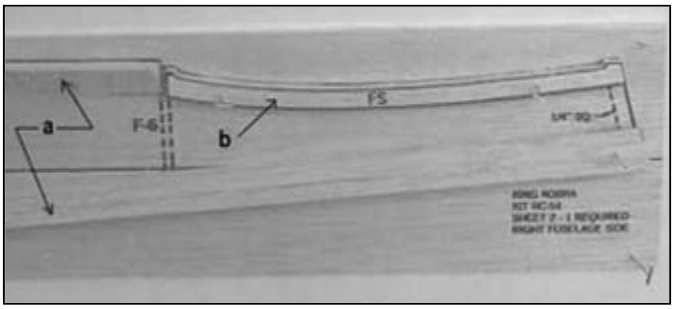
68. Note the placement of the triangular stock at the front. The bottom stock is placed flush with the dotted line to allow space for the firewall.





69. a. Glue on pieces of 1/2" triangular stock on the back of the fuselage sides.
b. Glue the stabilizer saddle FS in place.

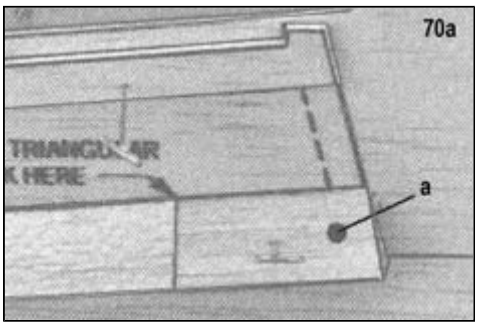


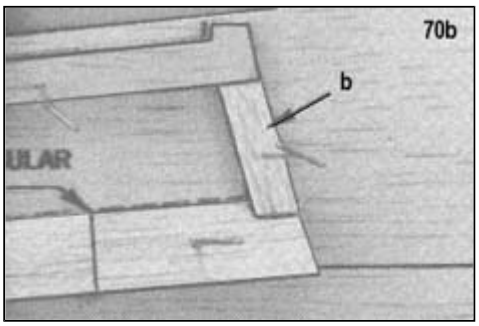


70. a. Complete the bottom 1/2" triangular piece.
b. Glue a piece of 1/8"x1/4" scrap at the back of the sides.

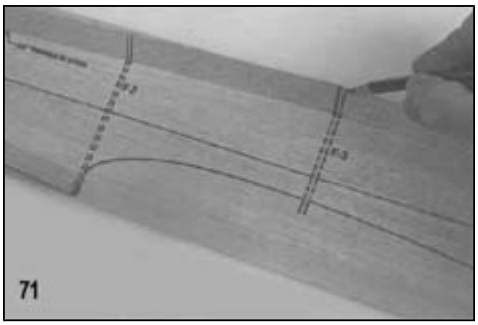
71. Mark the locations of the F-2 and F-3 formers on the 1/2" triangular stock.

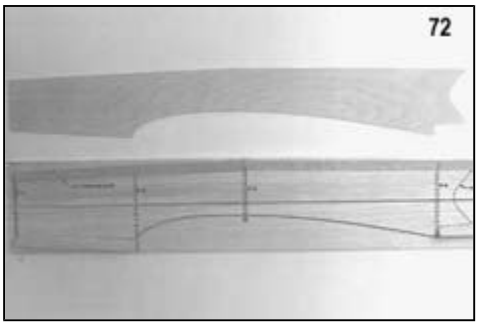
72. Fit the 1/16" plywood die cut doublers FD to the sides.

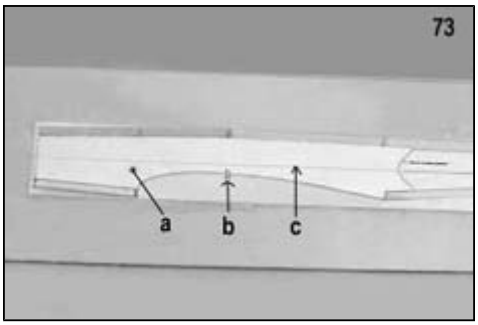




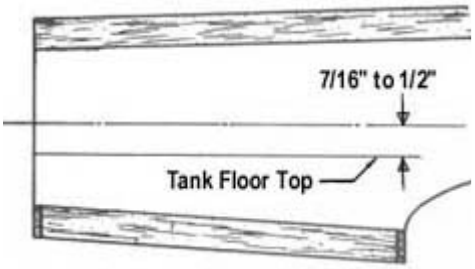
73. a. Glue FD in place.
b. Mark the location of the bottom of F-3 on the doubler.
c. Draw the datum line on the doubler.





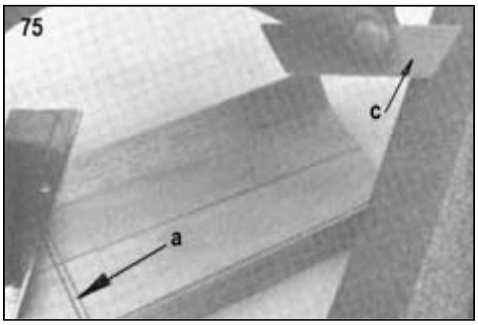


CAUTION: Epoxy or gap-filling cyanoacrylate glue is recommended for FD. Water base glues such as Sig Bond, Tite Bond, Elmer's, etc. may cause curling because of the large are a being glued. Spread a thin film of epoxy with a paddle. Don't use a large amount of epoxy glue - it will add weight to the model.



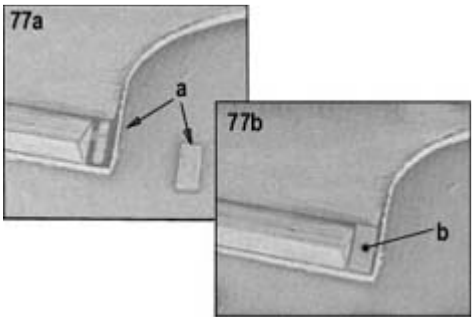
74. Draw the tank floor top line. See full size plans for more tank floor directions.

75. Look ahead to Picture 90. You will see pieces of 1/2" triangular stock being glued on the back of the firewall. These must be cut to fit against the 1/2" triangular stock on the fuselage sides. Do this now, on the sides, while it is easy, before they are joined together. Lay the pieces aside for use at Picture 90.



76. Cut the fuselage sides from the sheet. Don't cut too close, leave a bit for sanding.

77.
    a. A small gap remains at the end of the front bottom triangular stock. Cut a small piece of 1/16" balsa sheet, thinned down to 1/32" thickness to fit in this gap.
    b. Glue it in place.



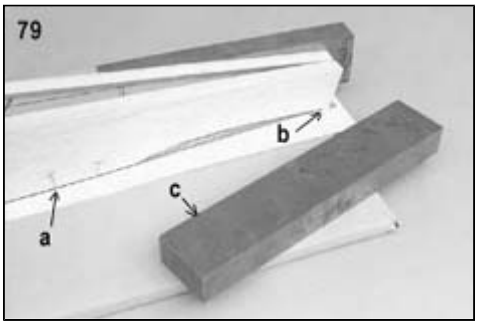
78. Pin the two fuselage sides together, outside to outside, and match them by sanding as required to make them exact duplicates.

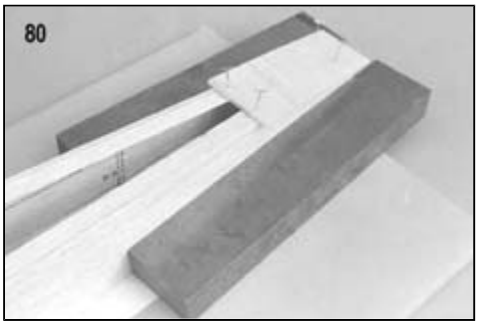
79.
    a. Turn the sides upside down on the top view plan.
    b. Note that the little end tab on the fuselage needs to be over the edge of the bulding board so that the rest of the fuselage top, from F-6 forward to F-3 will be on the board.
    c. Use some square iron or other weights at the rear where the fuselage can't be pinned down. The sides must be held firmly in place during the next steps.

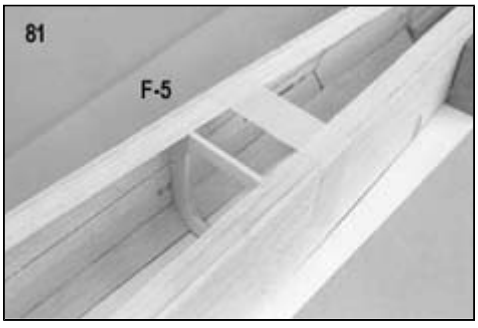
80. Glue the first piece of 1/8" sheet balsa bottom planking in place to hold the fuselage rear together.

    Skip former F-6 until later. Because triangular stock by nature is not perfectly accurate, it may be necessary to sand the former corners to fit properly against the angle.

81. Glue F-5 in place using pins and tape.



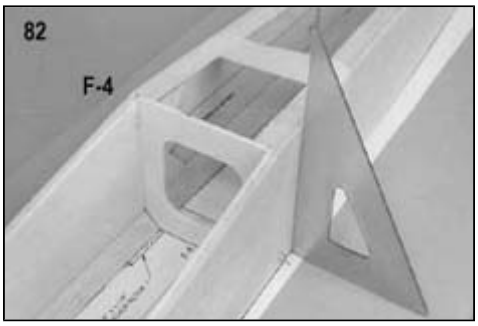


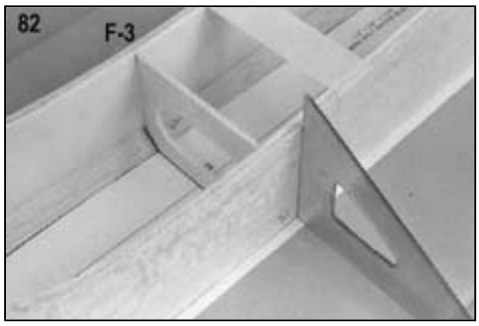


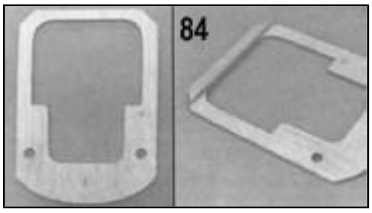
82. Continue forward gluing F-4.

83. Add F-3.

84. Prepare F-2 in advance, using the pattern, with dowel holes drilled and doubler installed. For fixed gear airplanes, cut out an access hole to the nose for inserting the battery if balancing requires this.



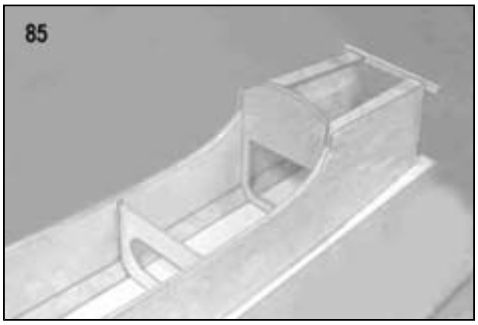


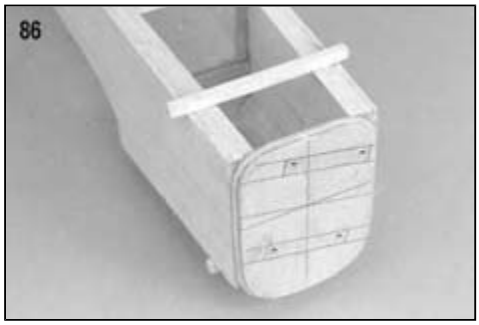


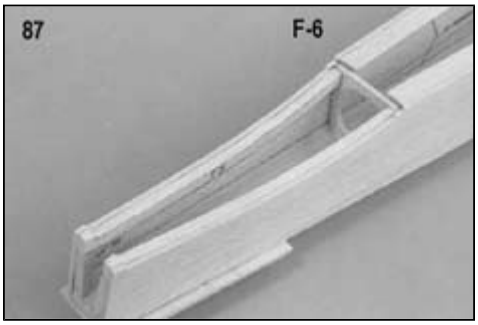
85. Unpin the fuselage from the board and tilt it forward on the front portion between F-3 and the firewall. Glue F-2 between the sides. Since the front is stiffer and harder to bend, we switched to tack gluing temporary cross pieces to hold the sides in place during this operation.

