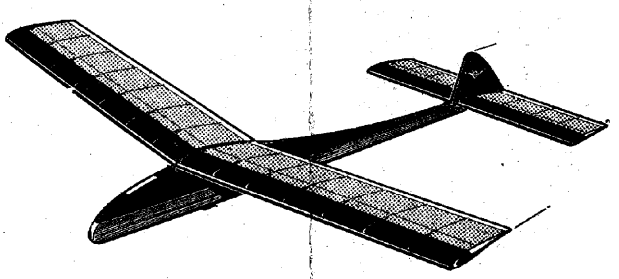
THE "CIRRO-SONIC"

High Performance Elementary Sailplane

BUILDING INSTRUCTIONS



This glider has been designed to give optimum performance with simplicity of construction. Its assembly makes an exceptionally robust and durable model, viceless all weather flying characteristics with superb towline stability.

First study the plan and identify all the parts on the printed sheets of balsa. Familiarize yourself with these and all other instructions. This design, if carefully built, is quite capable of consistent duration flights in moderate air of 2½ to 3 minutes from standard F.A.I. towlines of 164 feet.

The only tools needed are small pliers, a few pins, either steel-backed razor blade or Balsa Knife, also fine sandpaper. The fuselage base, wings and stabilizer are built directly over the plan.

FUSELAGE.

Lay the plan on the building board and cover with waxed tissue or greaseproof paper to protect from the cement. All the main fuselage members are $\frac{1}{8}$" × $\frac{3}{8}$" strips. Select one even grain length and bend gently to a curve by holding in the steam from a boiling kettle spout. Ensure that when released this curve fits the front top longeron without tension. Construct the basic fuselage structure of $\frac{1}{8}$" × $\frac{3}{8}$" longerons, neatly scarf and butt jointed where required with verticals of the same material. All struts are located with pins either side whilst drying. Diagram No. 1 will show this stage of construction. Also cut small gussets from across $\frac{1}{8}$" × $\frac{3}{8}$" strips and insert at nose and under wing mount where indicated.

When quite set, raise from the building board. Bend wire given to shape of tow hook indicated in Fig. 2. This is then bound, using strong thread, to lower longeron accurately checking its location. Rub cement well into the binding to secure. One sheet of $\frac{1}{16}$" × 3" × 12" balsa is cemented to one front side of the fuselage as in Fig. 1A. Its rearmost edge must only be $\frac{1}{16}$" over the strut below the trailing edge position to ensure a good butt joint with the rear sheeting. Then locate nose block of $\frac{3}{8}$" thick balsa, trimming away the top edge roughly to shape. Locate very accurately and firmly in position.

The rearmost side sheeting is now added. It will be best to place the fuselage above the $\frac{1}{16}$" × 3" × 18" sheeting provided then draw round with a pencil; cut out and cement accurately in place ensuring a clean joint with the front side sheeting. Then add sheeting to the second side as in Diagram 2.

When adding sheeting, it may be found best to secure the whole structure to a flat surface with weights to prevent warps. When quite set, trim away surplus balsa from the side sheeting, then carve away the nose and sand to continuity with the outline, as well as sanding it as in Fig. 1.

The two wing platforms of $\frac{1}{16}$" ply, $\frac{3}{4}$" × 2" are now prepared. Sand the corners neatly round. Score the front one across its middle, then bend in kettle steam to angle corresponding to a ply wing gusset — which should be used as a template. Cut a shallow groove across the fuselage where indicated in fuselage side view and firmly cement the platform in place frequently checking its angle with the gusset whilst drying. The middle of the platform must be level with the top edge of the fuselage. See Fig. 3 and Diagram 2A.

The rear platform is now located but this one remains perfectly flat and level with the fuselage top as in Fig. 4. Four lengths of dowel are now trimmed to 1" and inserted through holes drilled or cut with a pointed balsa knife. The dowels must be very firmly cemented in place and act as pegs for the rubber bands securing the wings and stabilizer in place. The underfin is now laminated from two parts supplied on the printed sheet and then cemented in place. Check that it is straight by sighting along the fuselage.

Sand all the fuselage very smooth and the edges to fine $\frac{1}{16}$" radii except under the wing and stabilizer.

WINGS.

The two wing halves, port and starboard, are built directly over the plan above sheets of waxed tissue. Firstly prepare the leading and trailing edge spars, trimming to correct length and marking off and cutting out the $\frac{1}{16}$" deep slots. Pin the leading edges in place flat to the building board above the plan. The thicker edge of the trailing edge is raised $\frac{1}{16}$" by inserting small packing pieces as detailed in Diagram 3.

