

Simple as A.B.C.  
to make—yet what  
a flyer!

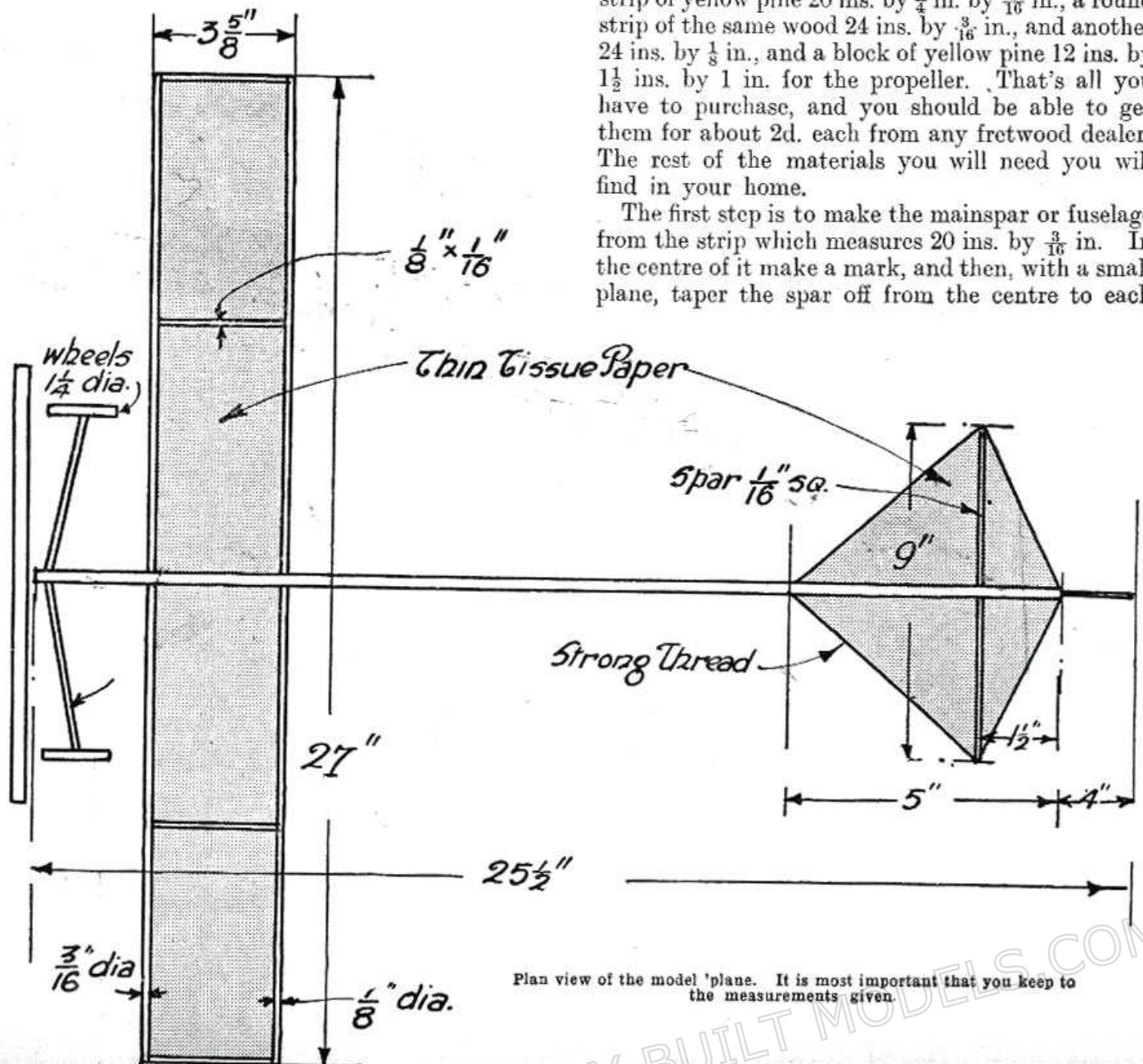
# A Long-Flight Model 'Plane

MODEL aeroplane experts will tell you that, as a rule, tractor model aeroplanes are not such good fliers as pusher types. But here's a machine that flies nose-first just like a real aeroplane and yet can make flights better than most single-screw models.