86. Remove the sides from the board and glue the F-l firewall assembly in place. Cover the blind nut holes with tape to keep glue out.

87. Fit F-6 between the sides and glue it in place. Since it will key the front of the stabilizer, make certain that the top of F-6 lines up with the printed edge lines on the fuselage sides.



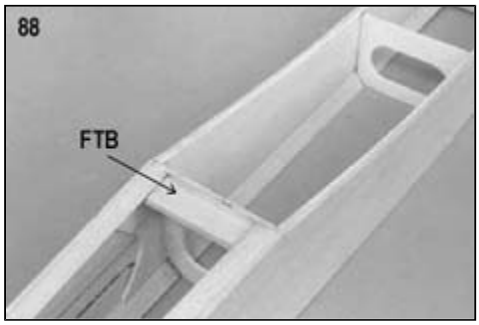


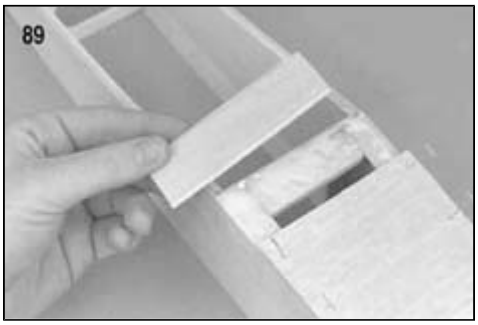


88. Cut FTB from 1/4"x5/8" trailing edge scrap. Add FTB just to the rear of F-4. The edges of FTB must be beveled to fit against the triangular stock.

89. Complete the bottom planking up to the rear of the wing opening.

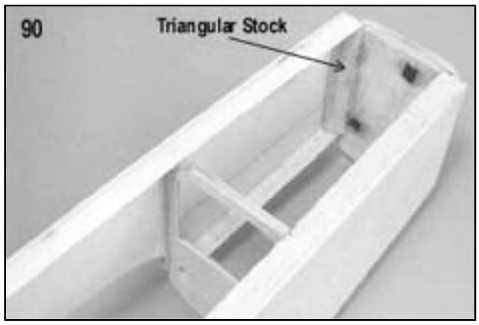
90. Glue the previously cut triangular stock to the firewall.





91. Glue the tank florr into the fuselage but for retracts, do not glue the floor in permanently until the nose gear unit is fitted. Read the suggestions on the plans.

92. Cut a notch in F-2 to pass the tank bubble.



HINT: We put a drill bit of the same diameter as the inside of the tubing into the end of the tube and used it as a handle for bending. Back it out a small amount at a time, adding a bit to the bend each time you move out. The result is the nice kinkless bend seen in the picture.

93. Bend the tubes of the tank so they point directly forward. Drill holes in the firewall to pass them. If you have trouble bending tubing try K&S 1/8" Soft Brass Fuel Tubing.


91


92 Sullivan SS-14 Tank Shown

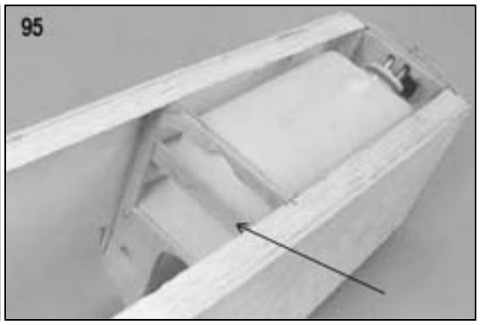

93

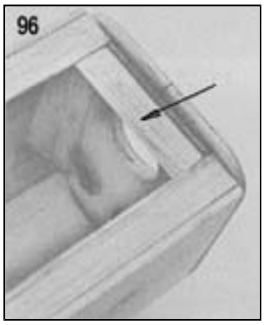
94. Put a scrap wood block on each side of the nose to hold the tank in place.

95. Retain the tank with a scrap ply bar tack-glued across the back. It can be pulled off when the tank needs to be removed.

96. When a 12 oz. Sullivan RST tank is used, a complete piece of top triangular bracing can be used as shown here in this Kougar picture. You will have to cut away part of it for the 14 oz. tank to pass the tubes. Make certain now, before the compartment is closed in, that the tank can be installed and replaced from the wing opening without trouble. Fix anything in the way. Hold a piece of sheet on the top to make certain there is no hangup on it. This is a good time to oilproof the compartment. Put in properly, you will seldom have any need to take out the tank and it is not difficult to do so when necessary.


95

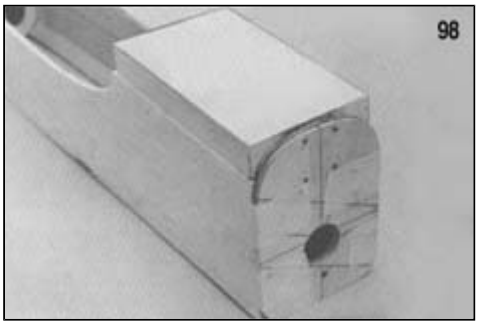

95


96

For the fixed gear version, the bottom block is installed in the same way as the following Kougar pictures 98, 99 and 100. The 7/8" tank hole shown is for a 12 oz. RST tank when the entire tank cap is brought through the firewall.

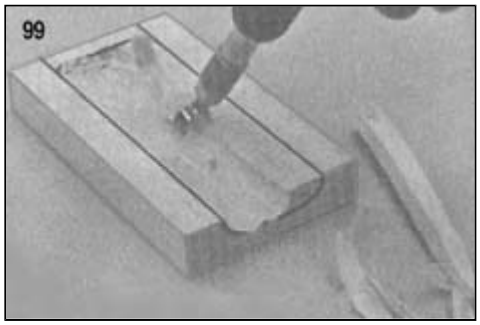
Newer Sullivan tanks require a larger 15/16" hole. Other brand tanks may require a different opening.

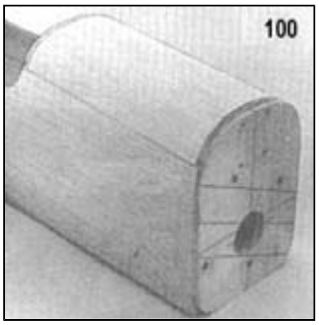

97


98

97. Complete the nose pushrods before putting on the bottom nose block.

98. Fit the 3/4"x3" bottom block between F-1 and F-2.


99


100

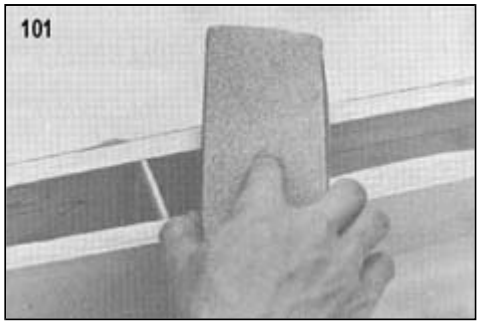
99. Hollow the bottom block out to make room for the battery in the nose if required for balance.

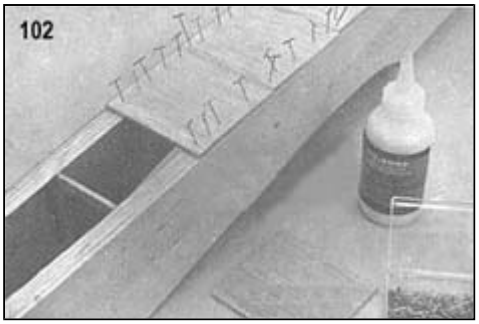
100. Glue the block on and shape it.

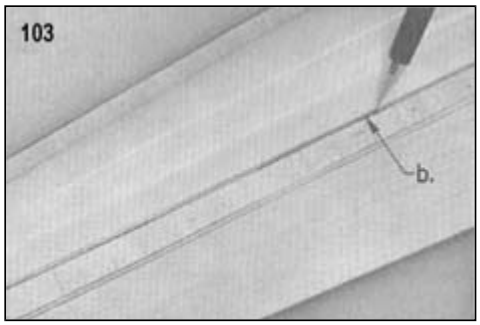
101. Sand fuselage top level and smooth.

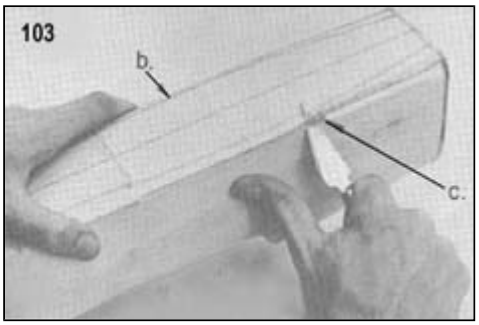
102. Glue pieces of 1/8" sheet to the fuselage top. (Do Step 43 before this one)

103.
   a. Position the top & canopy on the fuselage.
   b. Outline the position of the plastic fuselage top and canopy on the top of the fuselage with pencil. (Read note below.)
   c. Carve to shape.







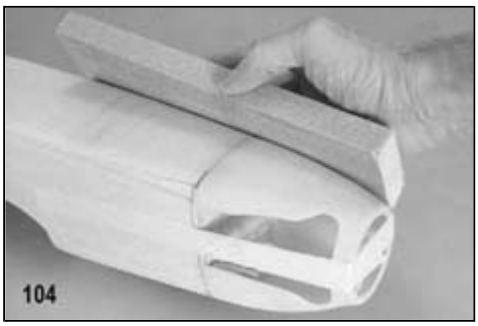


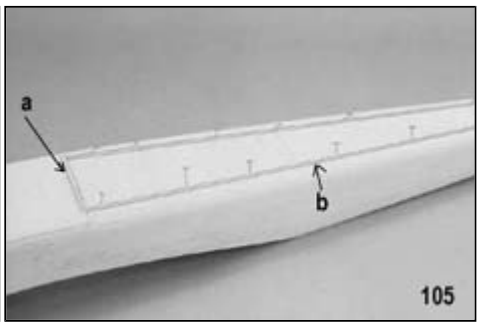
NOTE: The plastic top has a tendency to "suck in" along the bottom after molding. Plan the next steps to correct this by spreading the sides out slightly to a pleasing contour as the gluing rails are installed. (The canopy does not have this problem.) Also, look ahead to pictures of former FT which must be worked, into the assembly at the same time.

