

LONACH

tube must be built round cardboard formers first; correct alignment is essential as any warp or twist may be imparted to the fuselage. The sheet should be wetted, the formers inserted and the whole weighted down between two flat surfaces. The joint must be lined by a strip of $\frac{1}{4}$ in. by $\frac{1}{32}$ in. on the *outside* and both sides covered with a strip of tissue. The whole tube should then be covered with tissue. The rear end has to be cut away in various places

to accommodate tail and motor fittings, but that should not be done till all danger of twist is gone.

The rear wheel is of 1 in. diam. The shaft is 16 s.w.g. piano wire in $\frac{1}{8}$ in. diam. curtain spring. The curtain spring covers only the distance between wheel and fuselage bottom and is soldered at both ends. The wire takes a bend in the fuselage and runs along the bottom of the tube. Glue it to the two formers it passes through and lightly reinforce the tube bottom where it touches. The wire passes through a cut-out in the main bottom stringer and this should be strengthened with a small amount of plastic wood.

The lower motor peg fixing is a block of wood some $\frac{1}{2}$ in. by $\frac{1}{2}$ in. by $\frac{1}{2}$ in., with the two bound and glued brick dowels firmly glued into it. The block is fixed to both stringers and motor tube—it goes right through the motor tube so a cut-out must be made for it. The top of the pegs plug into a similar block in the tail assembly. The block should have the grain running at right angles to the tension applied to it.

Cover the fuselage with super fine tissue. The construction is extremely strong, so strong dope may be used.

Stub Wings.

The stub wing spars are continuations of the fuselage formers, so the $\frac{1}{16}$ in. ribs should be assembled with the fuselage. The L.E. spar ($\frac{1}{4}$ in. by $\frac{1}{16}$ in.) should be fitted early in the proceedings to ensure that it crosses the bottom main stringer at 90 degrees.

N.B.—The T.E. should curve round gently and be faired smoothly into the most convenient stringer. Wet it and work to the curve with the fingers.

The tongues are built up of $\frac{1}{16}$ in. sheet laminations with two mm. three-ply backbones to keep the dihedral constant during building and flying. If these are omitted the dihedral will decrease slowly. When the tongues have been

Fuselage.

THE fuselage is built on four main stringers, $\frac{1}{4}$ in. by $\frac{1}{16}$ in.; these run the whole length of the fuselage except for the top one which is interrupted by the cockpit.

After all the formers have been cut out and glued together, they should be assembled lightly on the four stringers. When all are well and truly in position check the alignment and glue them all firmly in place.

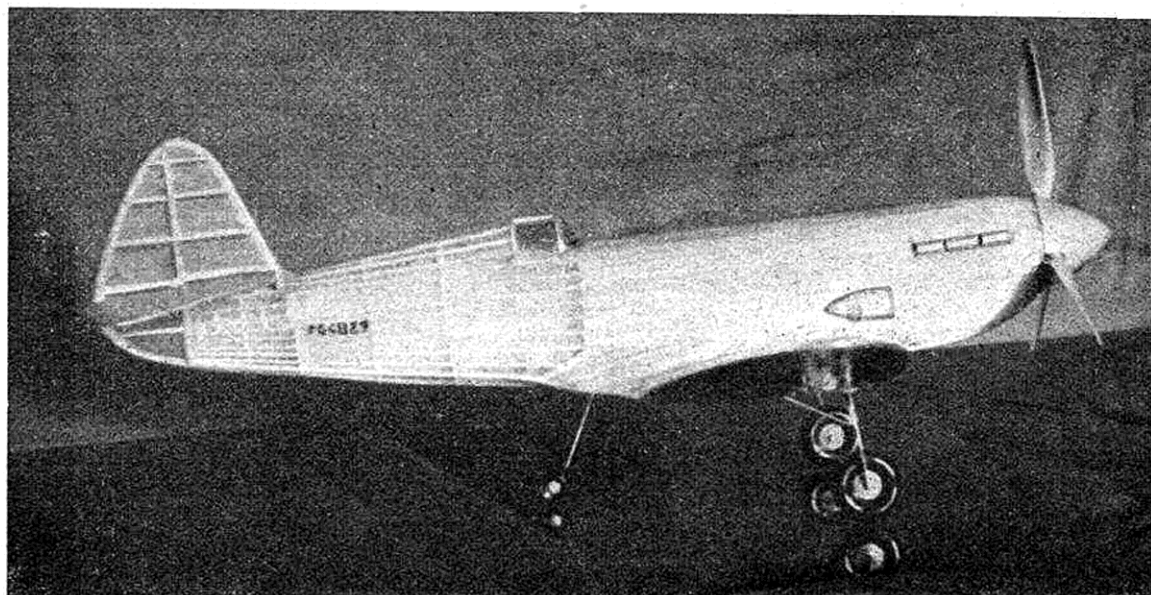
The $\frac{1}{16}$ in. by $\frac{1}{4}$ in. sheet planking should then be put on. Start at the side stringers and add planks to both sides alternately; starting at the sides prevents distortion as little bending of the planks is necessary. Underneath, where the bend becomes sharper, the wood should be soaked or steamed first. Leave $\frac{1}{4}$ in. of planking projecting into the first stringer bay. In this overlap notches for the stringers should be cut and the stringer ends embedded smoothly into it.