Cement upright in place all ribs R.2. The two plywood joining gussets are prepared, the one cemented against the rear of the leading edge of the port wing panel, another is trimmed in depth to $\frac{1}{8}$" so that it will fit closely against the front of the trailing edge. The two ribs R.1 are now laminated accurately together and located. Their centre line will be on the centre line of the two wings. See Diagram 3.

The top main spars are now cemented in their slots in the upper surface of all ribs. Ensure that nowhere is the spar proud of the ribs. The centre $\frac{1}{4}$" deep gusset is cemented to the port spar, ensure that the angles of all three gussets are the same.

When the two halves are quite set, lift the starboard side only and join to port side, supporting the wing tip upon a block 4" high, Diagram 4. This will give 2" of dihedral each side when the wings are level. Ensure clean butt joints between the leading edges and the trailing edges. Insert small $\frac{1}{8}$" thick gussets at centre section where indicated. When quite dry, raise the whole structure from the board, carve and sand the leading edge to streamline as shown. Add tip blocks and when set, carve to streamline, shaping to the undercamber.

STABILIZER.

The stabilizer or tail-plane is similarly built on the flat over the plan. Mark out and cut the $\frac{1}{16}$" deep slots in the leading and trailing edges then pin in place. The lower $\frac{1}{16}$" × $\frac{3}{16}$" spar is also set flat. Erect all the ribs and finally add the top spar. The tip blocks are securely cemented in place and when dry are carved and sanded to streamline.

FIN.

Sand the edges of this smooth and gently rounded. Cut slots in the base of the fin as in Fig. 5 and check for fit between two centre ribs of the stabilizer. Do NOT cement in place until after covering both stabilizer and fin, Diagram 4A.

COVERING.

Cut the tissue into areas about $\frac{1}{2}$" wider all round than the individual panels to be covered, grain lengthwise. Use modellers' tissue paste or photo paste for adhesion and use very sparingly. Cover the wing undersides first. Spread paste onto the lower edge of all ribs and outer members of one side first. Adhere tissue lightly to root rib and stretch evenly towards wing tip as well as tightly between leading and trailing edges. Now rub tissue lightly against individual ribs to form undercamber. Obviate any warps by even tension. Should any tissue not be adhering correctly to the undercamber, it may be corrected by access from the top of the camber, hence the reason for covering the undercamber first.

Now cover the underside of the opposite wing panel. Then cover the top sides, but in this case, tissue has no need to be adhered to the ribs, only the outer framework.

Next cover the stabilizer both sides, without adhering tissue to individual ribs.

The fuselage sides can be considerably strengthened by adhering tissue to the balsa wood. This is done with wing shrinking dope, brushed through the tissue and the wrinkles rubbed out by smoothing with a pad of tissue or material moistened with dope. The fin can also be covered both sides with tissue and also the under fin.

Now spray all tissue covered flying surfaces with water using a modellist's spray or old scent spray. Do not brush water onto the tissue. Pin all surfaces flat to the building board over waxed tissue whilst drying. Do not force dry in front of a fire.

Now dope both wing undersides first and when dry, pin one side flat to the board with a $\frac{1}{8}$" block under the tip trailing edge. Then apply a coat of dope and allow to dry completely. Then do the same on the opposite wing panel. This will give "wash-out" or decrease of wing incidence towards the tip to prevent stalls and laterally stabilize the model. Give three coats.

The stabilizer when doped must be perfectly flat. Give two coats of dope all over. Cut away the tissue between the two centre ribs then cement the fin vertically in place. Cut two $\frac{1}{4}$" long dowels and insert in prepared holes in lower edge of fin protruding through stabilizer to provide locating pins. Make two corresponding holes centrally in the top surface of the stern-bay where indicated. Check the line up of the fin by sighting along the fuselage. Any desired colour scheme may be applied but coloured tissues are recommended in place of coloured dopes with tissues and dopes only on the fuselage.

DETHERMALIZER.