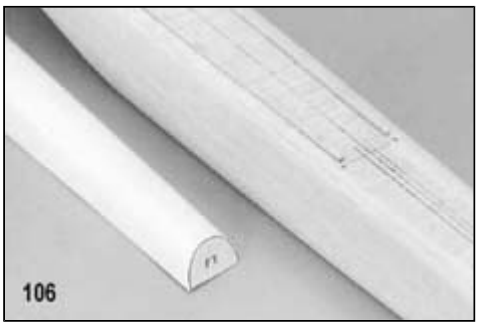
104. Final shaping of the nose is best done with the cowl in place, sanding both fuselage and cowl to blend smoothly together. Be sure and use fine sandpaper to remove any scratches left in the cowl after shaping.

We covered the fuselage at this point with Koverall and doped it several times so that these jobs did not have to be done with the plastic top installed and in the way. You may want to do some plastic film covering at this point.

105.
   a. Trim the front rail at an angle to fit against the front of the top.
   b. Pin on the 1/8" sq. side gluing rails, using the lines as a general guide, with the angle of the pins inward. Sit the top in place and see if the spread of the sides of the top is about right. If not, re-pin the rails and try again.



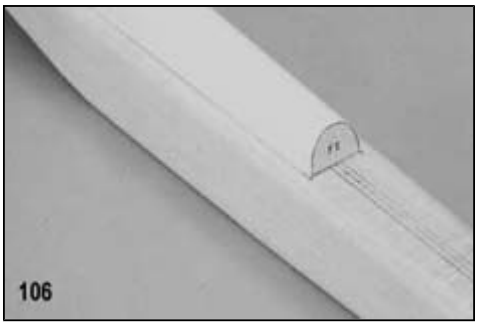


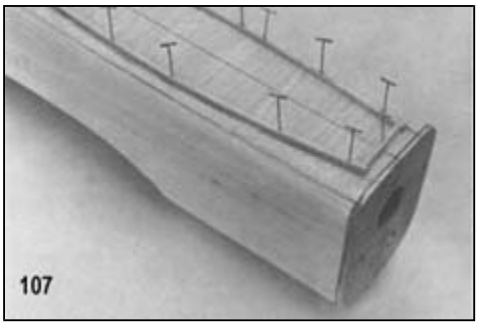


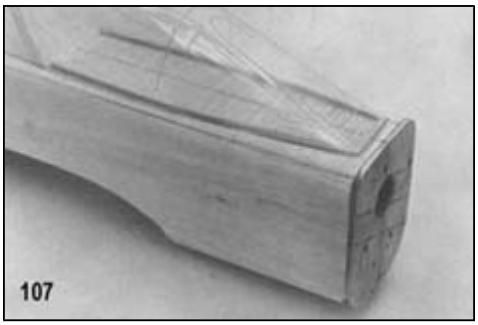
106. Bevel the edges of FT to fit inside of the back of the plastic top. This operation must be done in conjunction with the gluing rail installation. When everything is fitted, FT can be glued in permanently.

Sig-Ment may be used to fasten on the fuselage top. Don't put on large blobs - they may melt the plastic. Work quickly or the Sig-Ment will get too dry and not stick properly. "Super" cyanoacrylate glues are handy for attaching the top. Put it in place and run the glue under the seam between the plastic and the gluing rail. Or use slo-set glue, put on the rail before adding the top.

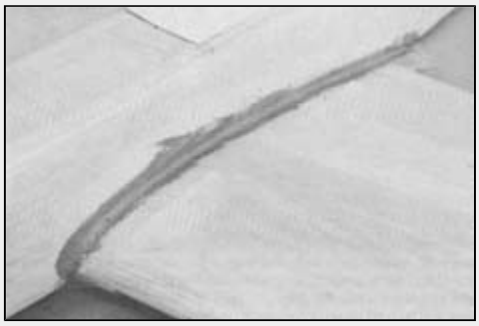
107. Taper the gluing rails for the canopy so that it fits against them snugly. The canopy must be trimmed down slightly to fit properly against the fuselage top. Both the back and bottom can be trimmed to get this accomplished. Do not install the canopy permanently until it is painted and the fuselage is completed and painted or covered. See the canopy painting section for information on glues and paints to use.



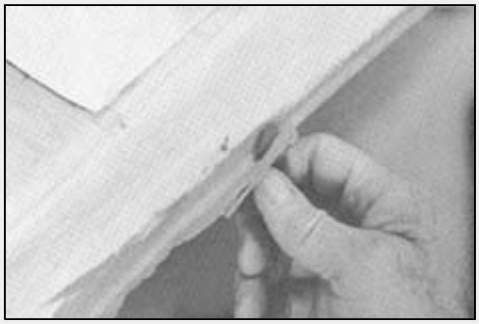




Optional Wing Fillet



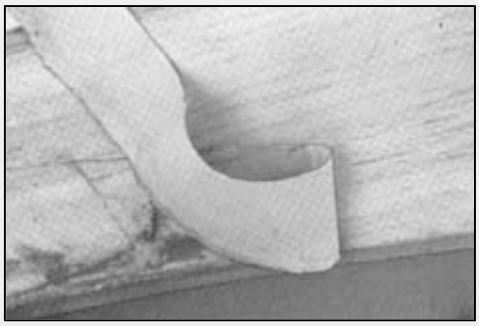
On the original prototypes, a small wing fillet of Sig Epoxolite was installed. The main purpose of this was to make a good seal at the wingfuselage joint. It was put on after the model was covered with Koverall and clear doped. On models with plastic film covering, fillet first. In this case it will be easier to cover the model if the putty is trimmed off flush with the fuselage side rather than given a fillet shape.



Here is the procedure for making an Epoxolite fillet:

1. Mask off the side of the fuselage-where the Epoxolite will be applied. It need not be a very wide strip - about 1/8" was used on the prototypes.
2. Tape a strip of wax paper on top of the wing on each side where the fuselage will touch the wing.
3. Apply a bead of Sig Epoxolite to the fuselage side bottoms.
4. Put the wing on and bolt in place. This will cause the putty to squeeze out from under the fuselage onto the wax paper protective strips on the wing.
5. Spread the excess putty onto the 1/8" strip of exposed fuselage side and start a rudimentary fillet shape.
6. After the Epoxolite has gotten partly stiffened, shape the fillet further using a wetted finger or tool of the desired shape.
7. Allow the Epoxolite to set up.
8. As soon as it is hard, but not fully cured, remove the wing.
9. Trim off the excessthat squeezed into the inside of the fuselage and even the outside edge of the fillet.
10. Smooth the outside edge of the fillet and shape the fillet with a round tool covered with coarse sandpaper - 60 or 80 garnet. If you use fine paper it will clog up too rapidly. Be careful not to sand through the masking tape protecting the fuselage, but sand down to it so that the tape can be peeled off, leaving a clean edge on the fillet.
11. After the fillet has cured (24 hours), fine sand it and feather the edge formed by the masking tape into the fuselage side.

Don't get carried away with this idea, it can get heavy. Keep the fillet small. This same procedure can be used just to seal the wing-fuselage joint without an external fillet. No tape on fuselage necessary in this case, just trim off excess Epoxolite flush with the fuselage before it cures completely

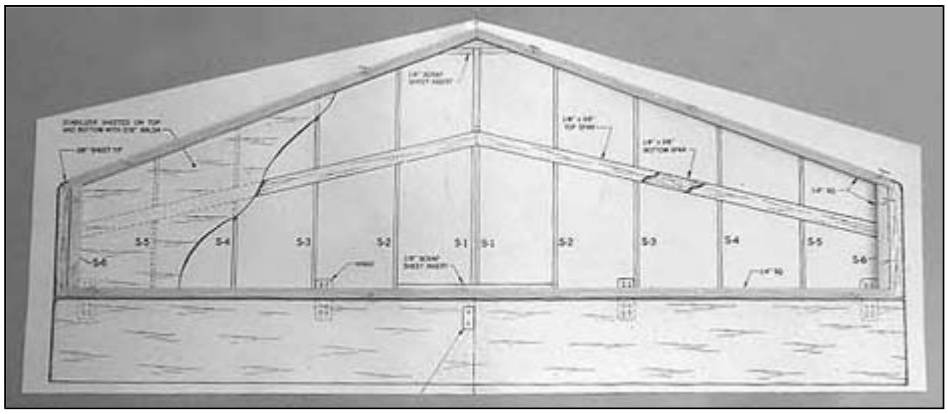


TAIL SURFACES

NOTE: The design of the stabilizer-fuselage joint includes a simple method of insuring proper incidence alignment of the tail. Make sure you understand it before proceeding. Study the pictures and drawings. The 1/4" sq. main frame of the stabilizer in the center at front and back is left exposed in order that it can be mounted directly on the fuselage. The front 1/4" sq. main frame area sits on the top of F-6. The rear 1/4" sq. main frame area sits on the top of the tab at the end of fuselage side. The result is a keying of the fuselage and stab together with zero incidence.

108. Build the 114" sq. balsa main frame of the horizontal stabilizer directly on the plan.

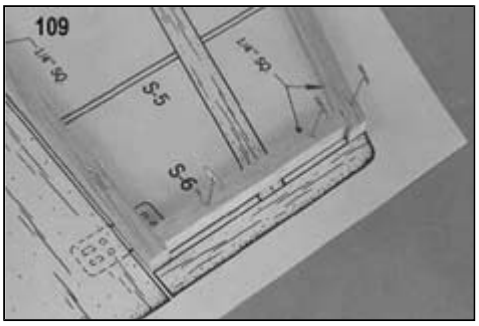
(The grey toned area of the drawing indicates the main frame outline.)

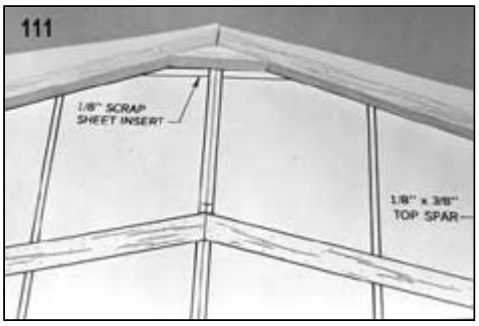


109. Note that the tip pieces of 1/4" sq. are inset to allow space for later installation of rib S-6.

110. Cut a piece of 1/4" sq. to fit in the center joint of the leading edge.

111. Glue in place.

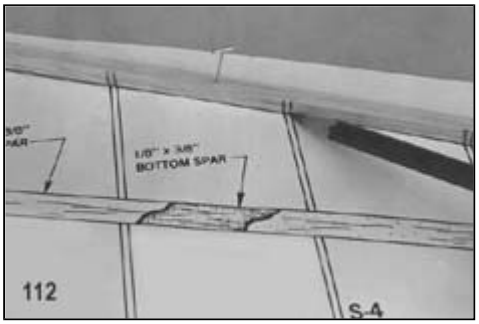


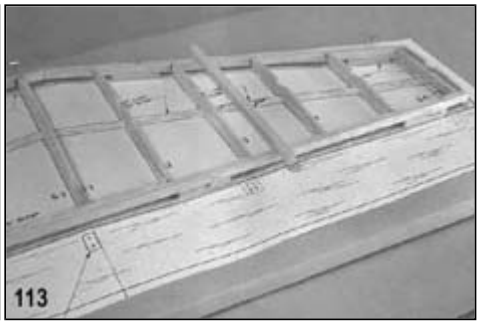


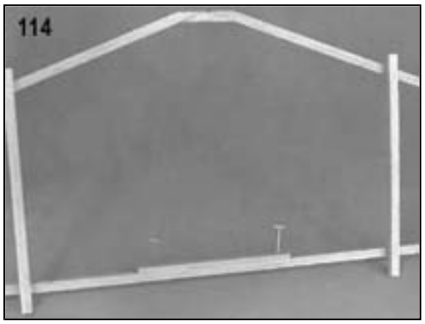
112. Mark the locations of all ribs, front and back, on the 1/4" sq. main frame.