It is advisable only to notch the first and last stringer-bearing formers and to cut the rest of the notches by eye; in this way good curves are obtained. The $\frac{1}{4}$ in. by $\frac{1}{16}$ in. stringers must project by $\frac{1}{16}$ in. and the former between them should be sanded away by $\frac{1}{16}$ in. to prevent any chance of it bearing against the tissue covering.

For the cockpit opening, two pieces of $\frac{1}{32}$ in. sheet should be bent to form the cockpit sides and joined smoothly to the stringer below. The aperture for the sheet celluloid is then cut out. The cockpit support is a hoop made of two laminated $\frac{1}{8}$ in. by $\frac{1}{32}$ in. sheet strips; curve one and hold it down, then glue the other one to it still in the curved position. When dry little or no tendency to spring back will remain. A piece of $\frac{1}{16}$ in. square should be placed between the top of the hoop and the former at the back of the cockpit to support the sheet celluloid. All joints in the windscreen, etc., should be covered with $\frac{1}{8}$ in. strips of glued tissue. Seccotine should be used, not durofix as this tends to melt the celluloid; also seccotine that wanders where it shouldn't may be rubbed off before it is dry.

All planking and sheeting should be given two coats of banana with intermediate sandings, and one coat of high-gloss. The nose formers are both three-ply ($\frac{1}{8}$ in.) and the front one must cover the whole circular area (*i.e.*, cover ends of planking and ends of main stringers). The box it contains is made of four pieces of $\frac{1}{32}$ in. sheet, fitted into the formers cut out to receive them. A similar box fitting into it and containing the gear mechanism must be built by careful fitting.

The $\frac{1}{32}$ in. sheet motor



A 42 in. SPAN HIGH - SPEED SEMI - SCALE LOW - WING FIGHTER, WITH TRICYCLE UNDERCARRIAGE AND OF GEODETIC CONSTRUCTION

lightly fitted, fit them into the wings (both wings and fuselage should be built before tongues or tongue boxes are assembled in them), and install the correct dihedral by placing something under the tips. Then firmly glue them into the spars and ribs of the stub wings.

Firmly pin down the fuselage on its centre-section and put in all the geodetic on the top surface. Then do the bottom surface. When the geodetic is done put in the undercarriage. Do not put on the undercarriage before the geodetic because you will not be able to be sure there is no twist.

The wire of the undercarriage is 16 s.w.g. in curtain spring as in the tail wheel. When inside the wing it bends and is firmly glued to the underside of both the tongues. Another wire is soldered on and leads to the 1/16 in. rib nearest the fuselage and is glued to this. This wire provides support in sideways thrust. The other vertical strut is also soldered. The geodetic will have to be cut away to make room for the soldering operation, but the same piece is of course put back again. The wheels are 2 in. diam. air wheels, but if celluloid ones are used the gauge of the wire should be reduced to 18 s.w.g. to provide the necessary give.

When undercarriage and geodetic are done, the L.E. covering of 1/32 in. balsa should be put on. Soak it well, as the double curvature where the dihedral starts will make things a little difficult. The covering should be done in two pieces meeting on the L.E. spar. It must be glued fast to the planking of the fuselage where it meets it and the planking should be cut away to accommodate it. The 1/32 in. sheet projects 1/4 in. or so inside the fuselage.

