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The Model Aeronautical Journal of the British Empire

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EDITORIAL

ONCE again it falls to our lot to write a Christmas Editorial, and we do so in high hopes that this will be the last war-time one. Last year we recall writing it in the midst of a relative "heat-wave," but this time, as we go to press, weather conditions are more appropriate, and the outside thermometer is not far away from zero.

To our many readers in all parts of the world we extend our sincere good wishes for a peaceful Christmas . . . may they find yet some hidden source of supply of rubber . . . and may it stretch ten times its unstretched length, all according to formula!

Ancient and Modern.

As usual, this is a Christmas "Double Number," and what we lack, owing to limitation of paper supplies in actual bulk, we trust that once again we shall give satisfaction by the quality of the articles and illustrations in this issue. A new feature is the Colour Supplement in our centre pages, descriptive of two of the finest models it has been our privilege to describe. A departure from our usual custom is the description of a model which has not yet flown; but when it is known that that model has been designed and built by Dr. J. E. P. Forster, and that it has at least shown every sign of being a very sound flier over a wide range of gliding tests, we have little hesitation in describing it, and, if the demand warrants it, providing full-size scale plans through the AERO MODELLER Plans Service.

Will interested petrol 'plane "fans," therefore please note that we are prepared to supply a set of plans for "Spitfire II" at the price of 10s. 6d. post free, and that orders should be placed as soon as possible. It will probably take a couple of months to prepare these plans, and cash should not be sent with order. It will be sufficient if a postcard is sent, giving the sender's name and address, which will enable us to gauge the demand.

Plans of the B.E.2.C. will be available early in January, at the price of 7s. 6d. post free.

Letters to the Editor.

This popular feature was abandoned about two years ago, when the Journal, in common with all others, suffered yet a further reduction in size. However, recently we have received a number of requests to revive this page, and therefore give notice that we shall do so at an early date. Readers are invited to send letters on matters of general interest, but should bear in mind that, with a view to our publishing as many each month as possible, they should keep them as short as is compatible with adequately dealing with the subject on which it is desired to express opinions.

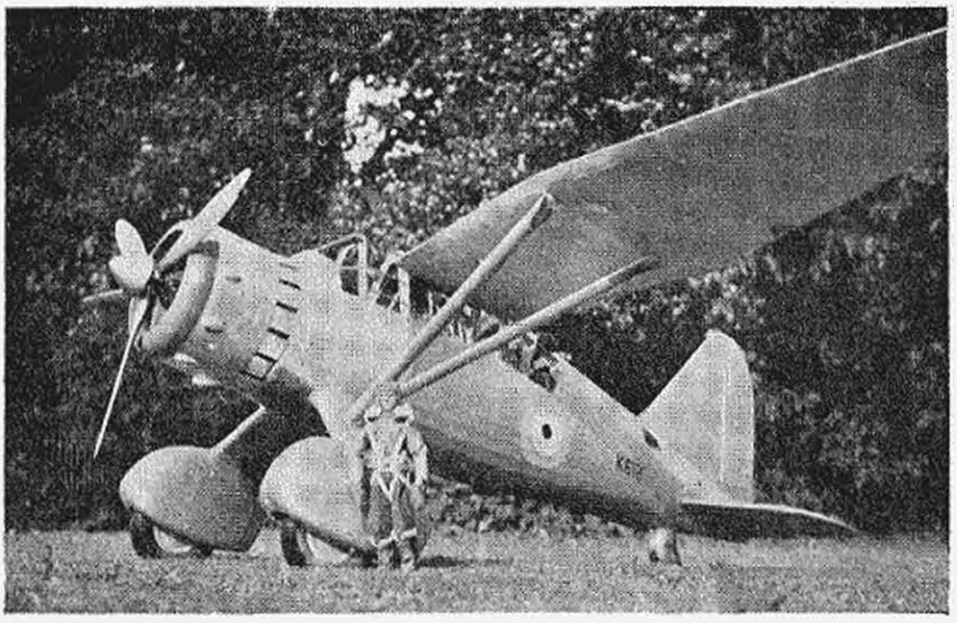
The S.M.A.E.

In our "Club Notes" this month we print the first of a series of advertisements which we shall be publishing on behalf of the Society of Model Aeronautical Engineers, space for which we have been pleased to present free of charge to the Society.

In the early days of the war there was a "panic" move in certain quarters to shut down the Society for the duration. Fortunately, this was countered from other directions, and the Society has continued to function and, in fact, strengthen itself in some respects throughout the past four years. Led by its able Chairman, Mr. A. F. Houlberg, the Council has continued from time to time to meet, sometimes under "blitz" conditions of considerable excitement; but, latterly, under more peaceful conditions. Recently the Council has made certain dispositions, with a view to providing this Journal with fuller and more up-to-date information of its activities, and also has arranged for wider publicity being obtained for the Society, its aims, and objects.

We welcome the appointment of Mr. D. J. Laidlaw Dickson, firstly as Publicity Officer of the recently-formed Press Committee of the Society, and, more recently, as Press Secretary, in place of Mr. Hills, lately resigned. The newly-formed Publicity Committee is now issuing a duplicated broadsheet with news and latest competition results. This amounts to a "Stop Press" service, and the sheets are mailed to Secretaries of all the affiliated Clubs. The Society's journal, the cost of which, since the beginning of the war, has been borne by the proprietors of this journal, continues, of course, to be issued monthly, and contains

CONTENTS OF THIS ISSUE



reports on the Society's meetings, full competition results, etc.

Many thousands of our readers must know little of the Society and what it stands for, and it is hoped that the series of advertisements which we shall publish month by month will do much to familiarise them with the Society.

We understand that a small brochure, descriptive of the Society's activities, is now in preparation and will be available early in the new year to interested enquirers.

Now that we can look forward to an end of the present War in the not-far-distant-future, we hope that the Society will rapidly increase in membership, and so play its part in re-establishing and ultimately expanding the Model Aircraft movement in Great Britain.

The Plans Service.

Once again we print at the end of this issue two " Plans Service " coupons of a total value of 1s. 6d.

Coupon " A " value 6d., may be used when ordering any plan of Glider, Duration Model, Flying Scale Model, etc., of a value up to 2s. 6d., or when ordering not less than any six 1/72 scale plans.

Coupon " B " value 1s. 0d., may be used when ordering any plan of a value between 2s. 6d. and 5s. 0d. ; or any twelve 1/72 scale plans.

Both coupons may be used when ordering any plan or plans to a value exceeding 5s. 0d. or eighteen any 1/72 scale plans.

Will readers please co-operate by adhering strictly to these conditions ; filling in the coupons in ink and with the words printed in block capitals : addressing them with their remittance for the cash balance of their order to AERO MODELLER Plans Service, Allen House, Newarke Street, Leicester.

Engine Design.

Considerable interest is now being shown in the design of model aircraft petrol engines, and we have received quite interesting correspondence following the publication of recent observations by Dr. J. F. P. Forster and Mr. L. H. Sparey.

In our next issue we shall publish a further article by Mr. Sparey which contains a number of modifications, some of which were advocated by Dr. Forster in his November " Petrol Topics."

We wish to make it clear that this forthcoming article was received by us *before* Dr. Forster's November " Petrol Topics " was published.

Some further notes by Mr. Sparey will be published in our February issue.

Interim Report on the Lysander.

. . . Virtually *nothing* to report !

Owing to war-time conditions it has been quite impossible to do any further work on the writer's one-fifth full-size, petrol-engine-driven, flying scale model of the Westland " Lysander," but some time ago a set of wings less flaps, slots, etc., were somewhat hurriedly made to complete the model for exhibition purposes : and a friendly reader took pity on the nakedness of the pilot and duly provided him with a pretty complete flying kit !

Our " report " this year is therefore reduced to a photograph of the completed model with the pilot in attendance.

30 Years Ago.

Thirty years ago, a not uncommon sight in a field in the neighbourhood of Westcliffe-on-Sea was that of a small boy flying a " Stick " model.

This little aeroplane was about 2 ft. long, the stick consisting of a piece of quarter-inch square birch, tapered at each end, and rigged with wire strainers to withstand the tension of the rubber motor.

The single wing was made of ¼ in. by 1/16 in. spruce, covered on the upper surface with oiled silk. Cambered ribs were of 1/16 in. by ¼ in. spruce also.

The tail plane was made in a similar manner and the fin was made from thin piano wire. There was a brass bracket carrying the propeller spindle, with a propeller about 8 in. in diameter, carved in walnut, and obtained from Messrs. Gamages. Its blades had been broken and mended with seccotine on a number of occasions !

There was no undercarriage on this model, which was capable of hand-launch flights, of course flying " tail first," of some 70–80 yards.

The proud owner of this model aircraft, which he had designed and built entirely himself, was the writer of this Editorial.

Thirty years on . . . and another small boy is flying a 3 ft. span Glider on Hampstead Heath.

The fuselage is, of course, built-up, and the wings are double surface. The model is constructed entirely of balsa and tissue covered, and scale plans for this are on pages 24 and 25 of this issue.

This glider has been entirely designed and built by the small boy flying it. His age is 13 : he is the elder son of the " small boy " referred to in the above paragraph.

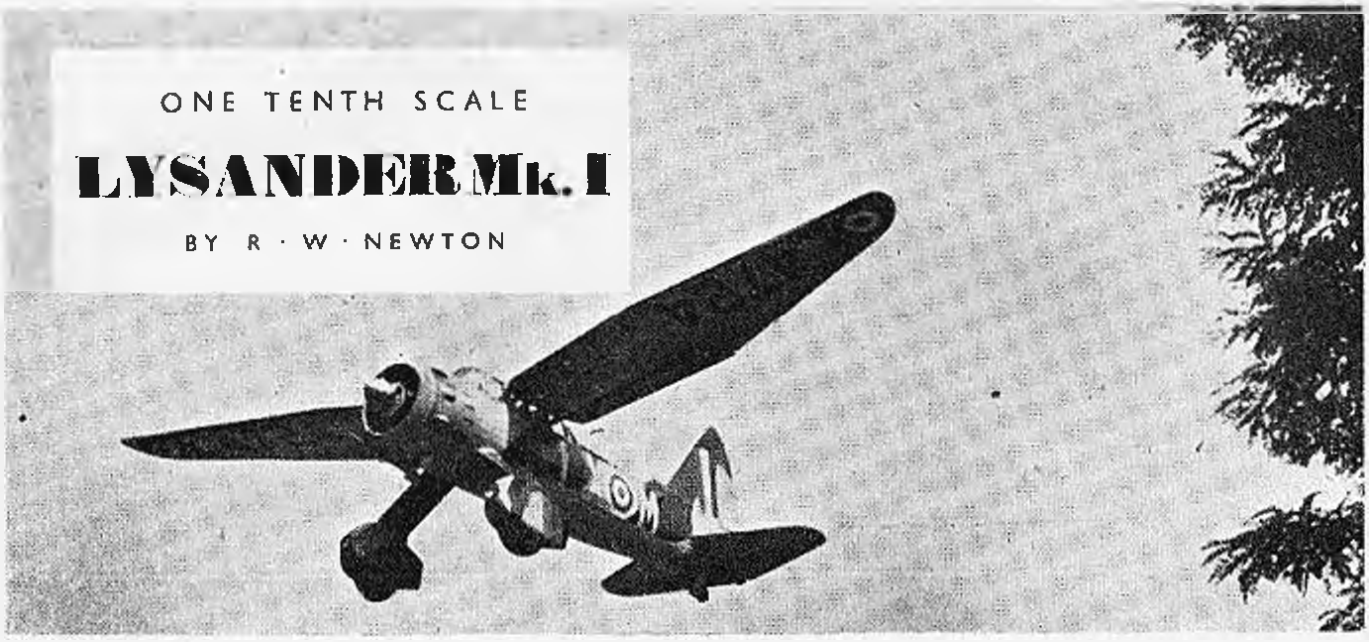
We may be allowed, we hope, this short " paternal " note . . . models have changed in these 30 years—who can tell what a *grand*son may design and fly *another* 30 years on ?

D. A. R.

ONE TENTH SCALE

LYSANDER Mk. I

BY R · W · NEWTON



Introduction.

This model has a special interest because it was not commenced until supplies of materials for this type of work had practically disappeared. In fact, to date, the whole machine is constructed from scrap which consisted mainly of 1/16 in. and 3/32 in. spruce three ply and odd strips of plain spruce. Small quantities of birch plywood of various thicknesses and a sheet of 1/40 in. birch were also acquired, together with any other useful oddments which could possibly be begged, borrowed, etc. So far the total cost has been two shillings for glue, and working time has been spread over the past nine months.

The accompanying photographs will serve to give a fairly complete picture of the method of construction employed, which follows, more or less, conventional lines.

Fuselage.

The fuselage is of monocoque construction employing fourteen 3/32 in. formers and forty-four 3/16 in. × 1/16 in. stringers and was made in two halves rather like an Easter egg! This method was chosen because no pieces of plywood were large enough to provide whole formers or were the full width of the larger fuselage sections and because it lends itself to accurate jig assembly.

First of all the jig was built from 3/16 in. plywood. Half-plan view and full-side view outlines were marked on the wood and then fretsawed, using a fine blade. Slots were then cut for former location. The side-view jig was screwed flat onto a board and the half-plan view jig erected vertically along its centre line.

Half formers were then cut, dropped into position and the stringers glued into slots in the formers. When the two halves of the fuselage were complete they were securely glued together, using a jig constructed from the outer sections of plywood from which the original building jig was cut. By this means perfect alignment was ensured.

Like Mr. D. A. Russell, I could not see my way clear to cutting something like 1,000 slots for stringers, etc., so a hand-punching tool was made from a pair of pliers (see illustration on page 11).

The fin and tail plane were built in and then all parts which are metal covered on the full-size machine were covered with 1/40 in. birch which was shrunk on, and resulted in an absolutely drum tight finish.

Rear Control Surfaces.

The rudder and elevators are of similar construction employing a 1/2 in. × 1/4 in. balsa forward spar, a 1/16 in. spruce trailing edge and 1/16 in. plywood formers capped with 1/40 in. birch.

Brass tubes are fitted at all points where bearings are required and 1/16 in. diameter brass rods are used as hinges and operating rods for the rear control surfaces. Where these rods project from the fuselage they are fitted with brass " U " pieces which are a snug fit over the forward spars of the fin and elevators. S.B.A. screws passing through the spars and " U " pieces complete the fittings, the spars being strengthened with plywood at these points.

Spring loaded non-hygroscopic cords are led over pulleys from the operating rod levers to a panel in the rear cockpit equipped with calibrated control levers.

Tail Wheel.

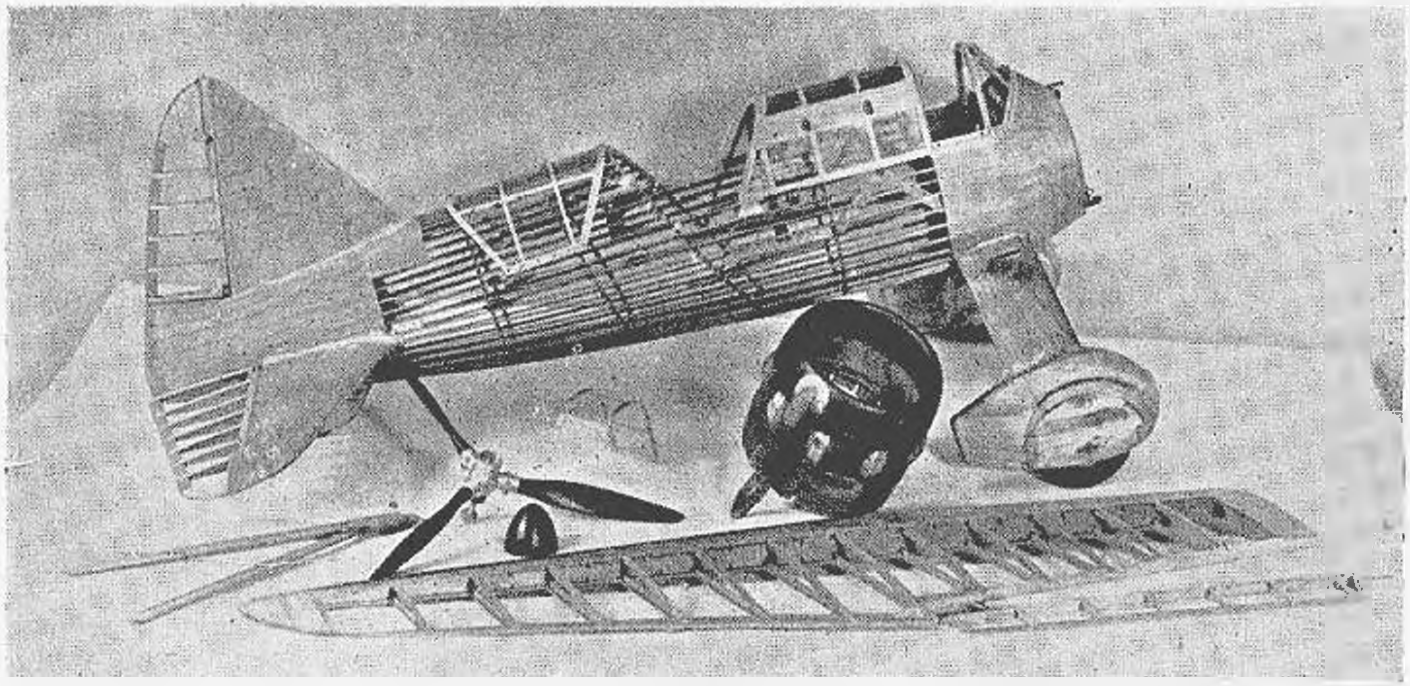
The tail wheel is fully sprung but non-conducting and is attached to strips of birch plywood passing through the fuselage from top to bottom, the external section being faired with balsa wood.

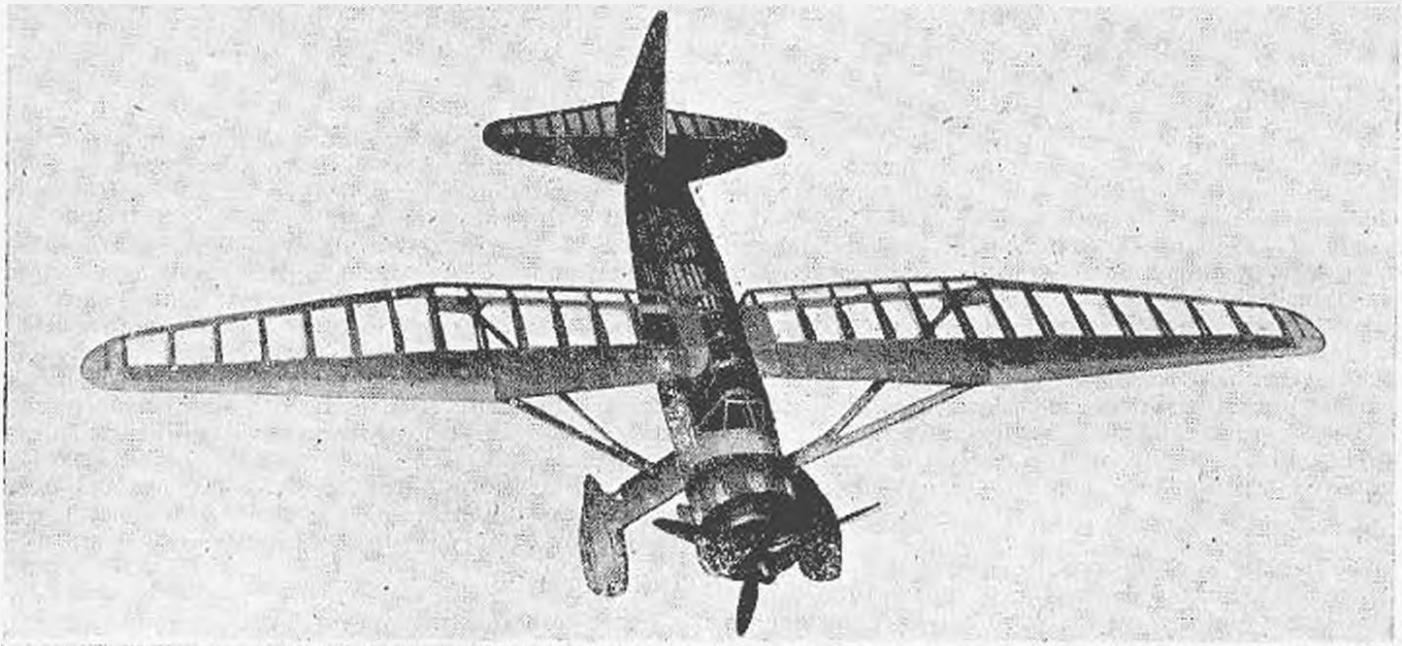
Cabin.

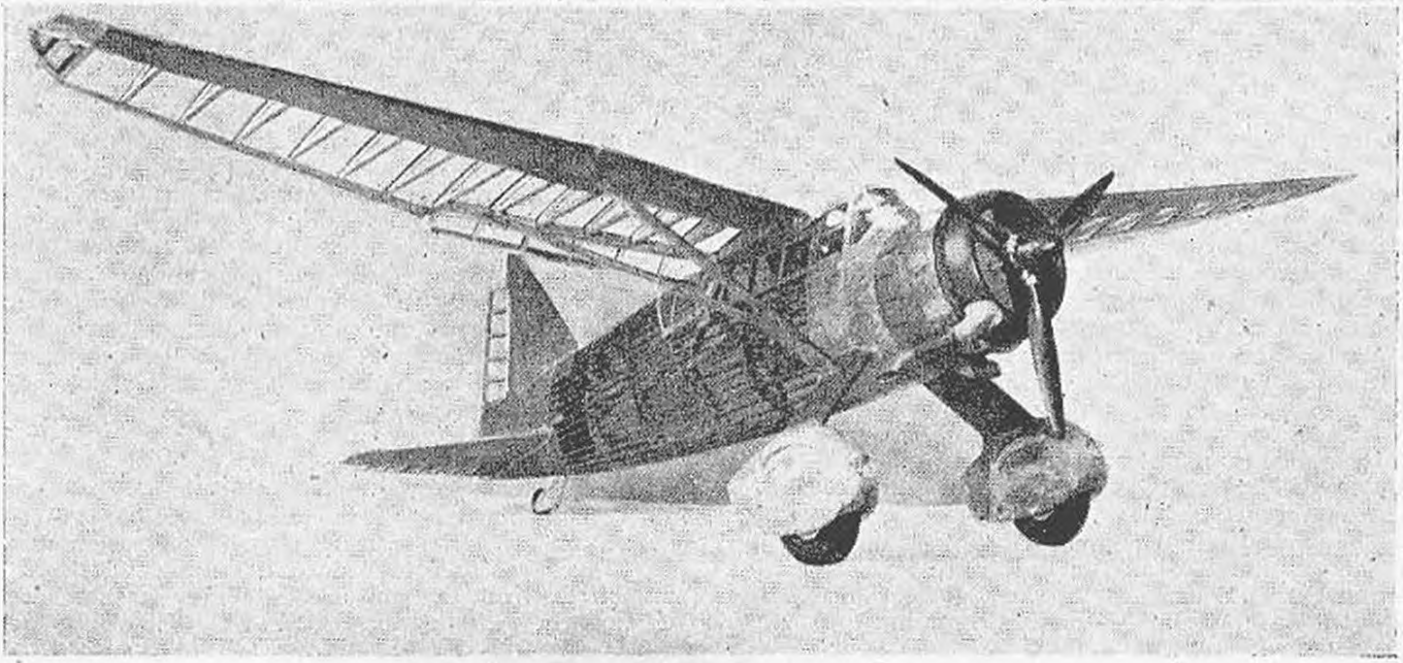
All fixed sections of the cabin are covered with non-flammable Cellostoid framed with 1/32 in. birch plywood. The front and rear cockpit covers are metal framed, the Cellostoid being riveted in position with very small copper rivets. Both cockpit covers are movable, the forward cover being hinged along one side and held in the closed position by S.B.A. screws, whilst the rear cover slides back on metal runners. A dummy instrument panel is fitted to the pilot's position and, for exhibition purposes, a pair of model Browning guns are under construction for the rear cockpit.

Undercarriage.

The main spars for the undercarriage legs were made from 1/2 in. diameter, 1/16 in. wall bakelised paper tubes (as used for coil formers in radio work). Formers were then slipped over these legs, glued in position and covered with birch sheet. By this means a very strong, light and slightly flexible leg is achieved. The tubes are







carried through the fuselage where they meet in the centre. Here they are plugged with wooden dowels which are "locked-jointed." Compression struts are carried forward to the front bulkhead and "T" section tension strips extend half-way back along the fuselage. The whole assembly is capped by a plywood panel carried right across the fuselage between formers 2 and 3. This panel carries the detachable pilot's seat and control column and will house the engine controls when the machine is in flying trim.

The spats were the biggest headache on the job! As already mentioned, balsa wood was out of the question, hardwood was far too heavy and a sheet covered framework was hopeless because of the complex curved surfaces.

It was decided to employ a framework made up of a centre plywood panel of full profile shape and two side panels spaced apart by spruce strips. The tail ends of the spats were then covered with thin plywood sheets because they are more or less flat surfaces. The general shape was then built up, using the whole of the writer's precious stock of balsa. This consisted of all conceivable sizes in very small quantities. The inner surfaces of the wheel chamber were then covered with birch sheet. In actual fact this method has led to a very light but strong structure, although, before painting, it has a somewhat patchwork appearance. Wheel springing is incorporated in the form of sliding bearings for the wheel spindles controlled by 18 s.w.g. piano wire hairpin springs.

Dummy landing lights were made by sinking sheet aluminium into shape for reflectors with the aid of a rough press tool, the same tool being used to mould the convex "lamp glasses" from Cellostoid. In order to provide "bulbs" for the lamps the tops were cut from small glass collar studs! The type often found in new shirts in the good old days do the job nicely. The whole assembly was completed by spinning an aluminium ring over the outer edges of the reflector and glass. The lamps were then sunk into the spats and faired in with plastic wood.

Engine Cowling.

The engine cowling is constructed from wood throughout. The front ring was turned from mahogany raided from old printing blocks, a rear ring was also turned from 3/8 in. birch plywood and a tube wound up, using three layers of 1/40 in. birch. Both front and rear rings were glued and screwed into position in the tube; the exhaust pipe, bulges, cooling gills and air scoop all being fitted afterwards.

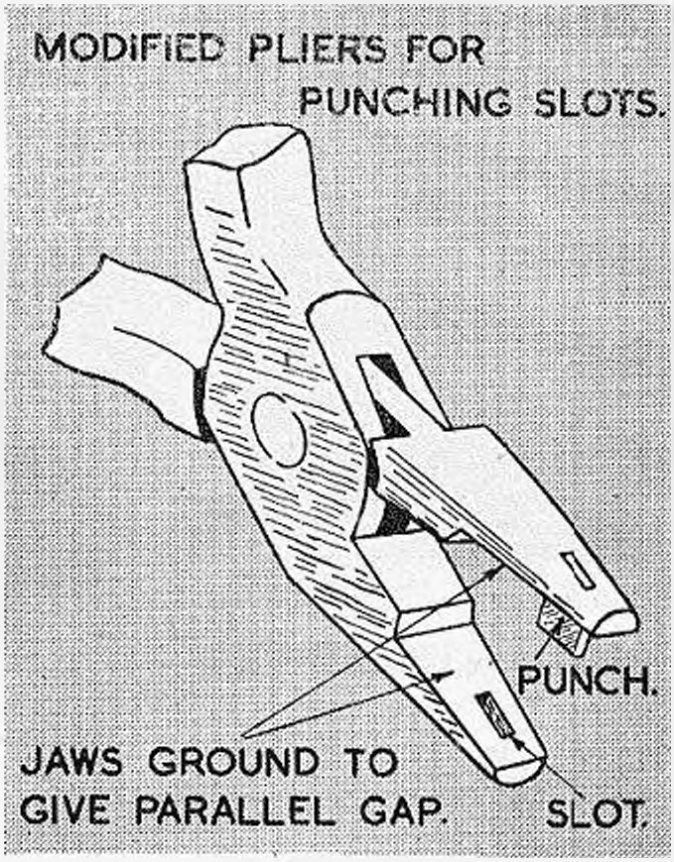
Three 4.B.A. studs and 3 brass angle plates are sunk into the front former of the fuselage. The studs are to carry an aluminium cone for the engine mounting and the angle plates form the anchorage for the cowling. Screws pass through the cowling at the rear plywood ring into the angle plates.

Airscrew.

The airscrew hub is machined from a single piece of 2 in. diameter duralumin. The three blade collars are equipped with built-in clamping flanges and are threaded internally and then slotted from top to bottom. This arrangement allows of pitch adjustment and provides a secure fixing for the blade roots. The blades themselves were carved from mahogany, the roots impregnated with bakelite varnish in order to harden them and allow a thread to be cut, thus ensuring a good fit in the hub collars.

Wings.

Main spars for the wings are built-up "H" section, using 1/16 in. spruce. First of all a flat spar was slotted



to take the cut-out plywood formers which are spaced 2 in. apart, except at the root, where the spacing is 1 in. When the formers were in position, 3/8 in. × 1/16 in. spruce strips were glued along the whole length of the top and bottom edges of the spar, the formers being recessed so that these strips fitted flush.

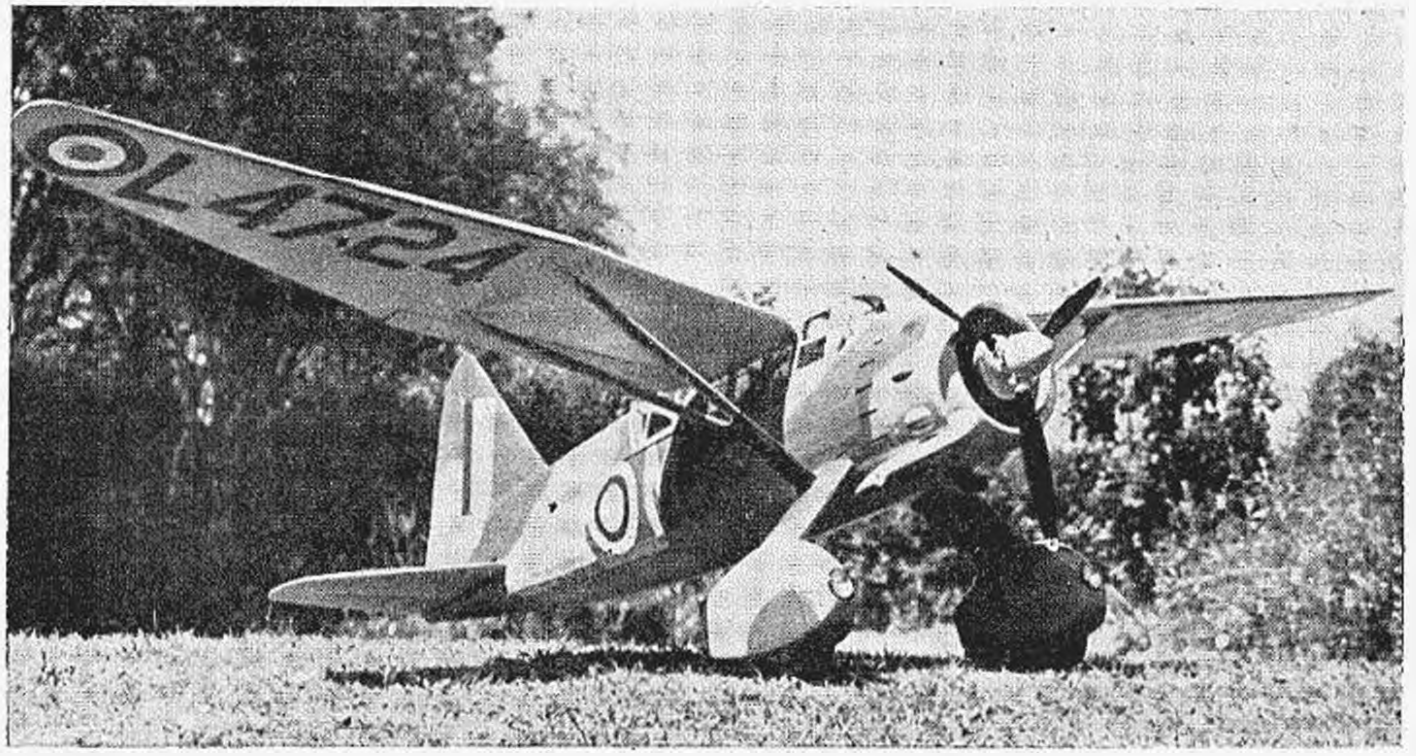
Both leading and trailing edges are 3/32 in. spruce, the latter being reinforced with thin birch. From the main spar forward, the wing is covered with 1/40 in. birch in one piece. Nose formers are also used forward of the main spar and 1/40 in. birch capping is applied to the formers at the rear of the main spar.