113. a. Tack glue a temporary scrap balsa cross brace across the top of the 1/4" sq. stabilizer main frame on each side.

114. Remove the frame from the board and glue piece STB in place. (See cross section drawing)



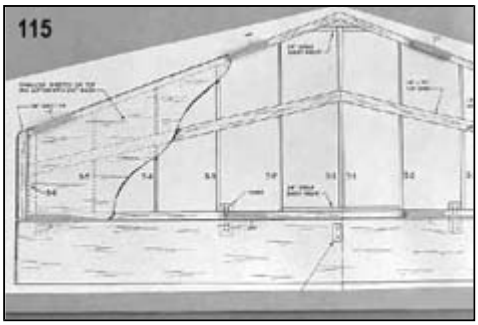


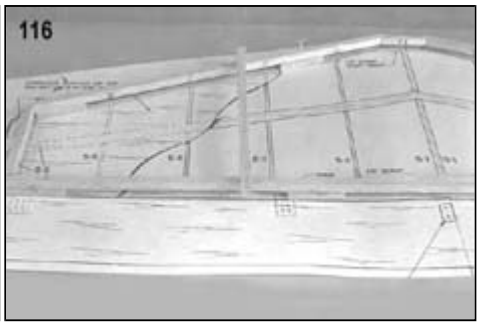


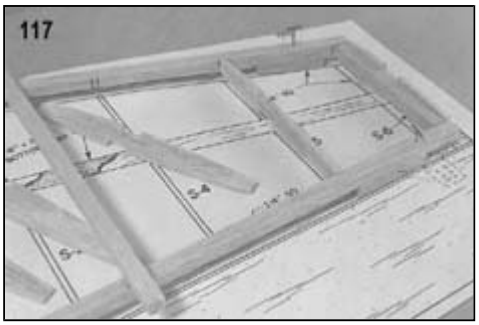
115. Place scrap 1/4" sq. standoff pieces on the plan in eight different locations, as shown by the arrows.

116. Return the main frame to the board, this time pinning it on top of the standoff pieces.

117. Bevel the rib fronts to fit the taper of the leading edge. Glue the ribs into the main frame.



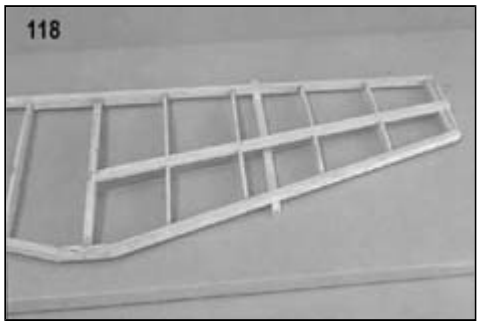


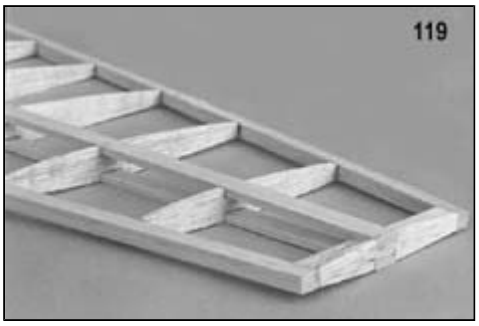


118. Remove the assembly from the plan. Turn it over. Glue the 1/8"x318" spar in place on each half.

119. Remove the temporary cross pieces and complete the spars.

120. Cut 1/8" scrap pieces. Glue in place. (Provides gluing area for sheeting around the keying gap.)

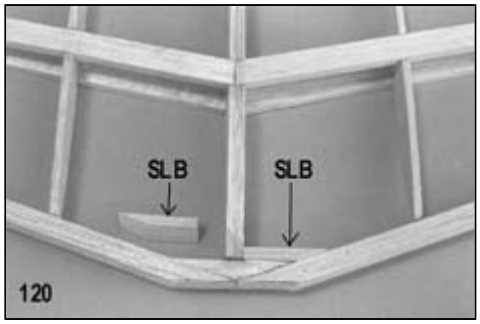


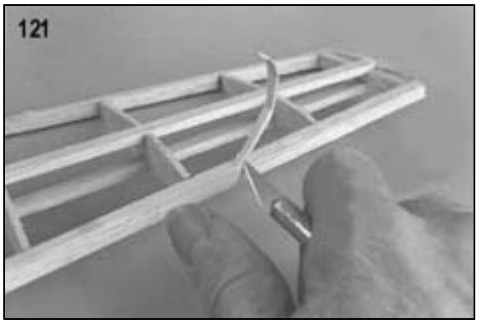


121. Carve and sand the leading and trailing edges to contour.

122. Smooth the stabilizer with a sanding block

123. Glue 3/32"x3" to the top of the stabilizer frame.

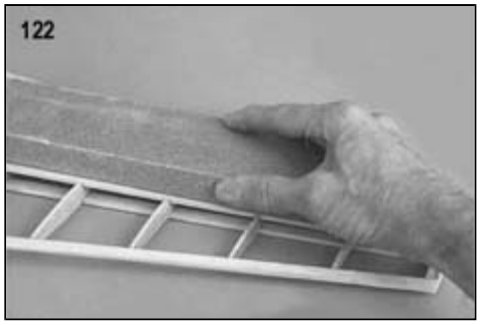


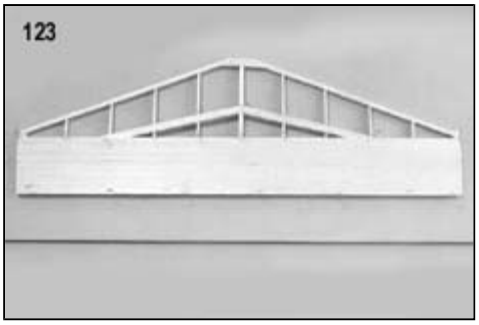


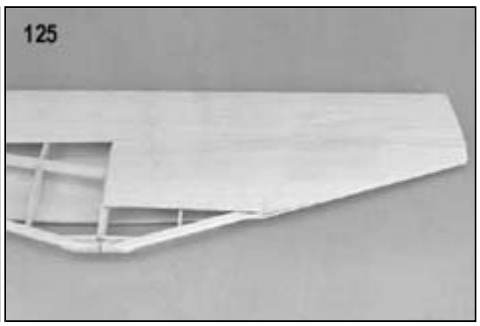
124. Glue the 3/32"x 3" sheet on the bottom, leaving the keying gap exposed. (There is no gap on the top.)

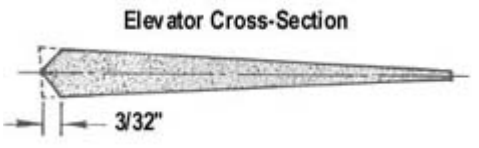
125. Continue sheeting the stabilizer doing both sides as you go.

126. Leave the front keying gap exposed and unplanked. (On the bottom only.)



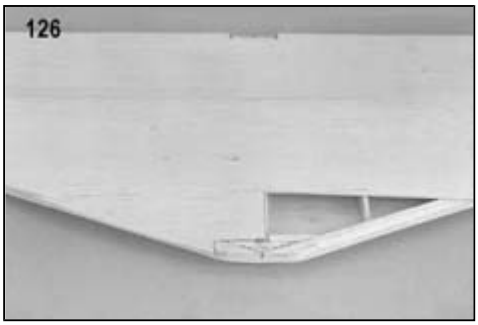


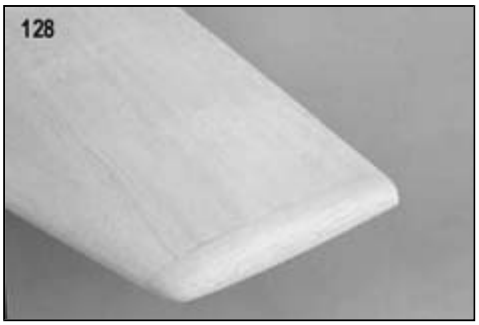




127. Glue the 5/16"x5/8"x3-1/4" blocks on the tips of the stabilizer.

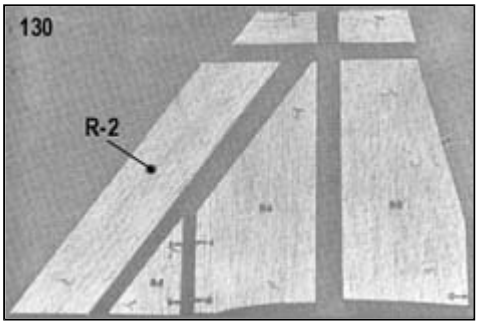
128. Carve and sand to contour.

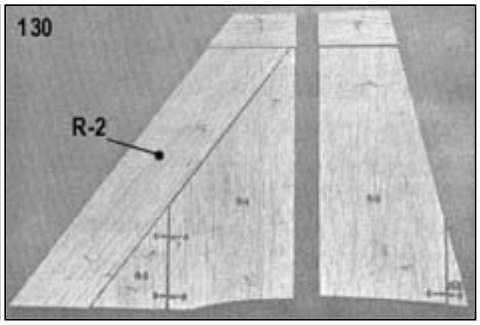




129. Shape the elevator stock in the same manner as previously shown for the aileron stock.

130. Cut out the tail parts. Fit them together using the sanding block. Glue and pin them down on wax paper. (R·2 is cut from 5/16"x2"x12" sheet. R-1 is glued in last.. Not shown in the pictures.)





We are asked why so many parts are used for the sheet tail when it would be easier to make it with a single grain direction. The reason is to provide a stiffer and more warp·resistant tail. The different grain direction of the parts makes the finished surface stronger. It only takes a few minutes longer to glue the parts together and it is worth it.

131. Sand off the printed lines and round the leading edge of the fin. Properly sanded, the fin will be nearer 1/4" than 5/16" thick.

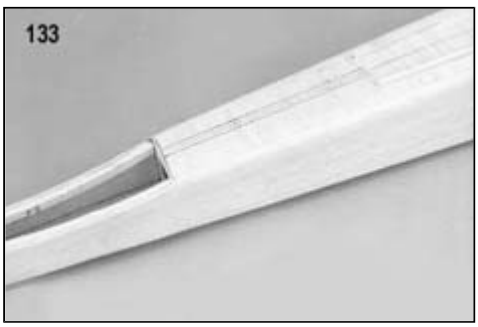
132. Carve and sand the rudder to the cross-section shown above.

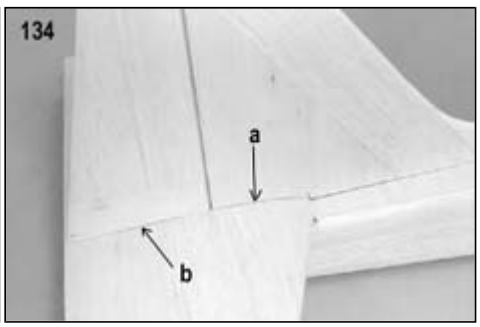
Put the wing on the fuselage and check to see if the stabilizer lines up with it when pinned in place on the fuselage. Make sure the stabilizer saddle in the fuselage does not prevent the 1/4" sq. main frame keying gaps from sitting down firmly on the fuselage. Sand the saddle down if it does. If any modifications must be made for side-to-side alignment, be careful not to change the incidence of the tail by disturbing the relationship between the top of F-6 and the back of the fuselage sides. This same caution goes for any changes necessary in the wing saddle necessary to line up the wing.

