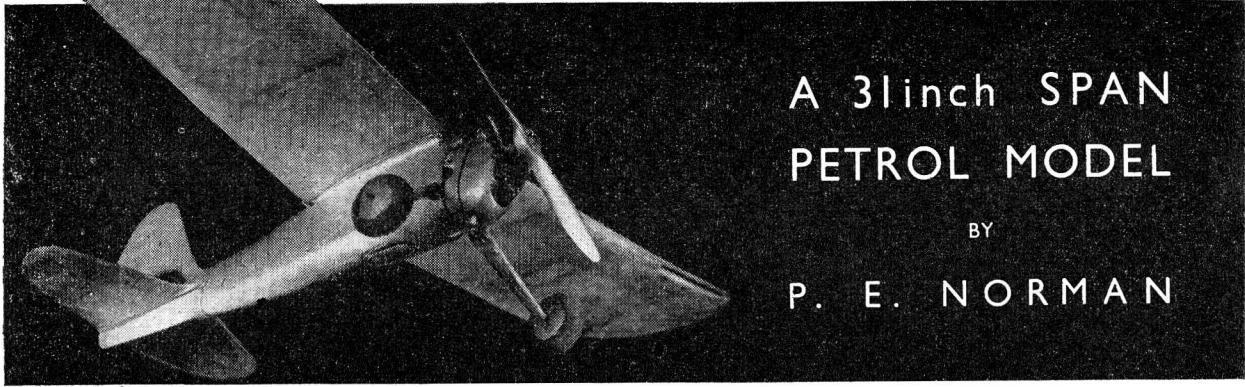


"NATSNEEZ"

THE PLANE ON THE COVER



A 3inch SPAN PETROL MODEL

BY

P. E. NORMAN

This model is the result of experiments to produce a really small and handy petrol model, with a good performance, as crashproof as far as possible, easy to maintain on the field, and possessing a pleasing appearance with simple construction.

It is powered with an engine of 1.8 c.c., 9/16 in. bore by 1/2 in. stroke, and 3 ozs. weight, which drives an 8 1/2 in. propeller, 4 1/2 in. pitch. This unit is of my own design and construction. Any engine of not more than 2.3 c.c. and 3 ozs. weight would be suitable.

Fuselage.

Commence by making the three formers: No. 1 from 1/8 in. hard sheet balsa; No. 2 from two laminations of 1/16 in. sheet balsa, cemented together with the grains running at right angles; and No. 3 from 1/8 in. sheet.

Join No. 1 and 2 formers with 1/16 in. by 1/2 in. strip balsa at the top, and a solid block of balsa at the bottom shaped to the section shown on the drawings.

Join No. 5 in position with two pieces of 1/8 x 1/4 in.

Cut two pieces of 1/32 in. three-ply wood grain running vertically, carefully bend them to conform to the shape of No. 1 former, cement and pin them to the sides at the nose end as shown.

Cut two pieces of 1/16 in. sheet balsa and carefully fit to each side, cement firmly in position, lapping the joints together at the top and bottom rear portion of the fuselage, cement and pin in position till set.

Insert a piece of 3/16 in. sheet balsa at the top, having grain across, cement and pin securely, then push a cane peg in immediately behind this block, through the two sides, cement, and trim off the ends flush with each side. This takes the pull of the motor retaining dowel (see detail drawings).

Carefully sandpaper the fuselage, drill holes for the wing and tail fixing dowels, and cement pieces of 1/32 in. sheet celluloid on the inside of the fuselage where these occur. This celluloid is amazingly strong and will prevent any possibility of the dowels being torn out.

Cut the 3/16 by 1 1/4 in. slots in the sides of the fuselage immediately behind the front former. These slots accommodate the undercarriage anchorage.

Cement two blocks of balsa on the sides of the fuselage under the wing position. These can be sandpapered to form the wing root fillets, and appreciably increase the strength of the fuselage. Finally, cover the fuselage with bamboo paper, using mounting or tissue paste as adhesive, give two coats of clear and one of coloured dope, rubbing down to obtain a smooth finish.

Dope the inside of the fuselage as far as No. 2 former. This will help to prevent oil saturation.

The Undercarriage.

This is a simple cantilever type constructed from one length of 1/16 in. diameter spring steel wire, and faired to a streamline section with hard balsa or willow, cemented and bound on with a wrapping of silk.

Construct as shown on drawing, then insert in the slots in the fuselage, and cement in position.

The Wheels.

These may be small airwheels such as I described in December, 1943, AEROMODELLER.

Ribs.

Cut out a "master" rib to section shown.

Cut 14 1/16 in. sheet balsa slats and place them together with the "master" in place and carefully shape them all together. Ensure that the under camber is correct.

Cut slots for mainspar, leading and trailing edges.

Mainspar.

