SHOWING FUSELAGE CONSTRUCTION
PRIOR TO SHEETING.

ALL FUSELAGE
FORMERS DRAWN
FULL SIZE.

ALL FORMERS CUT
FROM 1/8" SHEET
BALSA, EXCEPT NO.1
WHICH IS CUT FROM
1/8" 3 PLY.
OLD NOG

A HIGH EFFICIENCY SAILPLANE
OF 90" SPAN. BY P. E. NORMAN

This sailplane has been designed with a view to producing a machine having graceful lines and at the same time possessing a fine performance. In flight it has proved to be very stable and these qualities together with its robust construction, should repay anyone who decides to build it.

Commence by cutting out formers from ¼ in. hard balsa. The centres may be cut away to reduce weight but I have not found this necessary on the original model. Cut No. 1 former from ¼ in. 3-ply wood.

Next cut the longerons, ¾ in. by ¾ in., from ¾ in. sheet hard balsa, and also the ¼ in. plywood keel and hook combination, which extends to between formers 4 and 5. Glue the longerons and plywood keel to No. 1 former. Place the other formers in position, and ensuring that they are in true alignment when viewed from the front, glue firmly in position.

Cut the trailing edge of the rudder, which also forms the rear of the fuselage, and glue in position, bringing the longerons together and pinning them in place until the cement has set, again ensuring that this unit is in true vertical alignment.

Cut out from ½ in. sheet balsa, the two sloping platforms on which the centre section of the wing is located, and cement firmly in position.

Add the longeron which forms the back of the fuselage (the curved part is obtained by cutting from ¾ in. sheet). Firmly cement a piece of ¼ in. by ¾ in. hard balsa between this longeron and the trailing edge of the rudder. The platform on which the tail sits (½ in. sheet balsa) is now securely glued and pinned in position.

Make hooks as shown on the drawing and bind, with thread to small pieces of 1/16 in. plywood which are then glued and bound in the positions shown to form the tail fixing hooks.

Add two blocks of soft balsa and, when dry, sand them to fair the platform into the sides of the fuselage.

Next take a block of balsa and cement between the front sloping platform and No. 1 former.

Allow to set, and shape and sandpaper to conform to the lines of the fuselage.

Make two paper tubes, from strip gummed paper, about 2½ in. long to take 3/16 in. diameter dowels. Drill holes large enough for these tubes to press into in pieces of balsa ¼ in. square by 2½ in. long, cement them securely in the position shown on the drawing; these tubes are to locate the wing fixing dowels and as the machine has such a large span must be secured as firmly as possible.

Take a block of hard wood such as pine, and shape roughly to form the noseblock, see plan.

Make a hole in the top of it to accommodate lead shot when trim is being obtained.

This block is then securely glued and dowelled on to No. 1 former and the shaping completed.

This block may seem exceptionally heavy, but even so my original model needed ½ lb. of lead as well to obtain correct trim. Now the whole fuselage is covered with 1/16 in. by 3 in. sheet balsa wood, which should be glued and pinned and held in position with elastic bands till the cement has set.

Carefully sandpaper when dry to remove any inequalities and dope with clear dope.

Fill in the spaces between the sloping platforms, where the wing rests with ½ in. sheet balsa.

Cover the complete fuselage with two layers of bamboo paper, using photo paste or gripfix as an adhesive and carefully work out any wrinkles. When dry, dope with clear dope, and finally with two coats of colour, rubbing down to obtain as smooth a surface as possible.

The fuselage of my machine is a pale blue, and this, together with semi-transparent aluminium wings and tail and rudder makes a very pleasing colour scheme when in flight.

Tail.

This is of 27 in. span, elliptical and cambered section, modified "Clark Y;" commence by cutting out the ribs from 1/16 in. hard balsa. Cut the notches for the main spar, leading and trailing edges. Cut the main spar from ½ in. hard balsa. Notch the top surface for the ribs. Damp the main spar and carefully bend,
while holding over a gentle flame. (The leading edge is curved in the same manner.)

The leading edge is cut from ¼ in. sheet balsa, ¼ in. by ¼ in.

The trailing edge is cut from ½ in. sheet in two halves, the curve in this case being obtained by cutting from 3 in. wide sheet.

Assemble the main spar and ribs on the plan. Add the leading and trailing edges, and cement all joints. Allow to set.

Add the 1/32 in. sheet capping which extends from the leading edge to the main spar on the top and bottom surfaces, cement and pin in position until set.

Fill in the space between the two centre ribs at the top and bottom surfaces with 1/16 in. sheet (grain spanwise). Cover completed tail with bamboo paper, water shrink, and dope with one coat clear dope and one coat colour, pinning the tail down during the drying process to prevent warping.

Rudder.

This small unit should present no difficulty.

Commence by cutting a strip of 1/16 in. by ½ in. balsa, and damping, carefully bend, so that it follows the contour of the upper surface of the centre of the tail.