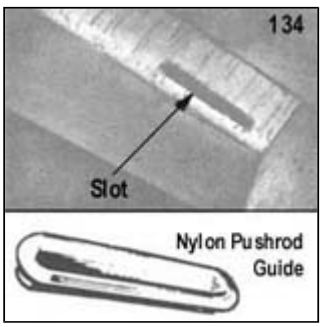
133. Draw guide lines for the fin.

134.
a. Fit the fin and rudder to the fuselage.
b. Make certain the rudder has enough clearance so as not to rub on the stabilizer at full movement of the controls.
c. Cut a slot just in front of the stab to pass the rudder pushrod.

If desired, you can add a nylon pushrod guide (not furnished). The elevator pushrod exits through the openings in the fuselage rear. Open it up as required to pass the pushrod. The pushrod wire may be bent slightly if it tends to rub on the fuselage.







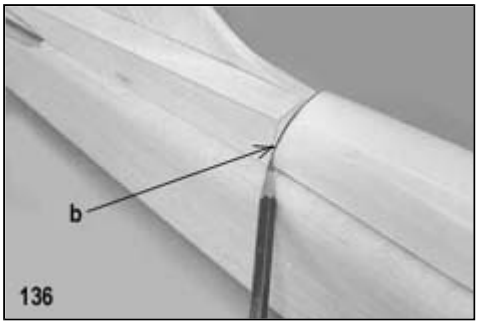
135. Inset a scrap of 1/16" plywood into the elevator and rudder on the opposite side from the control horn. This will prevent the horn from pulling through the wood when subjected to unusual strain. The control horns should be installed before covering, then removed until the covering is completed.

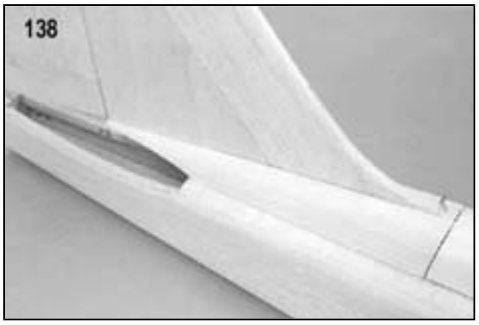
The stabilizer, elevator, fin and rudder should be covered andlor filled before permanently gluing in the hinges. To insure that the tail parts are solidly glued to the fuselage, cut out the covering material in the mating areas to expose bare wood. Puncture a series of 1/16" holes with a pointed wire in the tail and the fuselage top where they make contact. Have the holes at a slight angle to each other. When the epoxy glue is worked into these holes and sets up it will act like small nails, holding the parts together. The stabilizer saddle on the fuselage may not fit up perfectly against the stab because to make it do so might disturb the necessary seating of the main frame mounting gaps to the fuselage. If tl\e epoxy glue does not fill the stab-fuselage joint completely, complete sealing the seam with a mixture of epoxy and micro-balloons.

136.
a. Cut the tail blocks to shape, using the top and side view patterns.
b. Sit the block in place on the fuselage and against the fin and trace the shape of the plastic top on the front of it.

137. Put the fuselage top in place and cut the rear of the block to fit against it.

138. Carve and sand the block to a rounded contour to match the shape of the plastic fuselage top.





It is suggested that the blocks not be glued on until the fuselage and tail have been covered, the tail mounted and the plastic top permanently installed.

PUSHRODS

By the time most fliers get to a .60 powered airplane like the King Kobra, they have developed their own personal ideas about their favorite types of pushrods. Normally we include balsa pushrods for the elevator and rudder in kits and have had good results with them. But some builders worry about balsa pushrods in a very fast and aerobatic airplane. Others like nylon tubing pushrods or hardwood dowels. Therefore, rather than put in (and have to charge for) a pushrod that some of the builders would not use, we are furnishing none, leaving the choice to the individual buyer.

In the prototype King Kobras we used the Sig SH-654 Graphite Pushrods, a arrow-shaft type made from the new high-tech carbon material that is finding so many uses in modeling. It is recommended for those who want to use the ultimate variety rod. SIGSH559 Flexible Cable pushrods were used for the nose wheel and throttle.

RETRACTS

Because the King Kobra is a compact aircraft there is not a lot of wasted space in which to loose a retract unit. But that's better than having room to spare and the extra drag that goes with it. We designed the model first and found a way of fitting the gear into it, which seems to be a better approach than designing an airplane around a retract gear, particularly since the majority of King Kobras will be built by sport fliers.

The Spring Air 200 Series Retract Gear was selected for the King Kobra because it was ideally suited to the space available. The units were fitted in without having to compromise the concept of the model. They have proven to be both reliable and durable. You may use either the No. 201outfit with double coil main gears, or the No. 202 with single coil main gears. The shock coils are the only difference between them. We used single coil.

Those who look closely may notice that we happen to have 100 series units in the wing because they were on hand at the time we were building. For all practical purposes they are identical in mounting and usage to the 200 series. You must, however, have a 200 series nose unit (No. 205) with single arm steering that comes in the No. 201 or No. 202 outfit, for best results in the nose.

Though the pictures are only of Spring Air equipment, they still should be useful in providing guidance for mounting other types of retracts.

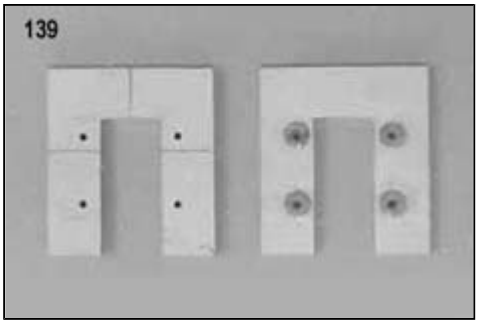
Full size drawings on the plan show the amount of space available for the nose units. Make certain that both the mounting and nose gear steering methods of the units you select will adapt to the King Kobra before buying them. There should be no space problem in the wing for most any kind of retract units.

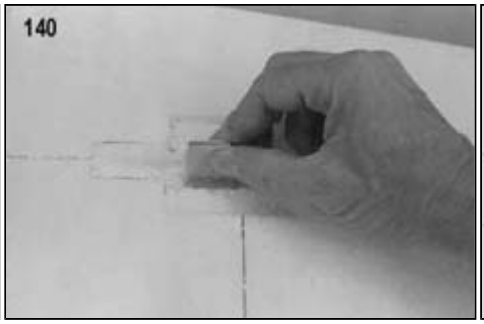
The kit does not include any parts or materials required for retract installation.

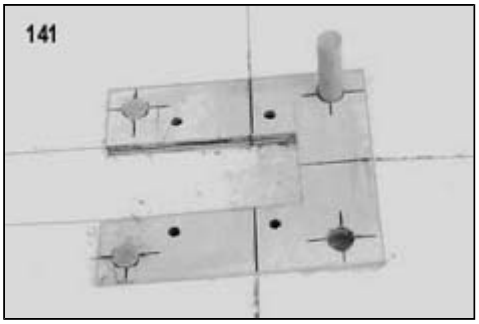
139. The wing mounting plates are cut from 3/16" plywood. 4-40 blind nuts are epoxied on the backside.
NOTE: The wing core has a slot cut out for the fixed gear grooved mounting block. In most retract installations this slot will have to be enlarged further during installation. If you find that your gear does not require all or part of this slot, glue scrap foam in it.

140. A small sanding tool is handy for making openings in the core for the retracts. This one is made from scrap plywood.

141. Drill 3/16" holes through the mounting plate and out the other side of the core. Epoxy the plate to the foam. Cut dowels of the proper length to go completely through the wing to the opposite surface. Epoxy them in place.





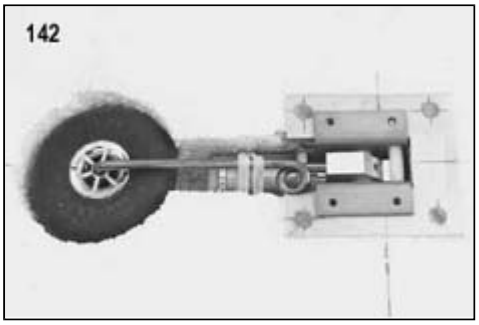


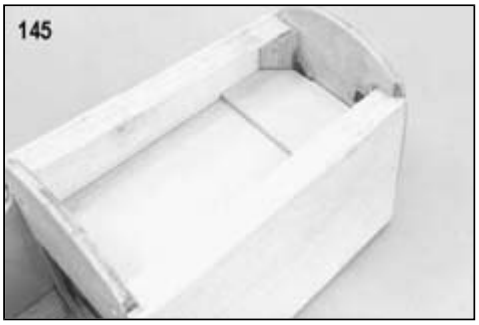
142. Excavate the foam as required to pass the retract unit and wheel.

143. Line the sides of the wheel wells with balsa wood. Wet it to make it easier to bend in place.

144. After sheeting the foam cores, cut out the openings for the wheel and retract unit.

145. Cut the nose unit mounting place from 3/32" ply (not lite ply) and glue it to the bottom of the tank floor.





SUGGESTION: As supplied, the nose gear has the coil located farther from the unit than is required for this installation. Before beginning, shorten the top of the gear so that the coil will be as close to the unit as possible without interfering with the retracting motion. Careful! Don't take off too much, check as you go. (It's easy to work the units by hand once you get the knack of catching the sliding brass bar with a thumbnail on each side and pushing away from the cylinder.) Don't bend the wheel axle into the gear until you are certain of your airplane ground angle. Set it up on the bench to be certain.

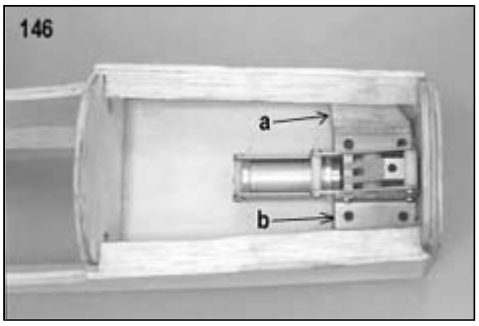
146. a. Brace the mounting plate to the sides with triangular stock through the mounting plate and tank floor.

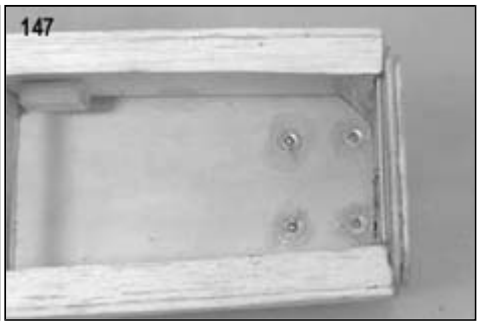
147. Epoxy 4-40 blind nuts on the top of the tank floor. The mounting bolts for the unit must be trimmed off flush with the floor so as not to damage the tank. See Suggestion (1.) on the full size plan before deciding on tank floor installation. This more recent method provides 1/8" more mounting space, which gets the steering arm higher and farther from the fuselage side.