Cut in two halves from hard 1/8 in. sheet balsa; cut the notches in the top edges for the ribs.

Join the two halves at the centre with pieces of 1/32 in. three-ply, glued and securely bound to each side at the centre, making sure that the correct amount of dihedral (2 1/8 in. at each tip), is maintained.

Slot the ribs on to the mainspar and cement in position.

Leading Edge.

Made from 1/16 in. by 1/4 in. hard balsa, with a piece of cane or bamboo of the same dimensions glued and bound to it at intervals for extra strength. The leading edge is gently "broken" where the dihedral angles occur, and cemented into the slots provided in the rib.

Trailing Edge.

This is cut from 1/8 in. hard balsa sheet, cemented into the slots, and when dry, sanded down to the knife edge.

The wing tips are now added from 1/8 in. sheet.

Check the wing for "trueness" and see that the incidence is the same on both sides (incidentally I have made a small washout on each wing). This is done during the doping.

Add the 1/32 in. sheet balsa capping over the leading edge of the wing, extending back to the mainspar on the top, and about 1 in. back on the undersurface.

Continued on page 616.

Continued from page 613.

Wing Tip Slots.

These help the stability to a very marked degree, and for those who have not tried them on models, I thoroughly recommend them. The drawings should make their incorporation quite straightforward.

Cover the centre section of the wing with thin sheet celluloid, examine the complete framework for any undue bumps or lumps, and carefully sandpaper.

Covering.

Cover with bamboo paper. Cover the bottom of the wing first, using waterproof adhesive, and ensure that the covering is fastened to the undercamber. Water-shrink the bottom surface, before the top is covered, so that the paper can be re-glued to the undercamber, should it have pulled away during shrinking.

Cover the top of the wing, water shrink, and give two coats of clear dope and one of colour (mine is silver all over, except undersurfaces, which are left clear doped).

Fin and Tail Unit.

Any necessary trimming adjustments may be made by inserting a small packing between the end of the fuselage and the unit; when the correct glide has been obtained these should be cemented in position. Cut the front former from $\frac{1}{8}$ in. sheet, and cut the slots for leading edges of the fin and tail.

Cement two strips of $\frac{1}{16}$ in. by $\frac{3}{8}$ in. balsa on each side, bring them together at the end and temporarily pin together, add the under fin, and cement in position.

Cut and fit the main post of the fin, slip the rib over it, then fit leading and trailing edges in position and cement—leave it to set. Carefully cut the two rectangular holes in the $\frac{1}{16}$ in. sheets to receive the mainspar of the tail, which is now inserted, and set truly at right angles to the fin, and cemented.

Cut the ribs and slip on to the mainspar (see drawing), cut the leading and trailing edges of the tail and cement in position. Insert the $\frac{1}{16}$ in. plywood tongue into the front former, and glue securely. Cover the fin and tailplane on both sides from the leading edges up to the mainspars with $\frac{1}{32}$ in. balsa sheet, fair in the space between the upper and lower fin and tail with $\frac{1}{32}$ in. sheet and finally cover the complete unit with bamboo paper, water shrink, and give one coat coloured dope.

The Engine Mounting.

This is detachable, which facilitates overhauls, adjustments, etc. Cut to same shape as No. 1 former, from $\frac{1}{16}$ in. three-ply wood, and pin and glue two hardwood blocks on the back to locate it in No. 1 former.

Make a hook from the threaded end of a bicycle spoke and fix in position with 8 B.A. nuts, back and front. This hook holds the elastic strainers and these are stretched inside the fuselage and a strong wooden dowel is inserted, thus holding the mounting in position. It is a very simple scheme and I have experienced no trouble whatsoever with this method of attachment (dowel fits behind undercarriages platform). I have reinforced the front and rear formers of the fuselage with thick celluloid cemented into them.

The drawings should help to explain this mounting.

Engine Cowling.

This is carved from solid balsa, which is then cut in two and hollowed out to fit round the engine, leaving spaces for the needle control valve, ignition timing lever, contact points and petrol tank filler cap (in my model this is made from a bicycle oil filler cap), and I might add

here that the celluloid tank is made in exactly the same way as the cases of my miniature accumulators (described in July, 1944, AEROMODELLER), and cut down in size to give approximately one minute's engine run.

The cowling is then glued together again, covered with silk or bamboo paper, and thoroughly doped inside and out against oil saturation.

The Accumulator Container Box.

This may seem an unnecessary item, adding extra weight, etc., but I have found it invaluable, if one does not want to make a new fuselage about every four weeks, due to acid eating it away! Also the little accumulator may be instantly removed for inspection and topping up, without removing the wing, but by simply withdrawing a rubber-covered bamboo peg. Cut a piece of thin celluloid sheet to double the length plus one inch of your little accumulator, by just over the breadth of it. Bend the celluloid into an inverted U shape, and carefully crease at the bends of the U to fit over the accumulator, fasten two sides to it, with amyl acetate, and leave to dry thoroughly. Put the accumulator into it and mark the positions of the positive and negative terminals in the top of the box. Drill two holes there and insert 8 B.A. screws from the inside, with large diameter washers on them, and then lock up with nuts (see drawing).

