

# ***SUPER CHIPMUNK***



**SIGCL19**

## **BUILDING AND FLYING INSTRUCTIONS**

### **BEFORE BEGINNING CONSTRUCTION**

Any references made to left and right refer to your left and right as if you were seated in the cockpit. In control line, references to inboard would mean towards the center of the flight circle, and references to outboard mean away from the center.

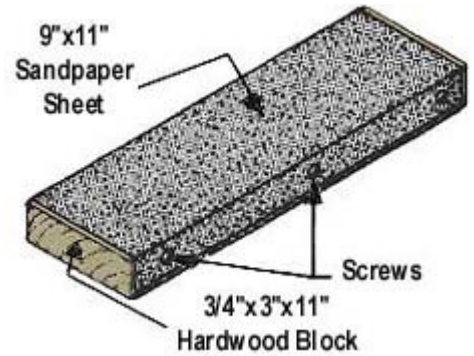
A piece of Celotex-type wallboard makes a handy building board, into which pins can easily be pushed. Lay the building board on a table with a flat and untwisted top. Pins can be pushed through all pieces of balsa in the kit without any lasting damage. The holes on the outside will fill up during sanding and doping. Don't be afraid to use plenty of pins, particularly when gluing planking on the top curve of the wing or the round top of the fuselage.

Wax paper should be used to protect the plan during building when the glue used is epoxy or an aliphatic resin glue such as Big-Bond. If a model cement like Big-Ment is preferred, use plastic wrap to protect the drawing. This type of glue can dissolve the wax out of wax paper which will inhibit drying.

Cut all long pieces of balsa first, followed by medium lengths, before cutting up any full length strips into short pieces. Leave the die-cut parts in the sheets until needed in construction. Remove pieces from the sheets carefully. If difficulty is encountered, do not force the part from the sheet. Use a modeling knife to cut it free.

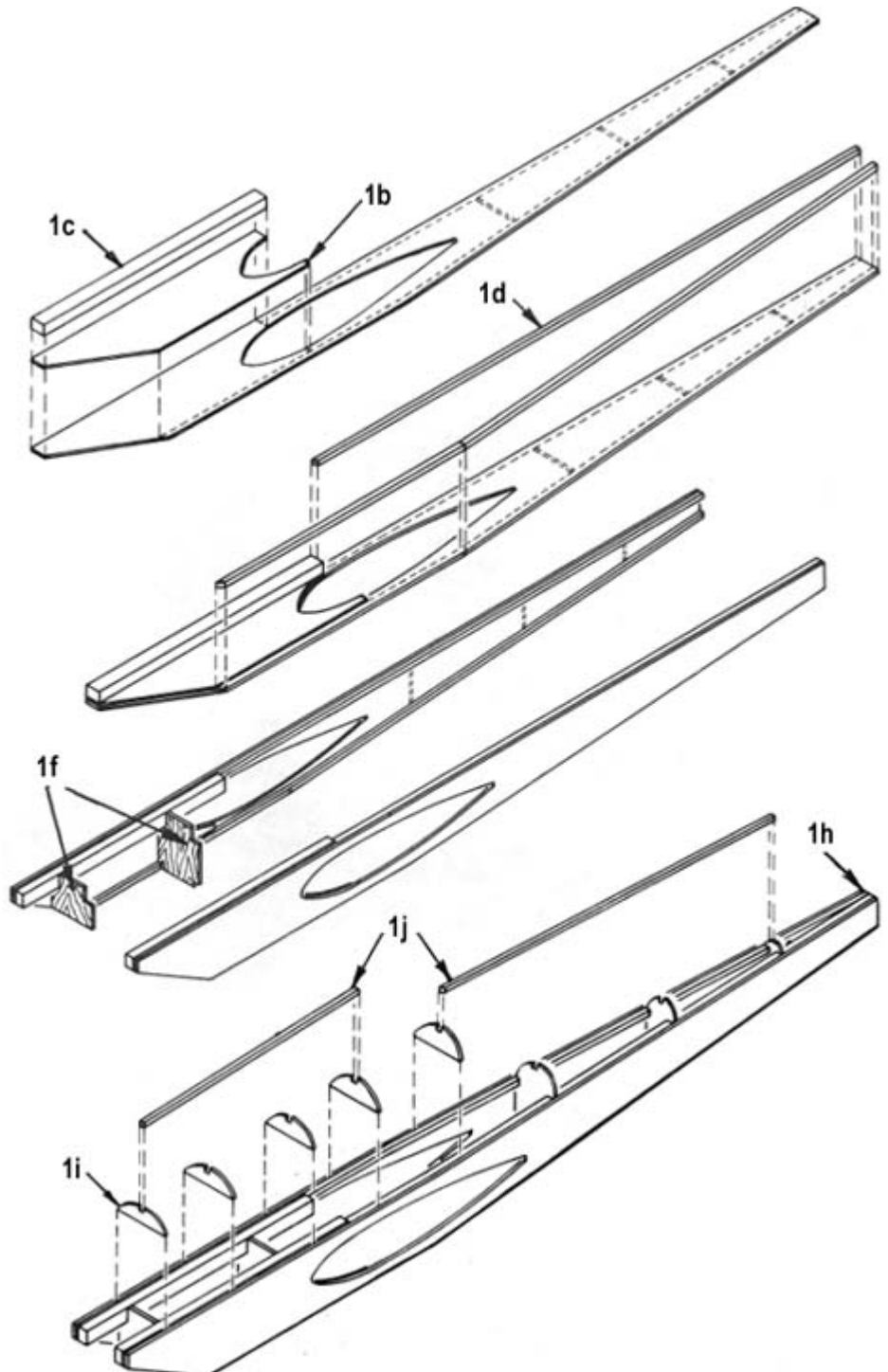
A jig saw is best for cutting out the printed balsa parts. Cut just outside the lines, leaving all of the line on the part. When fitting into place in the structure, use a sanding block to bring the edges to an exact fit. If an X-Acto knife is used don't cut too close to the lines but leave enough margin to true up and finish the edge with a sanding block.