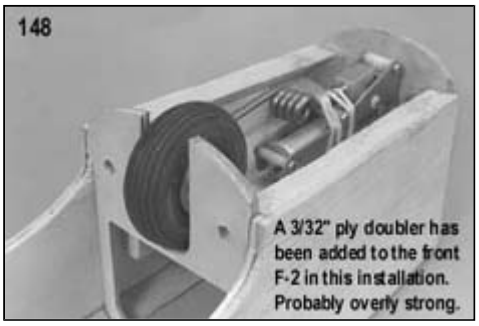
148. Cut out F-2 to pass the wheel. This hole could be cut out before the fuselage is assembled if you plan ahead. If not, a Dremel grinder is a help.

NOTE:
There is not much room for the Spring Air steering arm in the nose. In the installation shown in the following pictures the situation was carried to the extreme by mounting the nose unit slight off center to the left of the fuselage center line so that the wheel would retract into the exact center of the wing. This turned out to put the steering arm through the bottom fuselage block. The problem was avoided by first trimming down the plastic end of the steering arm to give more clearance. Next, the left side balsa bottom block was tack glued on, carved to shape and removed. The outer surface was covered with fiberglass cloth and resin. A router was used to remove all of the balsa from the block in the area of the steering arm movement right down to the inside surface of the fiberglass outer shell. This got the arm clear, but with only about 1/16" to spare - but a miss is as good as a mile.

Perhaps you should consider not being so picky as we were about the wheel being centered and instead put the unit in the center, letting wheel retract slightly off center. This will give a bit more space for the steering arm, though it probably still is worth-while to put the cloth and resin on the outside of the bottom block so it can be completely hollowed out for clearance without having to worry about cutting through the side and spoiling the block.



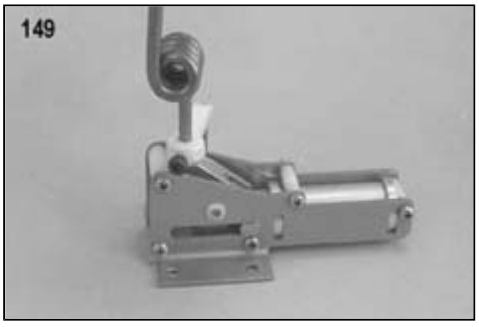


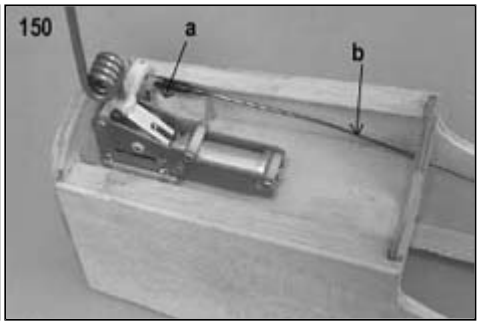


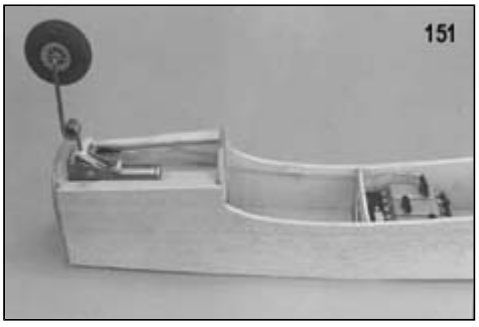
149. As previously mentioned, the Spring Air steering arm has minimum clearance on the inside of the nose block. Therefore the arm must be located flush against the unit to get it up as high as possible. To do so you will probably have to grind away a bit of the frame so the set screw will not drag on it during full movement of the steering arm.

150. a. The triangular stock must be whittled away to clear the steering pushrod.
b. Mount the cable pushrod tubing on a scrap balsa standoff. We used silicone cement to glue pushrod tubing in place. Its flexibility avoids binding problems that a rigid epoxy gluing job can sometimes cause.

151. The complete nose gear steering installation should be completed and tested with the servos operating before proceeding.

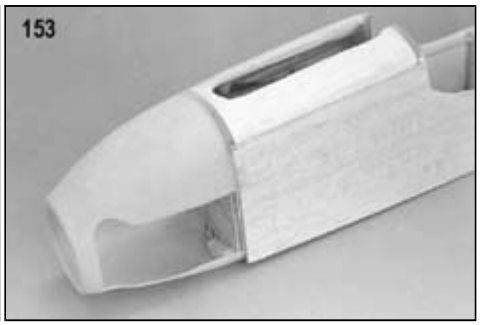


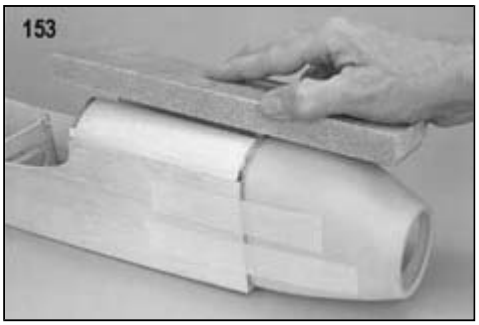




152. Cut the balsa bottom block supplied in the kit in half. Fit the halves onto each side with the required opening in the middle. Tack glue them in place.

153. Carve and sand the bottom blocks to contour. Cut through the tack gluing and remove the blocks. Now is the time to coat the outside of the left block with fiberglass cloth and resin. Carve out the inside of the blocks to pass the pushrod and provide space for maneuvering the unit into and out of the fuselage. (Do not build the unit in so that it cannot be removed.) The hole you see is just large enough with the hOllowing inside to allow the unit to be pulled to the back and out the wheel hole.





154. Put the wing on and mark the area needed for the wheel well.

155. Enlarge the marks by 1/8" all around.

156. Saw out the hole.

157. Line the hole with 1/8" plywood.

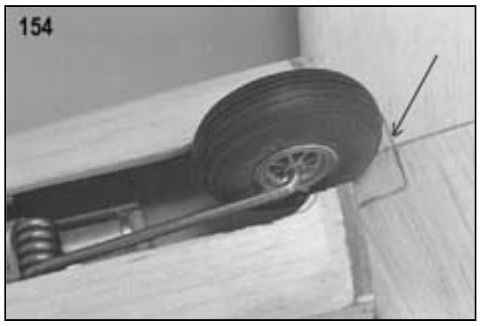
158. Cap the top of the well with 1/8" ply. This cap should match the level the tank floor so that the well is closed off from the inside of the fuselage when the wing is mounted.

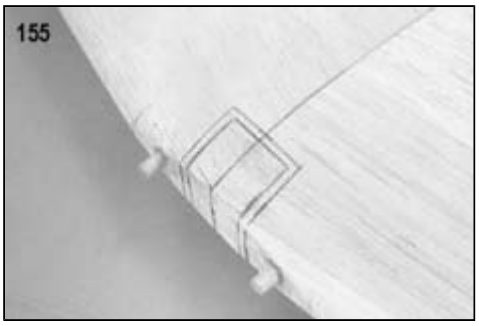
159. We made the wing fairing on the retract gear Kobra from sheet rather than blocks because of the well being in the way. This piece is inset into the sheet wood of the wing at the back.

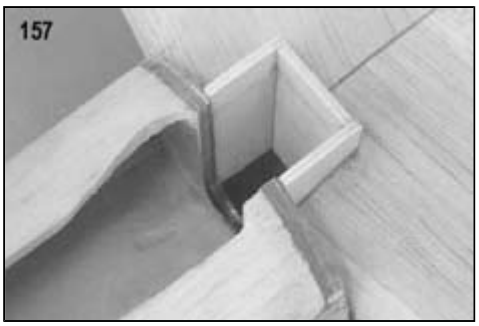
160. Trace the outline of the fuelage on a piece of 1/8" scrap.

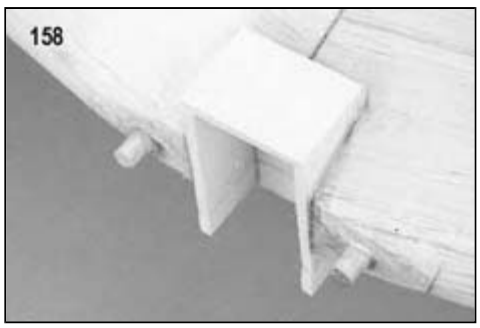
161. Draw an inner line inside by the thickness of the sheet used. We used soft 1/8", but 3/32" would bend easier.

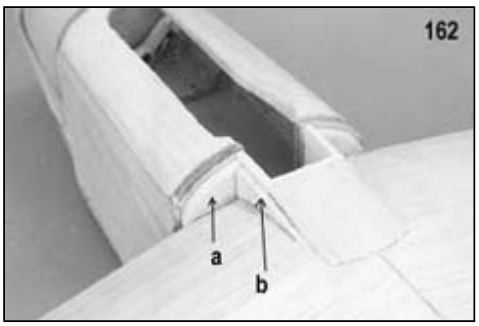
162.
   a. With wax paper between to prevent sticking, glue the scrap former to the wing.
   b. Add a scrap side former as shown.







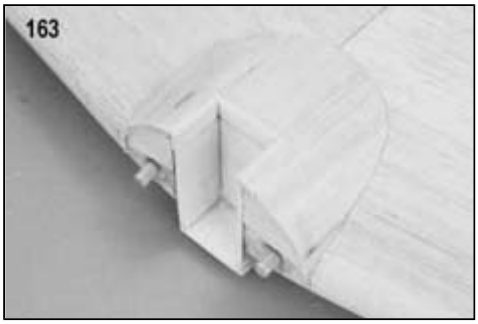


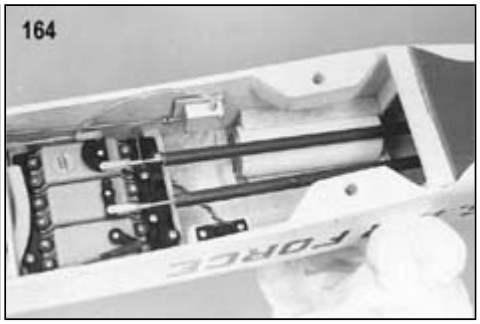


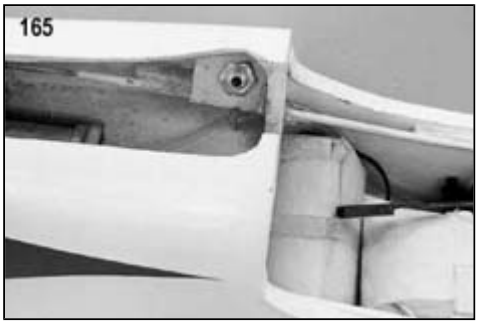
163. Soak the sheet wood in water until it is pliable and bend it into place.

164. This shows the air tank and control valve installation in one King Kobra. The servo for the valve was put on the wall of the fuselage just ahead of F-3.