The outboard halves of the leading edges are fitted with fixed slots and automatic flaps have also been provided.

Root spars of 1/2 in. × 1/8 in. plywood are passed right through the top of the cabin, glued securely to the main fuselage formers and struts and project at each side. The wings are plugged over these projections and bamboo shear pins passed right through from the leading edge. The shear stress applied to these pins in the event of a wing-tip landing should cut the rods and thus preserve the main structure; particularly since the first three wing formers are unlightened 1/8 in. birch plywood, covered with 1/40 in. birch.

Wing struts were made from 1/16 in. birch plywood sandwiched between 1/16 in. spruce and reduced to streamline section. Tongues formed by the plywood plug into faired boxes in the wings and undercarriage legs. All boxes and tongues are fitted with thin shear pins as at the wing roots.

At present the uncovered model, less engine and battery, weighs 2 lbs. 4 oz., so that, when complete, the wing loading should not be excessive. The original estimate was 3 lbs. 1 ozs. total weight, giving a wing



loading of approximately 20 ozs. per square foot and it would seem that this figure will be reached within reasonable limits.

Covering.

Quite obviously there is no necessity to dwell at great length on the covering of the model as the technique involved is well known to you all. Therefore, the only points of interest in this direction are materials. Once again, owing to war conditions, jap silk was unobtainable and a heavy grade bamboo paper was employed. Incidentally, this has provided a very good covering indeed. This being the first time I have used this material I was agreeably surprised at the results.

As an adhesive for the covering, distrene varnish was used, which proved excellent for the purpose. It does not dry too quickly, is completely waterproof and never becomes quite hard, being always somewhat flexible. It has one other great advantage, it is insoluble in cellulose thinners. This feature is useful in two respects: (*a*) the adhesive does not soften when dope is applied, thus ensuring a taut covering with no wrinkles at points of fixing; (*b*) dope does not soak through the covering into the wood below at ribs, stringers, etc.

The latter feature is one of some importance, because until this adhesive was used it was found that when applying coloured dopes to finished aircraft unsightly marks appeared along ribs and stringers unless these were heavily doped before covering. The latter measure is undesirable on the score of excessive weight.

Painting.

So much for the covering! The next job to be tackled was doping and painting. The machine is finished in accordance with its full scale brother; that is to say, standard camouflage colouring, insignia, etc., have been applied.

First of all the covering was given three coats of clear dope applied with a brush. This system of application was used so that a good thick dope could be employed, thus reducing the number of coats to a minimum.

The colour coats were all applied by means of a paint spray-gun. A small gun giving a narrow fan spray at fairly close quarters was constructed for the job. It is hoped in the very near future to give full details of the spray apparatus because it has proved very simple to construct and is extremely easy to use. Moreover it is felt that many readers would welcome the information.

Most surfaces received two coats of colour, some, however, required more; a great deal depends on the colour of the paint, but this will be dealt with when describing the spray apparatus.

In order to produce the best effect at the boundaries of the camouflage colours, stencils were cut to cover the first colour applied and spaced a short distance from the surface to be sprayed. This enabled a "blured" junction to be achieved. All cockpits, etc., were, of course, completely covered and sealed with masking tape during spraying.

All circular insignia were painted onto jap tissue by hand and then applied to the machine in the form of transfers. All markings with straight boundaries, however, are best made by marking the characters in reverse on to a piece of tissue. The tissue should then be turned over and sprayed the required colour. The characters are best cut out with the aid of a razor blade and steel straight-edge, after which they may be fixed to the covering with adhesive.

The black serial numbers under the wings were sprayed on, using a one piece stencil. This was possible because the surfaces are practically flat and only a single light colour; also since the characters are in black paint only one coat was necessary.

Since assembling the completed parts, the writer has amused himself by endeavouring to make a few photographs of the model with the intention of simulating a full-size machine. These efforts have to some extent been marred by the scarcity of correct grades of materials. This scarcity has prevented proper tone rendering of the camouflage colours; the contrast being too pronounced. However, for the time being work must cease and one day it may be possible to fly the machine and reap the reward of my labours.

THE AUCHENGARGLE TOURIST TROPHY

By ROBERT JAMIESON

" 1.—The trophy shall be called the Sir James Grousing-Sporran Cup, and shall be for model aeroplanes of the Wakefield type."

" 2.—The competition shall be on the lines of a tourist trophy race, competitors being required to fly round a circuit of some miles in diameter. All models shall start together, and be followed by their owners to wherever they land. They shall be set off again from there, and so on till the course is completed : first home being the winner."

" 3.—The actual organisation of the contest shall be carried out by a combined committee of the competing clubs."

McGillicuddy laid aside the rules and looked round the gathering before going on. " These are the only conditions laid down by our benefactor regarding the trophy he has gifted. His idea is, I think, not to foster mere speed and duration, but reliability and ' steerability.' Novel as the idea is, the contest should be a unique and welcome innovation."

" Can't be done," shouted Tumps McWhuppet of Teuchle Toorie. " How are you goin' to steer 'em ? " (Cries of " Hear, hear.")

" I have not noticed," said the Maestro drily, " that models have any objection to flying down wind when trimmed to do so——"

" Winds don't blow round in circles," interrupted a Muckle Mire delegate.

" Very true, my friend," said McGillicuddy, " but, for once, local conditions are in our favour. I have here "—the Maestro unrolled a large sheet—" a specially prepared map of the district, showing the direction of the prevailing winds and air currents. You will notice that the local wind, the notorious Camgale, blows along the face of Ben McSplurge and then wheels right round the mountain in a complete circle. I suggest we take advantage of this, and, starting from Auchengargle, fly down-wind to Teuchle Toorie, then round the shoulder of the hill to Muckle Mire, and thence back to Auchengargle to complete the circuit."

The startling novelty of this suggestion unleashed a babble of excited discussion. But the Maestro's plan was sound. It was adopted unanimously ; thereupon the meeting got down to the serious work of organisation.

Knowing that such a novel event was bound to attract widespread interest we determined to plan the contest thoroughly, so that all should go smoothly when the great day came. Since we had no precedent to guide us, the task was not easy.

With the Auchengargle flying field as a base, it was decided that the race should start from a mass hand launch. Two flagpoles were to be erected 200 yards apart, and competitors would line up between them. The same two poles would serve as the finishing line, and models, to complete the course, MUST pass between the standards, anyone passing outside the line being required to go back 200 yards and try again to finish by flying between the poles.

So that no mistakes of identification should be made it was decided that all models display a number on the fin. A distinctive colour scheme was also allocated to each club as follows :— Muckle Mire models, all red. (No political significance.) Teuchle Toorie, all yellow (very appropriate), and Auchengargle, black and white zebra striped fuselage and fin, orange wings and tail. This at the Maestro's own request, to save him recovering the " Cutty Sark ".

Training for the race was of the Commando-type ; not only must the models be at concert pitch, their owners also would require to be in the peak of condition, if no time was to be lost in following the speeding planes. Strangers to the district were apt to look rather puzzled when told that the groups of young men (clad in running shorts and singlets) were NOT harriers, but members of the Model Aeroplane Club. Long distance running, wall climbing, stream jumping, swamp fording and tree hopping in the Tarzan manner, were all practised regularly. The Maestro was insistent, and himself went into rigorous training, despite his advancing years.

" If your plane is trying hard to win, would you be so unkind as to have it sitting, waiting, while you're half-a mile behind ? " was his slogan. We presumed the other clubs were training in a similar manner.

Anticipating a record crowd on the field for the start and finish, a large map of the course was prepared. A pigeon enthusiast whose loft was on the edge of the flying field kindly offered as many " homers " as we required ; so a first-rate intelligence service was organised. Birds were to be stationed at strategic points around the course, and released to carry news bulletins back to the starting point. Thus could the progress of the competitors be followed all the way round.

Drambuie was also pressed into service as a " Spotter-reconnitor " for the Auchengargle Club, and soon learned to follow and report the location of the club's models. The danger that he might assist members of other clubs by following *their* models on the great day was overcome by mixing a little sardine oil with the dope we used, thus enabling the wise old bird to distinguish friend from foe.

Our practice flying augured well for the race proper—for the Maestro—whatever his other faults—was a master of competition tactics and strategy. He had personally fitted every Auchengargle plane with a special fin of his own design—to ensure its flying down-wind—and had himself supervised every practice session. " And remember, lads," he was for ever dinning in our ears, " never more than two-thirds or three-quarter turns, and take it easy at the start ; it's the stayers who have the best chance of finishing."

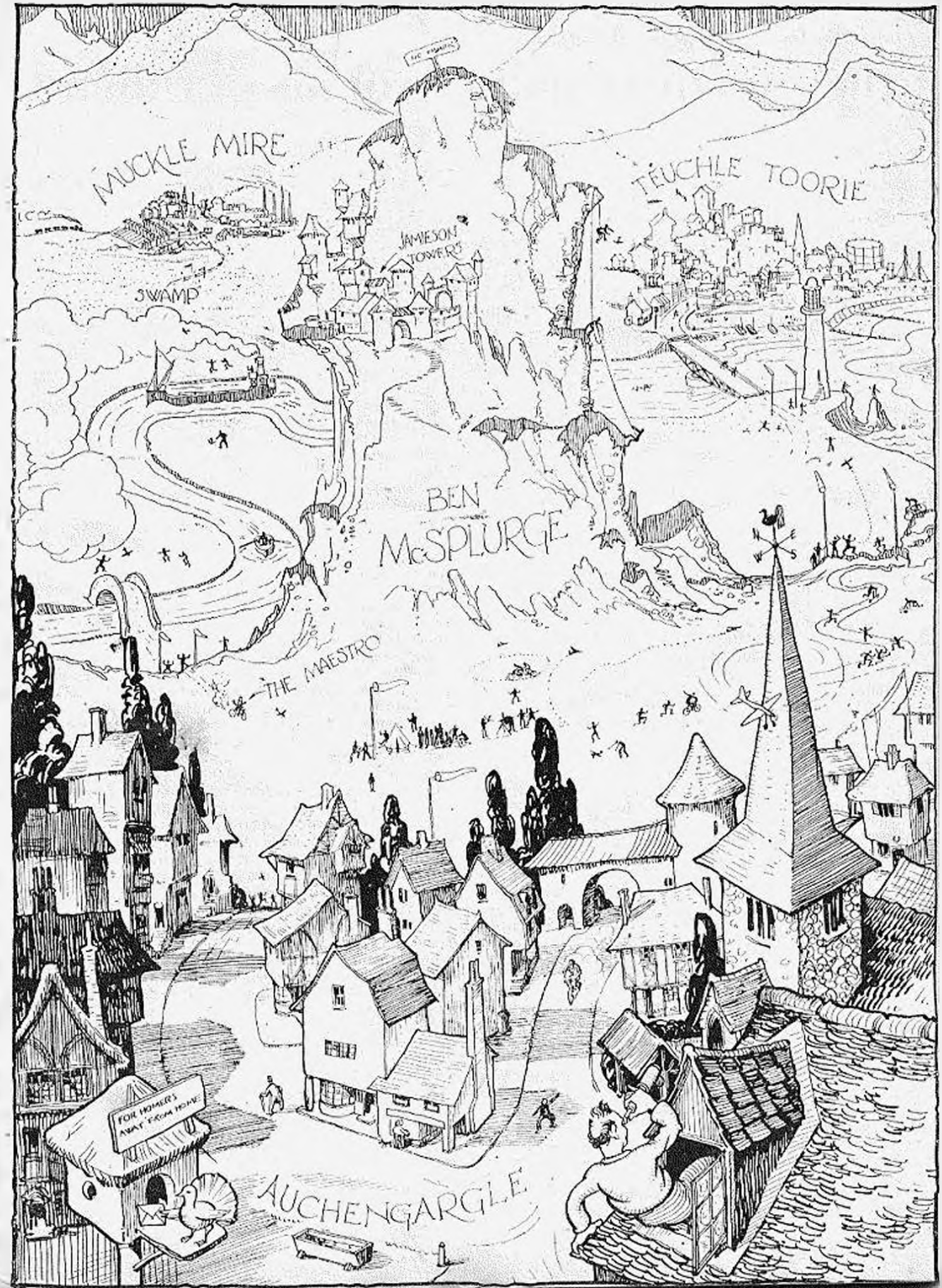
Unfortunately, I never got a chance to stay the course, as the Jamieson model got involved in an argument with a milk cart on the evening before the race and came off a bad second. The Maestro consoled me.

" Its maybe just as well, Bob," he said. " Now you can take charge of the news and intelligence service on the field. I'll be a lot happier in my mind if I know what you're doing."

I wasn't quite sure that this was a crack at my expense, so I let it pass.

So we came at last to the great day, and, as expected, the gallery was large. In the centre of the field towered the two flagpoles, each with a windsock at the masthead marked " Start and Finish," and around them milled the competitors and their helpers.

McGillicuddy was a busy man ; for in addition to


MUCKLE MIRE
TEUCHLE TOORIE
JAMESON TOWERS
SWAMP
BEN McSPLURGE
THE MAESTRO
FOR HOMERS AWAY FROM HOME
AUCHENGARGLE

competing he was acting as field master; supervising the checking and weighing in, and directing the stewards who marshalled the crowd. Most of the gallery concentrated well to windward of the starting line, grouping themselves near the map and the loudspeaker van.

Each competitor was allowed the help of one assistant to act as spotter and winder-upper. Most of these, suitably attired, were now lined up alongside the field. No bar had been placed on the assistants using mechanical assistance, consequently a strange array of vehicles were assembled. Bicycles, tricycles, scooters, soap-boxes, bogies and perambulators had all been pressed into service. (The latter, no doubt, as transport for the injured.)

As zero hour drew near the crowd fell silent, and an air of excitement swept the field; there was the usual last-minute flurry and running around—then a blast on a whistle gave the signal to wind up. Now began a great stretching of motors and whirring of winders. Twenty-seven competitors had weighed in, and in two minutes all were wound up and ready to go; now they were lined up between the posts with their backs to Ben McSplurge—since the models had to be launched into the wind. The crowd held its breath—the runners got ready to go—the moment had come! Crack! went the starter's pistol. Twenty-seven left hands released twenty-seven props. Twenty-seven right arms swept forward and the models went off like a flock of brightly-coloured birds flushed by a gun shot. The runners went off like rockets down the road to follow them. Then the crowd roared its delight as the models banked and turned down-wind to fly over their heads.

Twenty-six got off successfully, but the twenty-seventh, for some unknown reason, did not turn, but flew straight on. Unfortunately the launcher's assistant—whose duty it was to follow it, was so intent on going all out on his scooter that he did not notice. His mate's frantic yells and gestures attempting to recall him caused great amusement.

The Maestro showed no undue haste as he crossed the field to the tandem he was sharing with McSwindle. Drambuie was following his model, and the Maestro's *sang froid* was part of his policy—taking things easy to start with. Unfortunately, his tandem partner—McSwindle—was in a fever of impatience to be off. As McGillicuddy came on the road, his partner mounted, thinking the Maestro would jump on as he passed, but the "ironhorse" gained speed so quickly that the Maestro was left standing. The over-zealous McSwindle was over half a mile down the road before he realised he had no passenger.

His consternation was comic when the Maestro passed him on a borrowed "penny-farthing" and made a derisive gesture.

The models and their followers soon disappeared and the crowd settled down to await the first pigeon bulletin. When the flag showing the position of the leader was stuck on the map a gasp of surprise rose from the crowd. No. 7 (Snooky Munro, Muckle Mire) was already at Dickman's Dike, well beyond Teuchle Toorie. Could he keep up such a cracking pace? Along with this there came news of the first lame ducks and crack-ups.

No. 12 (Teuchle Toorie) had landed in a tree. Crew had climbed to retrieve it, but themselves had been "treed" by an angry bull. Relief expedition urgently wanted to "shoo" it away.

The message from No. 17 (Auchengargle) caused a great deal of bewilderment at first. "Model landed in pond. Lit fire to dry it, but had slight accident. Please send a pair of shorts." Unfortunately we could do little, as our stock of spares did not include anything in the shape of shorts.

Then at last came news of the Maestro. He was reported to have passed Teuchle Toorie, going confidently and well—but he was last in the field! No. 7—the leader, was almost at Muckle Mire! Could our great white—or should we say striped—hope, haul down that terrific lead?

Soon the field began to thin, and, as the day wore on it became evident that less than half the field would finish. The gruelling nature of the event had taken its toll. Then came the news that No. 7 was out!—cracked up on the outskirts of Muckle Mire. This threw the whole event wide open, as he had been miles ahead of the rest of the field.

Slowly No. 13 (H. B. McGillicuddy) began to creep up. Excitement began to mount higher. What was going on behind that mountain? What desperate heights of human endurance was that great bulk hiding from our eager eyes?

Then came the most dramatic news of the day. From the last observation post of all came the dramatic announcement that No. 13 (The Maestro) and No. 21 (Tumps McWhuppet of Teuchle Toorie) were now sharing the lead. They had passed together, going all out for the last lap. Neck and neck to the finish!

Every eye in the crowd was glued to the low hill over which the finishers must come. Who would be the first? Suddenly a speck appeared in the sky—what colour was it? We could hardly wait to see—then a great groan of disappointment burst from the home club. It was yellow—No. 21. Slowly it sailed towards us, and then our hearts bounded in relief and the Teuchle Toorieites groaned, when it became evident that it would not pass between the posts, and therefore its pilot would have to go back 200 yards and try again.

While every eye was watching the yellow plane a startled yell heralded more drama—Yes! Black and white body—orange wings—No. 13—there it was, gliding gently down to earth some 150 yards short of the finishing line.

Now the excitement was almost unbearable. As McWhuppet raced towards his model the Maestro appeared over the hill mounted on a small tricycle, his knees almost touching his ears. When McWhuppet had reached his model, the Maestro had still 50 yards to go. The Teuchle Toorie man picked up his model and started to race back, handwinding as he went. Before he was a hundred yards away McGillicuddy reached his model and started frantically to hand wind. Both were ready at the same time. Both turned to launch together. Both models rose, banked and turned down-wind to fly straight for the line—the Maestro slightly in the lead. Then we nearly collapsed when the Cutty Sark began to drift and we saw it would not cross the line. At the last moment Drambuie dramatically intervened—flying alongside he fluttered his wings violently—the slip stream had the desired effect. No. 13 crossed the line—the winner by 10 yards.

The crowd yelled themselves hoarse—some with delight—others with rage. Ignoring all protests we triumphantly chaired the winner. What a day! 1st Auchengargle, 2nd and 3rd Teuchle Toorie. Team prize, Muckle Mire. (They finished before dark.) Thus ended the Auchengargle Tourist Trophy Race!

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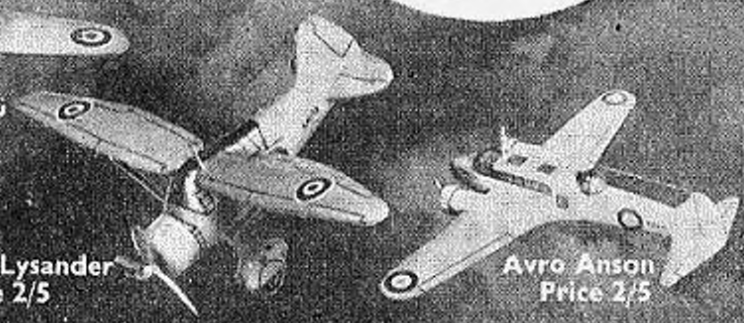

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AEROMODELLING DEFINITIONS

By "JAKE"

Balsa wood.—An extremely rare and precious substance, rumoured to have been common years ago. Small pieces may still be seen in the larger museums.

Balsa substitute.—A substance discovered after much research as to the heaviest material occurring in nature. It can easily be recognised by the large knots growing in it in all directions.

Transfers.—These should first be soaked in warm water. They are coated with a special kind of glue, so that, on being fished out, they attach themselves firmly to the fingers, and break if any attempt is made to remove them.

Counterweight.—Used on single bladed airscrews, and a great help in winning competitions. Usually made from brass tubing so arranged that when the propeller begins to revolve, lead shot, etc., flies in all directions, thus disabling any nearby competing models.

Horses, cows, etc.—Intelligent animals, usually of large and threatening disposition, specially trained by farmers to mount guard over any models coming their way, and slowly trample them to pieces on the arrival of the owner.

Club room.—A dimly lit spot, not large enough for pole-flying. Most club rooms possess the amazing property that, no matter how much wood and cement is taken down there, there's never any to be found when it's wanted.

Wing loading.—An inverse measure of the likelihood of a model to leave the ground.

Flying field.—A small piece of ground near a large pond or river, and usually selected in a remote, densely wooded part of the country.

Solid model.—An oddly-shaped piece of wood, used for testing newly-bought coloured dopes.

Auto rudder control.—A device which alters the rudder trim in flight, thus enabling gliders to be nose-dived off the line.

Glider winch.—A wonderful way of preventing out of sight flights. The apparatus consists of numerous wires which entangle themselves round the model, thus preventing it from flying away.

Retractable undercart.—A complicated wire structure, useful for bringing the weight of a model up to Wakefield standard without the waste of good wood.

The moving finger.—A mysterious figure to be seen at all the pre-war meets. Identified by his magnificent astrakhan boots and the fur coat, in which he invariably wore an aspidistra as a buttonhole. Believed related in some way to McGillicuddy.

Downwash.—A light brown, foaming beverage, forming an essential part of the aeromodeller's kit on competition day.

SKIN FRICTION ON MODEL AIRCRAFT

By "C," B.Sc. (Eng.), S.I.Mech.E., S.R.Ae.S.

AERO MODELLERS all know that when a model aeroplane moves through the air, there is some form of friction between the surfaces of the model and the air through which it is passing; but what many of them do not realise is that this "skin friction," as it is called, may form as much as 55 per cent. of the total drag on a Wakefield model, and even 75 per cent. of the total drag on a model sailplane. These figures are rather staggering, and it would seem worth our while to expend some effort in reducing this large skin drag.

The phenomenon, known as the boundary layer, can easily be investigated by anyone. Examine any smooth hard surface upon which dust has been allowed to settle, and try to move all of this dust by blowing at the surface. No matter how hard or in which direction one blows, it is always found that a fine layer of dust remains firmly undisturbed, although it can be removed with the lightest touch with the finger. This shows that when air, or any fluid for that matter, passes over a solid body the air immediately next to the surface is at rest relative to the body. Now, if the air at a certain distance from the surface of the body is moving at a velocity relative to that body, and the air in contact with the body is stationary, there must be a layer of air in between in which velocity progressively increases from zero to the velocity of the air flowing past. This layer of air is called the boundary layer and is the reason for so much effort in full-size aircraft design nowadays.

Figure 1 illustrates diagrammatically the way in which the velocity varies through the boundary layer, the length of the arrows being an indication of the velocity at various points through the layer. Viewing the boundary layer as consisting of a very large number of very thin layers, it can be seen that each layer is going a bit faster than the layer below it and a bit slower than the layer above it.

Experiment shows that there are two forms in which the boundary layer may exist over smooth surfaces, streamlined and turbulent. If a smooth model wing is tested in a wind tunnel by gradually increasing the tunnel speed from zero, it is found at first that the flow in the boundary layer is steady, or streamlined, but that as the tunnel speed is increased, unsteadiness or turbulence appears in the boundary layer at the trailing edge. As the speed is further increased, the unsteadiness moves forward so that the forepart of the boundary layer is streamlined and the rear part is turbulent, the point where the change from streamline to turbulent flow, or transition as it is called, takes place being known as the transition point. If the tunnel speed is increased sufficiently, the whole of the boundary layer may become turbulent.

The variation of velocity through a streamline and a turbulent boundary layer is shown graphically in Figure 2, where y is the distance of any point from the surface of the body, $\wedge$ is the thickness of the boundary layer, u is the velocity at any point in the air flowing past, and U is the velocity of the air outside the boundary layer which in the case of a 'plane in flight is the same as the plane's air-speed. From this graph it can be seen that as we go out from the surface the velocity increases rapidly at first from zero at the surface, and then more slowly until it reaches the value U at a distance $\wedge$ from the surface.

Though the existence of a boundary layer can be easily grasped, difficulty is sometimes found in understanding why its presence should result in such a large resistance, for, as will be shown, only a very small amount of air is affected.

That such resistance does exist can be easily demonstrated by moving the blade of a knife edgeways through a tin of treacle. In this case the resistance is due solely to skin friction, and despite the smooth surface of the knife is quite considerable.

Figure 3 shows a cross section of a streamlined boundary layer, greatly enlarged. If we consider a small section at G_0 which is square at one instant, it can be shown that after a time, when it has moved to the position G_1, its shape has changed to the trapezoid as shown.

If a square india-rubber is stretched into a trapezoid, as was the small square section of air in the boundary layer, it is found to require quite a considerable force and, similarly, the square section of air needs a force to distort it. The force given by the surface on a small square section next to it is the frictional force at that point. If we thus add up these frictional forces all over the surface we get the total skin friction over the surface, resulting in the frictional drag on the body.

The frictional drag of a body D_f is given by:—

$$D_f = C_{Df} \cdot \tfrac{1}{2} \rho V^2 E \qquad (1)$$

where:—

D_f = drag in lbs.

C_{Df} = frictional drag co-efficient.

ρ (pronounced row) = density of air in slugs/cu. ft.

V = velocity of the body in ft./sec.

E = surface area or "wetted area" of body in sq. ft. *

* For a wing, tailplane or fin we take E = 2 × "wing area."

The value of ρ at standard temperature and pressure is 0·002378 or $\frac{1}{421}$ very nearly.

Simplifying this and expressing the drag in ozs., and E in sq. ins., we get:—

$$D_f = \frac{1}{7580} C_{Df} V^2 E \qquad (2)$$

For a purely streamline boundary layer:—

$$C_{Df} = \frac{1{\cdot}40}{\sqrt{R}} \qquad (3)$$

where R = Reynolds Number of body.

For a wing, tailplane or fin, $R = \frac{Vc}{\nu} = 6300.V.c.$

V = airspeed in ft./sec.

c = mean chord, ft. (i.e. $\frac{\text{area}}{\text{span}}$)

For a fuselage or nacelle $R = \frac{Vl}{\nu} = 6300\ V.l.$

l = length of fuselage or nacelle in ft.

For a purely turbulent boundary layer:—

$$C_{Df} = \frac{0{\cdot}074}{R^{\frac{1}{5}}} \qquad (4)$$

From equation (2) it can be seen that we can reduce the frictional drag of our models, keeping the speed constant, by reducing C_{Df} or E.

Little can be done on the modern model aircraft in the way of reducing E. In most competitions wing area and fuselage cross sectional area are fixed within narrow limits, and any reduction in the area of the tail surfaces begins seriously to affect stability. The most that model aircraft designers can do is to have a circular cross section fuselage on a petrol or rubber powered model and a pod and boom fuselage on sailplanes.

There is, however, quite considerable scope in the reduction of C_{Df} for model aircraft, particularly in the larger and faster models such as sailplanes, and petrol models.

The Reynolds Number for the wing of a large petrol model may be in the region of 200,000, and substituting this value in equations (3) and (4) we get that with a wholly streamline boundary layer $C_{Df}=0{\cdot}00311$, and for a wholly turbulent boundary $C_{Df}=0{\cdot}00644$, i.e., over twice as much as the former.

For a Wakefield model the Reynolds Number may be 56,000 and then using equations (3) and (4) as before for streamline boundary layer $C_{Df}=0{\cdot}00583$, and for turbulent boundary layer $C_{Df}=0{\cdot}00832$, nearly one and a half times as much as the former.

So it can be seen that quite an appreciable amount of drag can be saved by keeping the boundary layers of one's models streamlined and free from turbulence.

This is not extremely difficult to do; all sharp projections, such as spars or formers, sticking up under tissue covering, must be avoided; all wing, undercarriage, tail and any other fixings must be kept inside—exterior rubber bands being fatal—any absolutely necessary hatches must be perfect fits, no gaps being allowed, and all contours must be nice and smooth.

The surface of the model must be given a shiny gloss finish and not allowed to become dusty!

The height of particles which will begin to affect both lift and drag of a wing is given by:—

$$\frac{h}{c}=\frac{100}{R} \qquad (5)$$

where h = height of particles in ins.
c = chord of wing in ins.
R = Reynolds Number of wing.

Taking the typical case of a petrol model previously mentioned, in which R = 200,000 substituting in (5) and taking c = 12 ins.

$$h=0{\cdot}006 \text{ ins. or } \frac{6}{1000} \text{ of an inch!}$$

This entails a shiny polished surface.

To understand why such small particles should affect the boundary layer to such an extent, let us investigate its size.