Make a large sanding block that will take a full sheet of sandpaper. Use several wood screws on one edge to hold the sheet in place and be easily removable when required for replacing the sandpaper. This will be found a valuable tool during construction.



## 1. BASIC FUSELAGE CONSTRUCTION

- a. Cut the fuselage sides out of the 1/8" printed balsa sheets.  
Note that there is a right and a left side. On one side cut to the dotted line at the front of the wing cutout. This will later allow the wing to be inserted into the fuselage.
- b. Glue the 1/16" plywood fuselage doublers to the inside of each side with Sig Epoxy Glue.
- c. Next, glue the hardwood motor mounts on top of the fuselage doublers with Sig Epoxy.
- d. Glue the 3/16" square balsa pieces to the top and the bottom of each fuselage half.
- e. Lay each side of the fuselage on the plan and mark the locations of F-1 through F-7 on the inside of each sheet.
- f. Epoxy the plywood fuselage formers F-1 and F-4 in place on one fuselage side.
- g. After the glue has completely dried, attach the other fuselage side to F-1 and F-4. Use the top view on the plan to help make certain the sides are parallel, square and properly aligned.
- h. Pull the rear end of the fuselage together by gluing F-8, F-9 and F-10 in place.
- i. Add the remaining formers F-2, F-3, F-5, F-6 and F-7.
- j. Glue the 3/16" top stringers into formers notches.



## 2. FUEL TANK

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Install the fuel tank in the model at this time.

Drill a 3/16" dia. hole in the firewall to poke the fuel outlet tube of the tank thru. Be certain that the fuel outlet tube will be along the outboard side of the fuselage.

Epoxy the tank to the motor mounts and fuselage sides.

Cover the top and bottom brass vent tubes to keep saw dust out during the completion of the model.

After the model is finished and painted, cut holes in the top and bottom planking large enough to allow fuel tubing to be slipped over the brass outlet tubes. Bevel the extensions as shown on the plan to prevent siphoning. Use silicone seal (G.E. SILICONE SEAL, obtainable at most hardware stores or DEVCONSEAL-IT SILICONE RUBBER) to fill the seams between the fuel tubing extensions and the fuselage planking to prevent fuel from seeping into the fuselage. Also use silicone seal around the fuel feed tube at the front of the firewall. Sig Heat Proof Fuel Tubing will not harden in glow fuel, so if it is used for the vent extensions and feed line, they will rarely have to be replaced.

### ALTERNATIVE TANK VENTING

The tank venting shown on the plan has been the standard control line stunt tank set-up dating back to the late 1940's. Many modifications and variations in venting have been tried since then -- some successful in competition flying and some not. Most commercially available control line tanks still feature this same vent arrangement because of its simplicity and reliability for sport flying.

One simple modification that you may want to consider for your Chipmunk, for appearance sake mainly, is to:

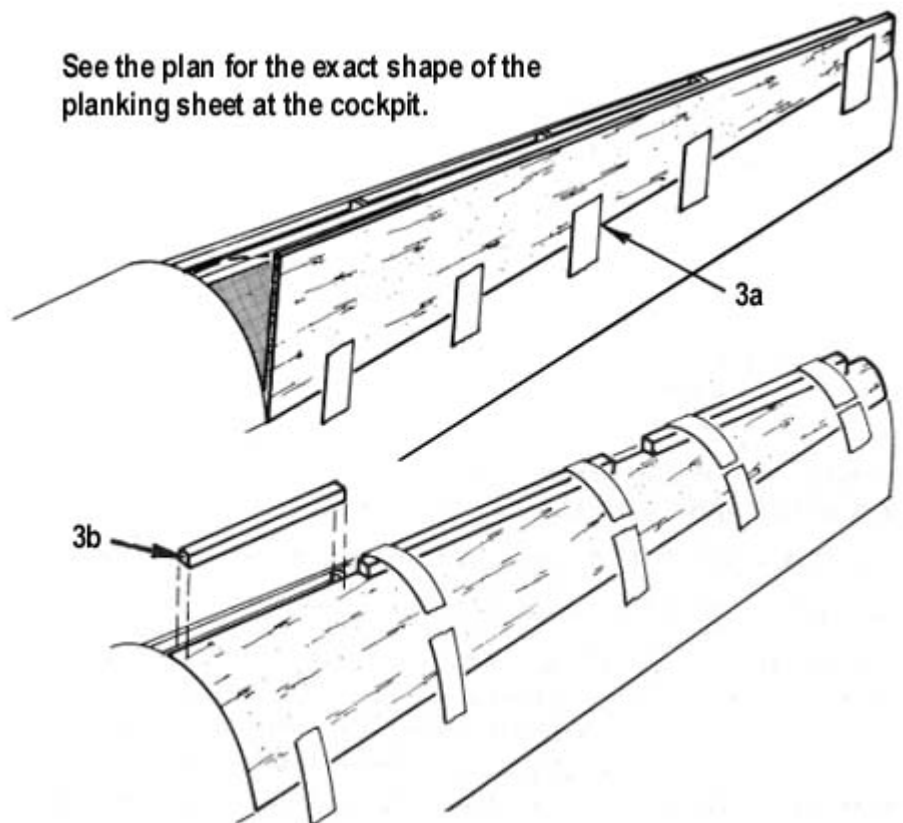
- Remove the top vent (the one that sticks out of the top of the tank) by heating the solder joint with a soldering iron and pulling the vent out with a pair of pliers.
- Solder a square piece of shim brass over the hole to seal it shut. Check for leaks by capping the remaining vent and submerging the entire tank in water while blowing air into the feed tube and watching for air bubbles, primarily around the soldered joints.
- Install the tank in the nose and extend the bottom vent out of the fuselage as described before.
- To fill the tank with fuel, stand the model straight up and down on its nose. Fill thru the bottom vent, watching for the overflow to run out of the engine's air intake when the tank is full. In-the-air performance of this vent arrangement is identical to the standard two vent setup.