165. Here's a handy spot for the air charging connection. It is just ahead of F-2, next to the wheel.

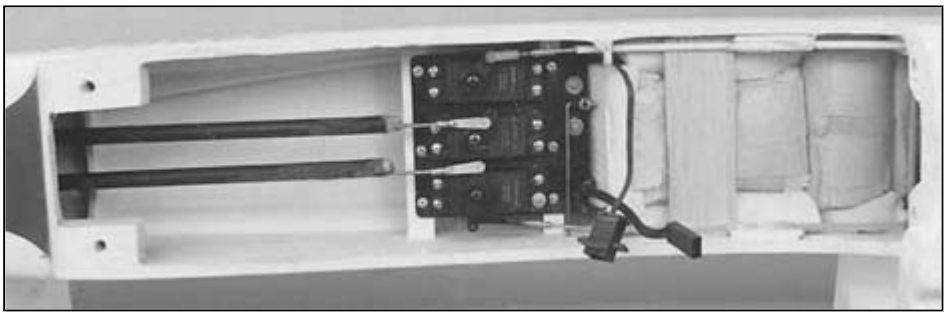






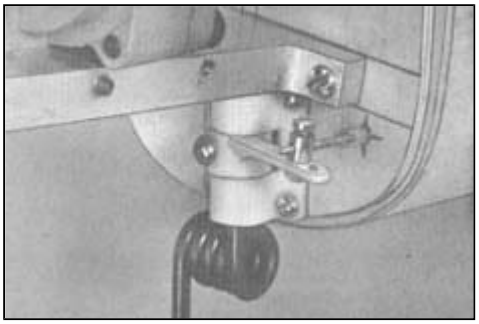
A simple method of securing the tuned pipe using brass strap and the wing screws. This installation has easy access to the screws, but the pipe is at a slight angle to the slip stream. An offset bracket and use of hex head screws will provide a parallel position.

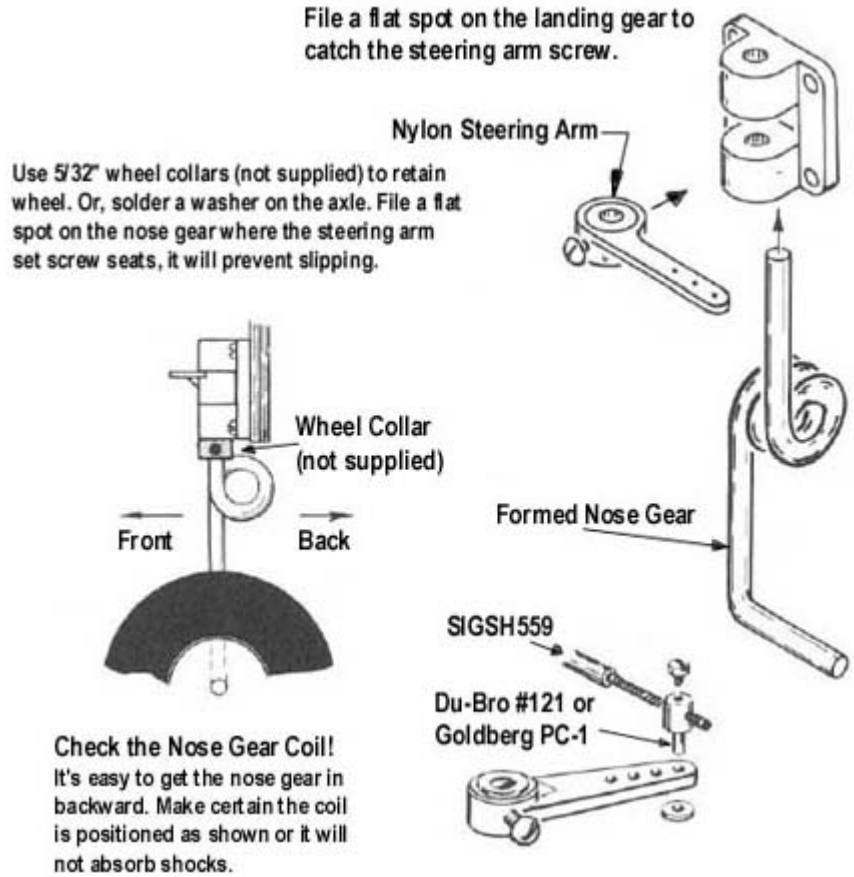
Below:
The radio installation in the King Kobra. The receiver and battery have been wrapped in Sig Foam Rubber.



NOSE GEAR INSTALLATION

The wheel collar suggested as optional for the nose gear is not furnished. File or grind a notch in the collar so it will fit down on the coil farther. The collar permits altering the height of the nose gear slightly if desired. Don't try to make large adjustments in nose wheel height with the wheel collar because the landing gear is more easily bent on a hard landing if the coil spring is located very far below the nylon nosewheel bracket. Large adjustments should be made by changing the wheel size.





KING KOBRA RC54 COVERING AND FINISHING

The manufacturer's directions for applying iron-on coverings are packed with the material. Follow these closely, for different types of covering have different iron temperatures and techniques of application. Whatever kind of covering you desire to use, it will not conceal a rough framework. Sand carefully with fine sandpaper before beginning to cover.

Our prototypes were covered with Sig Koverall and it's so strong and easy to use that we recommend it. Koverall is slightly heavier than silk, but not much. We covered one of our small Kobra (.19 - .35) prototypes with Koverall as an experiment and it was not noticeably different in finished weight from another that was covered with silk. On a foam wing model, the fact that Koverall is applied dry is a particular advantage. The wetting necessary for the application of silk sometimes raises the grain of the wood or a seam in the wing skins. It is more economical than silk.

IMPORTANT! Don't skip covering the fuselage and tail just because they are solid wood. They will be much more resistant to splitting and breaking on hard impacts if they are covered with something - Sig Silk, Silkspan, Sig Silray, Sig Koverall or plastic iron-on covering material. About the only recommended alternative to covering is to first fill the wood with Sig Finishing Resin and then paint the resin. (Fiberglass cloth is too heavy for a entire model.)

Brush a coat of clear dope (Sig Supercoat, Sig Lite Coat or Sig Nitrate, depending on the final finish to be applied) on all parts of the structure that will touch the covering. When the dope is dry, sand lightly to remove any raised fuzz or grain.

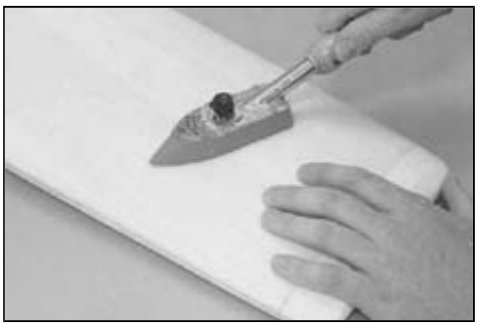
The bottom of the wing is a good place to start covering. Cut a piece of material about 1/2" larger all around than half of the wing, with the grain running lengthwise. (The grain of woven materials runs parallel to the finished bias edge.)

Pin the Koverall in place, pulling out all of the large wrinkles. (Koverall shrinks up considerably under heat. Don't worry about such things as the packaging fold wrinkles - they will come out with the iron.)

Brush around the outside edge of the stretched Koverall with clear dope. The dope will soak through the material and adhere to the dope already dried into the framework. Glue only the outside edges down. Leave the rest of the material unattached to be heat-shrunk with the iron. Trim off the edges with a sharp, new blade. On the bottom, trim off the material flush with the wing all the way around. Go over any rough areas or places that did not stick with more dope and press the loose spots down as the dope is drying and getting stickier. Sig-Ment is a handy seam cement for this purpose also.

The top half is done in identical fashion except that the cloth should be brought down over the edges instead of being trimmed off flush. On the front, lap the material over the edge of the bottom, over-lapping about 1/8". At the back, bring the material down over the back edge of the trailing edge but do not lap it over the bottom covering.

Smaller surfaces like the ailerons and elevator were covered with one piece of Koverall. First it was pinned and glued to the leading edge, then wrapped around over the trailing edge and back up to the leading edge again.



When covering has been completed, go over the Koverall with an iron to stretch it tight. Give the entire model two or more coats of clear dope before proceeding with preparation for and application of color. Because of the tight weave, air bubbles have a tendency to be trapped between the balsa and the Koverall. To be sure this gives no problem, use dope thinned 50-50 (so as to soak through) for the first coat and work down the covering with a balsa squeegee to get out air before dope dries.

The prototype King Kobras were covered using Sig Nitrate Dope as an attacher and filler, then painted with the Sig Skybrite One Coat No-Mix Paint System. (Sig Nitrate should always be used under enamels or epoxy, not Sig Supercoat or Lite-Coat, which should only be used underneath Sig Supercoat Dope.) A brochure on the use of the Sig Skybrite system is available free. Send a self-addressed large-size stamped envelope to Sig and request it.

Painting the Cowl and Fuselage Top

The plastic parts should be sanded to remove the gloss before they are painted. Don't use coarse sandpaper, which can cut deep scratches. These scratches may open up during doping (which softens the plastic) and become more noticeable. Instead use something like 220 3-M Tri-MIte no load silicon paper to start and polish down with 360 Tri-M-Ite or 400 wet paper before color doping.

Care should be used not to apply heavy, wet coats of dope. Put on light coats and allow them to dry thoroughly before applying a second coat. A spray gun is a good method of getting a good finish with a minimum amount of dope. Be especially careful with dope spray cans not to wet the plastic too much. Spray several light dusting coats with adequate drying time allowed.

Plastic may also be painted with Sig Skybrite, Sig Plastinamel, K & B Superpoxy, Hobbypoxy or Du Pont Dulux Enamel. Don't use other paints without testing first on scrap plastic. For best results, Skybrite Primer, K & B or other primer should be applied to the plastic before finishing with enamel or epoxy.

Painting the Canopy Framing

Dope is very difficult to use on the canopy plastic because of its warping action. Therefore we recommend Sig Skybrite, Sig Plastinamel or other suitable enamel or paint-for-plastic for the canopy. Epoxy can be used but it doesn't stick as well unless primer is used under it. Sanding the gloss off the canopy plastic will help adhesion on all types of paints. Mask off the edges of areas to be painted with 1/8" Stripe-Rite or similar plastic tape which will stretch around curved areas on the canopy. Mask off the rest of the unpainted areas with wider tape to protect it from scratches during handling. If some type of paint other than those mentioned here is used, test on a scrap of plastic first.

NOTE: Plan the painting so that the canopy can be glued on the fuselage as soon as the paint is dry. Don't leave the canopy lay around since it is likely to warp, either from the type of paint used or the fact that the framing is only painted on one side.

Cyanoacrylate glues may be used with caution to attach the canopy. With some brands, when a seam of glue is put around the canopy, the fumes may build up inside and cause fogging of the plastic. To avoid this, we put two holes in the cockpit floor. (In an inconspicuous place - behind the pilot's headrest.) A piece of tubing was inserted in one hole and blowing through it as the glue was applied a bit at a time, exhausted the fumes out the other hole before the canopy was harmed.

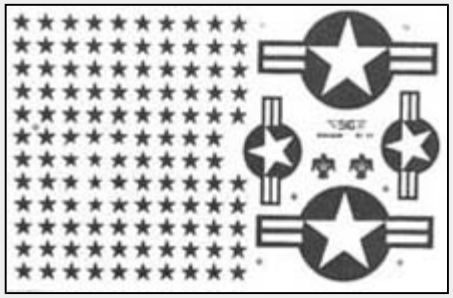
A Cure for Fuselage Warping

You may have noticed that when a piece of balsa is doped on one side and not on the other, it will curl. The same thing can happen on the fuselage sides under the wing opening, particularly when you put on a number of coats. (The rest of the fuselage will not show this effect to any extent because it is four-sided and cannot distort.) The effect isn't noticeable until after full cure of the dope and aging, which may take several months. To prevent this from happening, give the inside of the fuselage a coat of dope every time you give the outside a coat. This has an added advantage in making the cabin area fuel proof. In addition, when the hardwood servo mounts are installed, have them a little over-long so that the cabin sides are bulged slightly outward.