For a streamline boundary layer the thickness is given by:—

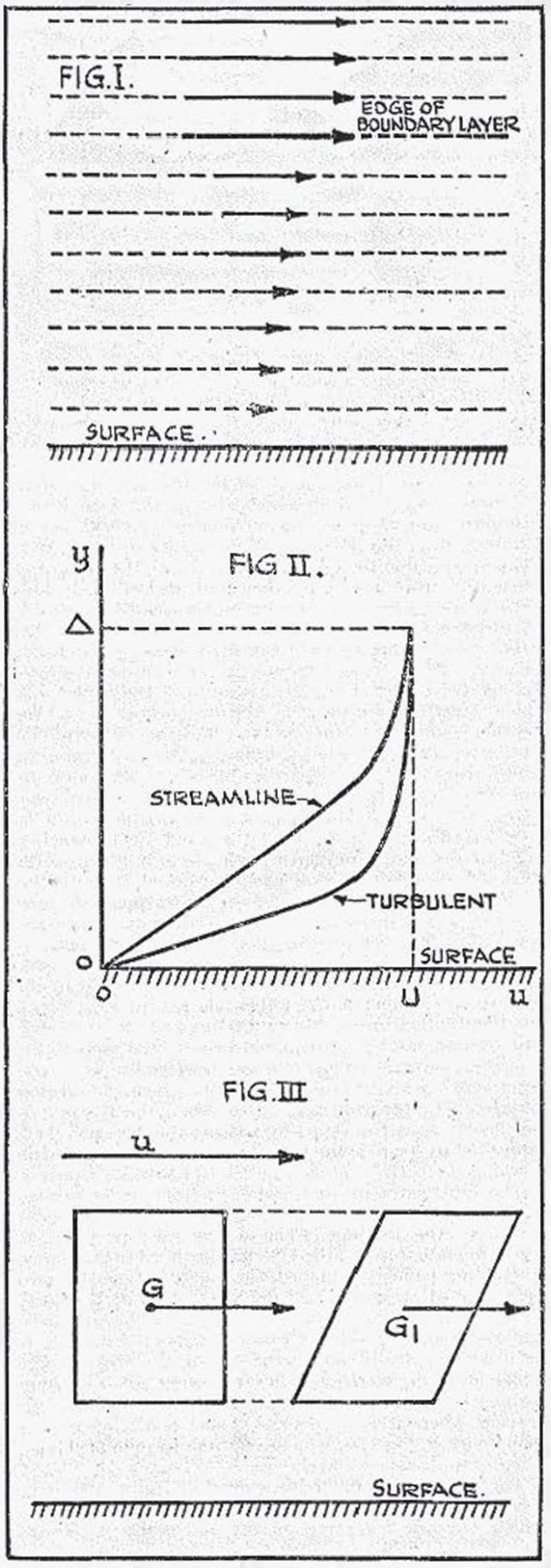
$$\frac{\triangle}{x}=\frac{5{\cdot}5}{\sqrt{Rx}} \qquad (6)$$

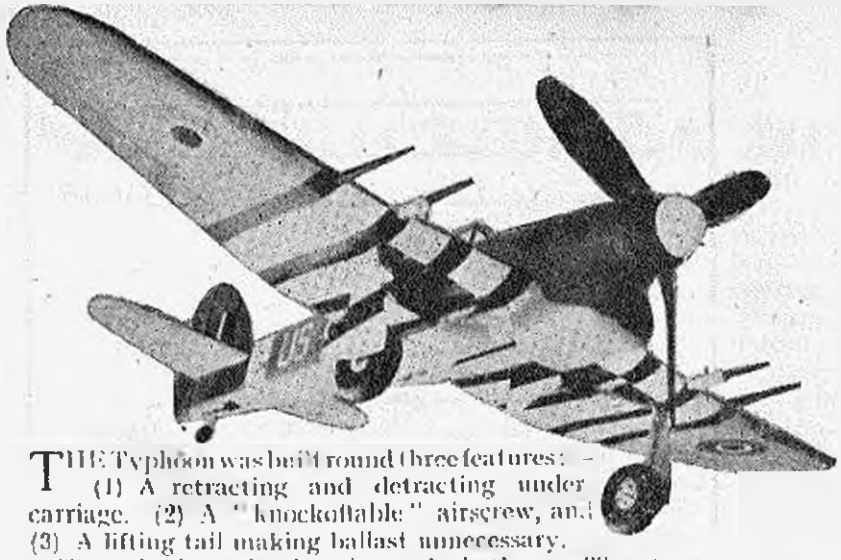
and for a turbulent boundary layer:—

$$\frac{\triangle}{x}=\frac{\frac{1}{5}}{R_x^{\frac{1}{7}}} \qquad (7)$$

where $\triangle$ = thickness of the boundary layer in ins. at a point x ins. from the nose.

(Continued on page 48.)





THE TYPHOON

1/12th

SCALE FLYING MODEL

By C. RUPERT MOORE, A.R.C.A.

THE Typhoon was built round three features: — (1) A retracting and detracting under carriage. (2) A "knockoffable" airscrew, and (3) A lifting tail making ballast unnecessary.

The wheel mechanism is worked thus:—The two skein motor is connected to a triangular "tail shackle" which is anchored by a peg through an oblong loop, allowing about ¼ in. travel backwards and forwards. A hinged "lever" is also hooked into this loop which magnifies and reverses the movement of the shackle. Running from the bottom of the "lever" is a 28 s.w.g. piano wire cable finishing at the L.E. of the wing and tensioned from there to the nose by rubber. This cable is also connected to a leg on the shaft of a double clawed piece of wire. When the motor is wound the cable pulls the lug twisting the shaft, which extends the claws above the L.E. As the motor runs out the nose rubber twists the claws back again and the cable pulls the "lever" forward. On to these claws hook the tension rubber for retracting the U.C. legs. This rubber, of course, is released when the claws retract (i.e. when the motor runs out), the legs tumble down and lock by gravity. The tail wheel retracts forward into the fuselage. It is rubber loaded by a band twisted round its axis. At the top of the skid is a crank, on to which is connected a wire running through a hole in a lug on the "lever," so that the skid can be worked independent of the "lever." On winding the claws protrude, and the tail wheel retracts. The undercarriage is tripped by an arm, like the arrester gear of the F.A.A. This is rubber loaded, so that on take-off it swings forwards and upwards, hitting a lever which is connected to the wire of the locking device; this releases the legs, which are then pulled up by the rubber hooked on the claws. The tension and the arm should be adjusted so that the arm comes to rest *in line with the fuselage bottom*. Also connected to this "arm" is a cable which, in turn, is connected to the tail skid cable when the "arm" is put down; so is the skid—by passing the "lever." It is advisable to spend some time in getting this mechanism working perfectly. *Make sure the legs go down together.*

The centre-section spar and L.E. from undercarriage leg to leg, is separate from the wing panels and fixed firmly to the fuselage. The wings are cut away to accommodate this and the U.C. legs are fixed to the wings. Each wing panel is "hinged" to the L.E. spar by two pegs, one at the root, and one at the tip of the spar. The pegs fit in slots, so that the wing can hinge upwards, and also knock off. Light rubber bands hold the panels in place diagonally under the tip of the spar to the panel and one starting under the wing fillet, passing through a hole in the T.E. of the wing panel to the top surface, where it is anchored. There is a wing rest of piano wire at the T.E. which is sprung to take backlash. This forms the shock absorbers.

The gear box is orthodox except that the 16 s.w.g. top shaft is finished at the front in a two pronged fork which engages a T piece on the end of the 12 s.w.g. propeller shaft, allowing the shaft to be "broken" by impact.

A disc of ⅛ in. ply with a ½ in. hole to accommodate the fork in the centre, is held tightly on the front face of the gear box by 3 piano wire clips. A hexagonal balsa box about ¼ in. long and ½ in. internal diameter is built over the fork and the front end is faced and backed by 1/16 in. ply, and drilled centrally to take a 12 s.w.g. bore bush. This bush is made from brass tube and has a ⅜ in. thread put on one end. One nut is put on to form a collar and the threaded end is pushed through the hexagon front and the second nut screwed on internally. The long end of the bush projects forwards. The T shaft is slid in place, engaging the fork. The whole of this fits inside the airscrew boss. The roots of the blades are cut away to clear the box, and what is left of the airscrew is drilled 1/16 in. larger than the bush. The bush actually projects in front of the airscrew! A ½ in. thick hard wood disc is fixed in front of the airscrew hub so that the front bearing can be fixed. The airscrew has two bearings, one a ¼ in. dia. brass disc, drilled to fit the *outside* of the bush, fits into the cavity in the hub and is held by three wood screws. This runs outside the bush close to the front nut. The other is the tin plate freewheel hinge plate drilled to fit the 12 s.w.g. shaft and held by three wood screws on the front of the wood disc. Taking the bush forward in this way allows the motor to be brought forward.

Providing two points are remembered the building is not difficult. (1) Build the fuselage side on a board and assemble then with the formers on the top, and 3/32 in. spacers along the bottom as a flat bottomed fuselage. Most of these are left in to stop the rubber sagging among the "internal workings." Cement the tops of the fillet ribs on to the lower longerons. (2) Build up the centre section L.E. spar complete with all mechanism, but don't sheet it. Cement the spar to the front of the fillet ribs and pack between the L.E. and longerons. Now the "lever," tail skid and all the mechanism except the "arm" can be installed—*Now* add the formers and two bottom stringers, after which the "arm" and further mechanism can be added. When adjusted, complete the fuselage. The undercarriage doors are made of 1/16 in. ply, steam bent to fit under the camber.

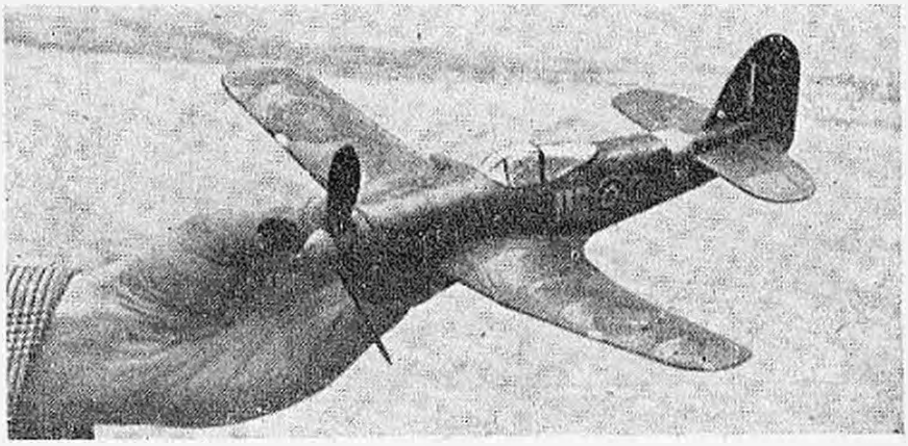
Rigging.

To put in motors remove tail peg and hook shackle over the tail "lever" and *don't forget to put the peg back.* Put rubber bands round ribs 3 and round wheels to keep them retracted. Test for balance. The C.G. should be 6¾ in. to 7-in. from the face of the first bulkhead. Note the large negative incidence on the tail. Glide into long grass, and trim by the tail. Put on 50 turns and launch. Watch the thrust line and add 20 turns at a time. The "knockoffable" airscrew makes landings with wheels up quite safe. Not until the model is flying perfectly should the undercarriage be brought into use.

If possible, cover the undersurface of wings and belly with heavy tissue or light bamboo paper.

DIMINUTIVE TYPHOON

BY R. COLEMAN



ON my next leave I determined to try out an interesting experiment which I had kept tucked away in the back of my mind ever since reading it in Zaic's 1937 Year Book. I always supposed it would work O.K. and anyway while there was plenty of balsa wood to use, why go to all that trouble.

However, times have changed, and balsa just doesn't grow on hedges any more, so it's about time I gave the pet idea an airing.

The experiment was completely successful, I turned out a neat little model of the "Hawker Typhoon" all complete with its monocoque brown paper fuselage. How much? Come again! Yes! I said, BROWN PAPER fuselage! Well! brown paper *and* plenty of glue.

Clever eh? That's what I thought when I read Zaic's book, and for those readers who haven't got the 1937 copy here's how it's done.

A solid wood former is curved to the exact shape and size of the fuselage in the same manner as if you were making a solid model. After sanding, the former is waxed all over with candle wax by holding above a stove or similar source of heat and rubbing the candle along as the wax melts into the wood. Make sure that when finished there are no blobs of wax on the surface, any uneven parts can be smoothed out with a hot knife.

The waxed former should then be mounted on a couple of bearings, one each end so that it can be rotated. I mounted mine between a couple of lathe centres.

A number of ½ in. wide strips of strong brown paper are now cut and soaked in water to soften them. Drain off the surplus and wind a strip diagonally round the former, starting at the nose end; overlap the joints about 1/16th. Cover the whole former with one layer of strips well pressed down to the fuselage contours. You will find that odd triangular pieces of paper will be required here and there and some strips will need tapering. It's a tricky job to avoid tearing and to get the wet paper to stick down to the wax.

Now give the whole a coat of strong water glue—Certofix or Lepages or similar, and put on the second layer of paper strips. This should be easier with the glue to hold things together, then another coat of glue and a final paper layer from the nose back to the cockpit. Thus the front half has three thicknesses, and the rear half has two thicknesses with a coat of glue all over.

Put aside for a day or two to dry out thoroughly, then cut down the centre line, top and bottom, and the two halves should come away without much trouble.

Two bulkheads and a rearpost are fitted inside the fuselage besides the weight box in the nose, and the motor anchor plates in the tail.

All these are shown on the drawing and should be carefully cut and tried in the two halves of the fuselage. When they fit snugly, cement them into one half and make up the weight box in the nose. When set join on the other half (in similar matter to an Easter egg) with slow drying glue. If you made the centre line cut carefully with a razor blade, and the parts have not gone out of shape at all, when the glue is smoothed off the joint should be almost invisible.

Wings.

The wings and tailplanes are quite simple and present no difficulties. Considerable care and attention should be paid to the fitting of them to the fuselage. The wing centre section is covered with stiff notepaper between the two base ribs. Holes are cut with a razor blade in the fuselage sides using a base rib as a rough guide to the correct camber. Be careful to get the correct incidence angles and positions so that the wings, etc., are not mounted lop-sided. Notice the centre bulkhead has to be cut through to allow the wing to slide through and be careful not to slice through the rear post when cutting the holes for the tailplane. Slide wing and tailplane through the fuselage, cement and wedge with small balsa wedges, add wing fillets of paper and balsa and fill in all holes with a cement fill. A 1 mm. ply facing is cemented to the nose bulkhead.

The fin and rudder is cemented to the rear post and top tail end of the fuselage.

Covering.

Cover the wings and tail assembly with jap tissue spray with water and when dry give one coat of clear dope all over, then two of camouflage colours followed by all the usual finishing details for a scale model. For a lighter model and better performance do without the coloured dopes, etc.

Airscrews and Flying.

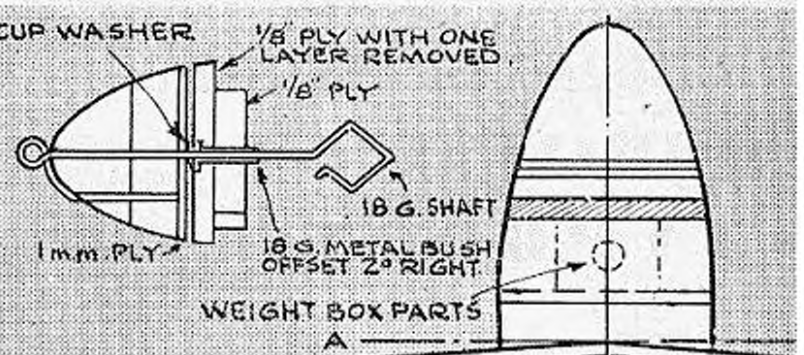
The prop. shown on the drawing is a three bladed 4 in. dia. 7 in. pitch. The blades are carved separately and fixed to the centre spinner. The shafts should be off set to the right in the nose block to counteract torque which can be rather severe at top number of turns on the motor. The motor was made up of 4 strands of 1/8 in. rubber 13 in. long.

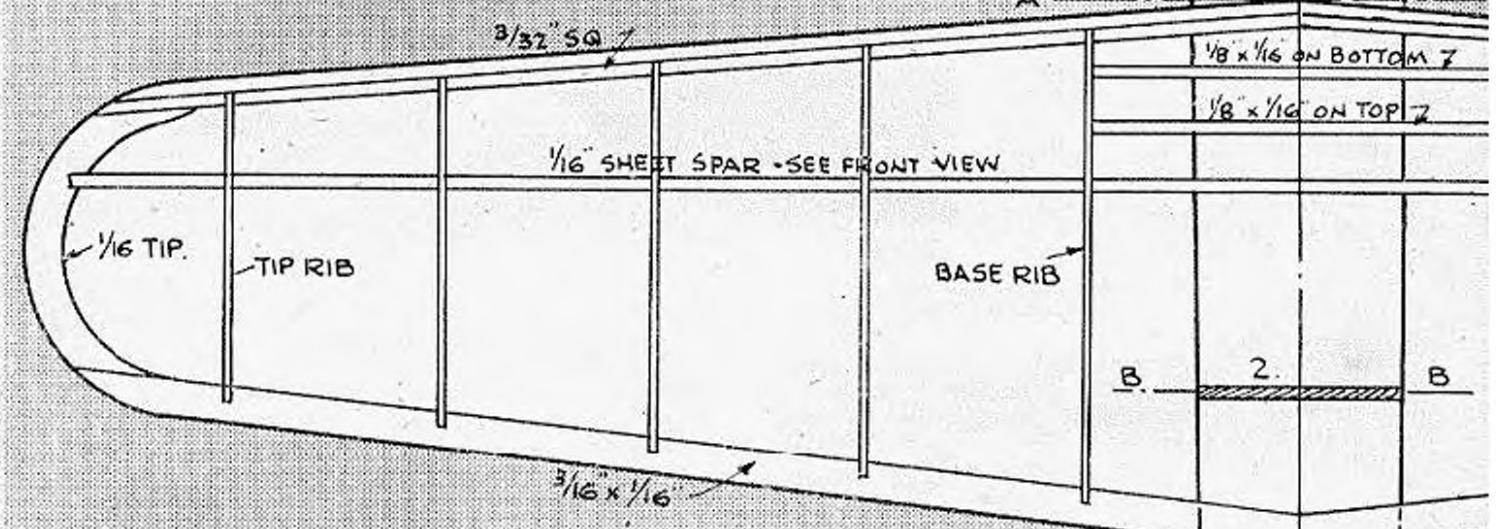
The model will probably be tail heavy with the motor fitted so it will require lead shot in the nose weight blocks (drill 1/8 in. hole in radiator bottom and plug with balsa) to obtain the correct balance for a flat glide.

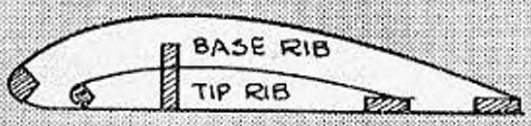
Remember to launch fast, as in flight the model lives up to the name of its big brother—as regards speed anyway. With the 4 inch prop. she gives quite good flights of about 15 seconds so far. Be careful of the torque, increase incidence on the left-hand wing if necessary. This Baby Typhoon should be quite suitable for R.T.P. flying, and I intend to try this out next time.

·12" SPAN· FLYING SCALE·
"HAWKER TYPHOON"
DESIGNED BY
·R·COLEMAN·

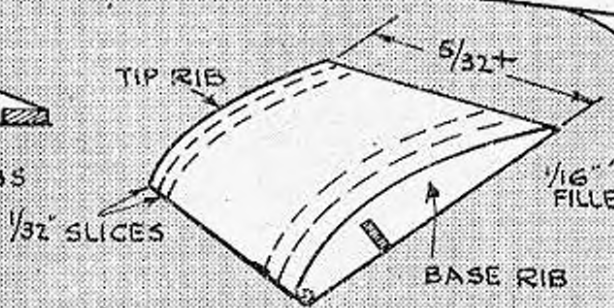
·SCALE· FULL SIZE·

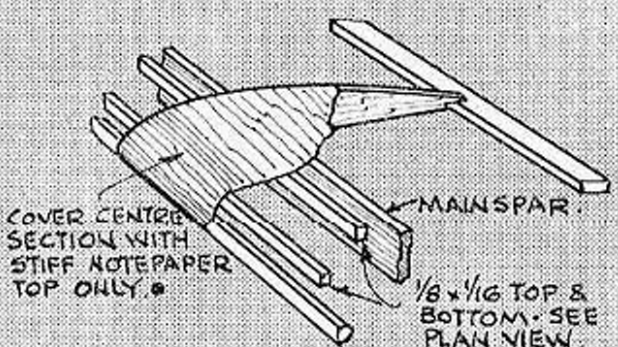






SHAPE BALSA BLOCK 5/32+ WIDE FROM WHICH WING RIBS 1/32" THICK ARE SLICED



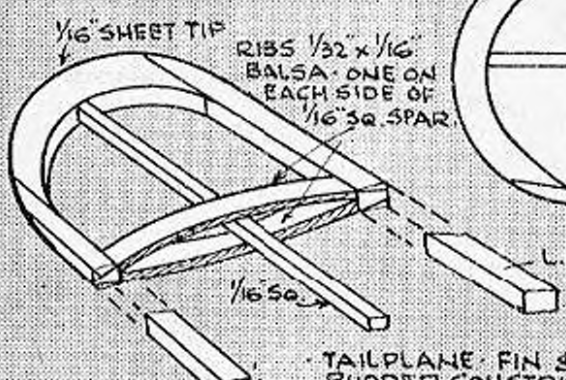


·SKETCH OF WING CENTRE SECTION·

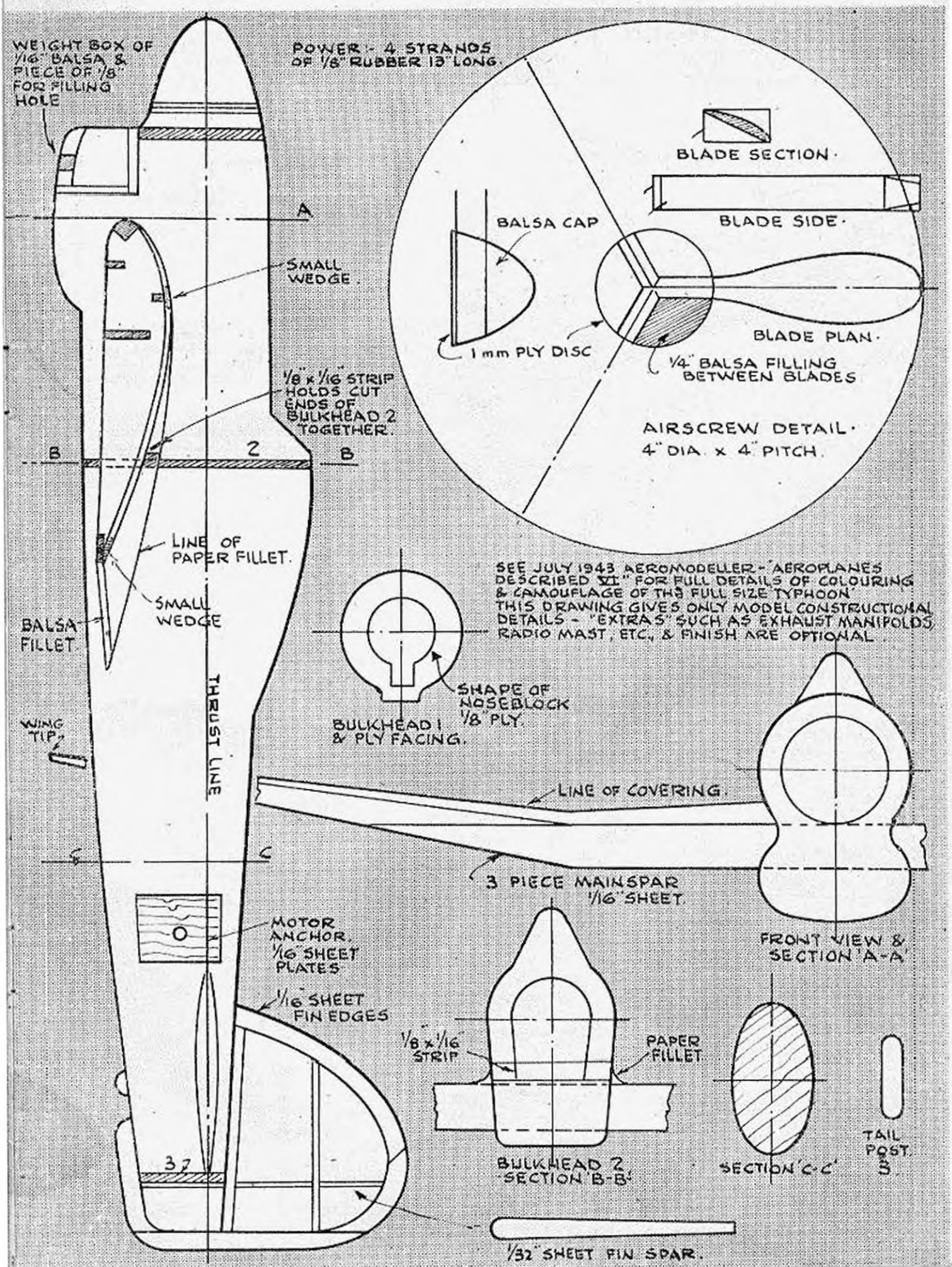
COVER WINGS, FIN & RUDDER JAP TISSUE AFTER FITTING TO FUSELAGE, BUT TAILPLANE BEFORE-HAND - SPRAY WITH WATER & WHEN DRY GIVE ONE COAT OF DOPE THEN TWO OF CAMOUFLAGE COLOURS.

3/32" DOWEL

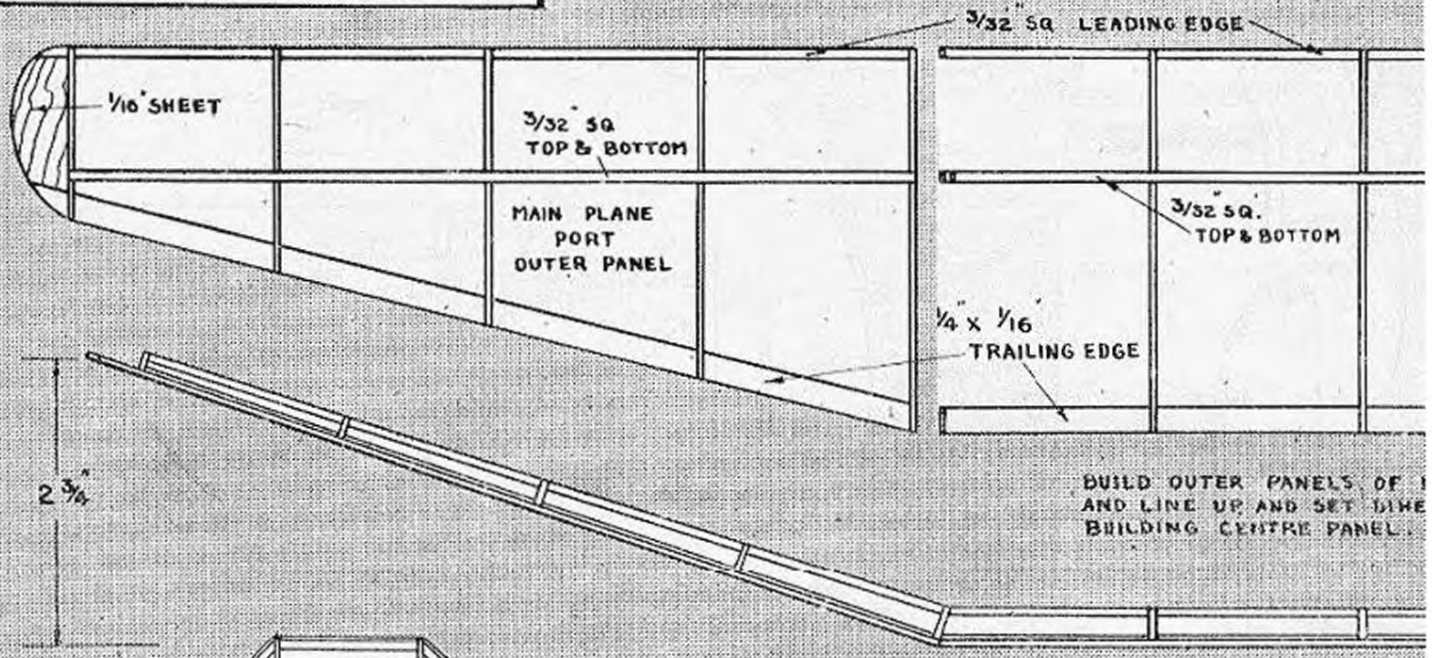
NO UNDERCARRIAGE WAS FITTED ON THE ORIGINAL, BUT IT IS ADVISABLE TO FIT ONE FOR INDOOR & ROUND THE POLE FLYING.

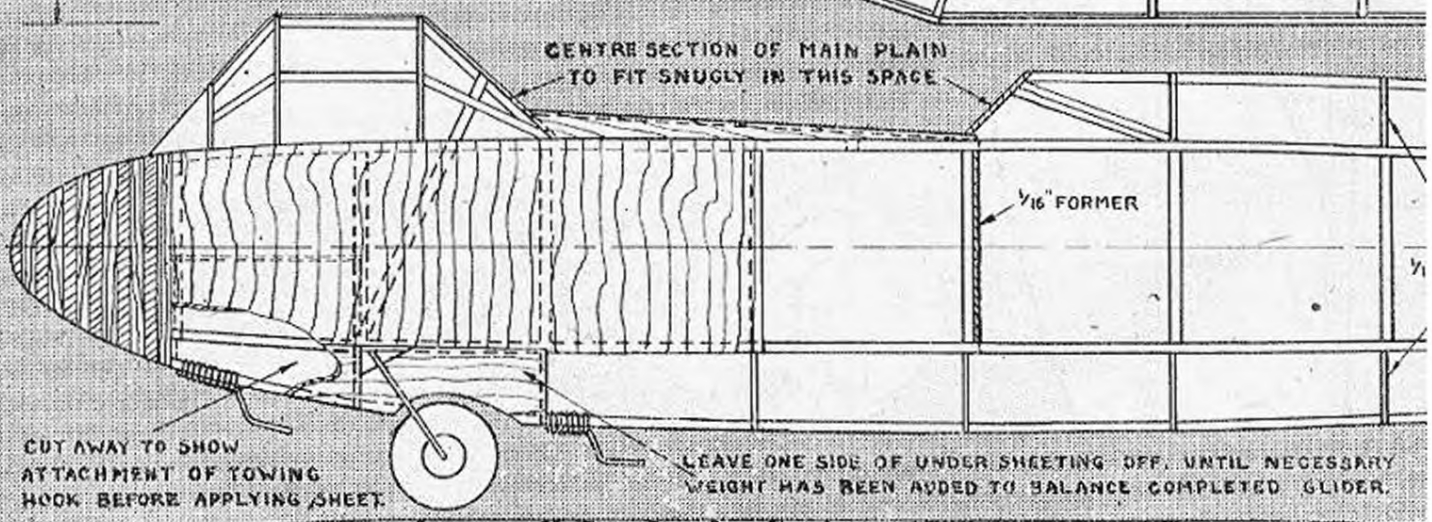


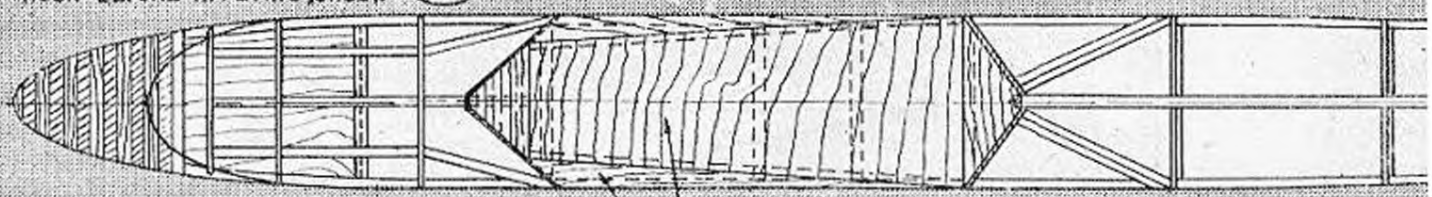
·TAILPLANE· FIN & RUDDER CONSTRUCTION.


WEIGHT BOX OF 1/16" BALSA & PIECE OF 1/8" FOR FILLING HOLE
POWER - 4 STRANDS OF 1/8" RUBBER 13" LONG.
BLADE SECTION.
BLADE SIDE.
BALSA CAP
BLADE PLAN.
1 mm PLY DISC
1/4" BALSA FILLING BETWEEN BLADES
AIRSCREW DETAIL.
4" DIA. x 4" PITCH.
A
SMALL WEDGE.
1/8" x 1/16" STRIP HOLDS CUT ENDS OF BULKHEAD 2 TOGETHER.
B
2
B
LINE OF PAPER FILLET.
SMALL WEDGE
BALSA FILLET.
SEE JULY 1943 AEROMODELLER - "AEROPLANES DESCRIBED VII" FOR FULL DETAILS OF COLOURING & CAMOUFLAGE OF THIS FULL SIZE TYPHOON
THIS DRAWING GIVES ONLY MODEL CONSTRUCTIONAL DETAILS - "EXTRAS" SUCH AS EXHAUST MANIPOLDS, RADIO MAST, ETC., & FINISH ARE OPTIONAL.
SHAPE OF NOSEBLOCK 1/8" PLY.
BULKHEAD 1 & PLY FACING.
WING TIP.
THRUST LINE
LINE OF COVERING.
C
C
3 PIECE MAINSPAR 1/16" SHEET.
MOTOR ANCHOR. 1/16" SHEET PLATES
FRONT VIEW & SECTION 'A-A'
1/16 SHEET FIN EDGES
1/8" x 1/16" STRIP
PAPER FILLET
BULKHEAD 2. SECTION 'B-B'
SECTION 'C-C'
TAIL POST. S.
1/32" SHEET FIN SPAR.