But don't think that it's an expensive model—two shillings is the most you need spend in making it. As for tools—well, a sharp penknife, a small pair of pliers, a ruler, a tube of glue and a sheet of fine sandpaper will be ample.

Here are the materials you will need to buy. One strip of yellow pine 20 ins. by  $\frac{1}{4}$  in. by  $\frac{3}{16}$  in., a round strip of the same wood 24 ins. by  $\frac{3}{16}$  in., and another 24 ins. by  $\frac{1}{8}$  in., and a block of yellow pine 12 ins. by  $1\frac{1}{2}$  ins. by 1 in. for the propeller. That's all you have to purchase, and you should be able to get them for about 2d. each from any fretwood dealer. The rest of the materials you will need you will find in your home.

The first step is to make the mainspar or fuselage from the strip which measures 20 ins. by  $\frac{3}{16}$  in. In the centre of it make a mark, and then, with a small plane, taper the spar off from the centre to each



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## A LONG-FLIGHT MODEL 'PLANE

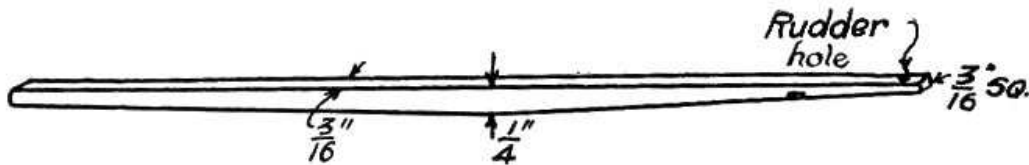


Fig. 1.—The finished main-spar, which should be 20 ins. long. Notice how it is tapered from the middle to the ends.

end. The ends should then measure  $\frac{3}{16}$  in. square. The finished spar is shown at Fig. 1. Glasspaper it well until it has rounded edges. Next, make a mark  $\frac{3}{4}$  in. from one end, exactly in the centre of the spar, turn the spar over and  $\frac{1}{2}$  in. from the same end make another mark in the centre. Now heat a fine needle in the flame of a candle until it is red hot, and with it bore a hole from the top of the spar, taking care that it penetrates to the spot already marked on the bottom of the spar. It may be necessary to heat the needle several times.

Two or three medium-sized safety-pins (steel, not brass) will next be required. On one, cut off the pin part to a length of about  $1\frac{1}{4}$  ins., and bend it into the shape of the rear hook shown at Fig. 2.

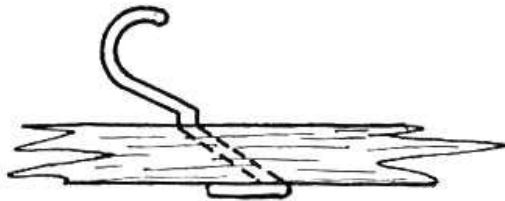


Fig. 2.—The rear hook for the elastic is made from a piece of wire taken from a large safety-pin and fixed in the mainspar in the manner shown.

Cut off the ends from the remainder of the safety-pin, which will leave another  $1\frac{1}{4}$ -in. length, and bend it into the shape of an S, as shown at Fig. 3. This gadget, when fitted to the elastic, enables the latter to be taken off the rear hook and attached to a hand-winder.

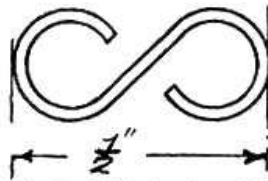


Fig. 3.—This hook, which joins the elastic to the rear hook, makes it easy to hitch up the rubber to a hand-winder.

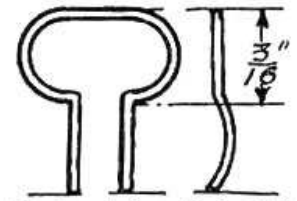


Fig. 4.—A piece of wire bent to this shape and bound to the middle of the mainspar will keep the elastic lying close to the fuselage.

In the centre of the spar glue on a hook, made from a fine hair-pin, of the shape and size shown at Fig. 4. This hook keeps the elastic within bounds when it is wound up.