From a piece of ½ in. sheet, cut a reinforcing strip to the same curve and cement it to the 1/16 in. piece.

Cut the leading and trailing edges from ¼ in. sheet balsa and also the short main spar. Insert these units in position and cement thoroughly. Make two hooks similar to those made on the tail end of the fuselage, and bind and glue in position. Cover the whole rudder with 1/32 in. sheet balsa and one larger of bamboo paper. Dope in the usual manner.

Wings.

The wing is in two halves to facilitate portability.

Main Spar.

Cut this from ¼ in. hard balsa, which is reinforced with 1/16 in. 3-ply wood glued and fastened to the balsa with strip gummed paper. This forms a very strong main spar which is necessary for a machine of this span.

Study the plans, and note the various rib forms.

The section I have used is not one of any particular section but I find that it is advisable to select one which has a good undercamber and a reflex trailing edge. Readers may like to introduce their own favourite section, and I should like to hear from anyone who builds this model, and who tries other sections.)

Cut ribs Nos. 1, 2 and 3 from ½ in. sheet balsa. Cut notches for the main spar, leading and trailing edges.

Cut the rest of the ribs from 1/16 in. sheet hard balsa.

Slip the ribs in position on the main spar after carefully covering the main spar back to the amount necessary shown on the plan.

Check them up for true fore and aft alignment, and cement lightly in position.

Cut the leading edge from ¼ in. by ¼ in. hard balsa, and the trailing edge from ¼ in. hard sheet. It will be seen that each of these are made in two pieces, cut to shape, glued and bound with strip gummed paper.

Place the leading and trailing edges in position and glue.

The leading edge continues into No. 1 former and is strongly glued here. The trailing edge finishes at No. 2 rib but a reinforcing piece of ¼ in. balsa should be cemented and bound to the trailing edge and continue to No. 1 former, for maximum strength.

Carefully insert auxiliary spar in position and cement. Now add the trailing edge fillet, cut from ⅜ in. sheet.

The half wings are held together by two sets of hooks bound together for flight on the upper and lower sides. These hooks are bent from 1/16 in. diameter spring steel wire, securely sewn with thread to pieces of 1/10 in. plywood, which in turn are glued, pinned and bound with strip gummed paper to the main and auxiliary spars in the manner shown.

Make a good job of these, as they have a heavy amount of work to do.

The wing tip is now finished with ⅜ in. sheet balsa.

Wing tip slots are fitted and may be made as follows. Between ribs Nos. 11 to 16 cement pieces of ⅜ in. balsa cut to the section shown. Allow to dry.

Build up the slot with light balsa cemented to the top of the leading edge, and sanded off to the correct section. The slot is completed when the 1/32 in. sheet balsa covering is added to the leading edge, and extending back as far as the main spar.

The 1/32 in. sheet is carefully cut to fit between ribs Nos. 11, 12, 13, 14 and 15 and is then curved round the ¼ in. balsa leading edge, glued and pinned in position until set.

This 1/32 in. sheet covering is fixed to both the top and bottom surfaces. Fill in the space between former No. 1 and rib No. 2 on the bottom surface with ⅜ in. sheet balsa.

Add two pieces of ⅜ in. balsa at the front and rear of No. 1 former, cut to the same section as the sloping platforms on the fuselage. Cement thoroughly.

Fair in the space at the top surface between No. 1 and No. 2 ribs with 1/32 in. sheet balsa. Grass spanwise, and fillet the centre sections at the roots to conform to the lines of the fuselage. Sandpaper the wings carefully all over and examine to ensure there is no warping. The two halves should now be bound together, and the wing placed in position of the fuselage to see that it fits in the space correctly.

It will be appreciated that, because of the sloping platforms the wing may slack round and move forwards and backwards with no damage.

Cover the wings with strong bamboo paper.

Cover the bottom surfaces first, ensuring that the covering is glued to the undercamber with waterproof adhesive. Water-shrink the bottom cover and allow to dry.

Cover the upper surfaces, water-shrink and allow to dry. Dope two coats clear and two coats coloured dope on the upper surfaces, weight the wings down on to suitable rests when drying out to prevent warping.

The machine is now complete except for trimming.

It should balance at a point one third of the chord forward from the trailing edge and lead shot should be poured into the hole provided in the noseblock until this is obtained. Cover in hole with a balsa wood plug.

(continued on page 124.)
Test Flights.

Hand launch on to long grass, nose slightly down, and correct for trim by packing the leading or trailing edge of the tail up or down. The incidence of the mainplane should not be altered.

I should add here that assembly is by means of elastic bands cut from old motor cycle and cycle inner tubes.

When perfect gliding trims are obtained the machine may be tow launched, using the rear hook for light winds, and the front one for stronger winds.

Any turning trim may be obtained by slightly offsetting the small upper fin.

A large space should be found to fly this model as it possesses a really fine performance, and looks exceptionally graceful in flight.