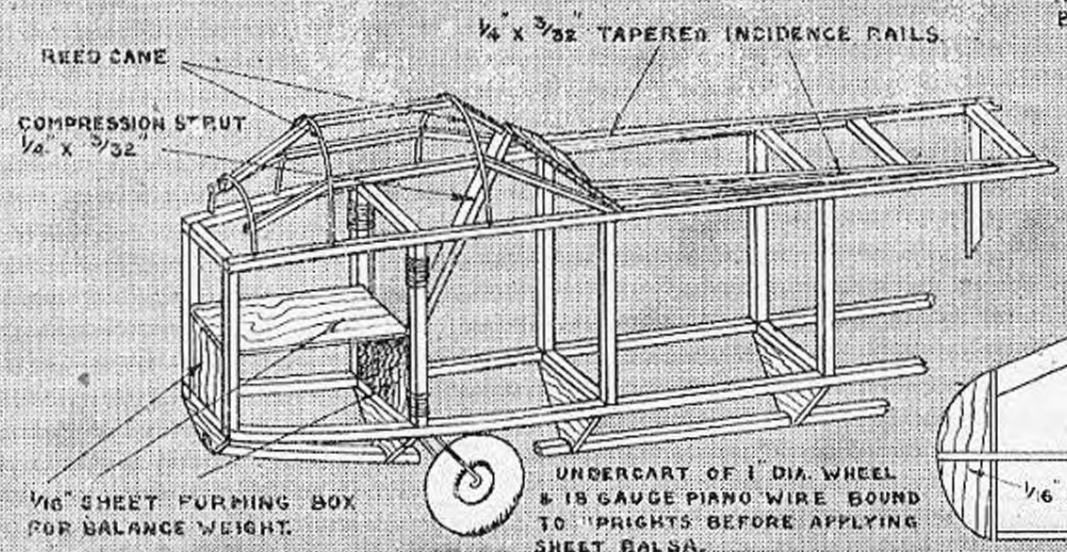
THE CHALLENGER.



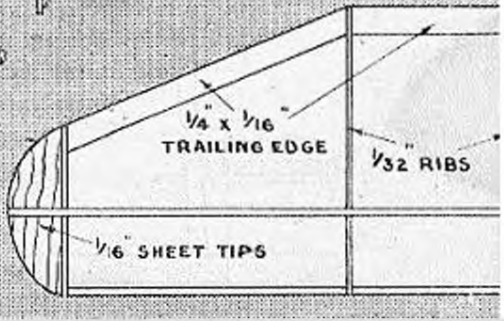




FUSELAGE BUILT AS AN ORDINA
AND 3/32 SQ. STRINGERS ARE T
BEFORE 1/8" LAMINATIONS FO



FULL SIZE



1/16" TRIANGULAR FORMER

3/32" SQ.

1/16" TRIANGULAR FORMER

FAIRING ON CENTRE SECTION BUILT UP AFTER APPLYING 1/32" SHEET TOP & BOTTOM. THIS OPERATION IS BEST COMPLETED WITH WING IN POSITION ON FUSELAGE TO ENSURE FAIRING LINING UP WITH FUSELAGE.

PLANE FIRST, ANGLE WHEN

1/16" SHEET.

1/16" RIBS

FULL SIZE WING RIB

3/32" SQ.

1/4" x 1/16"

3/32" SQ.

1/32" SHEET

PLATFORM FOR TAIL PLANE

1/16" SHEET

MERS

1/16" ROUND BAMBOO

BUILD FIN AS A SEPARATE UNIT. SPAR TO EXTEND 1 1/4" BEYOND LOWER RIB. CEMENT FIN TO 1/32" SHEET PLATFORM, SPAR EXTENSION PASSING THROUGH SUITABLE HOLE IN PLATFORM AND CEMENTED TOP & BOTTOM.

FULL SIZE FIN RIB.

SLAB SIDER FROM 3/32" SQ. BALSA, TRIANGULAR FORMERS ADDED. FORWARD SHEETING SHOULD BE APPLIED SE BLOCK TO ENSURE A CLEAN FINISH WHEN SANDING TO SHAPE.

L RIB.

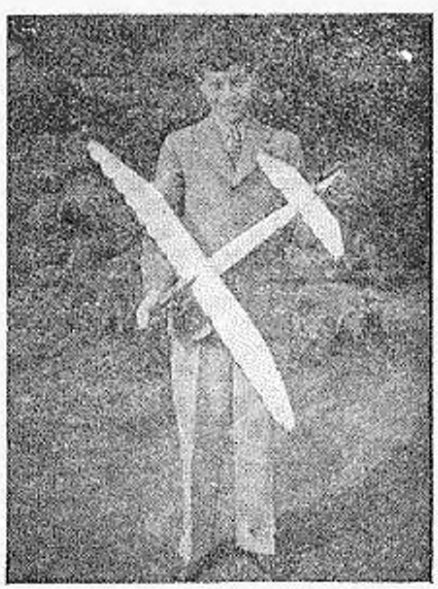
METHOD OF BUILDING TIP.

TAIL PLANE.

1/32" SHEET TOP AND BOTTOM

1/16" SQ. TOP & BOTTOM

3/32" x 1/16" LEADING EDGE



Michael Russell, aged 13, designer and builder of "The Challenger." The above drawing is ¼ full size.

THE DE HAVILLAND 83 FOX MOTH

By E. J. RIDING

Classed as a five seater commercial and feeder line aeroplane, the De Havilland " Fox Moth " was designed by Mr. A. E. Hagg of the D.H. Company for his own family use and was put into production during the middle of 1932.

The D.H. 83 distinguished itself early in its career by winning the 1932 Kings Cup Race. The winning machine, G-ABUT, entered by A. E. Hagg and piloted by W. L. Hope averaged 124.13 m.p.h. over the course and completely baffled the slide rule experts who worked out its handicap. Thereafter, the history of the D.H.83 has been connected mainly with commercial flying with the exception of one last fling in 1934, when G-ACSW, entered and flown by H.F. Broadbent secured eighth place in the Kings Cup of that year at an average speed of 121.05 m.p.h.

Various companies have used the 83 for feeder line services and joy-riding, notably Hillman Airways, Portsmouth, Southsea and Isle of Wight Air Services, West Coast Air Services and Giro Aviation Company. At the outbreak of war it was still being used extensively for pleasure flights by small firms up and down the country and, of course, by most of the touring " circuses " since 1932.

The " Fox Moth " was to have been used by the Houston Everest Expedition in 1933 for light transport work between their base and Calcutta but it was unfortunately completely wrecked during a gale at Allahabad. The machine bore the registration letters G-ACCS.

Another machine was delivered to the Duke of Windsor when he was Prince of Wales. It was equipped with wireless, painted in the colours of the Household Brigade (Royal Blue and Dark Red) and was registered in Great Britain.

About 91 " Fox Moths " were built, 48 being registered in Great Britain and the rest sold abroad. The first batch of machines were registered G-ABUO, G-ABUP, G-ABUT, G-ABVI, J and K. 'UO was fitted with skis and sold to Canadian Airways Ltd. in 1933, 'UP was wrecked on a touring display in 1932, 'VI and 'VJ were both destroyed by fires on the ground and 'VK and 'UT were impressed at the outbreak of war for duties with the R.A.F. G-ABUT will be remembered by those who visited Croydon before the war as being operated by Surrey Flying Services for 5/- circuits. Altogether about ten 83's were impressed into the R.A.F. at the beginning of the war for various light transport duties.

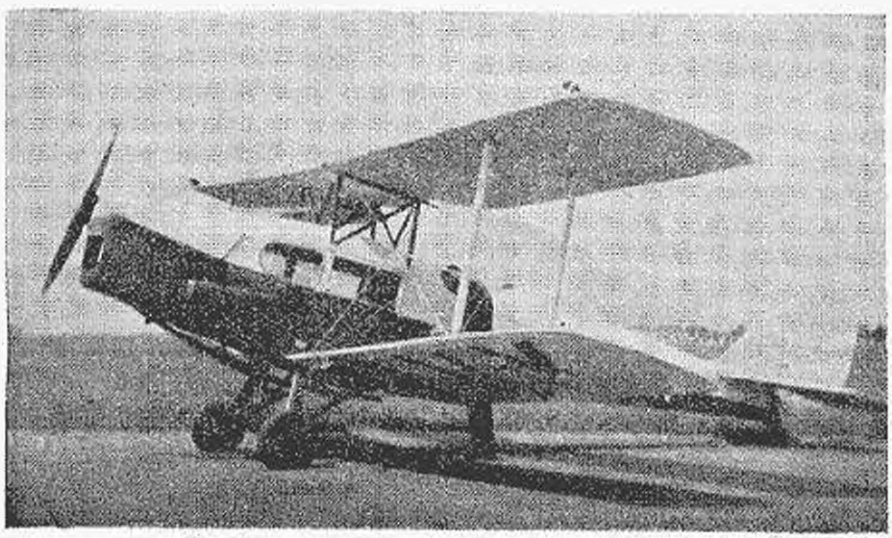
As mentioned above, the " Fox Moth " was a five seater cabin biplane, the passengers being accomodated in an enclosed cabin between the wings and seated side by side in pairs facing each other. The pilots cockpit was situated behind the cabin and communication with the other occupants was made possible by means of a small aperture in the rear wall of the cabin.

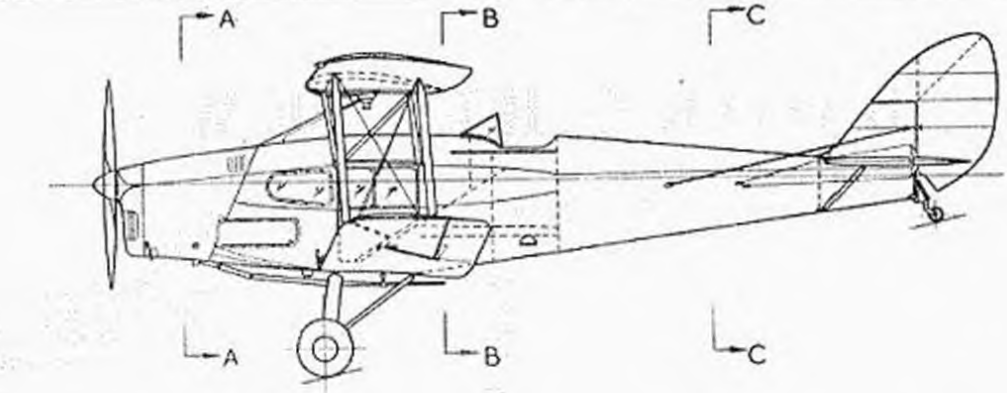
The first machines were fitted with the 120 h.p. four cylinder, in line, air cooled D.H. " Gipsy III " engine, but later models were fitted with the standard 130 h.p. " Gipsy Major."

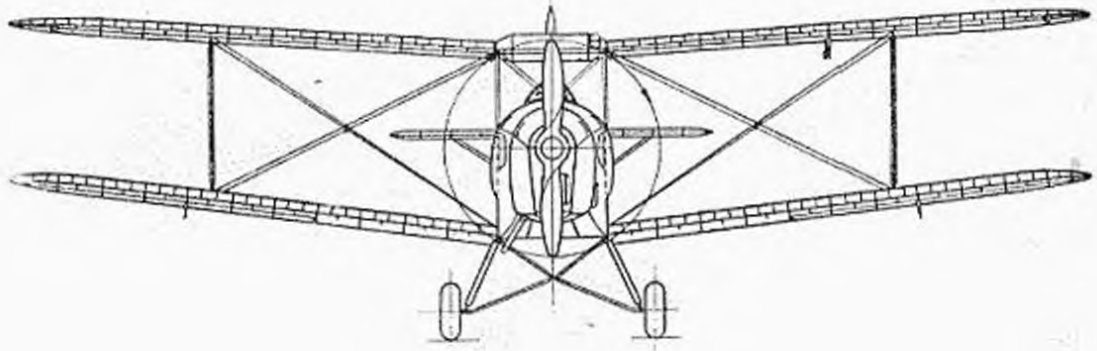
In accordance with usual De Havilland practice, the fuselage was of plywood box construction with spruce longerons and cross members. The wings and tail surfaces were practically identical with those of the " Tiger Moth," the lower planes being modified to enable them to be folded. The wing spars were made from spindled 'I' sections of the same material. Wings and tail surfaces were fabric covered. The undercarriage was also similar to that of the " Tiger Moth," shocks being absorbed by rubber blocks in compression. Shock legs and radius rods all interchangeable.

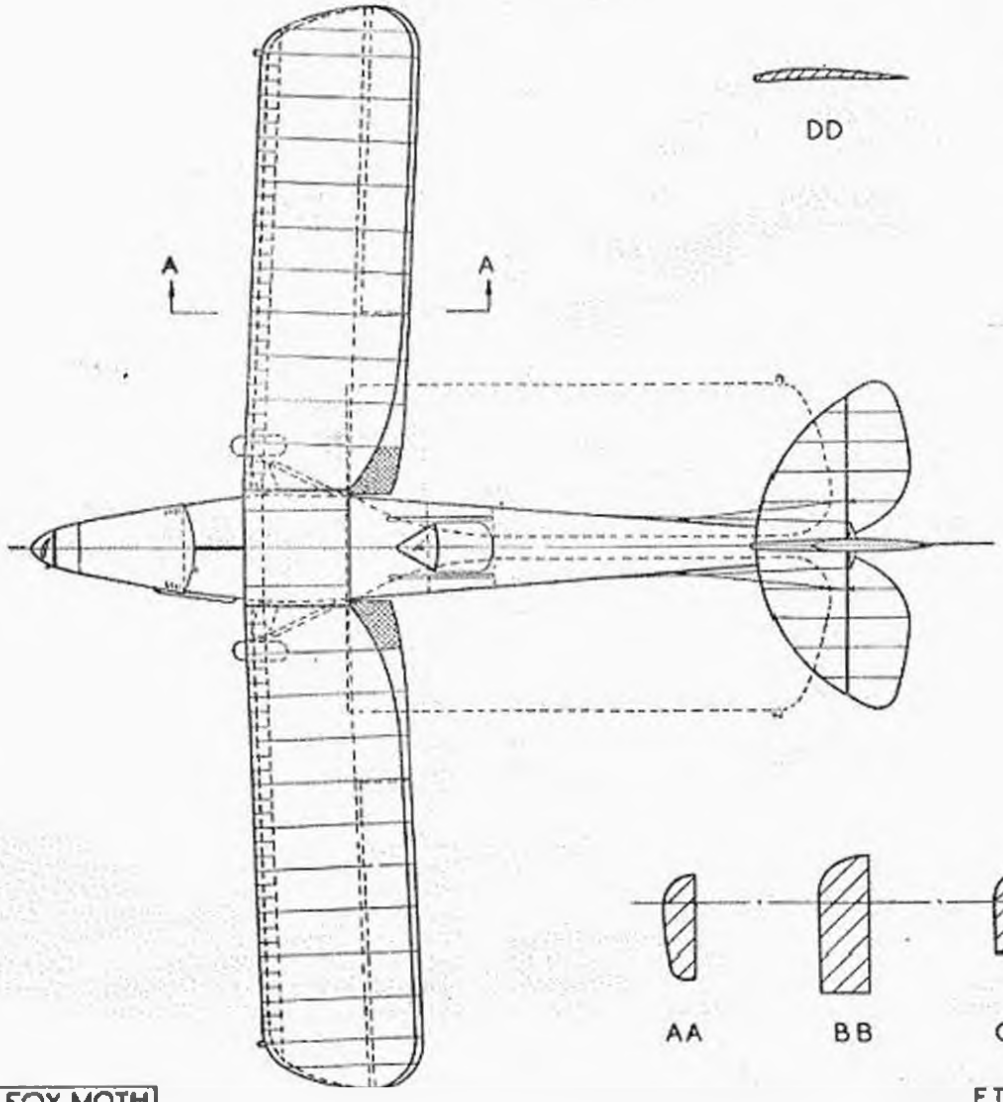
Specification.

Span 30 feet 10 inches. Length 25 feet 9 inches. Chord 1 feet 4 inches. Tailplane Span 9 feet 6 inches. Wing Area 239 square feet. Weight Empty 1,050 lbs. Loaded 2,050 lbs. Tankage : 25 galls in centre section. Duration 4 hours. Max. Speed 120 m.p.h. Landing Speed 40 m.p.h.









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DE HAVILLAND 83 FOX MOTH

FT

BOOK REVIEW

By "D. B. M."

SIMPLE AERODYNAMICS.

By A. H. SMITH.

Price 3/- or 3/4½ post free. ***Harborough.**

The study of aerodynamics, if it is to reach the standard of present day knowledge, is a subject full of pitfalls to trap the shortsighted, or perhaps, unknowledgeable student. The would-be designer must, before he begins on the long course of learning, ask himself one imperative question. Is he a natural mathematician? If the answer is yes, all is well; if no, then he must be prepared to acquire a high standard of mathematics, for without this knowledge and ability he will be lost. The days when the Wright Brothers built a glider of silk, timber and wire, in a shed in the garden and finding that it would fly, decided to install an engine, are gone. How like the Wright Brothers are many young, enthusiastic modellers. They design and build models that fly, and fly well. Their machines win competitions and bring them fame in the modelling world; it seems but a short step to the design of full size aircraft.

That the design and construction of flying model aircraft has been the grounding school for many of our present-day designers is beyond dispute, but unlike the present day modeller they were trained in the hard way, by trial and error. They had no carefully compiled books to guide them. The modeller of to-day is much more fortunate. He may, for the outlay of a few shillings, acquire well written books dealing with the problems of basic aerodynamics.

SIMPLE AERODYNAMICS is one of these books.

The Author, Mr. A. H. Smith, is a well known, practical aero-modeller and he has the ability to put down on paper, in concise and easily understandable form, the problems of aerodynamics as they apply to flying models. Let it not be thought however,, that this book will only be of use to the modeller, for it deals with the basic facts of the phenonenum of flight and provides a useful stepping stone for the intending " full size " designer.

From the first chapter, appropriately entitled " First Things First," the Author takes the reader through an intelligent course of instruction in aerodynamic forces, airflow, wing form, parasite drag, control surfaces, stability and performance. The concluding chapters deal with airscrews, rubber-driven models and model data in general. After each chapter is a list of questions, the answers appearing at the end of the book. This feature is wise for it is very easy to read straight through a work of this kind without really absorbing the information given; if, however, the reader is honest with himself and does proceed until he can correctly answer the questions, he will, without doubt, obtain a thorough grounding in Theory of Flight.

One point worthy of special mention is the inclusion of graphs showing characteristic curves of various aerofoil sections. It is only recently that wind tunnel tests at Reynolds Numbers at anything like the low figures required for model work have been made. Now it is possible for the modeller to obtain exact data concerning lift and drag coefficients, centre of pressure movement and deal with the problems of scale effect, so that model designing at last comes into it's own, rivalled only by full-sized work.

Finally, to touch for a moment on the question of mathematics again, SIMPLE AERODYNAMICS contains quite a fair sprinkling of formulae and the reader is assumed to possess an elementary knowledge of Algebra and Trigonometry. This should not, however, deter the non-mathematically minded for the examples given by no means call for the application of the proverbial ice pack. In fact, this work will more than justify a place on the bookshelf of the enthusiastic modeller or student of aerodynamics.

★ ★ ★

AIR TRANSPORT & CIVIL AVIATION YEAR BOOK.

Price 10/6. **†Todd.**

The Air Transport and Civil Aviation Year Book comes at a most appropriate time. The lack of stated Government policy and the almost total absence of British transport aircraft make it fairly obvious,as things stand at the moment, that we will not be able to compete with the Americans when the war ends. Britain has had, of necessity, to devote her activities to the designing and building of purely fighting aircraft, and in this sphere she leads the World. Unfortunately bombers built for fighting never have and never will make suitable conversions for air line operations. America, on the other hand, is devoting approximately one third of her production to troops transport. To do this she has merely had to convert her already well developed air line aircraft designs for military use. Consequently she will, at the end, of hostilities, be in a very strong position as regards immediate air line operation. Whether Britain has now reached a stage in her conduct of the war when serious consideration may be given to the problems of post-war air transport, is a question that cannot be answered by the man in the street.

But the man in the street can, and should, acquaint himself with the International problem of air transport that will have to be dealt with if Britain is to take her rightful place in Future Civil Aviation.

It is important, therefore, that AIR TRANSPORT AND CIVIL AVIATION YEAR BOOK, should be widely read. The book is divided into seven sections. The first deals with the views and suggestions of a number of eminent persons actively associated with aeronautical affairs. Not unnaturally, views as to future policy differ fairly widely, but the reader cannot fail to be impressed with the urgency of the matter, not only from the point of view of economics but also of prestige.

The second section gives a summary of official memoranda and statement of policy and the third details of three transport committees. Section four gives the reader a summary of the principal air transport companies and section five, a list of air transport companies of the World. Section six contains an alphabetical air guide. The last section, seven, deals with distances between airports and town centres,.

The future of training in aeronautical subjects is given some prominence. The importance of such training should not need emphasing, but it is surprising how little attention has been given in the past to this matter. In fact there is a grave shortage already of qualified technicians available to the Industry.

From the aero-modeller's point of view the YEAR BOOK may appear to be rather heavy going in parts. But the aero-modeller of to-day is the potential designer and technician of the future. He is also the future voter and as such he bears a heavy responsibility. Every aero-modeller, or, in fact, everyone who takes an intelligent interest in aviation matters, should read this book, for the views and plans of the writers will undoubtedly form the basis of Britains future policy in the air.

NOMOGRAPHS.

By R. H. WARRING.

Price 2/- or 2/2½ post free. ***Harborough.**

The word "Nomograph" probably means absolutely nothing to the average aero-modeller. It did'nt to me until I produced my Chambers dictionary and even then I could only find "Nomography," which, I gather, is the name given to the art of Drawing up Laws in the Proper Form. A "Nomographer" is one versed in this Art. The word "Nomograph" is not given in Chambers but it is quite simple to apply it to "Laws Drawn up in Proper Form," and this is exactly what the book contains. To describe this work as being invaluable to modellers is to badly underestimate it's worth. I am not one of those fortunate people who were born with silver slide rules in their mouths, or even of humble celluloid, come to that; I have learnt, through bitter experience that there is no short cut to the acquiring of mathematical knowledge and advertisements that tell me I can be the envy of my friends in three months leave me cold. Having thus achieved the age of wisdom, so to speak, I was considerably shaken when first introduced to NOMOGRAPHS. I have found that the calculation of such terrors of model design as Velocity and Stalling Speed, Lift, Wing Drag, Parasite Drag, Induced Effects, L/D Ratio and Gliding angle, Horse Power required and Horse Power available, Rate of Climb, Reynolds Number, and even that horrible Airscrew Design Factor "J", merely required the simple handling of a ruler, for instant solution.

It is not easy to describe in few words just how the charts are worked, but if, for instance, the model's wing loading is required you turn to Nomograph No. 1. There you find three vertical scales. On the left is the wing area in square inches, on the right the weight in ounces. In the centre is the wing loading in ounces per square foot. All one has to do is connect the wing area and weight by means of a straight edge and read off from the centre scale, where the rule cuts it, the wing loading. Having achieved this figure it is a simple matter to find the velocity from Nomograph No. 2, by substituting the wing loading in the appropriate scale, and carrying out exactly the same procedure. There is nothing more to it than this! It is not necessary for the modeller to be a mathematician for the successful solving of most of the problems connected with model design, and I can do no more than thoroughly recommend this book.

★ ★ ★

SOLID SCALE MODEL AIRCRAFT.

By. J. H. ELWELL.

Price 4/- or 4/4½ post free. ***Harborough.**

The importance of scale model aircraft cannot be underestimated in the light of present circumstances. This particular aspect of the hobby has always had its fair quota of enthusiasts, but to-day, when so much attention is given to aircraft recognition, the value of well built and accurately detailed scale models is immeasurable. That this is borne out by fact is shown by the authorisation of materials now in short supply, for kits of parts for the construction of solid scale models.

The subject is covered thoroughly by the Author who proceeds from the basic principals solid modelling, through details of tools required, suitable materials, and various methods of construction, to work of exhibition standard. A chapter is devoted to painting, lettering, marking and finishing, which are so important to the correct appearance of the finished model.

One of the most noteworthy features of the book is the abundance of really first-class photographs. For the most part they are untouched and it is often hard to tell whether the subject is a model or the real thing. Photography of models is dealt with at some length, the reader being shown how to, quite simply, construct most effective backgrounds. One feels that there many amateur photographers who would learn quite a lot from a study of this particular chapter.

Having given the reader a sound course in instruction in the art of successful solid modelling, the Author presents a number of scale plans and full working instructions for building replicas of the Supermarine "Spitfire," the Hawker "Hurricane," the Boulton Paul "Defiant" and the Heinkel He 111K Mk 5A. If the reader constructs this "stable" his enthusiasm will undoubtedly be fired and it is a safe guess that he will join the ever increasing ranks of Solid Scale Modellers.

★ ★ ★

ELEMENTARY HANDBOOK OF AIRCRAFT ENGINES.

A. W. JUDGE, A.R.C.Sc., D.I.C., Wh.sc., A.M.I.A.E., Assoc F.R.AGS.

Price 12|6 nett. **††Chapman & Hall Ltd.**

Mr. Judge's book fulfils a long felt want and being reasonably priced will undoubtedly be eagerly sought after by R.A.F. personnel and members of the A.T.C., quite apart from those in firms now building aircraft engines. The Author is, of course, well known for his more advanced books dealing with aero engine construction and design, but unlike so many "experts" he is more than capable of handling a subject in its more elementary aspect. The reader is first introduced to general considerations appertaining to the aircraft engine. These include an interesting survey of early engines, special requirements for the modern aero engine and various types in use at the present time. The two and four cycle and compression ignition engines are then described.

Carburetion and supercharging are comprehensively covered and the Author goes into detail in his description of various types of fuel. The importance of using the correct grade of fuel for a given compression ratio to give maximum efficiency is a matter which, in these days of pool petrol, is likely to be treated with a certain amount of indifference by the average man having "owner-driver" knowledge of petrol engines, is brought home very forcibly to the keen student.

Separate chapters are devoted to Cooling, Engine Components, Types of engines, Lubrication and Ignition. The last chapter deals with Starting, Testing and Maintenance. Useful engine formulae and information, as well as a comprehensive list of British aircraft engines make up an interesting appendix. Against each engine are details of the number and arrangement of cylinders, method of cooling, bore and stroke, capacity, reduction gear ratio, compression ratio, altitude, engine speed and power for International and maximum altitude ratings, take off power and dry weight. This is indeed a wealth of information.

As the title suggests this work should be treated as a handbook for reference. He would be a clever man who could read through and honestly say he had absorbed the contents, but the reader who wishes to learn about aero engines will undoubtedly do so if he proceeds, chapter by chapter, giving each careful study. Here is the difference between the Learn-All-About-Aero-Engines-In-One-Hour type of publication and the work of this most competent author. The information given by Mr. Judge may be absorbed with confidence by the prospective R.A.F. fitter and one has no hesitation in recommending AIRCRAFT ENGINES as a standard elementary text book for the A.T.C. present or intending Service fitters, or members of civilian concerns either manufacturing or handling aircraft engines.

★ ★ ★

AIRSCREWS FOR THE AEROMODELLER.

By R. H. WARRING.

Price 2|- or 2|2½ post free. ***Harborough.**

The design of airscrews is a matter that, I think it is safe to say, has not been gone into very fully by the majority of

aero-modellers, probably because the subject becomes very complicated in its more advanced stages. It is, after all quite a simple matter to carve, more or less by "eye," an airscrew that will give a model quite a satisfactory performance. Most of the old hands know from experience just what type of airscrew will give their "Super Wakefield" its best performance. Newcomers to the game graduate from semi-finished blanks, until they gain the necessary experience to deal with the matter from scratch.

AIRSCREWS could not be described as a work suitable for the beginner, for it goes into the technical aspect of airscrew design fairly deeply. But to the more advanced aero-modeller, who takes his design seriously, the book should prove of immense value. The Author begins by going pretty thoroughly into blade theory and the reader, having digested this, is left with the feeling that to just "carve" his airscrew is a waste of time. If he has given the matter very little previous thought he will probably be somewhat astonished that he obtained even reasonable performance from his models. The immediate problem is how to apply the theory he has absorbed to practical application. Mr. Warring then shows how this should be done.

The practical side to the book deals with the various considerations in laying out an airscrew design and as an example, a typical Wakefield model is used. Having got the proposed airscrew on paper the reader is taken through the various stages and intricicies of carving. Balancing, a ticklish job with multi-blade airscrews, is followed by a description of blade finishes.

The petrol modeller need not feel that he has not been catered for as the theories and practices described apply equally to either rubber or power-driven airscrews and considerable space is devoted to the latter.

The Author not only knows his subject, but is able to pass his knowledge on in print, so that it is not surprising to learn that AIRSCREWS, the first book of its kind in the world of model aeronautical publications, has been well received.

★ ★ ★

ASTRONOME FOR AIR CADETS.

By C. J. GRIMWOOD, B.Sc. (Eng.)

Price 1/6. ****George Allen & Unwin Ltd.**

Taking the form of a single sheet folder the Astronome consists of a number of printed parts to be cut out, stuck on to cardboard or thin card, assembled according to the most comprehensive instructions and formed into a spherical stellar chart. The constructor will need nimble fingers and an agile brain, but knowing the ability and keenness of the average A.T.C. lad and having seen how he can deal with comparatively complicated model aeroplane plans, one feels that a large number of ASTRONOMES will grace the piano, to the complete bewilderment of proud parents.

When the builder has successfully completed the model he will be able, amongst other things, to tell the time by the stars, learn star formations as they appear at various times in the year, and carry out a number of interesting astro navigation exercises.

★ ★ ★

MODEL AIRCRAFT PETROL ENGINES.

By J. F. P. FORSTER, M.R.E.S. (Eng.), L.R.C.P (Lond.)

Price 3/- or 3/3 post free. ***Harborough.**

It is practically impossible to buy or obtain, by fair means or foul, a model aircraft petrol engine at the present time. Nevertheless, the Author and the Publishers have decided to present MODEL AIRCRAFT PETROL ENGINES, and without doubt, the work will be more than appreciated by enthusiastic modellers, even though there is an official ban on the flying of power driven model aircraft.

Quite apart from model aeroplanes there are many engine owners turning their attention to model race cars for there is no ban to be worried about in this connection, so that engines may be run to useful purpose. Miniature petrol engines may also be used for driving racing model boats without incurring the displeasure of the Powers that Be. Consequently this book will prove of extreme interest to all engine owners, whatever particular aspect of modelling their interest lies in.

The Author, an active aeromodeller, is something of an authority on miniature petrol engines. He owns, and has flown, a large number of different makes and types. His experience has prompted him to make some interesting comments on the design, workmanship and purpose of engines intended for British flying conditions. Before passing on to these, however, it might be as well to give the reader some idea of what he may expect the book to tell him.