The next job is the making of the main bearing shaft (see Fig. 5). This can also be made from a safety-pin. Straighten the pin out until it is  $2\frac{1}{2}$  ins. long, taking care to get the shaft part straight,

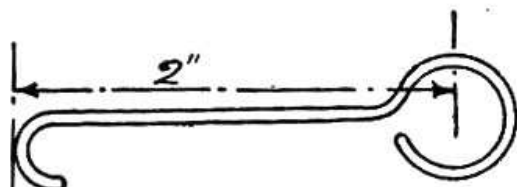


Fig. 5.—The main propeller shaft. Make the centre part dead straight, or your propeller will vibrate and make the model fly erratically.

otherwise it will cause the propeller to vibrate and the plane will fly erratically.

The main bearing is made from a strip of brass  $\frac{1}{8}$  in. by  $1\frac{1}{2}$  ins. by  $\frac{1}{32}$  in., which can be obtained from the top bar of an old tie-pin. Remove the pin part and straighten the bar out, then drill through the centre of the bar  $\frac{1}{8}$  in. from one end, making the hole just large enough to allow the main bearing shaft to revolve freely. Bend the bar to the shape shown at Fig. 6, and bind it on to the front of the spar with carpet thread, as shown.

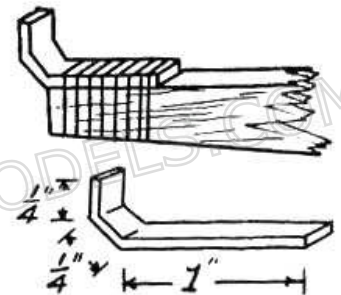
Make a notch on the bottom of the spar  $1\frac{1}{2}$  ins. from the rear end, just large enough to admit the tail spar, which is a strip of bamboo 9 ins. long,  $\frac{1}{16}$  in. square. Glue the tail spar into the notch and leave

it to dry, then make slight notches on the bottom of the mainspar at 5 ins. from each end. Pass a strong thread round the ends of the tail spar and the end of the mainspar, and tie together at the notch on the spar. Just touch the notches with glue to secure the thread.

To cover the tail, get a sheet of strong tissue paper and, after smearing over the thread, mainspar, and tail spars with glue, place the tissue over the outline of the tail and carefully stretch it until all wrinkles are removed. Cut off the superfluous paper, leaving  $\frac{1}{4}$  in. to spare all round. This is folded over the thread and lightly glued.

For the rudder, use a length of bamboo or fine

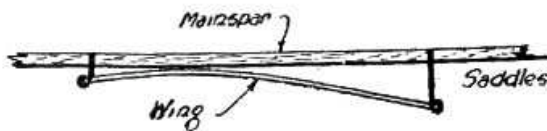
(Right) Fig. 6.—Showing the shape of the propeller shaft bearing and how it is bound to the nose of the mainspar. Glue the binding thread to prevent it slipping.





(Left) Fig. 7.—One of the five ribs used in the construction of the mainplane.

(Below) Fig. 8.—How the wing is cambered to the correct curve. Copy the curve very carefully in your model—this is a very important point.



wire  $11\frac{1}{2}$  ins. long and pointed on each end. One end is forced into the top of the mainspar  $\frac{1}{4}$  in. from the rear end, and the other bent over to fit into the rear face of the main-spar. Cover in the same way as the tail on one side only.

The chassis is made from a 16 ins. length of 20 gauge piano wire. Bore a hole  $1\frac{1}{2}$  ins. from the front of the mainspar and through the side, and push the wire through; then bend it down so that the ends are 7 ins. apart. Glue and bind it where it goes through the spar. For the wheels cut two  $1\frac{1}{4}$ -in. diameter discs of three-ply fretwood. Cut these out, bend  $\frac{1}{2}$  in. of each chassis limb outward, place on the wheels and bend up the projecting ends to prevent the wheels coming off.