## 3. FUSELAGE PLANKING

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Note that the front and rear of the fuselage are planked separately, then the cockpit sides are added last.

- Apply a seam of glue to the edge of the fuselage frame and tape the 1/8" sheet balsa planking in place. Allow to dry.
- Apply glue to the rear formers and top stringer. Dampen the outside surface of the planking sheet with water to aid in bending without breaking. Bend the sheet into position and secure with masking tape and pins. Taping 1/4" square pieces on the edge helps clamp the sheet in place.
- When dry, use a straight edge to trim the planking sheet along the stringer so as to leave half of the stringer exposed for attachment of the opposite side planking.
- Repeat the process to attach the opposite side sheeting.
- Repeat the process to attach the front planking, one side at a time, also.
- Cut and fit balsa cockpit side walls.



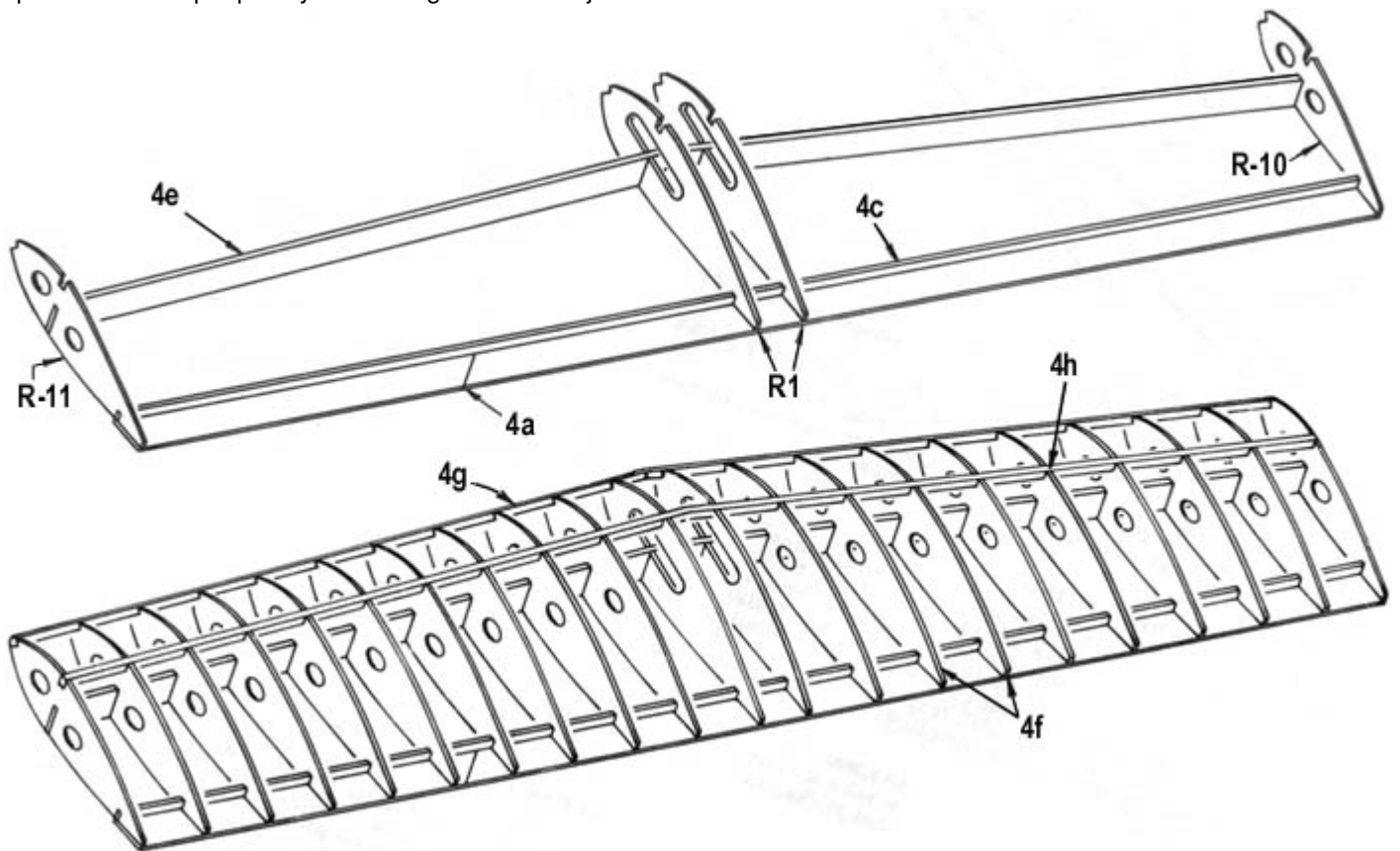


- g. Sand the bottom of the fuselage flat with a sanding block but do not put on the 1/8" bottom sheeting until after the wing is installed in the fuselage and the control hookup is completed.