The rear part of the wing is faired into the body by a piece of 1/32 in. sheet. It must be fitted so as to give a smooth curve and should be thoroughly soaked to make it do so with more ease. The front part, *i.e.*, forward of the main spar and where the L.E. covering ends is faired with plastic wood, moulded to continue the curves of the fairing right round. The whole wing must merge gently into the fuselage. The ribs and mid-way between them should be overlaid with strips of 1/16 in. by 1/32 in. sheet to raise the covering of the geodetic.

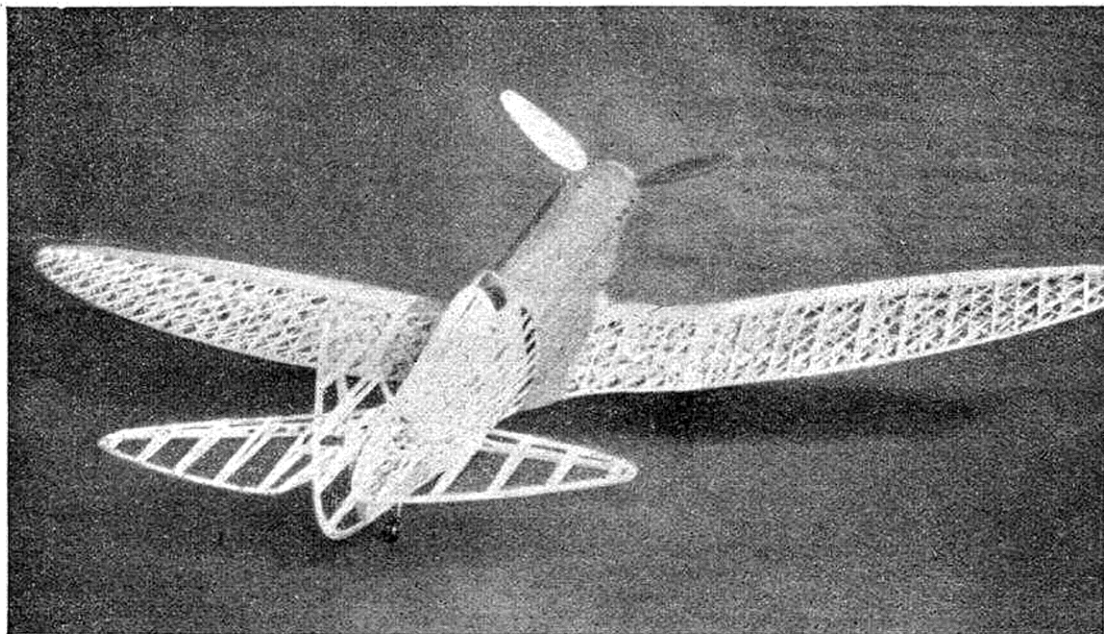
The Wings.

First make identical outlines: 1/4 in. by 1/16 in. is the measurement for all outline surfaces. When the ribs and spar have been lightly assembled, slip the outline over them and after pinning the whole thing down, glue it in real earnest. The ribs are all of 1/32 in. sheet and lightened where suitable, except for those holding the tongue box. These are of 1/16 in. sheet.

When the skeleton has been finished, pin it down firmly on a dead flat board by the main spar and T.E. Start the geodetic by laying in all the 1/16 in. square pieces *one way*. They must be let into the tops of the ribs so as to be flush. When all those one way are in, cut channels 1/16 in. wide through them and the intervening ribs to accommodate all the parts the other way. In this manner complete the whole upper surface. Wet the whole frame and let it dry on the board for 48 hours; then remove the pins and lay on all the

components of the underside geodetic one way only and immediately pin the frame down again. Do exactly the same as with the upper surface, only *always pin it down flat* when leaving off work or leaving it to dry out. In this way a perfectly flat undersurface will result, and with the geodetic construction that undersurface or the whole wing for that matter will never develop any kind of warp or fatal twist.

When the geodetic is done, assemble the boxes (which must be built round the tongues to ensure a good fit) in the wings and the fuselage, install the correct dihedral and glue thoroughly the boxes into the wing ribs and spar. The wing boxes may relax a bit so add 1/4 in. extra dihedral when installing them. The L.E. covering of 1/32 in. sheet may now be put



on; owing to double or even triple curvature, the sheet must be divided along the L.E. spar. Soak the wood well and when glued on to the underside pin down flat to avoid the L.E. being distorted by contraction of the wood on drying. When the underside is thoroughly dry put on the upper covering, leaving the joining of the two coverings till when the sheet is dry. Join the edges along the L.E. spar as well as possible and put a strip of tissue along to smooth out the crack. When the whole wing is finished, dip it (pinned down to the board with a piece of paper underneath to prevent sticking to board) in a fairly weak solution of Casco (waterproof glue, 6d. per tin at all hardware stores). This will harden the whole structure; give it a sanding to take off roughness. Dope the L.E. covering with two coats of banana oil and add the rib over-laying strips.