Although containing only eighty seven pages the Author manages to put forth a wealth of information covering general principals and descriptions of various types of engines, methods of mounting, cowling considerations, operation and management in the field, and, most important, engine maintenance. There are also three appendices giving the Author's ideas as to the most suitable layout and design for the ideal engine, a list of American engines with particulars as to piston displacement, and weight, and comparative data on twenty-eight different engines that have appeared in Great Britain.

Dr. Forster has some very definite and well formed ideas on the future design and construction of miniature petrol engines. (I used the word "miniature" rather than "model," purposely, because there are so many people to whom model means toy and I fail to see how these little engines, which are quite capable of running at speeds around ten to twelve thousand revolutions per minute and producing considerable fractions of horse power, can possibly be classified as toys!). To use the Author's own expression, he feels that he has a "mission." It is to improve the breed of British made engines. He points out that in the past those best qualified to turn out really good engines were seldom practical modellers, while the aero-modellers were seldom sound engineers, talking, of course, from the engine point of view. America has certainly left Britain well behind in development and production of miniature two-stroke engines, but Mr. Forster maintains that British workmanship, being the best in the World, is more than capable of remedying this rather sad state of affairs when the war is over. His book is without doubt, a firm step in the right direction.

A number of excellent photographs of engines and components and some well drawn diagrams complete a very interesting and instructive little volume.

* **HARBOROUGH PUBLISHING Co., Ltd.**
Allen House, Newarke Street, Leicester.

** **GEORGE ALLEN & UNWIN Ltd.**
40, Museum Street, W.C. 1.

† **TODD PUBLISHING Co., Ltd.**
Temple Chambers, Temple Avenue, E.C. 4.

†† **CHAPMAN & HALL, Ltd.**
11, Henrietta Street, W.C. 2.

AN ALTERNATIVE METHOD OF MAKING AIR WHEELS

By P. E. NORMAN.

Having read Mr. Cox's excellent article on making air wheels, I decided to try some myself, but thought I would make some slightly smaller and lighter ones.

The Tyre.

Obtain an inner tube of the 1½ inch size, and make sure that it is of the black rubber variety, as this gives by far the best results.

Cut off a 3 inch length, for each wheel. Slip one length on to a 1 inch diameter dowel (or hammer handle) having cleaned the tubing inside and out with petrol.

Punch a hole (I used a piece of sharpened 3/32 inch diam. brass tube) 3/8 inch from each end. See fig. 1.

Turn back one end for a distance of ¾ inch. Fig. 2.

Smear thoroughly with Dunlop Solution (use only this, as other brands are not nearly as strong), and bring back remaining portion of tube, ensuring that the holes come one over the other. (You can insert a screw head as Mr. Cox suggested, but I found this hardly necessary provided the operation is done before the solution becomes at all tacky. Leave to dry thoroughly; at least two days. Remove from dowel.

Incidentally, I find it best to "mass" produce, that is cut off several lengths and do the same operation, so that you have several tyres "under way" at once.

The Valve.

This unit is simplicity itself and is constructed as follows. Firstly look through your junk box and find some ¼ in diam. ball bearings.

Next, obtain a length of rubber covered flex, (this is about ¼ inch outside diameter), and withdraw the wire by cutting the rubber into 2 inch lengths and working if off the wire.

Now go to a wireless or electrical shop and obtain some rubber sleeves. These are short lengths of rubber of a slightly larger diameter than valve rubber., but slightly smaller than the ball bearing and are in ¼ in to ⅜ inch lengths.

Push a ball bearing into a sleeve, and then push a length of the rubber covering into the end of the sleeve, and join with Dunlop Solution. Cut a ¼ inch length of the rubber covering and leave one end rough or jagged. Insert this into the other end of the rubber sleeve, ensuring that the jagged end is inside next to the ball bearing, and join with solution.

(The reason for leaving the end jagged is so that it does not form a perfect seating for the ball).

Leave for a few minutes to set, and then test the valve by sucking the end of the tubing. The valve should stick to the tongue.

The Adapter.

This is a bicycle valve cut off where the little hole pierces the side, and smoothed off with a small file.

Push the Adapter into the end of the tubing, and give a few strokes of the bicycle pump, making sure that air is passing the ball and coming from the end of the valve.

Inserting the Valves.

Push a smooth stick or piece of ¼ inch diam. steel rod into the hole in the wheel and stretch sideways. Get someone to insert the valve into the stretched hole, so that it goes in up to the part indicated in Sketch Fig. 4.

Draw out the rod, and put rubber solution round the valve. Leave to set.

Give three or four strokes of the pump, and your tyre will turn itself inside out; when it does this make sure that the shape formed in the centre is an equilateral triangle.

I made the hubs in a similar way to Mr. Cox, except that instead of using ¼inch plywood I cut two discs of 1/32 in. plywood, 1¼ inch diam., and cemented them across grain to each other, and then cemented a disc of 1/16 inch balsa on to these, then sanded off to form a shallow cone.

The wheels are assembled as follows.

The brass tube with the nut or washer sweated on, is passed through one disc.

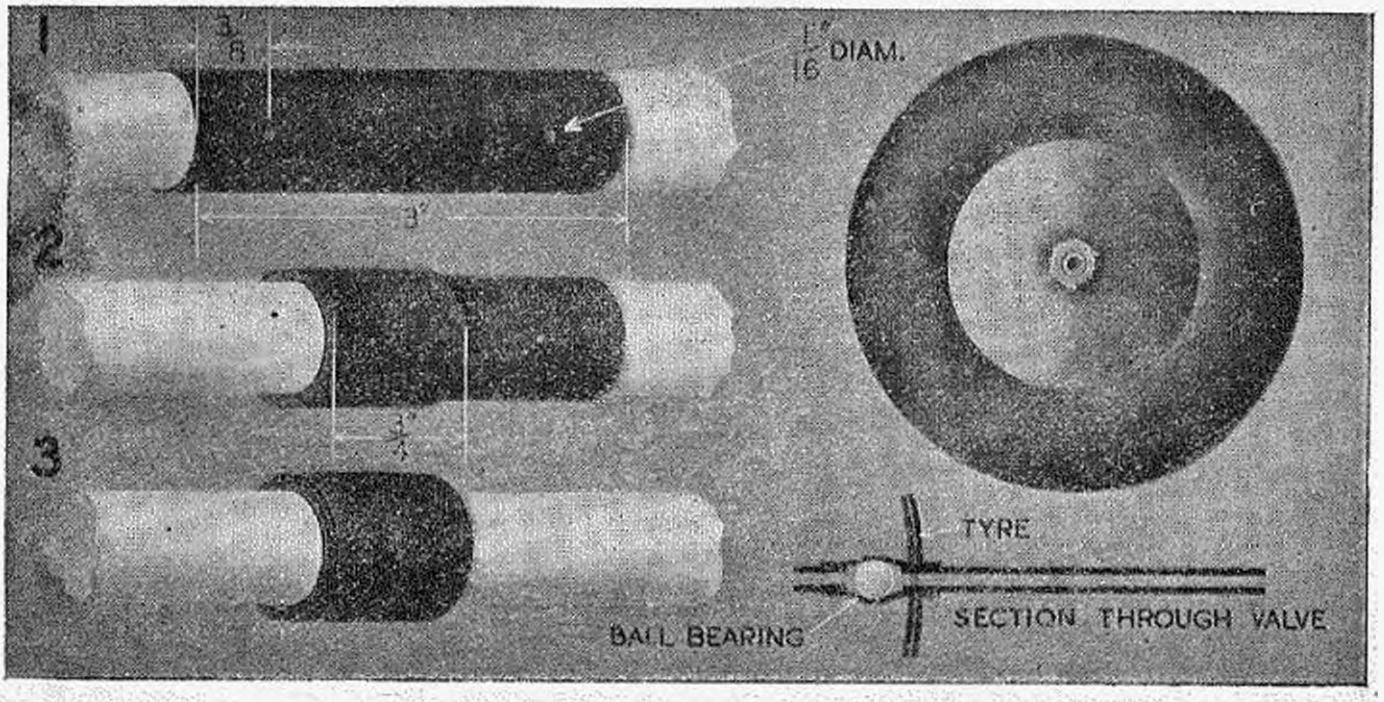
The air wheel is pushed on to tube.

Tyre is inflated to correct (or approximately ¼ inch diam. under correct) diameter.

The second disc is slipped on to tube and nut screwed up.

These air wheels are extremely light and will provide the sizes just under those of Mr. Cox.

Finally, I tried varying lengths of tube from 2¼ inch up to 3¼ inch and all gave satisfactory results.



SPITFIRE II

DESIGNED BY J. F. P. FORSTER

This special supplement is devoted entirely to the description of the two models shown on this page. Above is the Spitfire Mark II, designed by that well-known modeller, Dr. J. F. P. Forster. Built to ½ scale, it is the culmination of several years of experiment with "scale type" low-wing models. The model shown below is the work of another well-known practical modeller. The machine, a B.E.2.C., was used in the last war by the R.F.C. for reconnaissance work. The model is rubber-powered, and the designer and builder E. J. Riding.

B.E.2.C.

DESIGNED BY E. J. RIDING

SOLID SCALE MODEL MOTORS.

By S. B. S.

ARTICLE II.

THE BRISTOL PERSEUS.

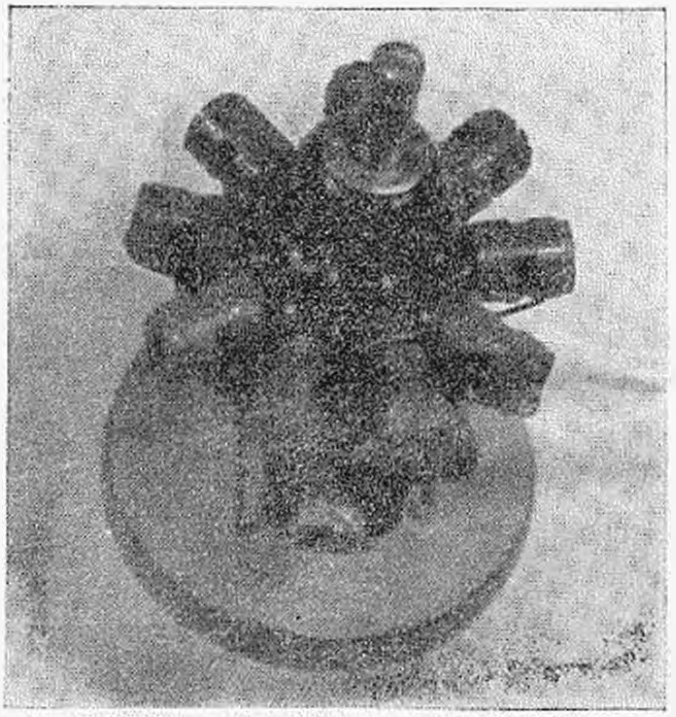
Before proceeding with the description of how this model is made a few facts concerning the original might be of interest.

It is a nine cylinder air cooled radial of 24.9 litres capacity, and according to my latest information the later editions are capable of producing well over 900 h.p. for take off. Owing to the time lag in releasing information, this figure may now be around the 1,000 h.p. mark. Being a sleeve valve job it has a remarkably clean frontal aspect, a point which assists in the modelling, and makes I believe an excellent subject on which to start the construction of miniature radial engines.

Planes on which it is to be found are, the Blackburn Botha I. The Blackburns Roc and Skua, the D.H. Flamingo, and our old friend, the Westland Lysander. So much for the type and it's uses, now for the model.

Three general arrangement drawings will be seen heading the list of parts. These have purposely been left incomplete, as the inclusion of all the cylinders on the side and rear views for instance, would have complicated them without providing any further assistance. They are drawn to the actual size of the model and should clearly indicate the position of every part.

Dealing with the separate pieces, A, the crankcase, is the first to tackle. This requires very careful workmanship in the making, and for my part I would suggest the use of hardwood,, The fretsaw is less likely to wander and a high finish can be easily affected. Take your time, and don't be disappointed if your first attempt looks like an egg. I've nearly 20 years experience with small tools, and I had to make three before I was satisfied. At each of the nine corners a tiny circle will be seen. These are very short lengths of common pin which are to simulate the bolt heads which hold the two valves of the actual crankcase together I put mine in after I had cut out the piece, but I would strongly advise you to mark them out when you are drawing the part on your piece of wood, and to drill them *before* you cut it out. You will find there is less risk of splitting the wood through working so near to the edges. In mine, the pins are about 3/32 inch long, and I drilled the holes with my patent pin drill. This consists of a pin with the taper point cut off, and then a point with a much less taper is applied by filing three flats with a very fine file. The whole being held in a pin chuck. This latter tool is most useful for holding the tiny crankcase pins whilst you file their visible ends nice and square. I pushed mine in almost flush when I came to fit them. Whilst on the subject of these pins, similar imitation bolts will be found in the gear housing. B., the relative position being moved round half a pitch when viewed from the front. These were fitted as before except that I left them sticking out a shade farther this time When finished they looked most effective. Pieces B, C and F should need little explanation. If you have a lathe the job's a picnic. I made mine by hand just to prove that the lathe is not essential. As before, take your time in cutting out with the fret saw, and use the finest file and/or sandpaper when dressing it.

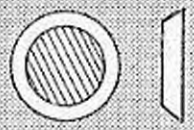


Piece C requires a hole drilling through the centre to take the airscrew shaft. Put this in before you commence to round off the nose of this part. S, the prop shaft, I made from a bright steel wire nail of slightly under ¼ inch diameter, and I drilled a 1/16 inch diameter hole down through the centre. My shaft is slightly oversize according to strict scale an 3/32 inch would be better. The nose is finished for by fitting a small washer over the shaft, and this I dabbed (with a centre punch) at the six points shown on the front view. It finishes it off.

Next I tackled the cylinders, and this I found the most ticklish part of the job. I tried out over a dozen different ways of simulating the fins and eventually settled on the method shown in the enlarged detail sketch. The foundation is made of 7 gauge knitting needle, the plastic variety. It cuts and drills easily and will not split like wood, and takes a superb finish. First a 1/16 inch diameter hole is drilled in one end, centrally, to a depth of the same amount. Then four radial cuts are made to half that depth; this to simulate the vertical finning on the top of the barrels. And next, the ports.

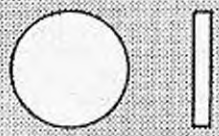
With nine cylinders for this model, and 14 for the Hercules which will be tackled later, I considered I had sufficient justification for making a jig. It was well worth the trouble. I used a 1 gauge needle, though something larger would be better, ⅜ inch or ½ inch diameter for preference. Into one end of this a 5/32 inch hole was drilled to a depth of ¼inch, the length of the finished cylinder. Then, at the angles shown on the drawing, three 1/16 diameter holes were run through to the centre holes from the outer walls of the jig. This is the ticklish bit as these port holes must be exactly half way along the length of the cylinders. Set your drill in the chuck so that it will just go through the jig and half way into the needle which you insert in the jig. If you do it right, and it might take one or two attempts before you get a perfect jig, you should have three ports ranging round the cylinder, all at the same distance from the end, and meeting in the centre. One more job before you start with the wire. The front ports must be filed to a D, and reverse D shape, the straight side of the D facing each other as seen in the enlarged detail. This is necessary as otherwise the wire would pile up at the centre holes and would look horrible. With a very thin triangular file I found it was only a few minutes work. Now for the finning. The Perseus barrel has about

PIECE A. (1).

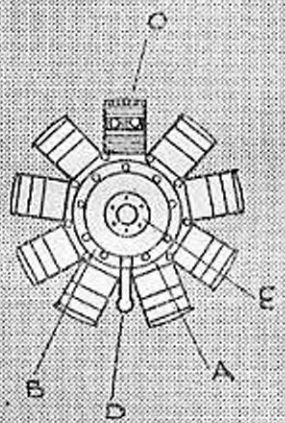


PIECE B. (1).

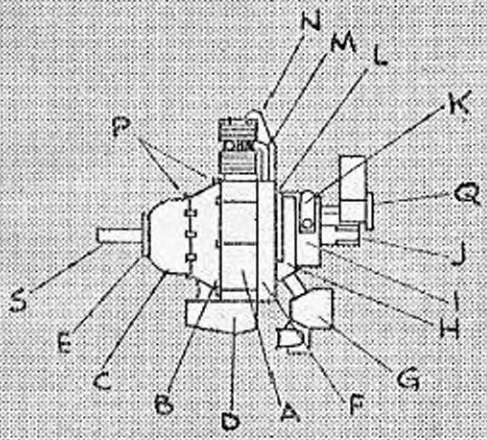
PIECE C. (1)



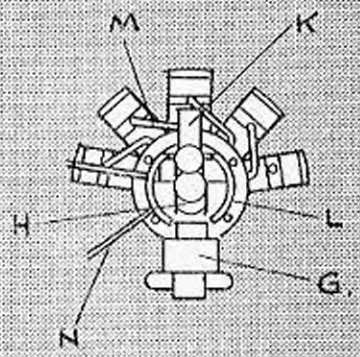
PIECE F. (1).



FRONT VIEW.



SIDE VIEW

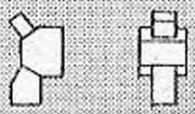


REAR VIEW.

BRISTOL PERSEUS.

PIECE H. (1).

PIECE I. (1).



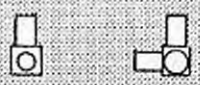
PIECE G. (1).

PIECES K (2)

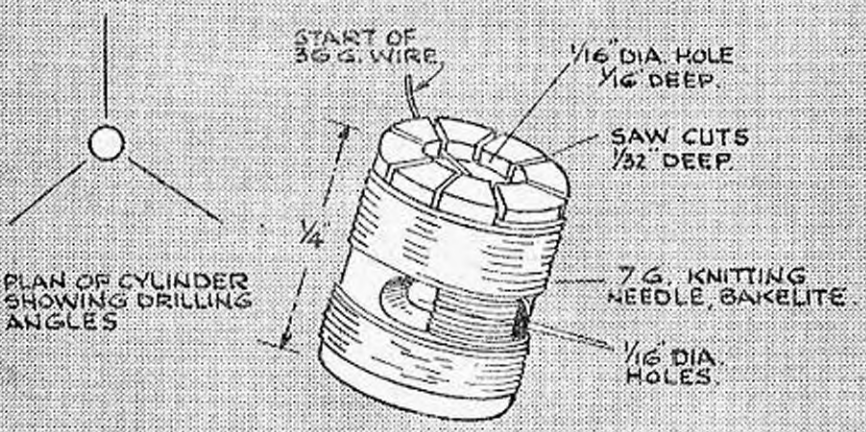
PIECE D (1).

PIECE J. (1).

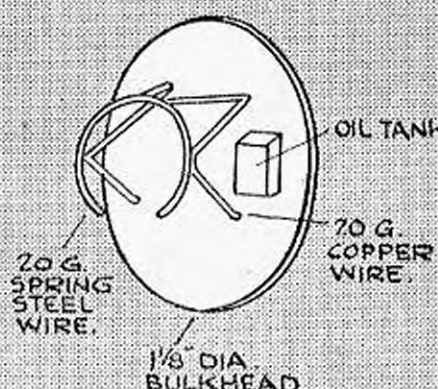
HOT AIR INTAKES. (2).



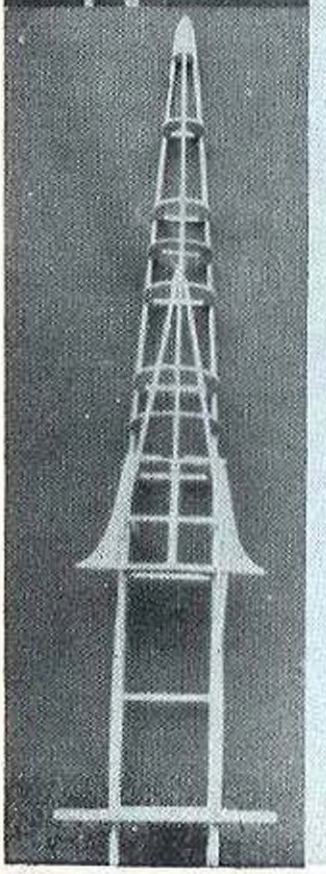
PIECE Q. (1).

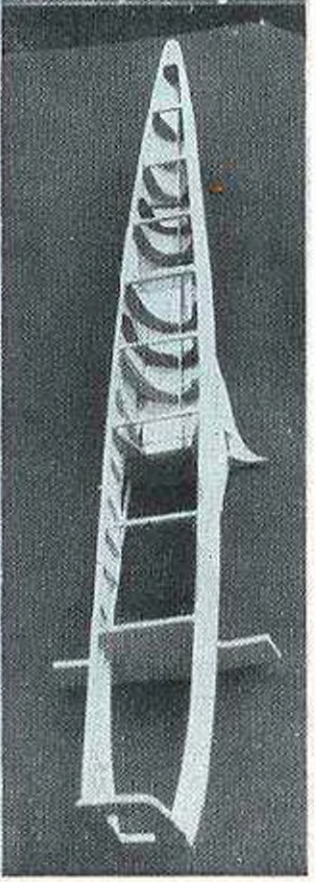


ENLARGED DETAIL OF CYLINDER CONSTRUCTION.



A practical FLYING SCALE PETROL MODEL





By J. F. P. FORSTER

WHEN deciding on a scale for a petrol model, convenient structural size (having regard to available sizes of material) and weight, and above all that elusive figure of *ultimate* wing loading which escapes even the mathematically inclined builder, all need consideration. Furthermore, with the present scarcity of engines, one is compelled to choose a scale which gives definite prospects of flight with an engine of given power already in one's possession. The structural weight of Scale Models is inevitably higher than that of equivalent-sized free lance freaks so commonly built before the war.

The weight of engine and accessories are about the only definitely known quantity, and the scale chosen must give an adequate wing area for a wing loading of well under 1 lb./sq. ft. after "guestimating" the structural weight, *plus* 50 *per cent.* Failure to add the 50 per cent. results almost invariably in a W.L. of 1 lb. or over! A light W.L. is, in the writer's opinion, very important in Scale Models in order:—

(a) to reduce landing speed, in spite of superb streamlining;
(b) to ensure as flat a glide as possible and consequently,
(c) to reduce risks of "nose-over" landings with the undercarriage in or near the full size position.

The fuselage of the Spitfire proves, on investigation to be a relatively enormous structure for the wing—a fact which is enhanced by the short span and Low Aspect Ratio. Fortunately, however, the Elliptical wing is very efficient, combining the advantages of high lift and rapid recovery associated with low A.R. with the reduced tip losses and drag of high A.R.

Specifications

The above remarks therefore explain the curious scale of one-seventh full size chosen for this model, giving us:—

Span	5 ft. 3 in.	Maximum Chord	15 in.
Length overall	4 ft. 6 in.	Wing Area (approx.)	4.75 sq. ft.

The all-up weight, heavily camouflage painted including batteries and fuel—in fact the true flying weight is 4 lbs. 8 ozs., giving a loading of 15.1 ozs./sq. ft. Despite the failure to reach the target of 12 ozs./sq. ft., the glide is remarkably flat and, considering all things, not very fast—it is easily hand-launched in still air at a slow walking pace.

The model is the culmination of several years' experiment with increasingly scale type Low Wing Models, summarised in a 3-part article in the January, February and March issues of the *Aeromodeller*, and all readers are referred to this article and prospective builders advised to preserve those issues (war time back numbers being unobtainable) for general principles and reasons for the several novel features incorporated in this model; in particular the "crash-proof" wing fixing allowing realistic faring; the undercarriage, and the "knock-off" nose-block and extension shaft.

Full size plans will be published by the Aeromodeller Plans Service in due course, together with an amplified

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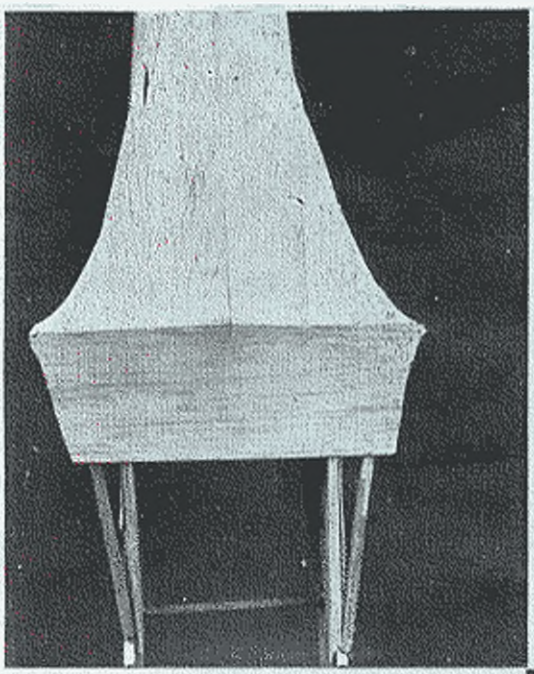
Four stages in the construction of the fuselage are shown on this page. The bottom half is constructed first, and the top half added later, as shown in the photograph at the top of page 3. Top left photo is a side view, and bottom left is from underneath. Top right photo is same view as second, after addition of the planking; and bottom right photo shows the main wing span section in place.



button on top of the cowling, chokes the air intake for starting. The needle control projects just below the dummy exhaust manifold on the port side, and the advance and retard is remotely controlled by a lever in the cockpit, the transparent dome-shaped hood of which slides back. The flap door on the port side also opens by inserting a thumb nail into a countersunk screw head operating a latch. Booster sockets for charging the mini-accumulator are fitted above the L.E. on the starboard side, so that the batteries are out of the operator's way at take off and the timer clock lever—the last thing to be checked before release—faces the operator at the same point on the port side. (Left-handed builders can reverse these points !)

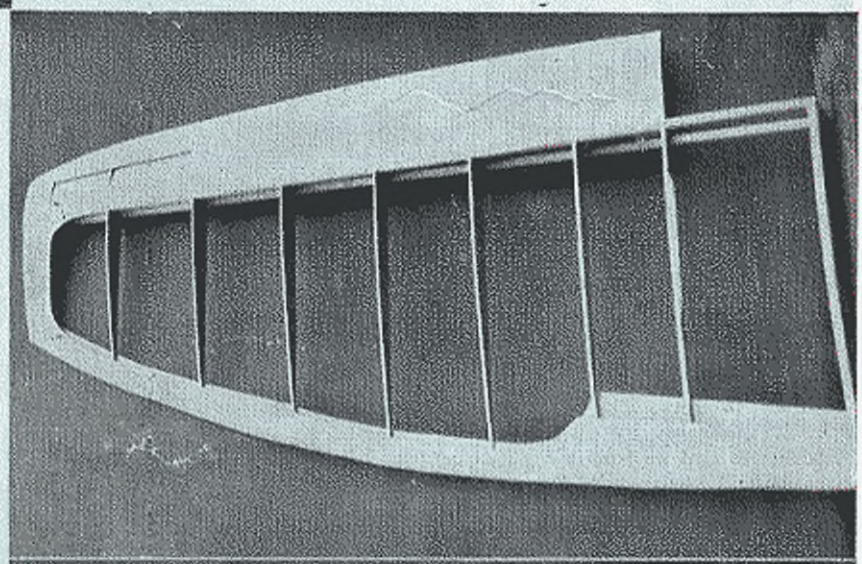
The lower half of the main framework is assembled and planked upside down on a flat baseboard, arranged so that the front ends of the two main C/L longerons project ½ in. over the end. This enables the front 5-ply bulkhead (the only true bulkhead in one piece from top to bottom) to be glued and pinned to their ends. The extension-shaft is perpendicular to the rear face of the nose-block and there is no down thrust—only side thrust. The starboard longerons and stringers are cut ½ in. shorter than the port, and great care taken to maintain this locating bulkhead perpendicular to the baseboard and main longerons.

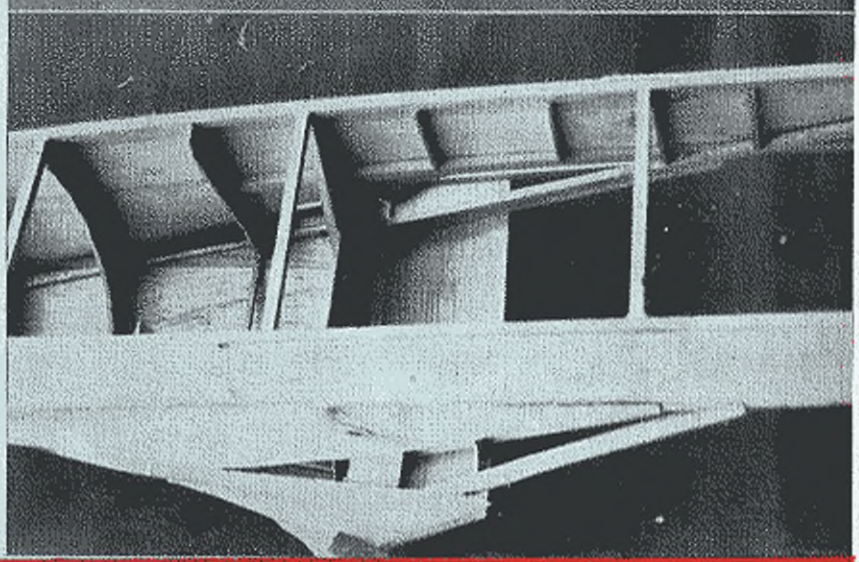
The planking of the wing fairing is delayed until the wings (whose centre portions are skin stressed) are completed. They are fitted on to their locating tongues, projecting outboard from the rear corners of the fixed L.E. portion of the centre section and brought into position under the fuselage "cut-away."

reprint, in pamphlet form, of building instructions, more fully illustrated than space permits in even this enlarged Christmas issue of the *Aeromodeller*.

A study of the accompanying selection of photos—I was going to say from the cradle to the grave, but actually from the drawing board to free flight or rather glide—should leave little to the builder's imagination and the writer looks forward to happier days to come, when instead of querulous correspondence on the impossibility of keeping the weight of the model to the large figure realised in this prototype, he will be faced by open competition on the flying field from builders who, when balsa is again obtainable in all grades, will without difficulty better his own figure for all-up weight. Visions of a flight of three such identical models parked on the tarmac of some Power Model Aerodrome of the future might be a fitting tribute to what is popularly conceived as the winner of "The Battle of Britain"!