#### 4. BASIC WING CONSTRUCTION

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- a. Cut the 1/16" x 1-1/2" trailing edge balsa to the proper length and splice them together. Note: Depending upon our balsa supply, we will sometimes substitute 1/16"x 2" balsa pieces for the specified 1/16"x 1-1/2" pieces. If your kit contains 1/16" x 2", use a knife and straightedge to trim them to 1-1/2" wide.
- b. After the splice has dried, pin over the plan and mark the locations of the ribs.
- c. Pin and glue the 1/8" x 1/4" balsa rear spar on the front of the trailing edge.
- b. Pin ribs R-1, R-10 and R-11 in place on the trailing edge.
- e. Slide the 1/8" x 1" bottom front spars into the ribs and pin securely. Place scrap balsa under the spars to support the front part of the wing during assembly. Glue the spars together at the center joint. Double check to be certain that the ribs and spars are lined up squarely and then glue all of the joints.



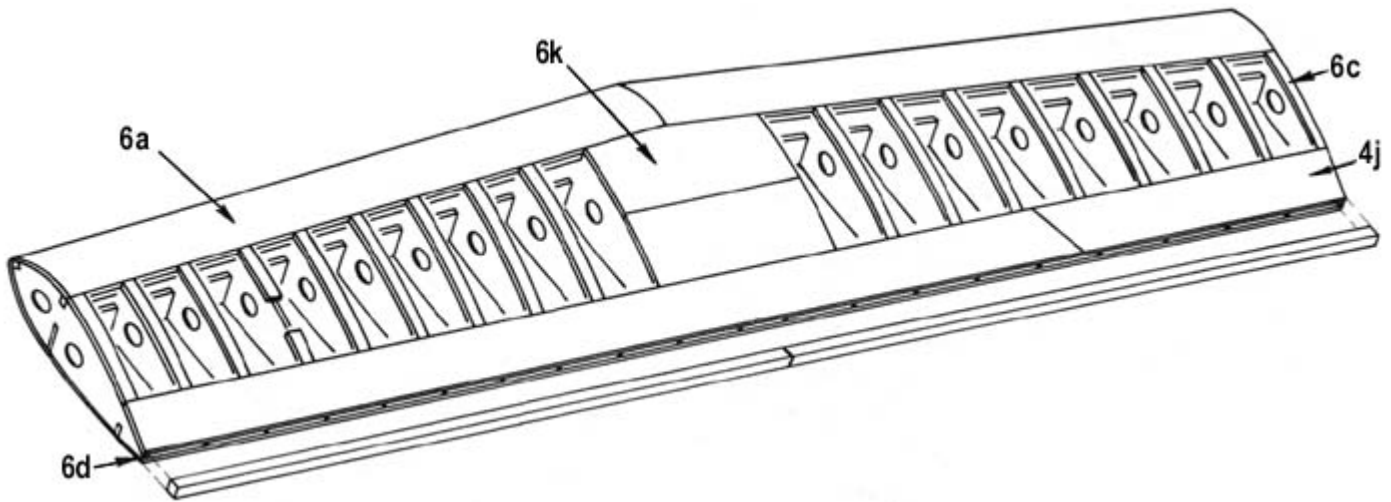
- f. Glue the remaining ribs R-2 through R-10 to the bottom front spar and the trailing edge.
- g. Install the 1/4" sq. balsa leading edge.
- h. Add the 3/16" sq. balsa top front spar.
- i. Glue in the 1/4" sq. balsa in the center section between the R-1 ribs. These support the bellcrank floor. See the cross-section of the wing on the fuselage side view for the exact location of these 1/4" pieces. They are shown in dotted lines directly below the bell crank plywood floor.
- j. Sheet the top of the trailing edge with the previously spliced (step 4a.) pieces of 1/16" x 1-1/2" sheet balsa. The wing assembly can now be carefully unpinned and removed from the building board.
- k. Refer to the isometric view on the plan showing the hardwood landing gear blocks. First, install the rib doublers R-2A and R-3A. Then epoxy the hardwood landing gear blocks. Drill a hole through the blocks for the torsion bar arm of the L. G. Look at the fuselage side view for the proper angle of the hole.

## 5. BELLCRANK

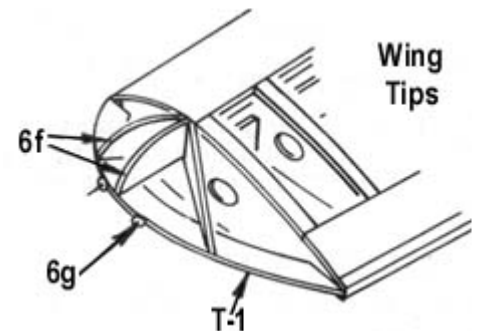
- a. An isometric view on the plan shows the assembly of the bellcrank to the 1/8" plywood bellcrank floor. After assembly, epoxy the retaining nut and washer permanently to the bottom of the plywood floor. Try not to get glue on the end of the bolt, so that it can later be removed and the bellcrank taken off for installation of the leadouts and flap pushrod.
- b. Fasten the leadout cables to the bellcrank. First, insert the ends of the leadout cables through the outermost holes in the bellcrank. (Check top view of wing) Then bind the ends of the leadouts securely as described by the construction sequence on the plan.
- c. Bolt the bell crank back onto the bellcrank floor. Thread the leadout cables through the holes in the wing ribs and set the bellcrank assembly in place between ribs R-1. Use 2 small spots of glue to tack the bellcrank floor in position on the 1/4" sq. braces. (Don't glue permanently, as it may have to be shifted slightly for adjustment of the bellcrank/flap neutral.) At this point, check to see that the bellcrank can be operated freely by the leadouts at the wingtip, without binding or snagging on the ribs. If not, find the problem and correct it. Enlarge holes in the ribs if necessary. Remember, it's very critical when building any control-line flying model that the control system work freely and smoothly. If it doesn't the airplane will not respond adequately to control applications, and the flight performance will be greatly hampered. Thoroughly check out the entire control system operation whenever an additional hookup (flap and elevator pushrods) is made in any of the following steps.