The wing is easy to make. Lay the leading spar ( $\frac{3}{16}$  in. dia.) upon a flat surface and the rear spar ( $\frac{1}{8}$  in. dia.) just  $3\frac{5}{8}$  ins. behind, and parallel to it. Cut five ribs (Fig. 7)  $3\frac{1}{2}$  ins. by  $\frac{1}{8}$  in. by  $\frac{1}{16}$  in. from bamboo and point each end. Make a small slit in the spars with the point of a penknife at distances of  $6\frac{3}{4}$  ins. Tip the ends of the ribs with glue and force them home. Put some books on the top and leave the whole framework to dry.

When dry, place the wing upon the table, and in the centre of the two spars make a cut about  $\frac{1}{16}$  in. deep with a sharp knife. Place books under the wing so that it is  $1\frac{3}{4}$  ins. off the table, and firmly

press the centre down until the centre touches the table. This forms the dihedral angle (see Fig. 8) and keeps the model steady in flight. Cover the wing with the tissue on both sides, covering the top first.

The wing saddles (Fig. 9) are the next items to make. They hold the wing in position on the mainspar and at the same time impart the angle of incidence. Bend two pieces of the piano wire to the shape shown at Fig. 9, then glue the ends and force them into the front and rear spars so that they grip the mainspar tightly. The rear saddle holds the rear edge of the wing  $\frac{3}{8}$  in. lower than the leading edge, as clearly indicated in Fig. 9.

The propeller is cut from the yellow pine block. Mark the exact centre on the  $1\frac{1}{2}$  ins. side, make a  $\frac{1}{4}$ -in. circle round it, and mark off as shown at Fig. 10. Do this on both sides, and then with a red-hot needle or fretwork drill bore a hole through the centre. Cut along the outlines and carve the propeller. Do this work with care, and see that the blades have a slight wing curve, that is, are concave on the inside and convex on the outside. This improves the driving power of the propeller.

Cut the wood away until the blades are about  $\frac{1}{16}$  in. thick, and glasspaper very carefully until smooth. Then pass a fine needle through the centre

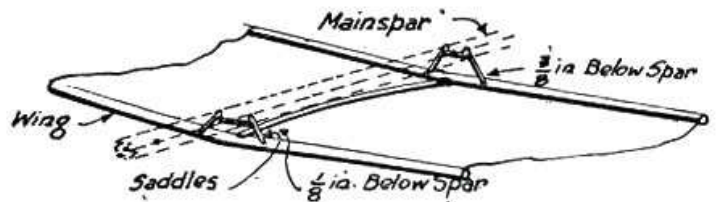


Fig. 9.—The wing is attached to the underside of the mainspar by means of wire saddles.

hole and balance the propeller. If one blade weighs down the other, glasspaper it until it poises horizontally. Force the propeller shaft through the centre hub hole, bend the little hook on and pull back until the hook is forced into the hub, then pass a little brass washer over the shaft. It is a wise plan to put a piece of cycle valve tubing