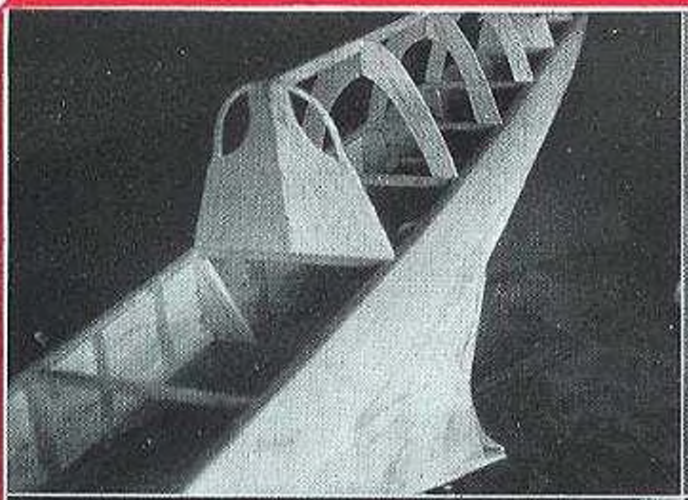
The model is, however, more than a serious attempt at "showmanship." It is a really practical, very stable and reasonably crash-proof *flying* model, whose Cyclone engine, though totally enclosed, is completely accessible at all points remotely likely to require attention for satisfactory operation. Furthermore the engine complete on its mounting can be removed by unscrewing four screws. An inconspicuous push-

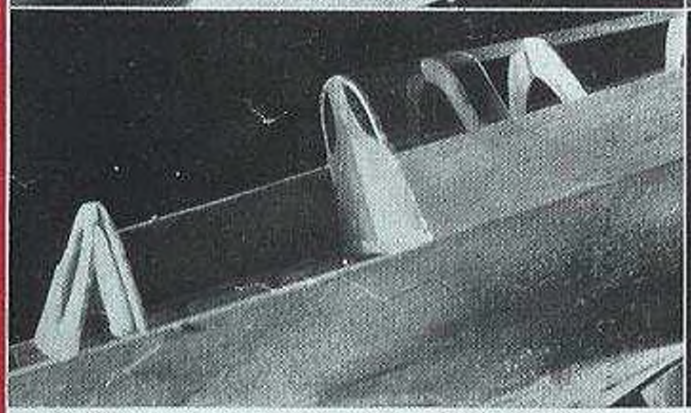


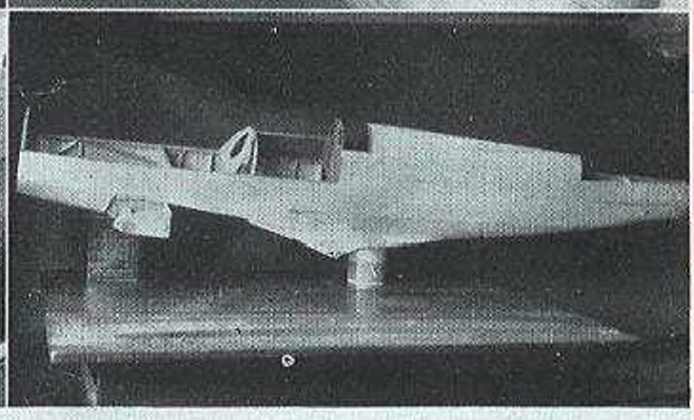


Top left and bottom right photos show flaring of the wing roots into the fuselage, whilst the middle photo shows the simple yet robust construction of the port wing. Note the in-built slot at the wing tip.

Both the Spitfire and the B.E.2.C. will shortly be available through the Aeromodeller Plans Service.







The fairing is then planked and sanded down to a knife edge conforming exactly to the upper camber of the wing.

The independently sprung cantilever undercarriage legs are 5/32 in. diam. spring steel pivoting in horizontal dural tubes embedded in the massive ¾ in. square hard balsa spar a little behind the L.E. of the centre section. The "Oleo-legs" are represented by enclosing the steel in thick cardboard tubes carried on rubber corks at each end and bound with tape and glue to which are glued sheet celluloid fairings. These are flexible and less prone to damage than thin sheet aluminium or 3-ply.

Summary

To all intents, the model is exactly to scale outline except for a 10 per cent. increase in area of the spar-less and partially stressed skin tail surfaces, and the airfoils of these and the wing which is U.S.A. 35b. (approx.). The dihedral is continued to the C/L on the lower surface of the centre section. Minor excrescences such as pitot tube, air intake and radio mast and aerial have been omitted, being too vulnerable on a flying model, though all such details could be attached for show purposes including a scale three-blader prop which on full size is 12 ft. in diam. (one

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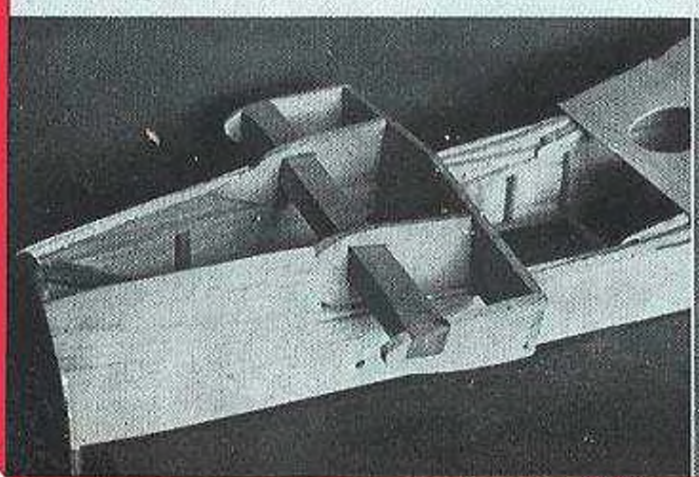
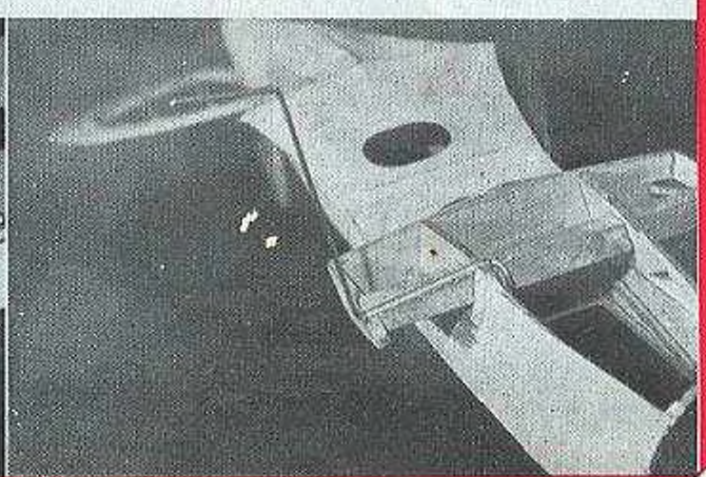
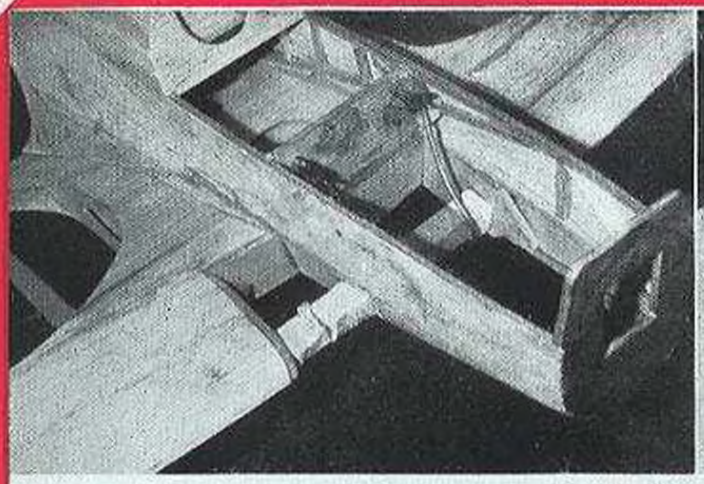
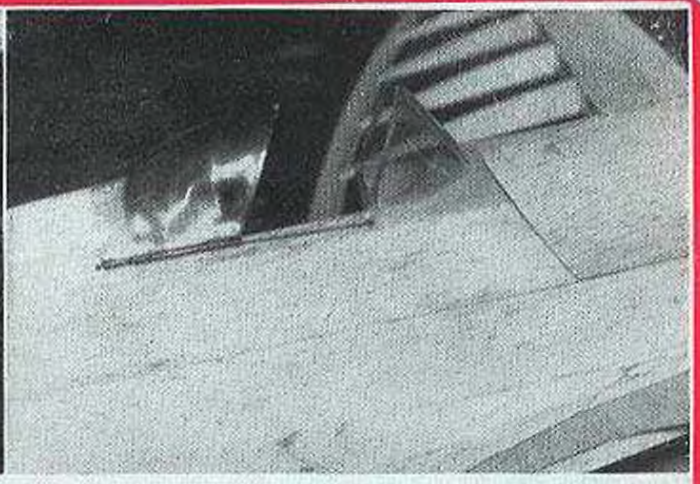
The four photos above show erection of the top half of the fuselage. Photo at lower left shows construction of the cabin, and that on right clearly shows cut-away of lower portion of fuselage for accommodation of the wing.

The two photos below show the anchorage for the undercarriage unit. A strong box girder supports the tubes, forming bearings for the spring steel legs, one of which is shown upstanding in the right-hand photo.









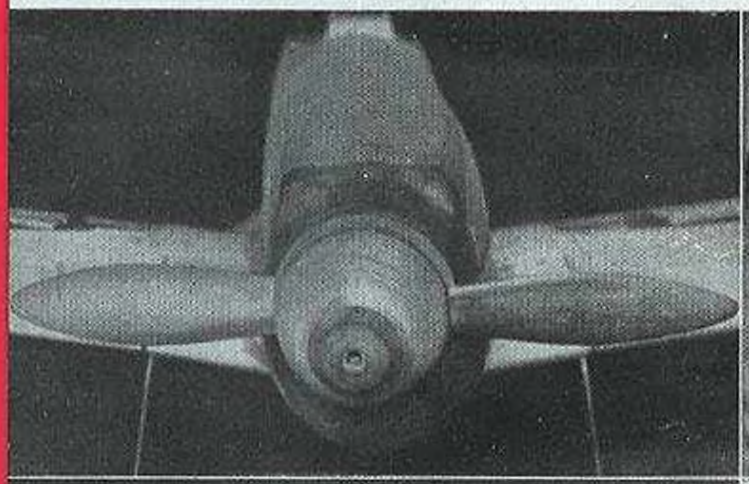
third of the span !) Being a flying model, however, the prop *should* be invisible

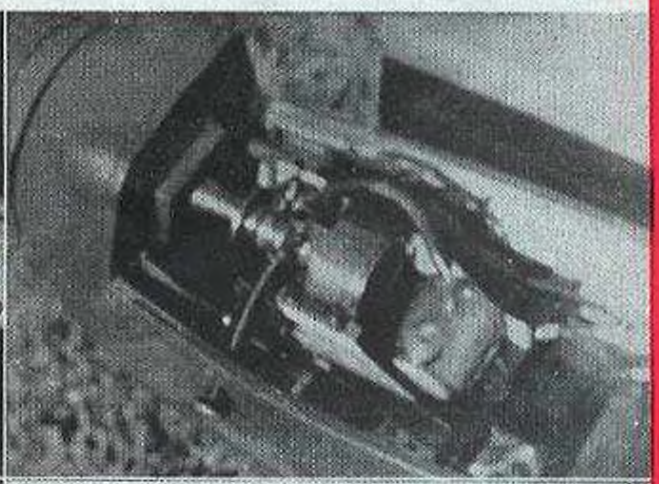
The undercarriage is mounted a little forward of the scale position and does not retract, though experiments are proceeding with a design that (it is hoped !) *will* do so, and automatically detract again a few seconds after the engine cuts. The knock-off nose block is a sure safeguard to the engine in the event of failure.

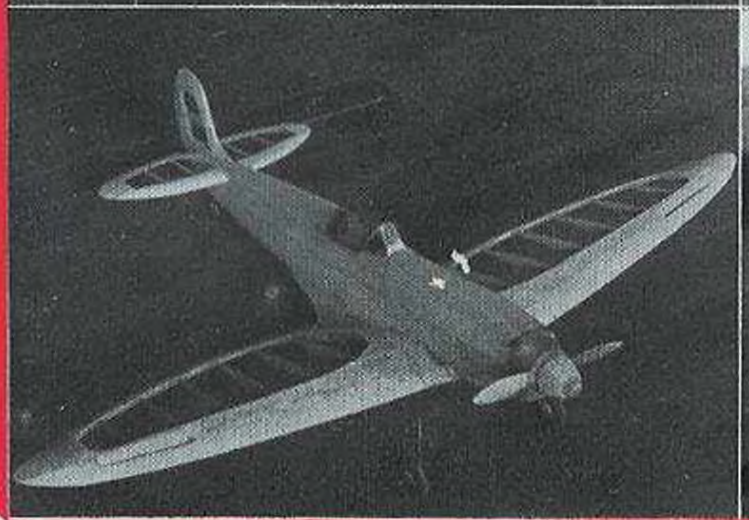
The building of a scale model is a delight in itself, and the writer confidently hopes that this model will afford its builders much pleasure both before and after its completion. Let us hope that by next Christmas there will be several builders who can call to their photographers : "Airborne !"

Above left is shown the upper ends of the u/c legs, bound with strip rubber to hooks incorporated in the bulkheads. Backwards movement of the legs causes these upper ends to move forwards against tension of the rubber. At right is shown the specially moulded cabin cowl, which slides back in the correct way.

The four lower photographs show the large spinner fitted to the airscrew ; the inverted mounting of the engine which drives the airscrew through an extension shaft ; the uncovered but completed model ; and the finished machine gliding.







B.E.2.C.

1½" to 1 ft. Flying Scale

DESIGNED BY E. J. RIDING

THE idea of building a flying scale model of the old last war Corps Reconnaissance machine—the B.E.2 C.—was not original. Mr. C. R. Moore had been hankering after the job for some considerable time, but owing to pressure of work in other directions he was unable to tackle it.

Consequently I have to acknowledge his suggestions and help, without which I doubt if the model would ever have materialised.

The model is a replica as regards dimensions and areas, but outside equipment, such as the gravity petrol tank on the underside of the port upper wing, have been purposely omitted until the model has been thoroughly tested in flight. Gliding tests showed that the model, like its full-sized counterpart, was remarkably stable, giving a long, flat, steady glide on the very first launch. Powered flight, unfortunately, had been held up by a series of bad week-ends, but during a short break in the weather we managed to carry out the initial powered flights at Rudlett on September 30th last.

After a slight adjustment of the tailplane incidence, which has a lifting aerofoil section (Clark "Y"), a short, straight flight ending with a perfect landing was obtained with only 100 turns on the motor.

Reverting now to the constructional features. The fuselage was made in the time-honoured fashion—i.e., ¼ in. x ¼ in. balsa longerons and compression members were pinned and glued into position over the side elevation drawing, making two separate side frames which were afterwards joined together with the requisite number of cross struts. The centre section struts were built integral with the fuselage, and the decking around the cockpits made from 1/32 in. sheet balsa. The air scoop on top of the dummy balsa motor was cut from a sheet of 0.5 mm. ply: in fact, all the parts forming the nose of the model were made of hardwoods, both to strengthen it and to shift as much weight forward as possible. The 1/16 in. x 3/32 in. birch stringers mounted on 3/32 in. sheet balsa formers were laid down the back of the fuselage, and with the exception of the decking and forward portion of the fuselage, back as far as the front centre-section struts, the whole machine was covered with jap tissue and treated with an undercoating of red dope on the fuselage and clear dope on the wings and tail surfaces, followed by a coat of drab green cellulose. The undersides of the wings and tailplane were left in the clear doped condition.

Roundels and service number were painted as shown in the photographs and red, white and blue stripes carried on the rudder, the blue being adjacent to the rudder post. The nose is painted aluminium.

The undercarriage and tailskid, details of which are shown on the G.A. drawing, were made from piano wire of various gauges and faired with spruce bound and glued into position as shown. The undercarriage is the result of a series of disappointments, since breakages were incurred after nearly all the initial glides. The present structure has been designed to stand up to very rough handling.

The complicated business of rigging the machine was accomplished by simply treating the model as if it were a full-sized job and going about it accordingly. After polishing up ones rigging knowledge—long since shelved—the wings were first boxed in pairs, the stagger being adjusted by the appropriate wires between each pair of interplane struts, then offered up to the fuselage. Correct angles of incidence and dihedral, (shown on plan) were obtained by using a rigging stick applied to datum points along the leading edges of the wings (dihedral), and a miniature spirit level used in conjunction with a straight edge for the incidence angle.

The 26 s.w.g. flying wires were then cut to length and fastened to their respective lugs on the wing spars, the landing and drag wires being tensioned by means of small rubber bands.

Each wing box can be knocked clear in the event of a crash.

Wing spars were built by using a 1 mm. ply web sandwiched between top and bottom booms of 3/32 in. x ¼ in. balsa. The ribs (R.A.F. 14 section) were made from 1/16 in. balsa sheet cut to a template.

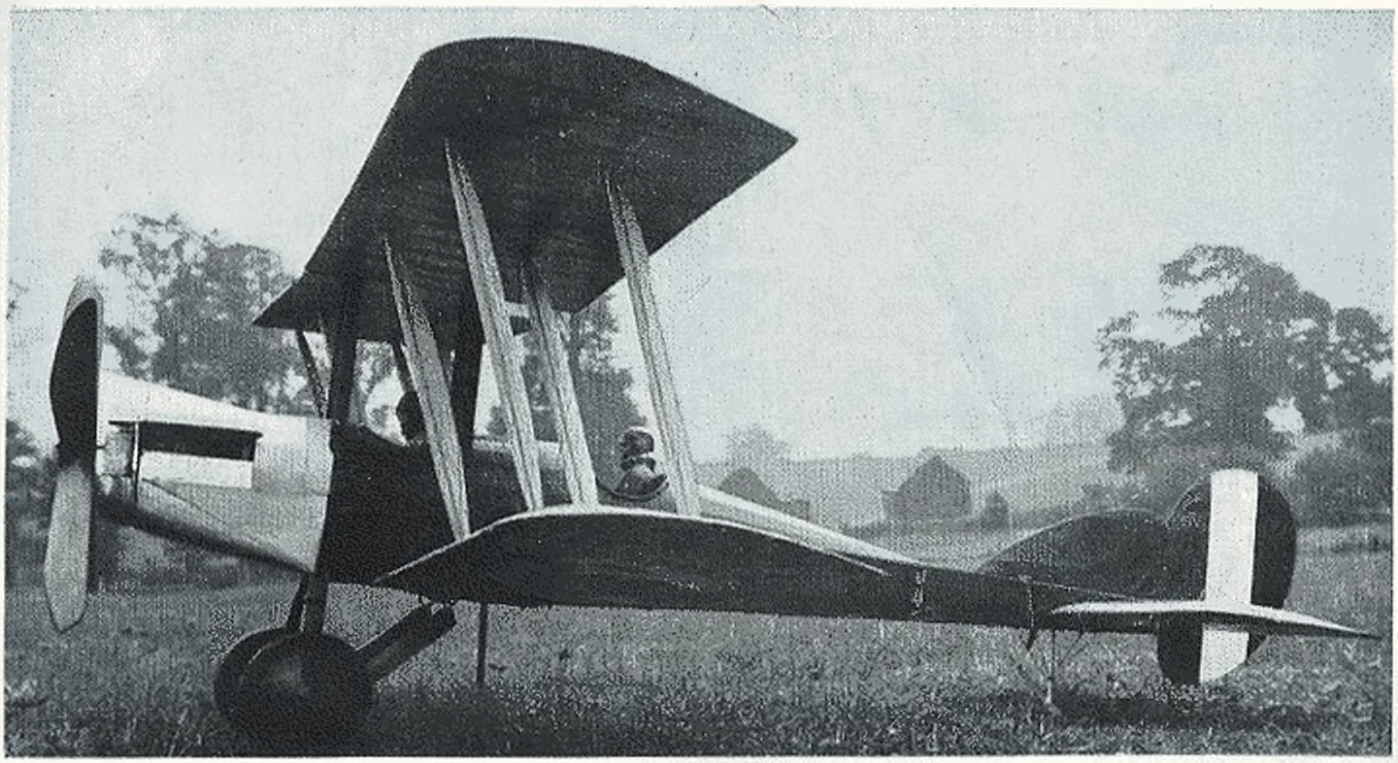
As well as making the model look very realistic in flight, the addition of a pilot and observer keeps light from the rubber motor, which is made up from three skeins, six strands each, of ¼-in. flat rubber.

The 13-in. diameter four-bladed propeller was carved in two halves from blocks of American Whitewood and glued together before final finish and balancing. Incidentally the crew were manufactured at Mr. Moores' private Empire Air Training Centre, where aircrews are turned out to order at quite a steady rate simply by pressing layers of paste-soaked newspaper into two halves of a plaster mould, the completed halves being glued together when dry and the "flash" trimmed off with a razor blade.

The wheels were made in a similar manner, dope being poured through the valve apertures in order to harden the interior.

It will be noted that the model is equipped with the round type fin instead of the triangular one depicted in the photograph of the full-sized machine.

The photographs of the model were taken on an overcast day with a 1¼ in. x 2½ in. Goertz folding camera, lens aperture F4.2 with an exposure of about three seconds on Kodak "Verichrome" film.



Above: the model compares very favourably with the full size machine shown below. In fact, the only visible differences are the round d f n e-part of the fin, previously mentioned, and the larger ai. screw.

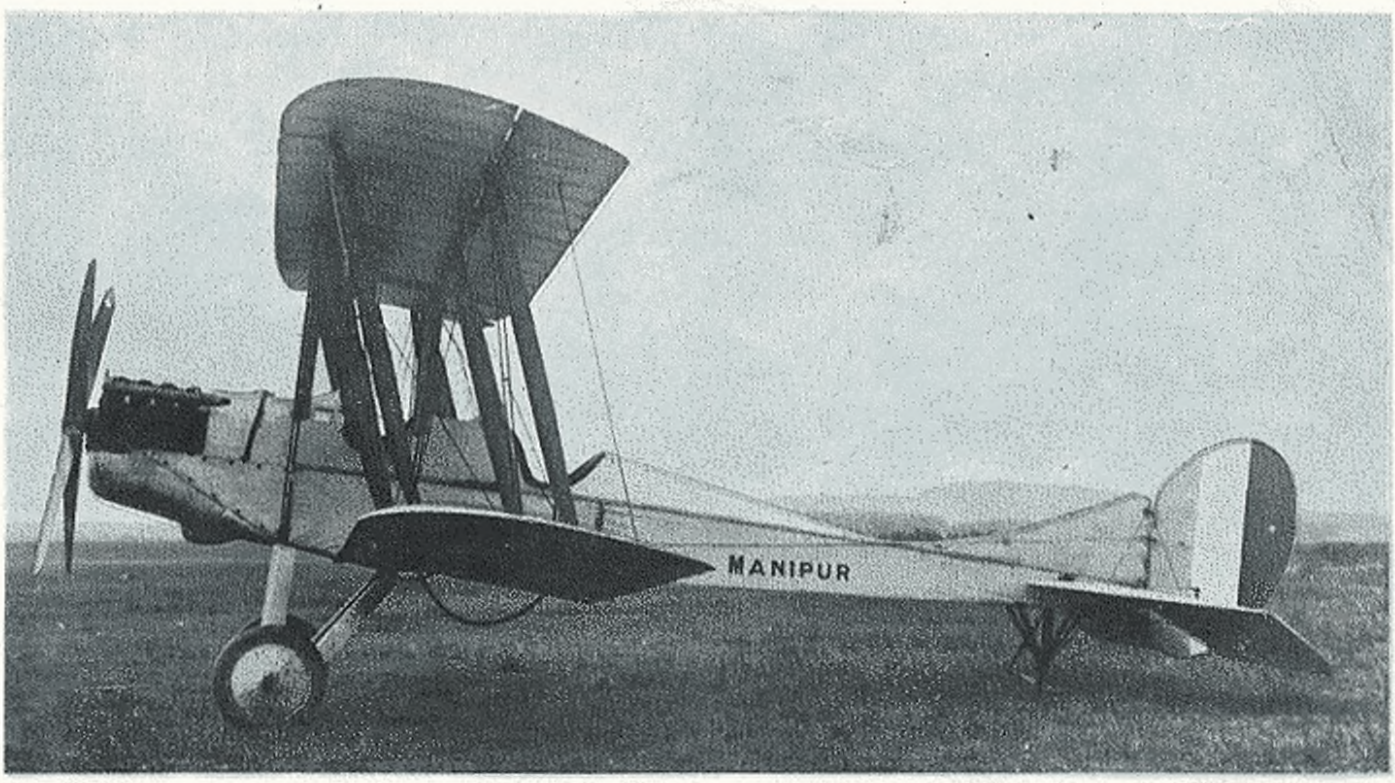
Designed and built at Farnborough in 1914 and used by the Royal Flying Corps for Corps reconnaissance duties, the B.E.2 C. was a biplane of equal span renowned for its inher nt stability. Fitted with the 90-100 h.p. R.A.F. 1.4 eight-cylinder aircooled Vee engine, it was used by Nos. 2, 4, 5, 6, 7, 8, 9, 12, 13, 15, 16, and 21 squadrons.

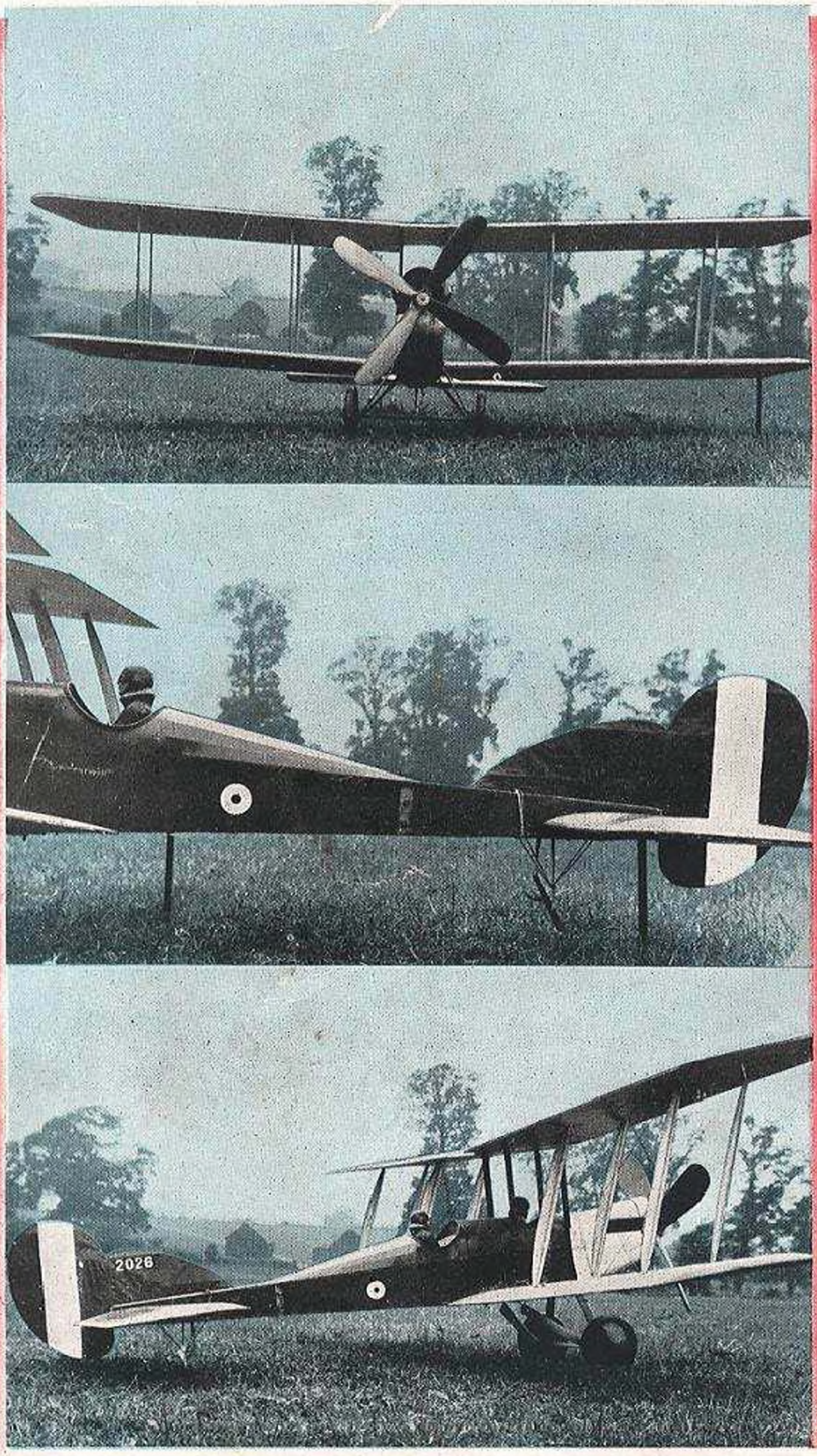
Specification

Span (upper and lower)	37 *ft.* 0 *in.*	*Chord*	5 *ft.* 6 *in.*
Length	27 *ft.* 3 *in.*	*Gap*	6 *ft.* 3 *in.*
Height	11 *ft.* 1¼ *in.*	*Dihedral.*	9½ *degrees*
Stagger	2 *ft.* 0 *in.*	*Incidence.*	4 *degrees* 9 *mins.*

Speed 72 *m.p.h. at* 6,500 *ft. Duration* 3¼ *hours. Service Ceiling* 10,000 *ft.*

Overleaf are three more views of Mr. Riding's excellent machine. Centre of these shows details of tailskid and fuselage, also motor attachment pegs. (One skein on upper and two skeins on lower peg.)





Price 2d. *Published by the Aeromodeller Plans Service Ltd., Allen House, Newarke Street, Leicester.*

46 fins, and if our model is to look like the real thing, we will need to use a pretty fine wire to get that lot into a space of ¼ inch. I tried out several sizes of wire, from 28 down to 46 S.W.G. The former was to coarse, it looked like a 2 B.A. screw : The latter too fine, the fins were practically invisible. Eventually I compromised on 36 S.W.G. as being the best ; it's fine enough to look the part, and robust enough to handle. If you haven't any, a card, or bobbin of 5 amp copper fuse wire will be just about right, and if you can't get that, don't use anything heavier than 10 amp fuse wire. Start the wire by laying it in one of the slots in the top of the cylinder : A dab of cement will hold it. Then wind it carefully and tight, round the needle until you start to overlap the right hand front port hole. Feed it through the hole and out of the left hand port, keeping it firm and close up to the previous turn. Continue this until you have filled the straight side of the D, then carry on right down the cylinder until you are about 1/32 inch from the bottom. At the back of the cylinder, below the inlet port, finish winding. Apply a tiny dab of cement, hold it until it has set, and then snip off the waste wire with a razor blade. You will find that there is a band of bare needle extending right round from one front port to the other, with the inlet port halfway. This band is normally occupied by a H shaped induction casting which feeds the three inlet ports which exist in the actual engine. I tried filling mine with a very thin strip of card, which I enamelled black. It wasn't very successful and finally I painted the band with the enamel and left it at that. Lastly, and before you part the cylinder from the length of needle, paint it.

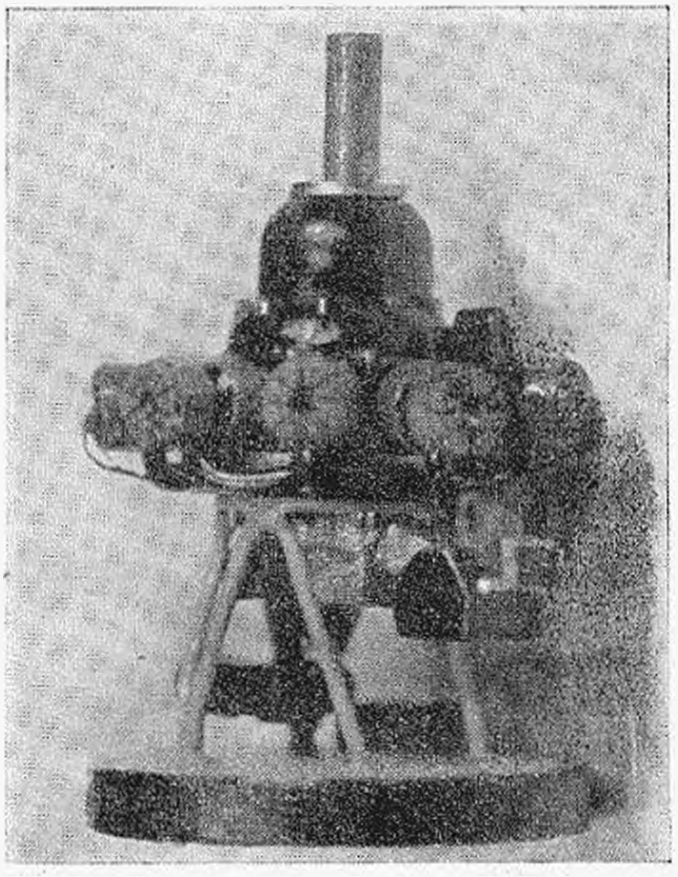
As far as I can make out from photographs, the cylinders appear to be grey. I tried an enamel first, but it simply filled up the crevices between the turns of wire and made it look like a smooth rod. Finally, after a number of experiments, I used a medium Poster Colour grey, and once the cylinders were secured on the crank case, fixed it with clear varnish or dope.