## 6. COMPLETING THE WING

- a. Sheet the leading edge, top and bottom, with 1/16" x 3" sheet balsa.
- b. Sheet the center section of the bottom of the wing with 1/16" x 3" sheet balsa.
- c. Cut and fit 1/16" x 1/4" cap strips to the top and bottom of each rib.
- d. Sand the ends of the ribs and rear of the trailing edge planking with a sanding block so that a good match can be made with the 1/4" sq. trailing edge cap. Pin and glue the 1/4" sq. balsa trailing edge in place and splice at the center of the wing.



- e. Glue on the T-1 wing tips.
- f. Add the wing tip braces, T-2, T-3 and T-4.
- g. Glue the leadout eyelets in place with Sig Epoxy.
- h. Cut the 1/4" sheet balsa flaps from the printed sheet. Sand to shape shown on the plan. An isometric view shows how the control horn is epoxied into the flaps. Drill a hole and cut slots in the flaps to receive the control horn wire.



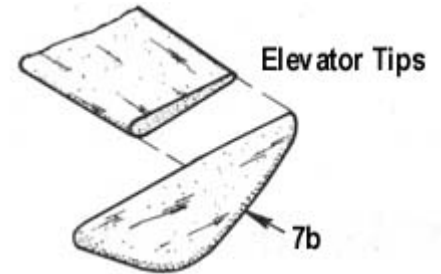
- i. The wing and flaps later must be slid into the fuselage opening for final assembly. Consequently, the flaps cannot be permanently hinged to the wing at this time. However, the hinge slots in the wing and flaps should be cut now so that the flaps can be "dry fit" (no glue) to the wing to check assembly and movement of the control system in the next steps. An isometric view on the plan shows how the molded hinges are assembled.

- j. With the flaps "dry fit" to the wing, hook the 3/32" wire flap pushrod from the bellcrank to the flap horn. Check for neutral position of the flaps (see fuselage side view) when the bellcrank is in its neutral position (see wing plan). Loosen the tack glue spots holding the bellcrank floor, and move the floor forward or backward slightly, if necessary, to get both the flaps and bellcrank in neutral position. Epoxy the bellcrank platform permanently in this location.
- k. Remove the pushrod and flaps from the wing and sheet the top center section with 1/16" x 3" sheet balsa. Carefully sand the entire wing smooth with a sanding block.

## 7. TAIL SURFACES

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- a. Cut out the elevator and stabilizer parts from the balsa printed sheets.
- b. Glue the 1/4" sheet counterbalance tips to the elevators.
- c. Sand and shape to airfoil section shown on the plan.
- d. Install the control horn in the elevators in the same manner as the horn was installed in the flaps.
- e. Hinge the elevators to the stabilizer.
- f. Sand the shaped balsa rudder to finished form. Note on the top view that the rudder is given an airfoil shape with one flat side.
- g. Cut the dorsal fin from the printed sheet and sand.



## 8. FINAL ASSEMBLY

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- a. Insert the joined flaps into the fuselage opening. Carefully slide the completed wing through the fuselage. Note that the wing opening in the fuselage is slightly undersize to allow a close individual fit to the wing. The leading edge of the opening on one fuselage side must be opened up to the dotted line to allow room for the center of the wing to slide by. Also, trim the trailing edge of the opening slightly on both sides so that the flap control horn can be held back out of the way of the wing as it is being slid in. (Note alternate wing installation method described on the plan which is preferred by many modelers.) In whichever method you use, always trim evenly from the top and bottom of the fuselage opening so that the wing incidence will not be changed.
- b. Pin the wing securely in position in the fuselage. Check carefully to insure that it is square and true to the fuselage, especially from the front and top views. If it is not correct. Then permanently glue in place with epoxy. Cut small slivers of scrap balsa to glue into any large gaps between the wing and the fuselage.
- c. Permanently epoxy the hinges into the slots already cut in the flaps and wing. Check for free movement.

Hint: Some modelers smear a trace of vasoline over the hinge pin area to keep the epoxy, that will ooze out of the slot when the hinge is pushed in, from sticking and binding. If you do this, make sure the Vasoline is only on the pinned portion of the hinge so that the hinge flat will be solidly anchored with epoxy into the wood structure.

- d. Cut away the top center section wing sheeting between the fuselage sides just over the bellcrank area. Don't cut any farther forward than the 3/16" sq. top front spar.
- e. Install the pushrod from the bellcrank to the flap control horn. The pushrods can be retained in the bellcrank and control horns with wheel collars (not furnished) or with washers (not furnished) soldered to the pushrod. If you solder, use care to avoid melting the nylon bellcrank and control horns. Unbolt the bellcrank so it can be lifted slightly to allow fastening the pushrod retainer underneath. Bolt the bellcrank back in place and check the entire control system, thus far, for freedom of movement.
- f. Install the long 3/32" wire elevator pushrod from the flap horn to the elevator horn. Level the flaps at neutral position and slide the stabilizer forward or backward until the elevators are also level at the neutral position. Epoxy the stabilizer in this spot. Before the epoxy hardens, check carefully to see that the stabilizer is properly aligned with the wings. Check from the front and top views.