Insert the box into a space cut in the bottom of the fuselage and cement thoroughly in position; I should add here that I leave the fitting of the box till the very last job on the model, because I rig up the model with everything on for flying and balance for the centre of gravity, attaching the box and accumulator to the bottom of the fuselage with elastic bands, and sliding back and forth until the correct balance is achieved, when the position for the box is noted and cut accordingly.

Coil Fitting.

The coil is bound to a small strip of $\frac{1}{16}$ in. plywood with adhesive tape. The plywood has a hole drilled and tapped 8 B.A.

The coil is inserted in the fuselage through the space covered by the wing (having, of course, connected length of cotton-covered electric wire to the terminals) and manoeuvred till the end of the coil fits in the space in No. 2 former, when an 8 B.A. screw is passed up through a reinforced hole in the bottom of the fuselage through the tapped plywood.

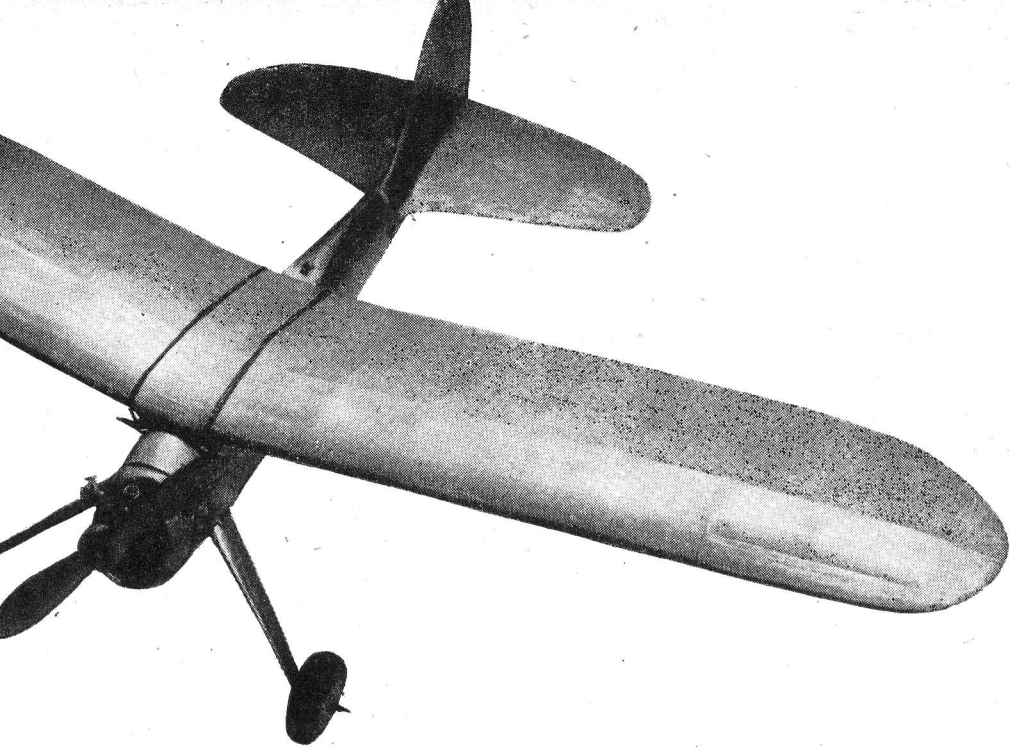
The wiring is now completed and as will be seen from the drawing is very simple.

One connection is taken from the coil to a small screw located in the top of the fuselage just behind the wing. This serves as the positive connection for the booster battery, the negative connection being the exhaust pipe of the engine.

Test Gliding.

Test gliding is rather tricky until the chief characteristics have been found. There should be no tendency to "nose up" as the machine may spin in when the engine cuts on its first power flight. Adjust the pin and tail unit as necessary, until a perfectly straight glide is obtained, with no signs whatsoever of over elevation. Test with the engine running fairly slowly—if the model shows signs of banking with the engine running slowly, pack the engine mount to give slight opposite torque. These adjustments must necessarily be very small with such a small model.

When power flying never alter the tail unit once the correct glide is obtained.



This, the smallest petrol driven machine yet to appear in the "Aeromodeller", is by no means a machine for the beginner. However, for the more experienced "Petroleer" such a small model is fascinating to fly and to watch, being fast and possessing a good climb. It will stand an amazing amount of knocking about and above all is handy to pack and carry, with the additional advantage of being economical to make.