Just an odd point before leaving the cylinders. You might find the 5/32 inch hole in the jig a tight fit for the needle. I eased it out with the fine file, but an 11/64 inch drill might be better if you can get one. Also before removing from the jig, I ran the saw round the end of the needle protruding from it. This gives you the position for the final sawing off. Don't go too deep when you mark it thus, or it might break when you come to withdraw it from the jig.

The rest of the parts should be easy and call for little comment. Get the angle of the flat on piece H right, so that G, the carburettor sits right. The two tiny pieces shown below G are the warm air intakes which are cemented to the cold air intake at the bottom of the carburettor. They should sit behind the two lower cylinders when the job is complete. D, the oil sump, sits between these same two cylinders. L is a part circle of 20 guage copper wire and should be a close fit round H. This is the screening conduit for the plug leads, which strictly speaking should be soldered to it, but as this would have meant rather unsightly blobs of solder I trapped the ends of the twin plug leads N between it and F, and with a razor blade, trimmed off the ends of the plug leads flush with the inner rim of the ring L.

N, by the way, are made of 36 gauge copper wire, doubled, and the loop end which should be squeezed close is turned over and tucked into the 1/16 inch hole in the top of each cylinder and secured with a dab of cement. Leave the colour its natural shade, they are supposed to be braided copper.

You will observe four tiny circles drawn at four points around the conduit L. These are pins like the crankcase bolts, only this time, let them protrude about 1/16 inch. Put them in so that they nip L close to H. In figure 2 you will see the mounting frame which secures the engine to the bulkhead, or, if you prefer it, the base on which to display your motor. The spring steel wire is intended to clip over the four pins referred to. Once your pins are fitted, shape the spring clip round a bit of dowel rod so that it just slips on to them. The inner diameter of this clip should be about 15/32 inch, and leave the gap shown at the bottom.



You will need that to get it on to the engine. On a diameter of about ¾ inch drill four holes in the bulkhead and build up the three V's which form the supporting frame, of about 20 gauge copper wire. Solder the junctions and the clip on to the ends as shown. If you have got it right, the gap in the clip should pass over part Q, then down until it is in line with the four pins, over which it should then sit nicely. Its a tricky job at first but you will soon get the knack of it. The bulkhead can be any thickness you like, or of course, it can be the front end of your fuselage. The oil tank shown is ¾ inch × 3/16 inch × 1/8 inch, and sits to one side, so that Q, the generator, and J, the starter, do not foul it. I haven't a picture of the Perseus bulkhead, and I won't swear to it that such a tank does exist. It appears on other Bristols however, and helps to relieve the bareness of this model.

M, by the way, are the intake pipes from the blower, and are made from 16 or 17 gauge copper wire. The top end is cemented in the rear port hole, and the lower end to the piece F, immediately behind the next cylinder to the right as shown in the rear view.

Finally, painting,: Parts A, B, and C are painted black before assembly, and with the pins P, *Out*. You can push them in after the paint has dried. F, H, I and K are silver. The main body of G is black, with silver to the trunks top and bottom. The warm air intakes are black. K are silver, with the tiny disks tipped black. Q is also black, and made up from 9 gauge needle. J is black with the tapered end silvered, and the induction pipes M are also black.

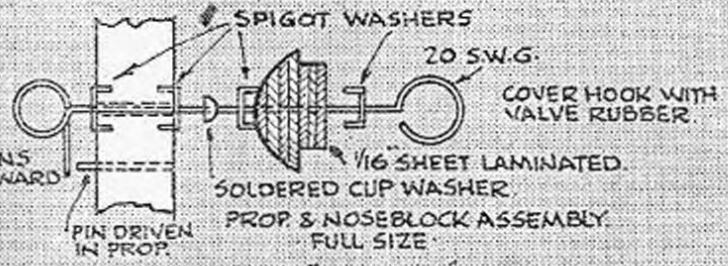
The mounting frame I painted grey, and for no good reason at all the oil tank was red. The photographs indicate neither black or silver, so that it may be grey or light blue, or even green. Lastly I stained the rim of my bulkhead with wood stain and varnished it so that it might serve as an exhibition base.

Try and get a photograph in front of you when you come to the final stages, it helps a lot.

"PETER"

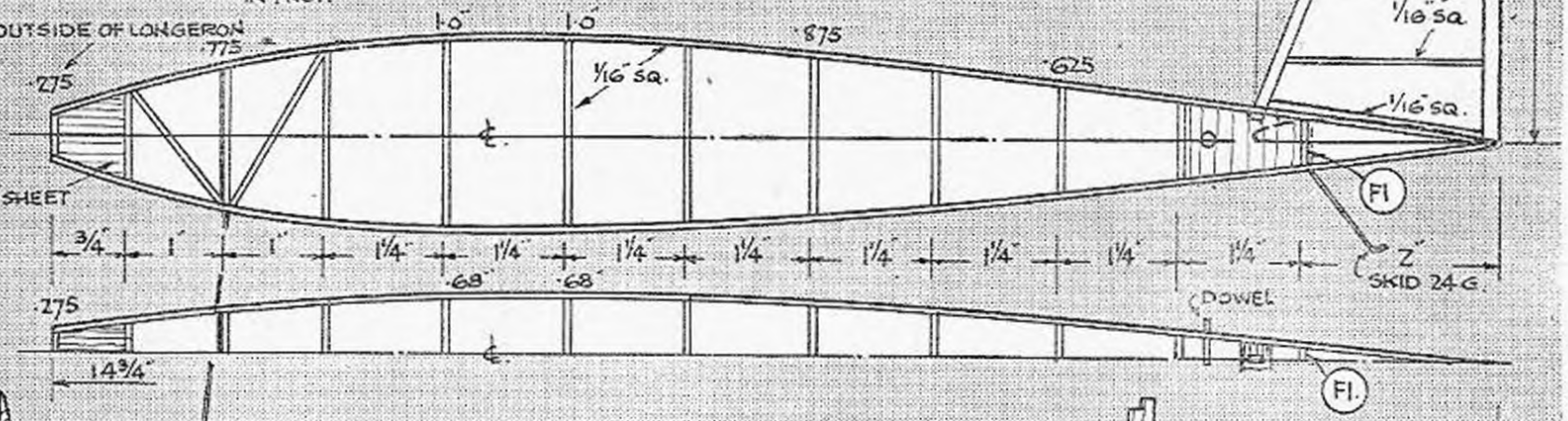
DESIGNED BY
R.V. BENTLEY.

SCALE ½ FULL SIZE

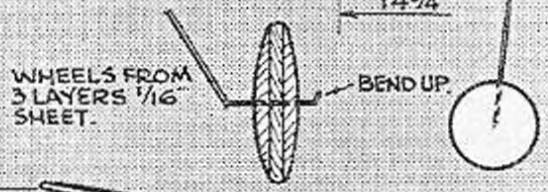


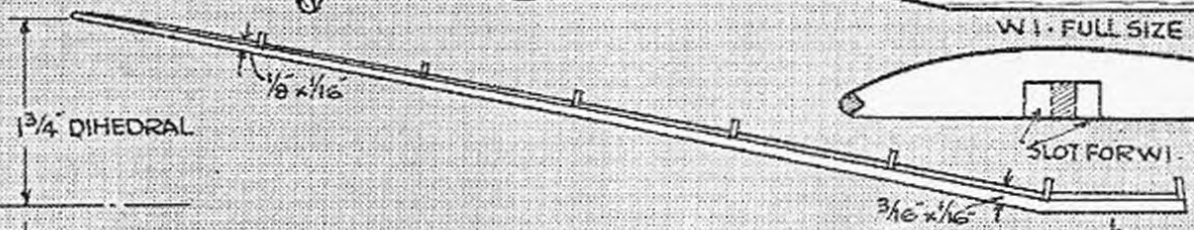
POWER:
4 STRANDS ⅛" STRIP

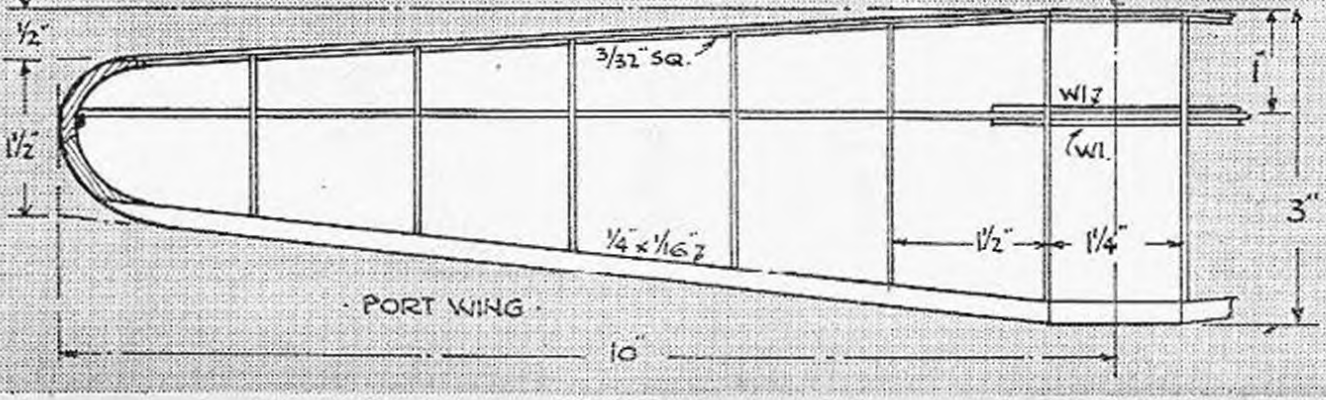
PROP.: 7" DIA.

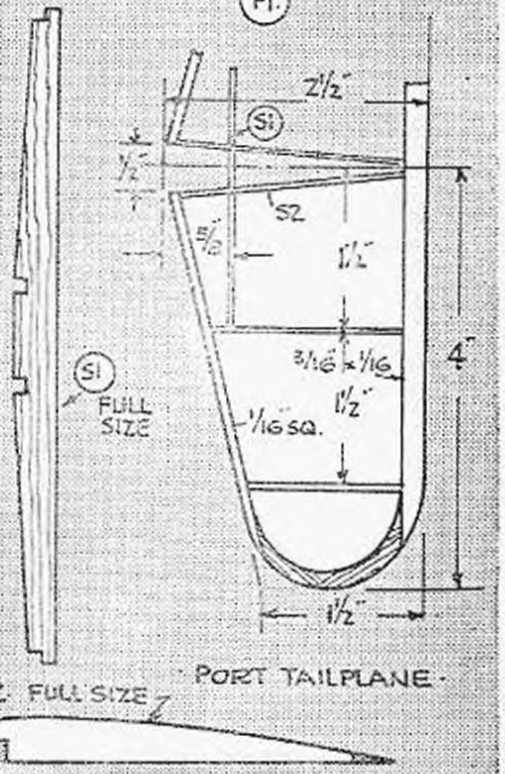


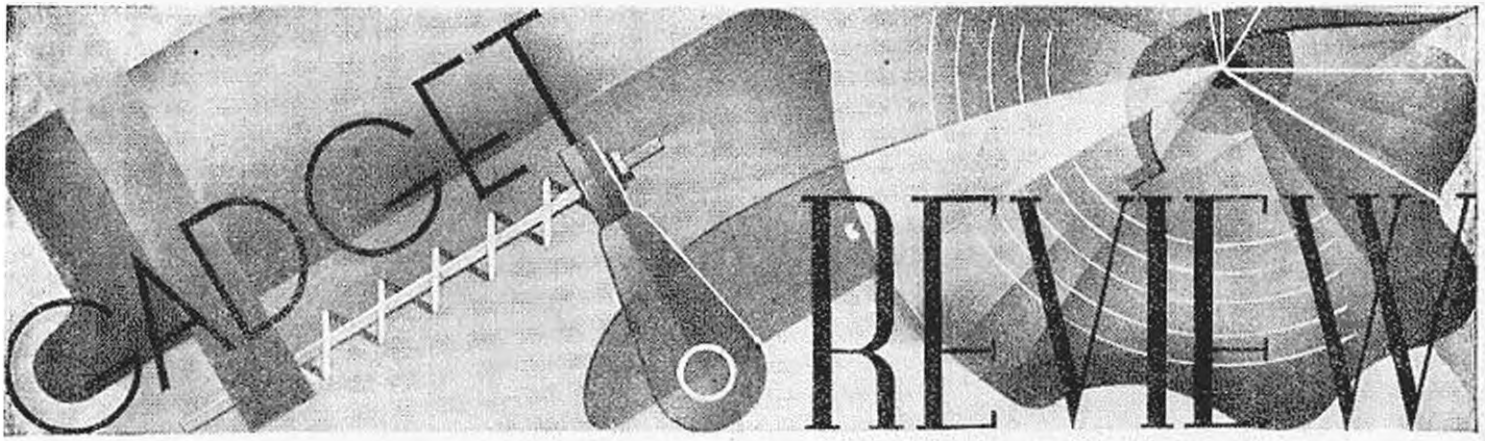
20 G. U/C WIRE PASSES RIGHT ROUND INSIDE FUSELAGE TO WHICH IT IS CEMENTED AND BOUND WITH THREAD.











LAUNCHING WINCH FOR GLIDERS.

By A. W. Smith.

With the increasing interest being taken in gliders at the present time, I think the small winch described below will be of interest to the many rubber-modellists who have taken to gliding.

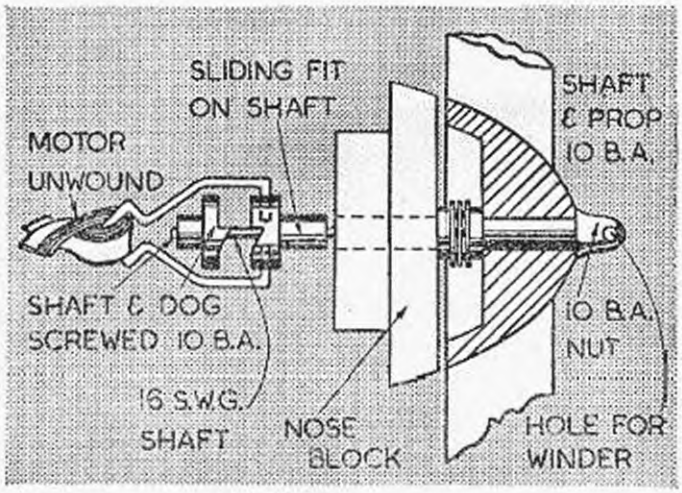
The main requirement is a drill of the type usually used to wind up rubber motors. Probably all modellers have one at their disposal. Also required are the following:— One mild steel rod of ¼ inch diameter and about 5 inch in length, (I used one from an old Meccano set), two tin lids about 4 inch diameter, these were obtained from two empty 1 lb. cocoa-tins, and finally a 1¼ inch length of brass curtain rod.

The construction of the spool upon which the launching-cord is wound offers no difficulties. The lids are soldered, with the brass bush between them, to the steel rod. The brass bush is not essential but helps to give a good soldering surface between the lids.

When the spool has been made it is simply secured in the chuck of the drill and the winch is ready for use. As most drills are of the 4 to 1 ratio the speed of this winch is considerable.

The chief feature of this winch is its ease and cheapness of construction, and it obviates the expense of purchasing a grindstone of the type used at present for winch-launching.

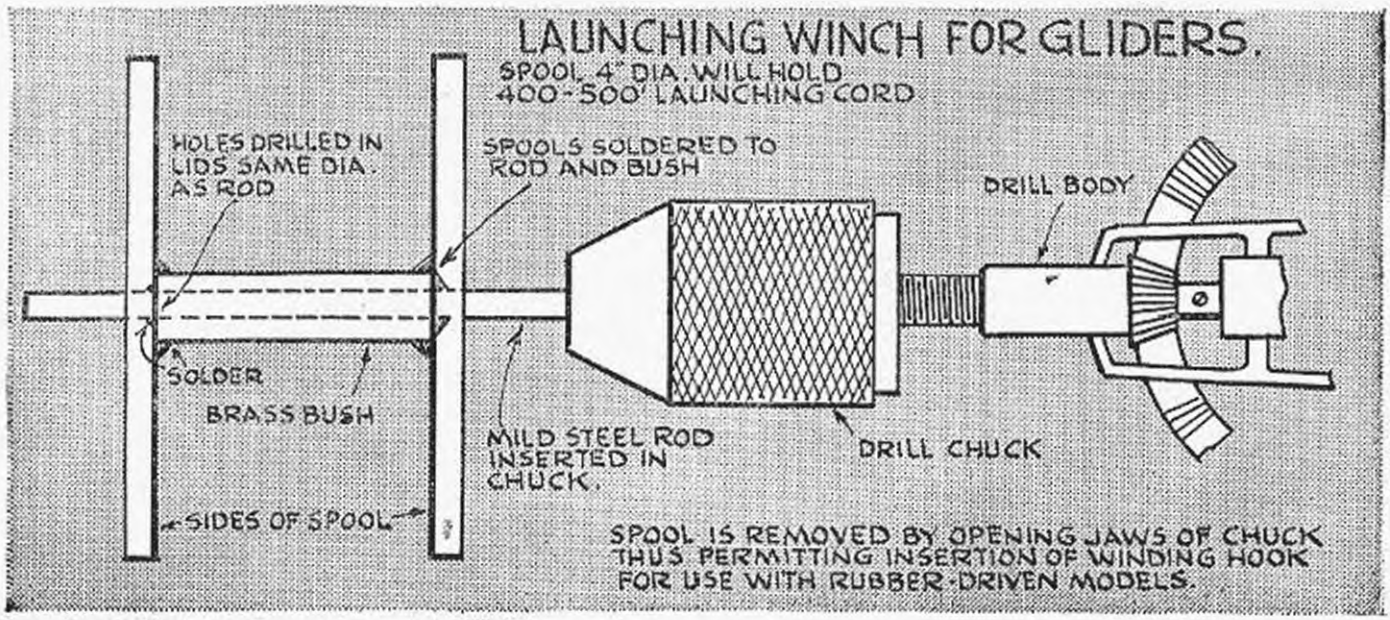
CLUTCH-TYPE FREE WHEEL.

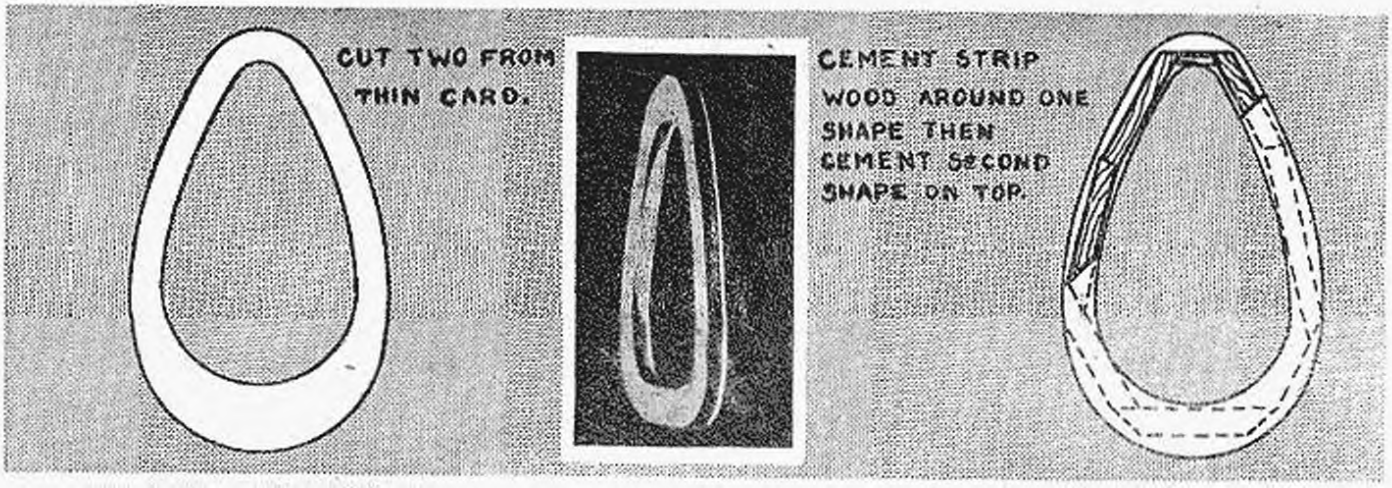


UTILITY FORMERS.

By C. P. Wheldon.

I am in the unfortunate position where thin sheet wood of good quality is practically unobtainable, and being a scale model fiend, this, for a while, sadly hampered my activities. I have now found the answer to this in the form of a new method of building formers.





The former shapes are traced on to thin card of 13 thou. thickness, two "shapes" per former. The centres of the cards are then cut out to give a thin ring of card. In my model of an ME109F of scale 1" = 1', the rings are about 4/10 inch wide, a little wider at the bottom.

Around the *inside* of this ring is cemented strip wood, which on my model was 3/16 inch × 3/16 inch balsa strip. This is clearly shown in the drawings and photographs.

The remaining ring is then cemented on top to form the finished former which is of "U" section. This makes a very neat and strong former, and will resist all tortional stresses and strains likely to be applied. The finished former is lighter than a balsa one, and stronger than a hard-wood former of the same area. These formers can easily be notched to receive stringers and can be cut out with scissors.

This method of construction lends itself to wing ribs also.

SOLID TIPS.

By P. S. Cooksley.

LANDING LIGHT.

Take a one and a quarter inch nail and file the point to round section Fig. 1. Then lay out a thin sheet of copper on a board (*not* the dining room table!) and using the nail as a punch, tap lightly with a hammer until a shallow depression appears in the copper.

This depression must now be cut away and placed back in the depression made in the board, and have a small hole punched in it with a scriber. If, after these operations the shape is not quite what it should be it may be put right by means of the punch.

The head of a pin is then filed down slightly and cut off leaving about a quarter of an inch of shape attached, which is inserted through the hole in the lamp and pushed into position on the model. The lamp is finished by painting silver and covering the front portion with celluloid. See Fig. 1 for sketch of finished lamp.

SET SQUARE.

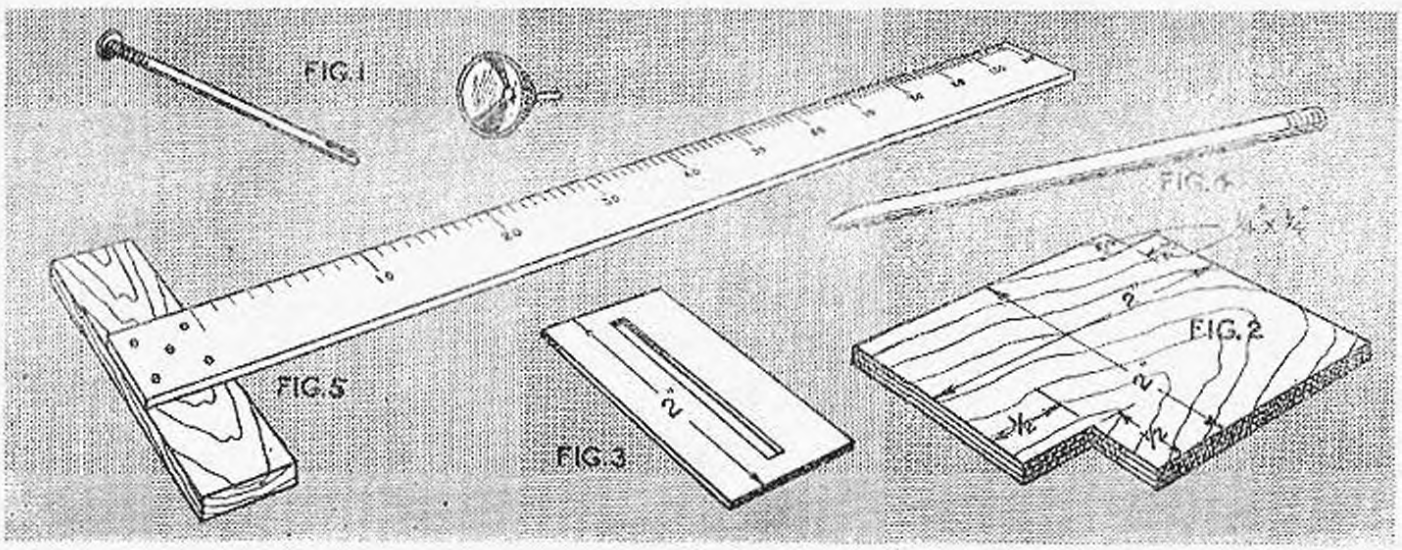
Fig. 2 depicts a special set square for checking the setting of tail units on solids. An ordinary set square is unsuitable for this job so the one shown has cut away portions at two corners enabling it to be fitted over the fairing between the two tail plane members. The small side is for use with single engined machines, and the larger side for bigger models. The square may be made of threeply. It should be checked with an ordinary set square for accuracy before use.

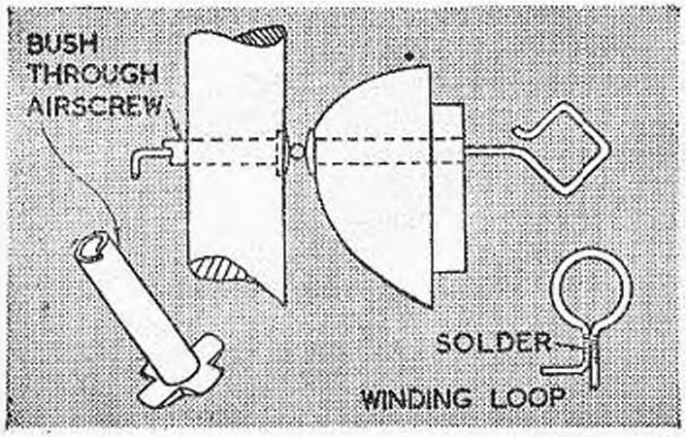
PUNCH.

Fig. 4 shows a small punch made from a six inch nail. It has the point blunted and is useful for embossing imitation rivets in sheet copper and brass etc., as used on engine cowlings etc. The jig shown in fig. 3, is for use with the punch and will ensure a line of rivets being kept straight. A word of caution. It is advisable to use a leather covered hammer when carrying out the above operation as it is very easy to pierce the thin materials.

TEE-SQUARE.

Finally in Fig. 5 is shown a ruled tee square with the scale set in feet. It may be made with a small block of wood and a length of lathe. The figures are marked in Indian ink and the instrument is finished with one coat of varnish.



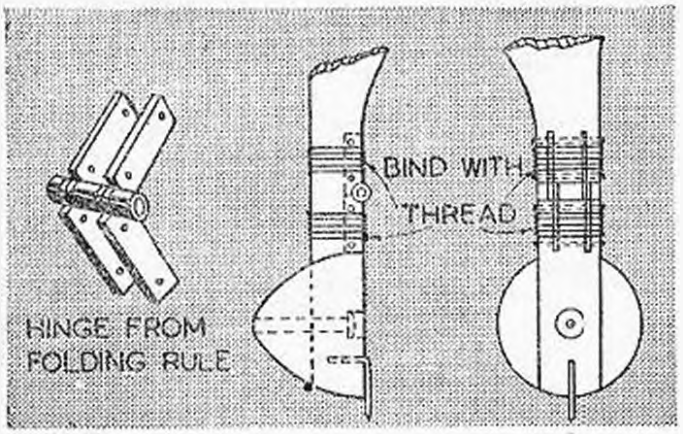


FREE-WHEEL.

By E. W. Bark.

The construction of the freewheeling device is simplicity itself, and reference to the diagram should make description unnecessary.

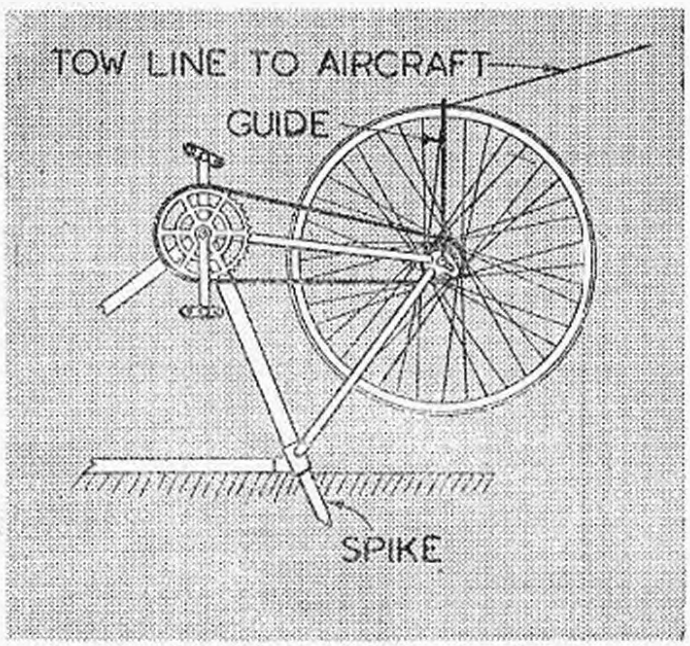
Four notches are filed from the head of a bush to form a cross. The bush is inserted in airscrew with the cross to the rear, and cemented in. A notch, as shown, is then filed in the front end of the bush. Finally the end of the shaft is bent to 90 degrees or a winding loop formed having a 90 degrees bend as shown.



FOLDING AIRSCREW HINGE.

By S. C. Fairless.

The hinge here described has been used with considerable success on a Wakefield model and will be found to be quite fool-proof. The hinge itself is taken from an old carpenter's rule. It is secured to the airscrew blade and hub, by means of pins passing through the holes in the hinge, and is bound and cemented. Reference to the diagram will make this quite clear.



BICYCLE TOW LINE.

By D. G. Hodinott.

An efficient glider tow line may be simply made from an old bicycle frame as will be seen from the accompanying sketch. The gadget consists of a frame and rear wheel from which the tyre has been removed. A spike is fitted instead of the saddle pin, this being firmly driven into the ground for use. One end of a strong thread is wound around the rim of the wheel, and the other end attached to the glider in the usual way. When the pedals are turned the model is elevated to the required height.

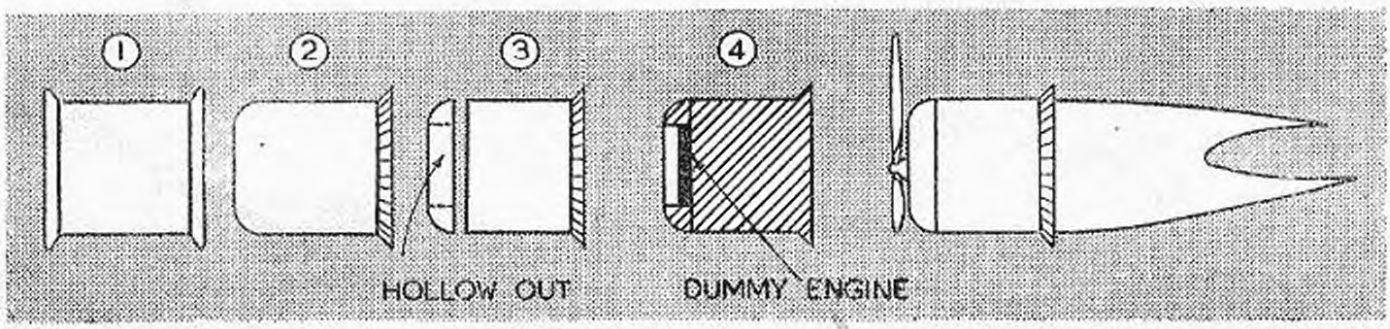
ENGINE COWLINGS FROM COTTON REELS.