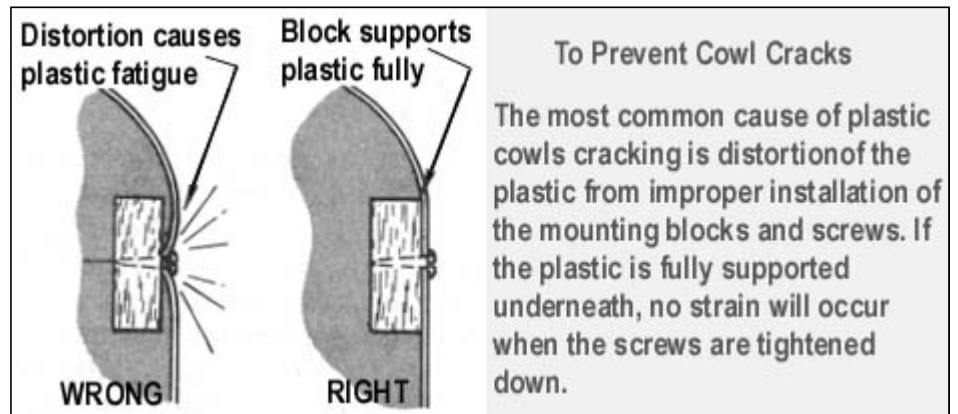
- g. Install the tail wheel unit.
- h. Cover the bottom of the fuselage with 1/8" sheet balsa. Carve and sand to shape. See cross-sections on the plan.
- i. Epoxy the rudder to the top of fuselage. With the airfoiled cross section of the rudder, little or no offset for line tension is required. Too much offset results in bobbling during maneuvers. However, be certain there is no opposite offset to the inside of the circle that would tend to decrease line tension. Add the 1/8" sheet balsa dorsal fin.
- j. Install the motor of your choice. An excessive amount of outthrust is not required and in fact zero thrust is perfectly satisfactory but be careful that no in-thrust (toward the center of the circle) is introduced. Drill through the motor mounts and epoxy 4-40 blind nuts in place.

## 9. COWLING

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- a. Assemble the engine cowling by first matching up the two halves by gently rubbing over a sheet of sandpaper laying on a flat surface.

- b. Butyrate dope thinner or MEK (methyl ethyl ketone) can be used to assemble the cowl. Hold the plastic joiner strips in place on the inside of one half. Leave half of the strip extended over the edge so as to lap onto the other cowl half when it is attached. (See isometric view on the plan.) Using a small, pointed brush, flow a few drops of thinner under the edge of the strip. It will spread along the seam by capillary action. Don't let the thinner get under your finger, it will leave a finger print.



- c. Hold the cowl halves tightly together. Use strips of masking tape to hold the opposite side (top or bottom) from which you will be gluing first. Flow thinner into the seam from the inside. Squeeze and hold together any parts of the seam not closed. Allow to dry. Remove the masking tape and join the halves on the other side. Allow to dry thoroughly.
- d. Even up the back edges of the cowl with a sanding block.
- e. Scrape and sand the seam to take out any rough spots or flaws. Do not use coarse sandpaper that will cut deep scratches in the plastic. The deep scratches may later open up wider when dope is applied. Use medium paper and finish carefully with fine paper, sanding down enough to have a smooth, scratch-free surface. Low spots in the seam can be filled with Sig Epoxolite putty. Don't put on too much Epoxolite and expect to sand away the excess later. Epoxolite dries very hard and must be worked into the final desired shape before it hardens. Epoxolite can easily be shaped with your finger and/or a single edge razor blade. Dip them in water occasionally to keep the Epoxolite from sticking to them.
- f. Cut out the 2 scale-like air intake openings in the front of the cowl. Mark the openings on the cowl. Drill a series of holes about 1/8" in diameter around the inside of the marks - have the holes almost touching each other. Cut through the bits of plastic between each of the drilled holes with a knife and break out the part to be removed. Once the preliminary openings are made, the edges can be trimmed to exact shape with a X-Acto knife.
- g. Mount the engine on the fuselage. Slip the cowl in place and attach the spinner to the engine. Tape and hold the cowl in correct alignment with the spinner and the fuselage. Leave about 1/16" between the back of the spinner backplate and the front of the cowl. Attach the cowling to the fuselage with #4 metal screws (2 each side). Drill pilot holes through the cowl and into the hardwood motor mounts. Open up the cowls holes so they are large enough to pass the mounting screws.
- h. Make small openings where necessary to allow access to the needle valve and glow plug.

## 10. LANDING GEAR

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- a. The wheel pants are joined in the same manner as the cowl, except that the joiner strips are not necessary. Cut out the wheel openings before joining the halves. Squeeze the parts together snugly while flowing thinner into the seam. The wheel pants can be fastened to the landing gear wires with Epoxolite putty as shown on the plan or with Sig Celastic fabric.



- b. Epoxy scrap balsa fairings to the landing gear wires and carve to airfoil shape.
- c. Insert the gears into the groove of the landing gear blocks. Use retaining straps and screws furnished in hardware pack to secure the wires into the blocks.