Some experienced modellers may like to fit a dethermalizing gear to their models. This must be built in before covering the stabilizer. Use 20 s.w.g. wire, bending a "V" shaped piece $\frac{1}{2}$" wide with arms $2\frac{1}{2}$" long with bent up hooks at their ends. This is then bound with the base of the channel against the lower spar beneath the fin. The arms rest above and are bound to the leading edge with the hooked ends of the arms projecting forward. A single arm of wire 3" long is bent at right angles for $\frac{1}{4}$" and this bend is bound to the rear of the lower spar. The rear end of the wire is hooked and projects behind and is bound to the trailing edge. Another length of wire is forced into the fuselage at the rear end with its hook upside down. Diagram 5 will show this arrangement quite clearly. The action is that the rubber band holding the front hooks will always be in tension tending to tip up the stabilizer. A piece of thick white parcel string is soaked in a weak solution of saltpetre and when dry makes a fuse. Through this string is sewn a length of thread similarly treated. The thread permits the rear of the stabilizer to be securely held by tying around the two rear hooks, 5A. Graduated lengths of fuse can be used for 1, 2 or 3 minutes to limit the flight and prevent the model soaring away on thermal currents. The angle at which the tail tips up to control the descent can be adjusted by bending the front hooks, 5B.

FLIGHT TESTING.

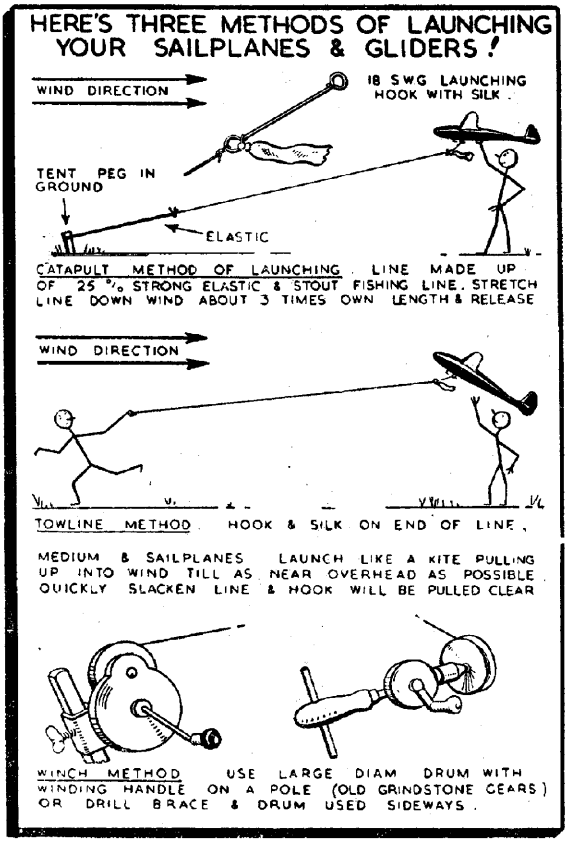
The wings and stabilizer should be secured to the fuselage with rubber bands tight enough to hold the flying surfaces without movement, especially during launching but flexible enough to obviate breakages during impact.

A hole is cut in the underside of the nose where shewn and lead shot added, or pieces of cored strip solder chopped up to make ballast within the nose. The model should hang very slightly nose down when supported by the finger tips at the balance point indicated on the plan at the wing tips.

Choose a calm, windless day for glide tests in preferably a grassy field. Face into wind and gently launch the model forwards, nose slightly down and observe the glide. Any tendency to stall (nose-up, followed by a see-saw action) should be corrected by packing up the wing trailing edge with thin slivers of balsa as necessary. Should the model have dived rather steeply, pack up the leading edge slightly. On no account should the balance be disturbed nor the stabilizer remain in any position but neutral.

There are several methods of launching the glider. If you are single handed, the two stick method may be used as in Diagram 6 where the model is resting in any elevated position ready to be pulled into the air on a stout line of linen thread or fishing line of any desired length.

The sketches below give three alternative methods of launching model sailplanes and gliders. The F.A.I. line length is 164 feet, and should be used on towline and winch launches. Always use the towline dead into wind. Trimming may be achieved by a small gummed paper tape tab adhered to the trailing edge of the fin. This would tend to make the glider "swing" slightly to one side on the towline; this may be corrected by towing the model slightly crosswind in the direction desired to counteract the swing.



When you have successfully completed and flown this model, perhaps you would like to build something else in our wonderful range of Duration, Free-flight Power and Control-line models. Ask your local "VERON" dealer to show you some of our more advanced designs. Write to us and tell us how you like our kits with any suggestions you may wish. Also we like to hear of successes in contests and club meetings throughout the world.

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