Covering is of superfine white tissue, overlapping the balsa covering by 1/4 in. The double curvature of the rear wing surface will necessitate covering half at a time. Dope with two coats of ordinary wing dope and one of high-gloss.

Do not smooth the inside of the wing boxes as the friction developed in here keeps the wings on. If more friction is needed put a layer of sandpaper on the tongue. The wing should be firm on the tongues but should dislodge itself with a sharp blow.

Tail Assembly.

This is built round a 1/32 in. spar suitably lightened; also fitted is a short secondary spar of 1/32 in. sheet at the back that acts as a locating plate to the rudder post. It is glued to the rudder post when the correct angle of incidence is found.

LONACH I.—contd.

The L.E. and T.E. are built up in the same manner as the wings and the construction is the same. The ribs are of 1/32 in. sheet throughout, with lightening holes. The leading edge as far as the spar must be covered with 1/64 in. sheet to prevent excessive bending and drooping. The ribs are overlaid with 1/64 in. by 1/4 in. strips running from back of L.E. covering to the rear of the T.E..

The main spar is interrupted in the centre-section by two pieces of 1/16 in. sheet that are flat against the pivot-post. The pivot (a piece of 16 s.w.g. wire) goes through all three and this allows the incidence of the tailplane to be altered at will. The pivot post is located in the top of the former underneath it. When the tail setting is formed, the L.E. is glued to the back of the top motor peg block and the rear spar to the rudder post; this locks the assembly.

The underside of the centre-section of the tailplane is covered with 1/32 in. sheet, a slot being cut for the pivot post. A 1/4 in. of deflection up and 1/4 in. down of the tailplane T.E. should be allowed for.

The fin is built round the rudder post which is of 1/16 in. sheet; the ribs are of 1/32 in. overlaid as usual *only* with 1/8 in. by 1/64 in. sheet strips. The covering of the L.E. is very difficult, due to the excess curvature and thus a covering of 1/64 in. sheet back to a 1/16 in. square piece running down 1 1/2 in. from the L.E. would be beneficial.

The tail assembly is detachable with a portion of the top of the fuselage. The steps provide a very firm fixing and this is located by pieces of 1/16 in. sheet acting as guides. The rear peg is 1/8 in. diam. birch dowel in paper tubing. The front attachment is the block plugging over the rubber peg tops. Rubber bands inside make the fixing rigid. The bands may be connected by holding the whole tail sidewise—so that the

rudder is horizontal; connect to the hooks, lift the tail assembly up and then let it slip into place.

Propellor Assembly.

The spinner is turned from any light hard wood (if you do not possess a lathe cut a template and get a wood turner to do it for you; he will not charge much!). It is located by an inner block over which it plugs smoothly.

This inner block carries the lower halves of three large press studs; the upper halves are fixed to the bottom of the propellor hubs by the wire loop to which they are soldered and which is itself embedded in grooves up the side of the hub. The spinner behind the hub should be cut away to allow the blade to be knocked out; pressing the sides of the hub are two pieces of rubber; these stop the blade turning in the air, but allow a sharp blow to knock them off. The correct pitch must be found and a mark made. Any good free-wheel may be placed in the front of the inner block, with the exception of those working by rubber tension against a spring.

General.

The power is arbitrary. Five skeins of two loops of 1/4 in. by 1/20 in. strip rubber will give plenty of power.

All the covering is superfine tissue. Make sure of a smooth finish everywhere. The high-gloss will help you a good deal but care in detail work is essential.

Above all do not tolerate the merest suspicion of wing or fuselage or tail warp; a spin will result or at any rate poor flying.

The flying speed is high (wing loading is about 8.5 for weight of 13 1/2 ozs.) so test by taking off with gradually increasing power; properly streamlined (*i.e.*, well finished) and a coat of high-gloss should see the model up to 50 m.p.h.

SCALE PLANS OF LONACH I. ON PAGES 152-3.