## 11. SANDING AND PAINTING PLASTIC PARTS

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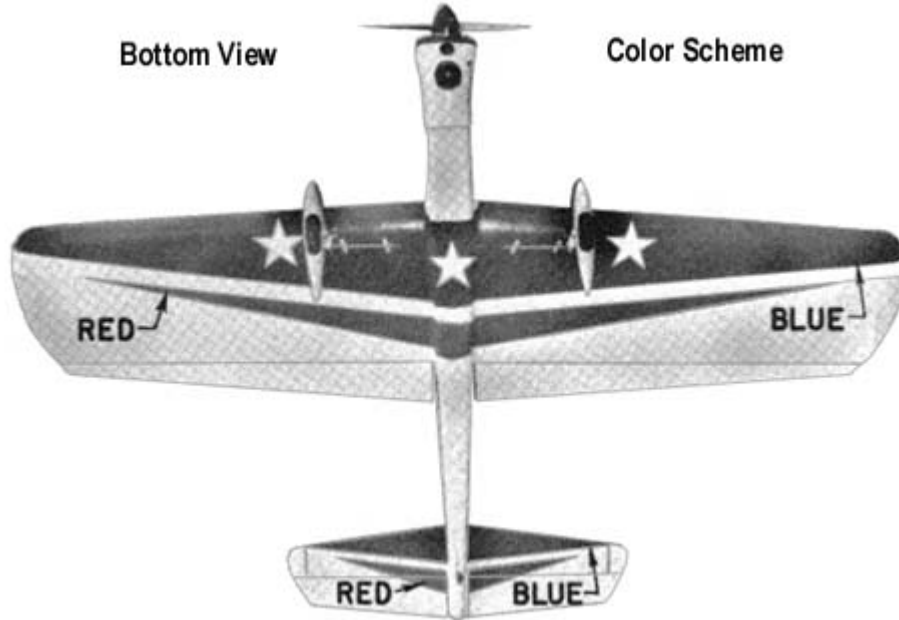
All of the ABS plastic parts should be sanded to remove the gloss on the surface of the plastic before they are painted. Avoid using coarse sandpaper which can deeply scratch the plastic. Deep scratches can open up during doping and become prominent. Use something like 220 grit 3M Tri-M-Ite Free Cut Finishing Paper. Polish down the first sanding with 360 grit Free Cut Trim-M-Ite or 400 grit Wet-Or-Dry paper before color doping.

All of the plastic parts may be painted with Sig Supercoat dope. It isn't necessary to put any base or filler coats on the plastic parts. Care should be taken not to apply heavy, wet coats of color dope to the plastic. Put on light coats and allow them to dry thoroughly before applying a second coat.

The ABS plastic parts may also be painted with K&B Super Poxy, Hobbypoxy or DuPont Dulux Enamel. Do not use other paints, dopes or finishes without first testing on scrap plastic to make certain they are compatible with the plastic.

## 12. FINISHING

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It isn't necessary to have elaborate paint spraying equipment to put on a good finish. If you brush, just be sure to thin the dope or sanding sealer until it flows out smoothly. Many paint jobs are ruined by trying to brush dope without thinning properly.

All wood parts of the model should be covered with silkspan. Covering the entire model not only strengthens the wood but gives the model a better finish with less work involved. The wood parts are first prepared with two brushed on coats of Sig Lite Coat (low shrink) clear dope. Sand each coat when dry. The bottom of the wing is a good place to start covering. Cut a piece of silkspan about 1" larger than half of the wing. Dip in water and apply. Work around the edges, pulling out all the wrinkles and stretching it smooth. Brush around the edges with clear dope and it will soak through the covering and adhere to the dope underneath. After drying, trim off the edges with a sharp razor blade. Redope any loose edges that have not completely adhered. The rest of the wing and tail surfaces and fuselage are covered in identical fashion. Brush two coats of clear dope onto the entire covered airplane. Sand lightly with fine sandpaper. Be careful not to sand into the silkspan, especially around corners and edges. Add Epoxolite fillets, if desired, at this time.

Brush or spray on one to three coats of Sig Sanding sealer. Thin out the sealer until it flows out smoothly without leaving brush marks. Apply the first coat of sealer and let dry thoroughly. Then sand most of the sealer away, letting it fill in the low spots. This is the most important step in obtaining a good finish, but sanding sealer also adds weight rapidly, so sand well. Apply a second coat, again sanding the majority of it away. Hold the model up to a light occasionally while sanding and you can see the low spots appear. If you can't sand these spots away without sanding into the silkspan, then you need a third coat of sealer.



We use 220grit 3M Tri-M-Ite Free Cut Finishing Paper for sanding each coat of sanding sealer. After the last coat, polish down the surfaces with 360 grit Free Cut Tri-M-Ite or 400 grit Wet-Or-Dry paper to take out any deep scratches made by the 220 grit paper.

Brush or spray on one coat of thinned clear dope to seal off the filler coats and start a gloss buildup. Then brush or spray on your "base color" coats. (The base color is the lightest, often most prominent, color you will use. In the case of the Super Chipmunk on the label, it was painted all white first. Then the red and blue "trim colors" were added over the white.) If you have done a good job of preparing the surface, two coats of base color should give good coverage.

When the base color is dry, mask off the edges of the trim color areas with Drafting Tape ("3M SCOTCH" brand is available at most office and art supply stores.) Brush or spray the edge of the drafting tape with clear dope. This seals the tape, preventing leakage of the trim color underneath the edge of the tape. (If you are spraying, be sure to cover with paper and tape all areas of the model that should remain base color.) Brush or spray on two coats of the trim color. When dry, carefully remove the tape. Use the same procedure to add other trim colors if desired.

If possible, spray on a coat or two of clear dope to protect the colors from scuffing and to give the entire color scheme a uniform gloss.