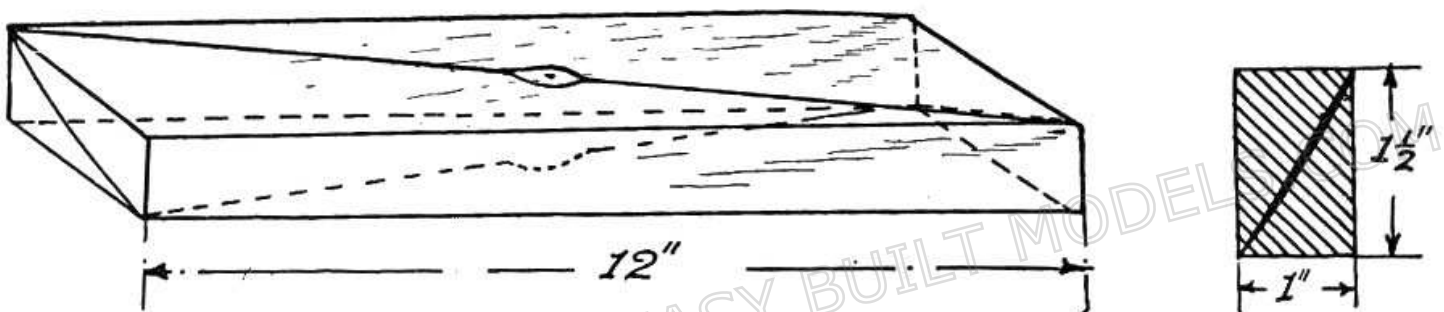
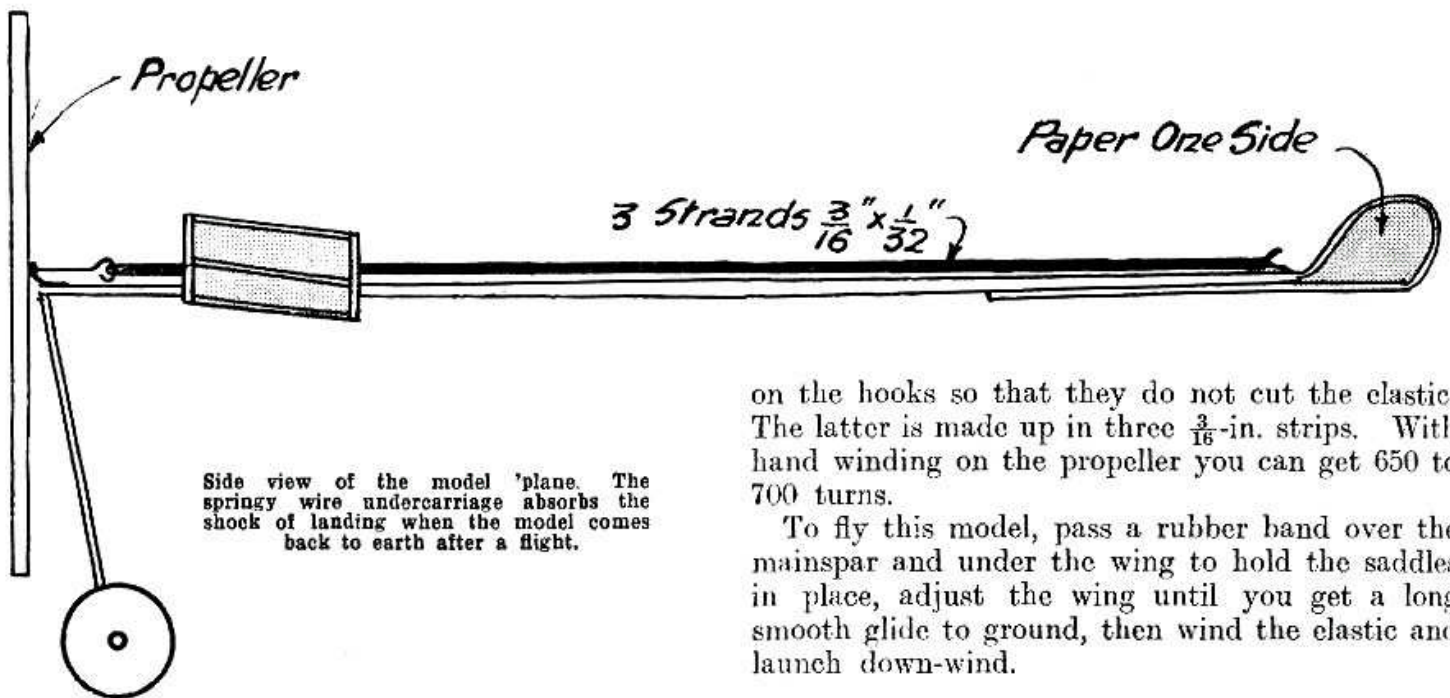


Fig. 10.—Carve the propeller from a block of yellow pine wood of the dimensions shown. This sketch is also a guide to the method of shaping the blades.

## A LONG-FLIGHT MODEL 'PLANE



Side view of the model 'plane. The springy wire undercarriage absorbs the shock of landing when the model comes back to earth after a flight.

on the hooks so that they do not cut the elastic. The latter is made up in three  $\frac{3}{16}$ -in. strips. With hand winding on the propeller you can get 650 to 700 turns.

To fly this model, pass a rubber band over the mainspar and under the wing to hold the saddles in place, adjust the wing until you get a long smooth glide to ground, then wind the elastic and launch down-wind.