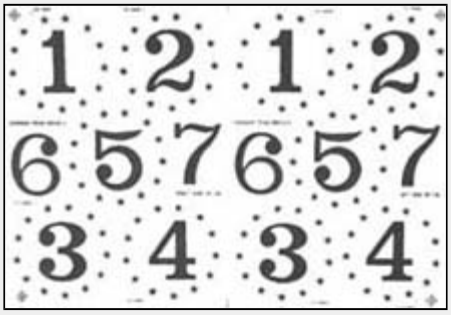
Color Schemes

On a non-scale model like the King Kobra, a wide range of color schemes suggest themselves. We will show here the ones used on the prototypes but in order not to increase the price for those builders who may prefer other decorations, no decals (except for the "King Kobra" name) have been provided in the kit.

The F-16 inspired color scheme on one prototype used the emblem, insignia and lettering from the DKM-235A Kougar Thunderbird Stik-Tite Pressure sensitive set (Also available individually as DKM-235AB Kougar Stars and Bars and DKM-235AC Kougar Black Lettering.)



DKM-235AB Kougar Stars and Bars decal. The large stars and bars measure 7-1/4" wide, the small 4-3/8".



DKM-235B Kougar Team Numbers Decal. The diameter of the circle of stars around the numbers is about 4-1/4".

DKM-235AC Kougar Black Lettering Decal. "USAF" letters are 3" high, "U.S. Airforce" is 1" high x 9-1/2" long, the buzz numbers are 13/16" high.

DKM-235C Kougar Team Insignia Decal. The width of the bar on the stars and bars is 3-1/4". "U.S. Air Force" is 7/8" high x 8-1/2" long.

VISIBILITY NOTE: The F-16 scheme is a fairly simple one to execute but some fliers may prefer to have some white striping on the bottom of the wing instead of making it solid red. This makes it easier to determine airplane attitude in a bank at a distance.

These same decals could be used to work out the basic configuration of the most recent (1983) color scheme used by the Thunderbirds. This reverts to the red scalloped fin splattered with blue stars similar to one used some years ago and which appears on the prototype Kouga. The flags are from Sig Flag decal DCM-805. (This decal now has right and left handed flags instead of two left .handed, as used in the photo.

The T-38 styled K.K. prototype used DKM-235B Kougar Team Numbers for the fin and DKM-235C Kougar Team Insignia decal for the stars-andbars, Thunderbird emblem and U.S. Air Force.

DKM STIK-TITE
Pressure Sensitive Decals
Cut out the decals with a pair of sharp scissors. Leave about 1/32" to 1/16" of clear edge around the decal. Round the corners as you are cutting. Wet the surface on which the decal will be placed with soapy water (use dishwater detergent). Place the decal on the model and squeegee the water from underneath with a balsa paddle. Allow to dry. This procedure will prevent air from being trapped underneath as is possible when the decals are applied dry.

Bottom Color Schemes

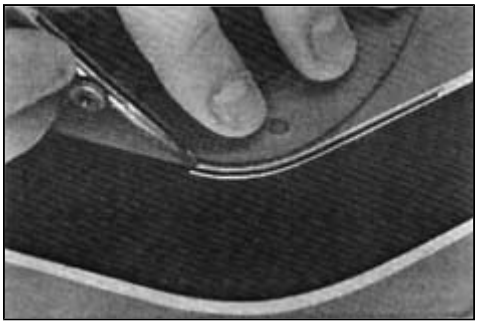
NO.1 is an easy-to-do layout with all straight lines. The red top wing tip and stabilizer tip stripes are brought around the bottom, but the white and blue stripes are not. The spanwise stripes are blue. The fuselage spear is red.

NO.2 shows the red-winged F-16 style King Kobra. A variation would be to leave the wing center section white with the red spear on the rear extending on to the nose.

No. 3 is a more complicated version with curves. The span-wise stripes are blue, the fuselage spear is red. The red, white and blue stripes on the tips are on the top of the wing and stab only.

Patterns are shown on the plan for the curved decoration which are not on the decal sheets. Masking off these curved parts for painting is made much easier if 1/8" wide masking tape is used. This will bend around corners easier than wider tape. Strips can be cut off regular width tape with a straightedge. After the decoration is outlined, wider tape can be joined onto the 1/8" tape to block off the nearby areas not to be painted. We use paper taped on to match the rest of the model to shield for spray painting.

Another way the curved parts of the decorations can be applied is with the use of a mechanical drawing ruling pen to draw them on the model using paint in the pen instead of ink. Thin the dope slightly with blush retarder to slow the drying process and aid the flow of dope through the pen points. Clean the pen frequently with dope thinner and wipe on a cloth before reloading with fresh dope. Don't try to draw a thick line with the dope and pen but instead draw a thin line on each side of the desired pin stripe (about 1/8" wide were used on the original) and fill in between the lines using the pen free hand and opened up for a wider flow. If you have a steady hand, use a small brush. Use a French curve to outline curved parts of the decorations. The ruling pen method is also handy to touch up any rough edges of masked decoration after the tape is removed.

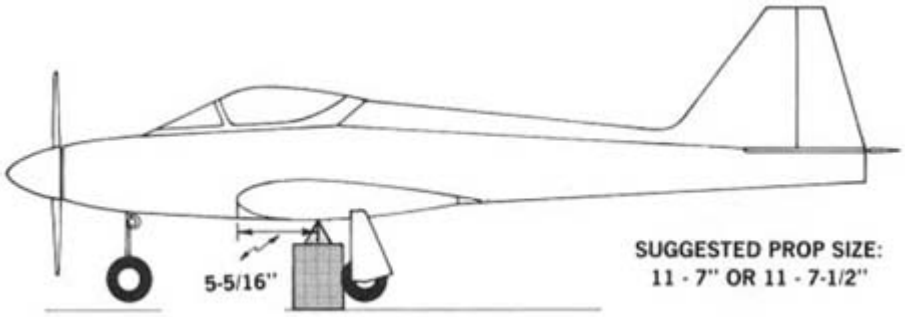


A third approach makes use of the common adhesive-backed vinyl shelf paper available at hardware stores with a new blade in a modeling knife, cut the color sweep on the T-34 version, for example, out of a piece of the shelf paper and use the mask remaining for spraying or handpainting the decoration on the tail.

For models covered with plastic film, the fin flash could be cut from trim sheets. Or follow the manufacturer's directions that come with the plastic film for applying this type of decoration.

Balancing

The King Kobra design, like the Kougar, requires a farther forward balance point than commonly used on some other pattern style designs. Do not decide on the basis of your experience with other models to ignore the following recommendations and use some other balance point. Far too many modelers build a kit, install the equipment and go out to test fly without ever checking out the C.G. Don't do this!.



BALANCING: Put a piece of masking tape on the bottom of the wing in the center. Mark the distances from the leading edge (the wing-fuselage joint) on it. A balancer can be made from a triangular architect's scale placed on a block high enough to get the wheels clear of the bench. Shift the model back and forth on the edge of the scale until the balance point is found. Balance with an empty fuel tank but with all the other equipment installed and the model completely finished and painted.

Our findings with 5 prototype models show that 1/2" behind the 25% point is as far back as ever will be necessary. Under no circumstances should the C.G. be moved farther back than the 33-1/3% point.

WHY MODELS MUST BE INDIVIDUALLY BALANCED

It is impossible to produce a kit that will automatically have the correct Center of Gravity (C.G.) position. Balsa wood varies in weight and it is easily possible for wood in the tail to be an ounce or more heavier or lighter than average. One ounce of extra weight in the tail has to be countered by about 3 ounces in the nose. Don't pile a lot of fillercoat or finish, use excess glue or make large fillets on the tail surfaces. The motor you choose, whether or not a muffler is fitted, the size and placement of your radio equipment, etc. all affect the balance. If you use an unusually heavy motor or muffler you may have to carry the battery in the radio compartment instead of the nose or even weight the tail. Don't consider that whatever C.G. the model builds out to as "good enough". Check carefully and make whatever adjustments that are required. With the C.G. properly located, a Sig design should fly with only minor trim changes required.

In addition to the fore and aft balancing procedure described above, the performance of manuevers is improved if the model is also in balance spanwise. For example, if one wing is heavy it may affect turning and loop tracking. Inset weight into the opposite wing tip to correct this problem.

Control Movements

The following control movements from neutral were used on the prototype King Kobras for test flights and are suggested as a starting point. Your own trimming and personal control reactions preferences should then be applied to determining the final measurements to be used.

BALANCE IS PART OF THE TRIMMING PROCESS

The balance point we arrived at for this design is a good place to start when trimming out the model for top performance. However, it should not be considered the final and irrevocable location. Individual models built from the same kit are slightly different from each other. The incidence may be changed a bit, a small or large engine selected, the total weight varies - even the skill of the pilot has bearing on just what should be the exact C.G. point. For example, when slightly nose heavy, the model is more stable and less likely to stall or snap roll from over-elevating. This also cuts down the reaction of the model to control movements which is good during test and practice flights to help prevent overcontrolling. But later, if extra sensitivity and quick reactions are desired for aerobatic performance, a position farther back may be desirable. So try different positions, but make the changes gradually, checking results and the effect of the change control responses and the performance of the model in the air at a good altitude.

RECOMMENDED CONTROL SURFACE MOVEMENTS	ELEVATOR	9/16" UP and 9/16" DOWN
	RUDDER	1-5/8" RIGHT and 1-5/8" LEFT
	AILERON	1/4" UP and 1/4" DOWN

FLYING

IMPORTANT: The King Kobra is not a model for low-flying time pilots. If you have little or no previous RC flying experience you cannot successfully fly a fast and responsive design like the King Kobra, particularly on test flights. It is suggested that you not attempt flying without the assistance of a modeler with experience. Contact your local model club or ask your hobby dealer for the names of good fliers in your vicinity and a suitable location for flying.

Many hours of work are involved in the construction of a model and it can all be lost in a moment of beginner's indecision. Even if you have some experience, an expert flier can help you get past the first critical test and trimming flights without damage to the model and give instruction in proper control.

Be certain to carefully range check your radio equipment and see how it operates with the engine running before attempting test flights. A lot of problems can be avoided if the engine has been well broken-in and the idle adjustment perfected on a test block or in another airplane before installation in the model.

Takeoffs with the King Kobra from grass fields are easily made if the grass is not too long or the ground too rough. Generally a lot of elevator application is required for liftoff. Be prepared to relax control pressure partially after becoming airborne so the c1imbout will not be too steep. On surfaced or smooth dirt runways less application of elevator will be needed.

After each test flight, readjust the RC clevis links on the push rods so that the trim levers on the transmitter can be returned to a neutral position. It will take several flights before exact trim is established on all axis of flight.

NOTES ON LOOPS

A true wing will perform perfect loops. A twisted wing will loop obliquely. One wing half being heavier than the other may also affect loop tracking. A side mounted motor may make one side of the model heavier than the other. Put weight in the opposite wing tip until the model is balanced. Should your model snap roll out of the top of a loop, it may snap in the direction of any twist in the wing, but the real reason for it snapping is because of a stall. This is probably due to one or more of the following:

- Airspeed too low.
- C.G. too far back.
- Pilot pulls too much elevator, a mistake aggravated by excessive elevator travel which makes the elevator more sensitive. Reduce travel of elevator and use more care in transmitter stick movement.
- Not enough power, too high a wing loading for the available power or both.

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