### 13. CANOPY

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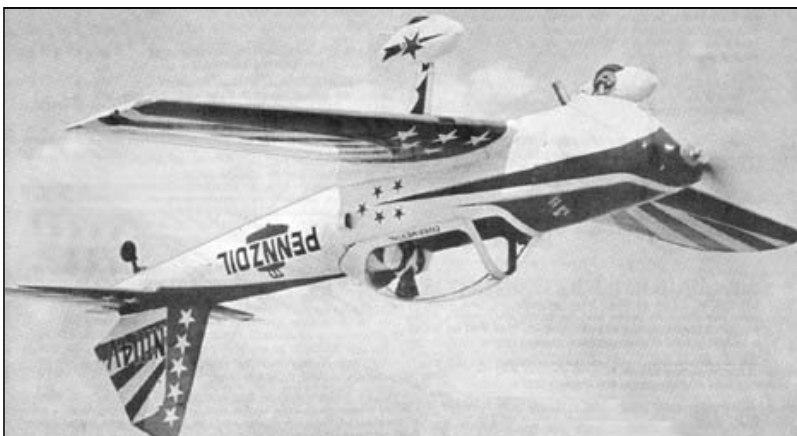
- a. Trim the excess plastic from the canopy, cutting along the outside edge of the raised framing. Trial fit the canopy to the fuselage, retrimming slightly where necessary to achieve a good fit without having to put heavy pressure on the canopy.
- b. The canopy can be fastened to the fuselage with Sig-Ment Glue, cyanoacrylate glue (Hot Stuff, Jet, etc.) or epoxy glue. Use all glues sparingly on the canopy. Too much Sig-Ment can distort the canopy edges and excessive cyanoacrylate glue vapors can fog the canopy plastic. Seal the seam with a strip of colored vinyl plastic tape or with a tiny bead (use a glue gun) of SigMent on the fuselage planking against the lip of the canopy edge.
- c. The canopy framing should be painted with either Sig dope or Plastinamel. Plastinamel has less warping tendency and can be brushed on the outside of the framing. If you use dope, it is best to mask off the framing on the inside and outside (before gluing the canopy to the fuselage) and spray paint both surfaces simultaneously. Use only very light, dusting coats of dope and allow each one to dry thoroughly before recoating. If hand painted with a brush, use only very light coats. These precautions will help keep the dope from warping the canopy.
- d. Protect the looks of the canopy by not allowing raw fuel to discharge on it. Fuel residue coming from the exhaust is not harmful to the canopy.

### 14. DECALS

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#### "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 dishwasher 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.



#### WARNING-DANGER!

Do not fly model airplanes near electric power lines. Instant death can result from contact with, or flying too close to electric power lines.

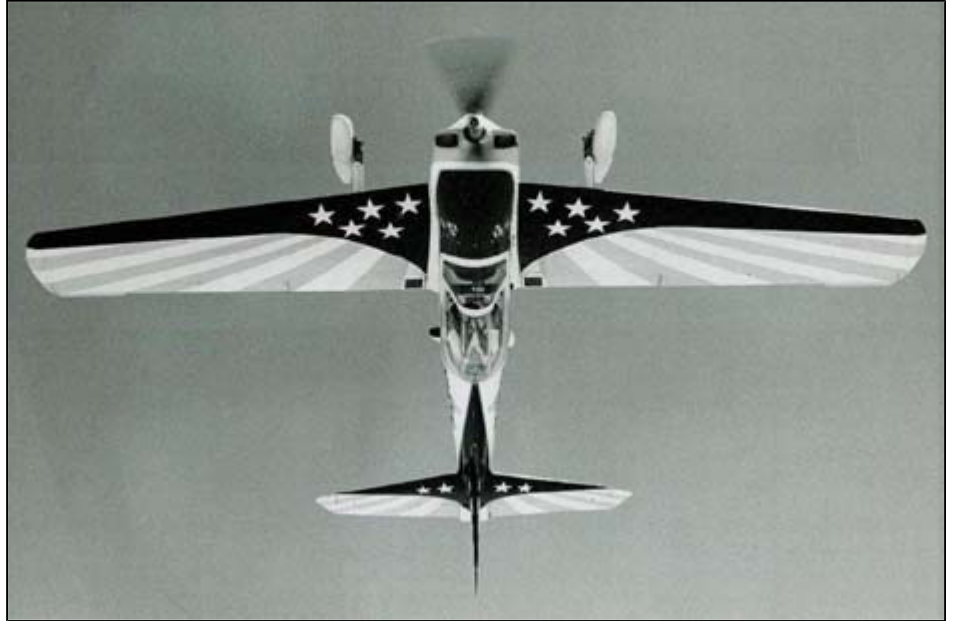
Photos of Skip Volk's full size Super Chipmunk reprinted by permission of "Sport Flying" magazine.

## 15. FLYING

The Super Chipmunk should balance about on the point shown on the plan.

It is actually a personal preference exactly where the balance point should be in this area. A more rearward balance point will make the plane more sensitive to control movements and less stable. A forward balance point will make it more stable and easier to fly. Each flyer has a different point at which a model will have the blend of maneuverability and stability to suit him.

In no case should you attempt the first flight with the balance point farther back than the point shown on the plan.



Fly the Super Chipmunk on .015" x 60' stranded steel control lines. Adjust the lines so that the elevators are in neutral when the handle is straight up and down.

Beginners to control line flying will find it helpful to hold their arm stiffly, without wrist movement.

- For level flight, you will then hold your arm straight at the model.
- To make the model climb, raise your arm.

All movements should be done slowly and smoothly. Use of arm movement only, in this way, avoids over control and steep climbs and dives that result from too much wrist movement.

After you have gained experience flying the model, wrist movement can be tried in addition to arm movement for quicker maneuvers.

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