By T. Thurlow.

Many modellers find difficulty in making satisfactory engine cowlings for their solid models. Here is an excellent method utilising the short war-time cotton reels.

The proceedure is as follows. First cut the rim from one end of the cotton reel and radius the edge with fine sandpaper. See diagram 1st left. The other rim is left on and carved to form cooling gills. The engine may now be painted and have accessories such as exhaust pipes and carburetter air intakes fitted. If, however, the builder wishes to make the engine even more detailed reference to 3rd diag. will show how the front portion of the reel may be cut off and a dummy engine, or painted engine, may be attached. The cut away part is then hollowed out so that it forms the effect of an exhaust ring and is fitted back into position over the dummy engine.

Finally the airscrew is fitted and the completed engine attached to the model. Diag. on right shows the engine with airscrew.



HAPPY 19

AIRYDA

AIRYDA

AIRYDA

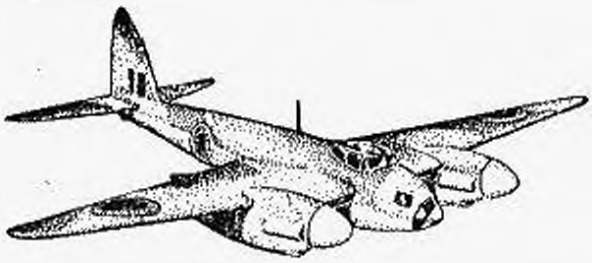
AIRYDA

ANOTHER YEAR IS RAPIDLY APPROACHING IT'S END AND EVERY LOOK IN YOUR MORNING PAPER WILL TELL YOU THAT IT WAS A SUCCESSFUL YEAR. FROM DAY TO DAY YOU HAVE FOLLOWED THE NEWS OF BATTLES AND OF VICTORIES, AND OF ALL THE HARDSHIPS AND OBSTACLES ON THE DIFFICULT ROAD TO SUCCESS.

WE, TOO, HAVE FOLLOWED THE NEWS. EVERY PROGRESS IN THE AIR MEANT FOR US A NEW DEVELOPMENT OF OUR FAMOUS KITS. BUT WE, TOO, HAD TO FACE OUR DIFFICULTIES; YOU KNOW ABOUT MOST OF THEM AND WE APPRECIATE YOUR UNDERSTANDING AND YOUR HELP IN EXPLAINING THE POSITION TO THOSE WHO ARE UNABLE TO OBTAIN THEIR KITS IN SUFFICIENT NUMBERS REGULARLY.

THE MANUFACTURERS OF AIRYDA KITS HAVE EVERY REASON TO BE CONFIDENT IN THE FUTURE; WE ARE SENDING OUR GOOD WISHES TO OUR MANY FRIENDS ALL OVER THE COUNTRY AND TO ALL THOSE WHOM THE WAR PREVENTED FROM BEING AMONG OUR NUMEROUS CUSTOMERS.

XMAS 43



D.H. MOSQUITO 3/-

AIRYDA KITS AND SUNDRIES ARE STILL AVAILABLE. ASK YOUR LOCAL WHOLESALER FOR SUPPLIES. HERE IS A LIST OF OUR FAMOUS RANGE OF KITS:—

16-in. FLYING MODELS

Spitfire	1/3
Hawker Hurricane	1/3
Blackburn Skua	1/3
Blackburn Roc	1/3
Messerschmitt ME 109	1/3
Curtiss Hawk P75A	1/3
Fairey Battle	1/3
Mr. Mulligan	1/3
Monocoupe	1/3
Boeing P26A	1/3
Art Chesters Racer	1/3
Puss Moth	1/3
Miles Magister	1/3
Percival Gull	1/3
Boulton Paul Defiant	1/3
Fairchild 24	1/3

DURATION MODELS

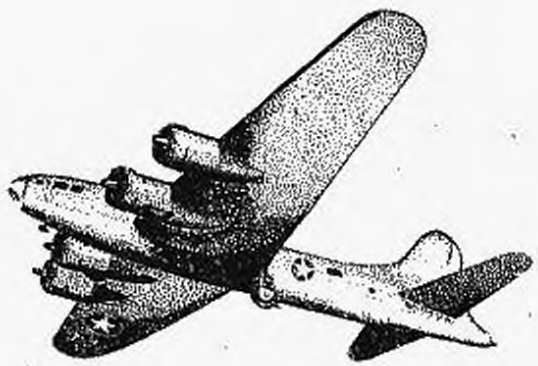
AIRYDA Junior 20-in. wingspan	5/-
AIRYDA MINOR 30-in. wingspan	7/6

BOATS

1/72nd Scale Kit of R.A.F. Rescue Launch	5/6

1/72 Scale SOLID MODELS

Hurricane	1/8
Spitfire	1/8
Curtiss Tomahawk	1/8
Miles Master III	1/8
Curtiss Kittyhawk	1/8
I-16 Rata	1/8
Bell Airacobra	1/8
Focke Wulf 190	1/8
I-18 Russian	1/8
Messerschmitt ME 109F	1/8
Grumman Martlet	1/8
North American Mustang	1/8
Grumman Wildcat	1/8
Mitsubishi S-00 (Zero)	1/8
Hawker Typhoon	1/8
Lysander	2/-
Fairey Albacore	2/-
Stormovik	2/3
Douglas Boston	3/-
Lockheed Lightning	3/-
Beaufighter	3/-
Junkers JU 88K	3/-
Westland Whirlwind	3/-
Mosquito	3/-
Dornier DO 217	3/6
Lockheed Hudson	3/6
Junkers JU 52/3M	3/6
Whitley Troop Carrier	3/6
Vickers Wellington	5/6
Boeing Flying Fortress II	7/6
Consolidated Catalina	7/6



FLYING FORTRESS II 7/6

RUSSIAN STORMOVIKS 2/3

ASK YOUR WHOLESALER TO - DAY . . .

AIRYDA

MODEL AIRCRAFT CONSTRUCTIONAL KITS

NATIONAL MODELLERS SUPPLY

AIRYDA WORKS • ASPLEY • HUDDERSFIELD

"AIRSPEED HORSA"

DESIGNED BY

R. V. BASE

FUSELAGE :—This is built on a half-former method. The backbone is 1/8 × 1/16th, and the ten stringers are 1/16th in. square. Number four former is cut down to accommodate the wing platform of 1/16th in. sheet. The wire cross-members for the undercarriage are bound and cemented into place. The fuselage is covered with 1/32nd in. sheet from nose to number 6 former; the remainder with tissue.

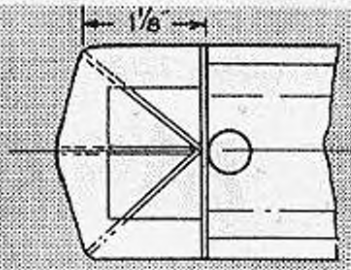
TAILPLANE AND FIN :—The tailplane is built on the plan in the usual manner and covered with tissue. The top part of the fin is built on the plan and then glued to the tailplane. The lower half is built on the plan and attached to the fuselage covering in tissue.

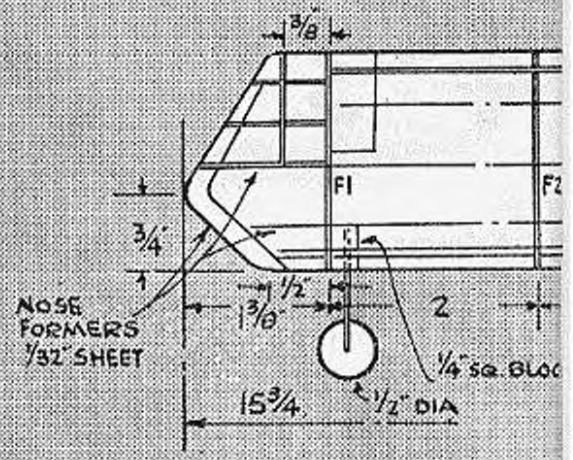
WING : — Construction is straightforward, the wing being built in the usual manner on the plan. Dihedral is built outboard of the centre section, the wing tips being raised one inch from the centre line.

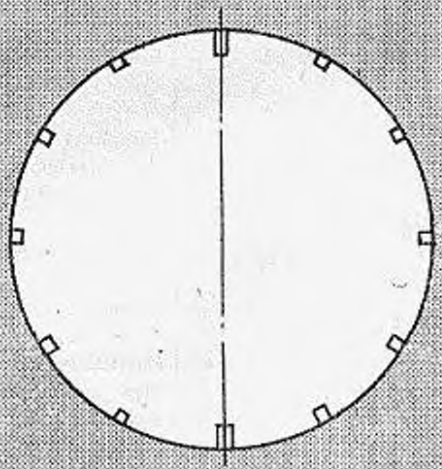
UNDERCARRIAGE :—The nose wheel is half inch diameter, the main wheels ⅝ in. diameter. Reference to the plan clearly shows the construction of the wire parts.

COLOURING :—The model is camouflaged in right bomber colours.

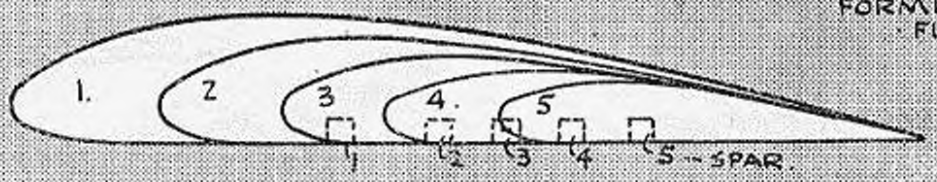
FLYING :—Trim is effected by weighting the nose with small pieces of lead, placed in the ballast tube. When the model balances correctly, the tube is filled with cotton wool, and a small piece of tissue doped over the top. As the model was intended to be towed by another machine, the tow attachment hooks are fixed under the centre section, as on the plan, and the tow line forks into a "V." Two small rings are attached to each end of the "V" for connection to the tow-hooks. The glider was originally towed by a 28" span duration model, both tug and glider being released at the same time. When the power runs out in the tug, the glider drops off the line and glides free.



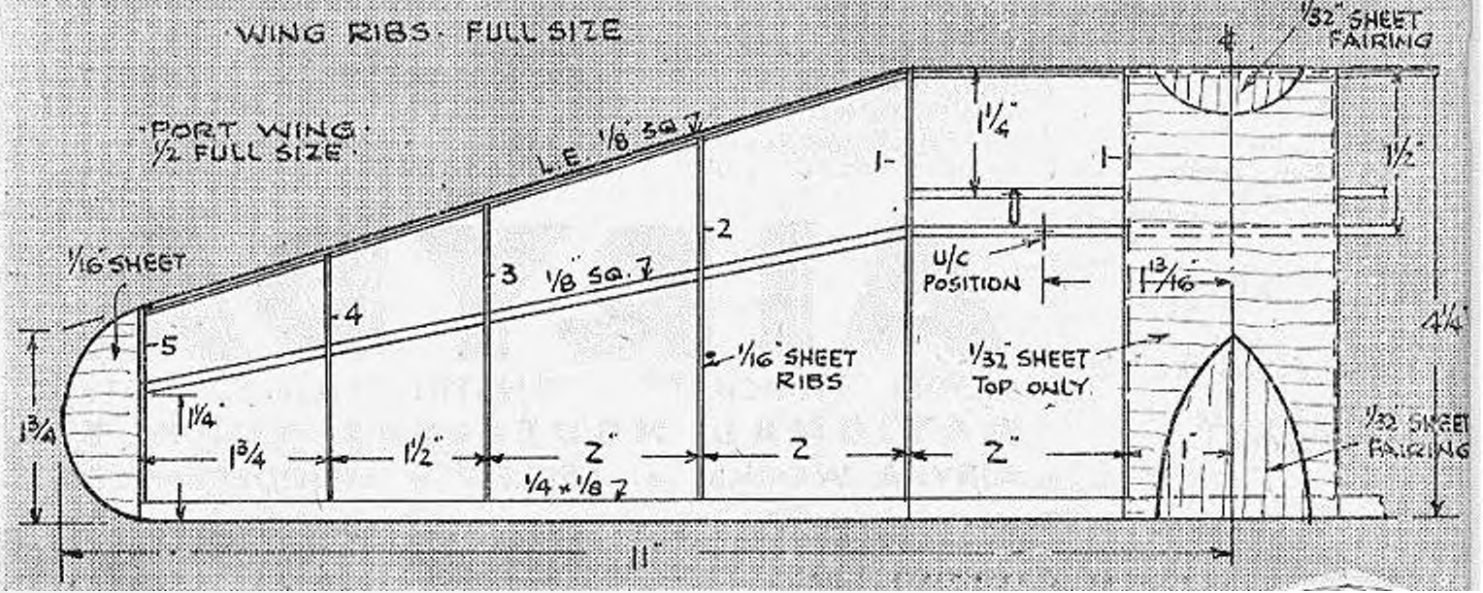




FORMERS 1, 2, 3, 4 & 5 FULL SIZE

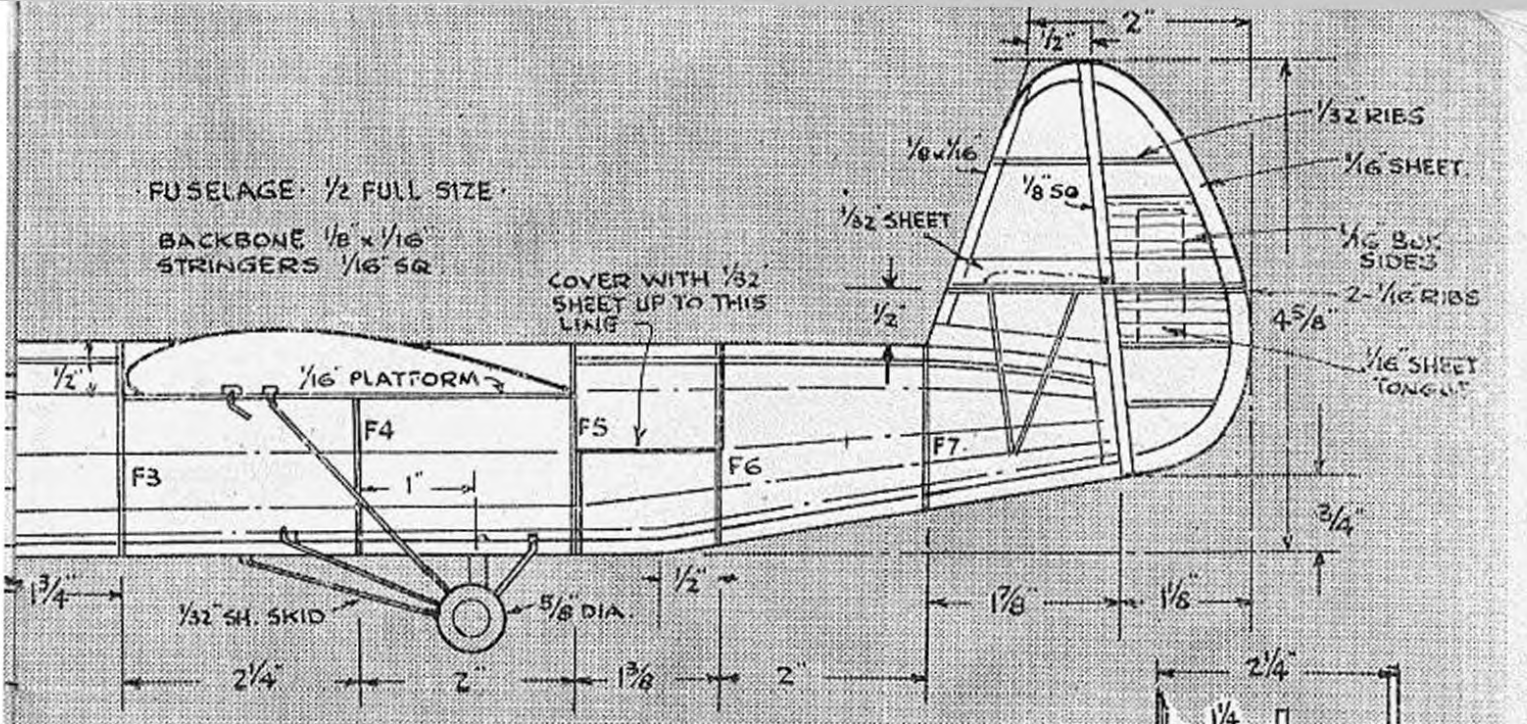


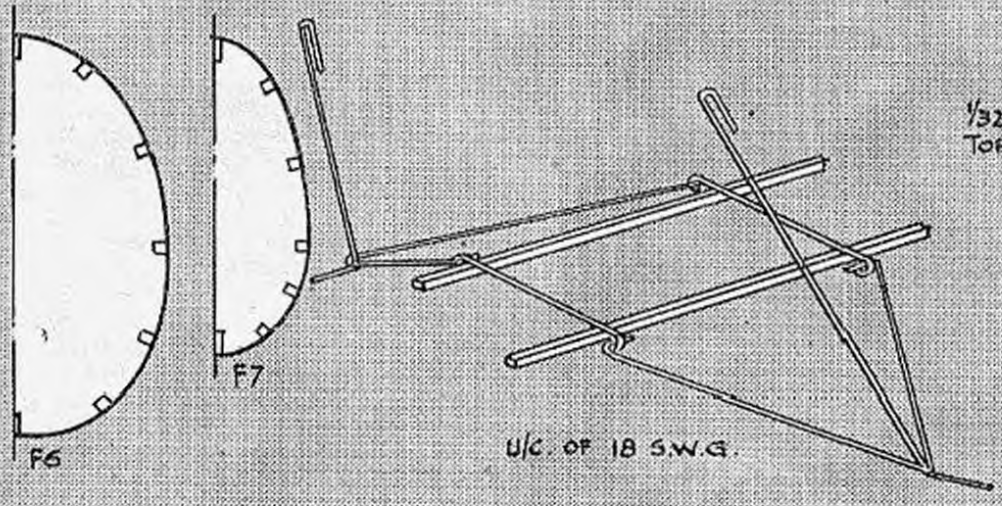
WING RIBS FULL SIZE

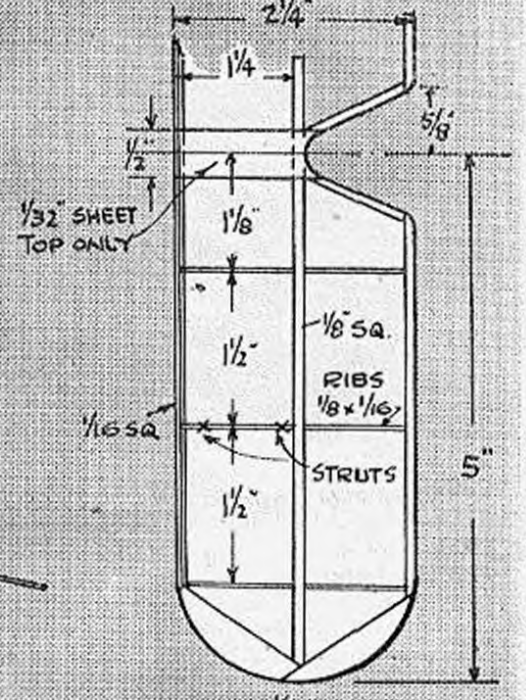


FUSELAGE ½ FULL SIZE

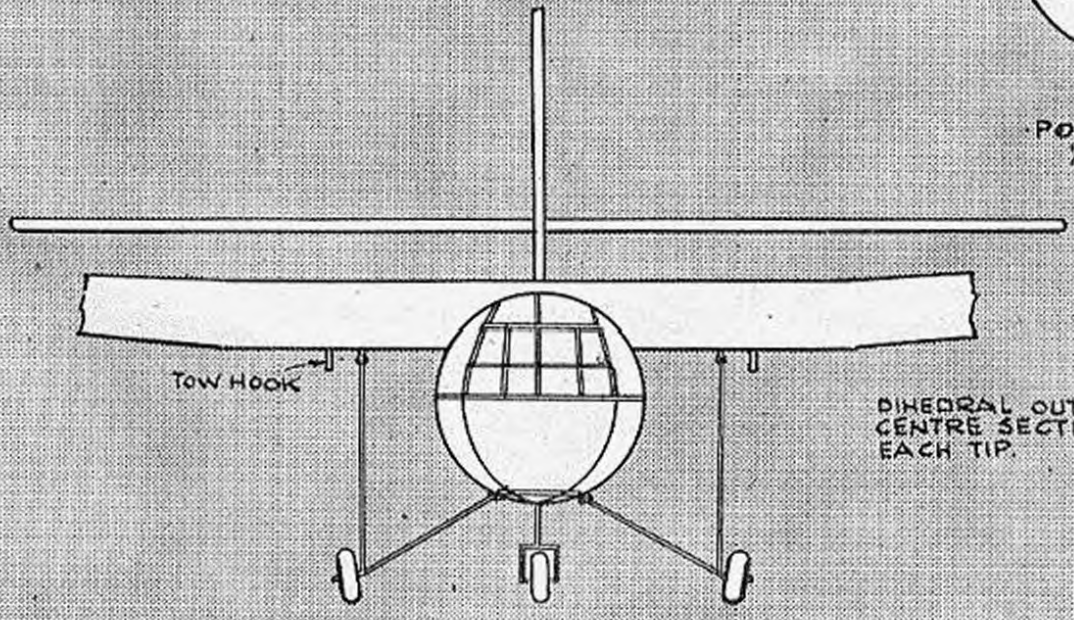
BACKBONE 1/8" x 1/16"
STRINGERS 1/16" SQ.







PORT TAILPLANE
½ FULL SIZE



DIHEDRAL OUTBOARD OF CENTRE SECTION 1" AT EACH TIP.

MONTHLY MEMORANDA

BY O · G · THETFORD

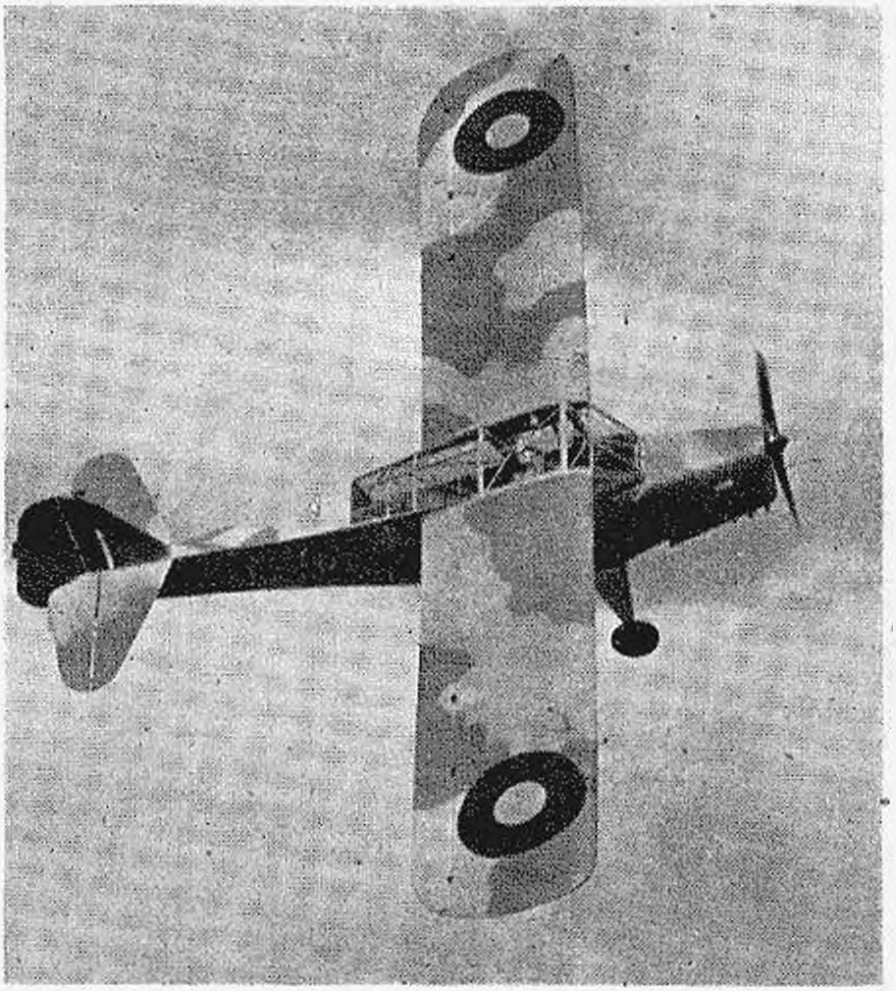


Photo by courtesy of The "Aeroplane"

P.R.U. Markings.

In September, 1943, some details of the work of R.A.F. Photographic Reconnaissance Units were made known to the public and P.R.U. aeroplanes are now required in any representative collection of solid models.

Long range Mosquitoes and Spitfires form the equipment of most P.R.U. Squadrons now operating. Spitfires have been used since the early days in the winter 1939–40 when they equipped No. 2 Camouflage Unit in France. Before the advent of the Mosquito twin-motor, machines used for P.R.U. work were Bristol Blenheim IVs and Glenn Martin Marylands. In the summer of 1940 No. 1 P.R.U. was formed and attached to Coastal Command. Mk. I Mosquitoes replaced the Marylands early in 1942 and much expansion has taken place so that many squadrons now exist forming a Photographic Reconnaissance Wing. Mk. IV Mosquitoes are now used in place of the Mk. Is which had a shorter range.

P.R.U. aeroplanes are painted azure (or cerulean) blue on both upper and lower surfaces and are given a smooth low-drag finish. They differ from other Service types in having the red and blue roundel on the fuselage in addition to the upper surface of the wings, instead of the red, white, blue and yellow roundel. The fin "flash" is normal.

A Civil Lancaster.

A converted Avro Lancaster I bomber has been operating the Trans-Canada Airlines route across the Atlantic to England since July, 1943. All the turrets are removed and it has a modified, transparent nose. Internal modifications and passenger accommodation generally is said to be based upon that of the Avro-York transport. The Trans-Canada Airlines Lancaster is registered with the Canadian letters CF-CMS which are carried on the wings and fuselage as on British Airways machines, with red, white and blue strips beneath them on the fuselage and beneath the wings, and red and blue strips above the wing. Red, white and blue "flashes" are painted on the fins, the white bar being wide as on the pre-July 1942 R.A.F. machines. The letters CF-CMS are outlined in silver against the camouflage which is of the Land Temperate type on the upper surfaces. The undersurfaces are finished a sky shade.

Ace of Spades Messerschmitts.

The Messerschmitt Me 109G was used by several noted German fighter squadrons in Sicily in the summer of 1943. One of these squadrons carried an ace of spades insignia on the motor cowling of their Me 109Gs, the marking being framed in a black diamond and painted against a white background. The regulation camouflage and light-coloured rear fuselage band were carried by the "Ace of Spades Messerschmitts" and some machines had several concentric rings painted on the spinners. Many fell into British hands after the invasion.

Baltimores at Malta.

Glenn Martin Baltimore III medium bombers were used extensively from Maltese bases for raids on the "heel" and "toe" of Italy just prior to the Italian surrender and these particular machines carried the white vertical surfaces, fuselage sides and undersurfaces, familiar on Coastal Command machines. Wellingtons used as torpedo bombers over the Mediterranean, are also painted in this way. One of the Baltimores was serially numbered FA 342.

A.O.P. Aeroplanes.

A.O.P., or, to give them their full title, Air Observation Post aeroplanes, are used by Army Co-operation

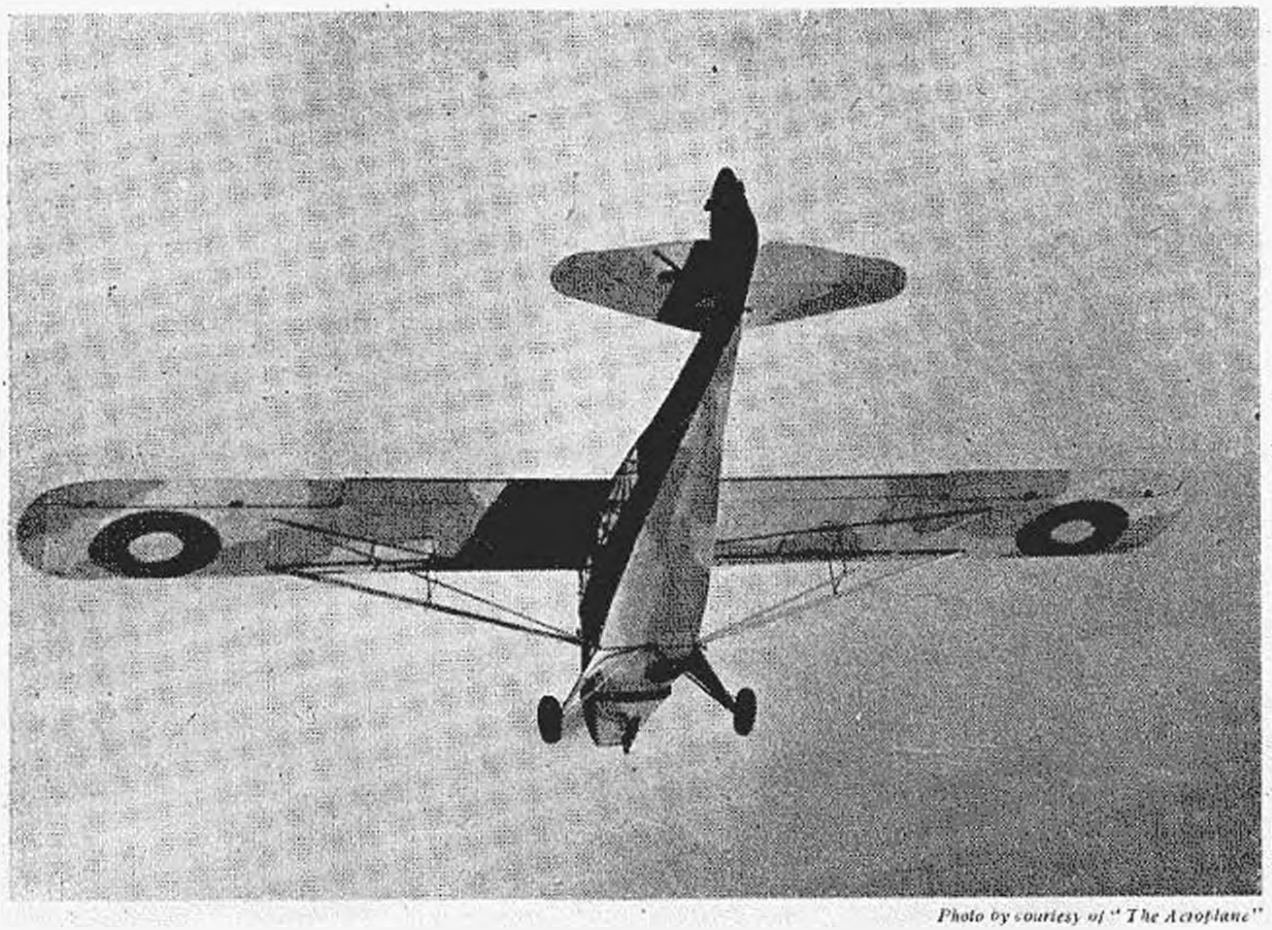


Photo by courtesy of "The Aeroplane"

units for gunnery spotting, and the transport of Army officers between battery posts and headquarters. They have to be capable of operating from improvised landing grounds of any description, from a ploughed field to a wide arterial road. Consequently a low landing speed with good handling qualities at low speeds and a short take-off run with a steep climb, are essential qualities, and to this end top speed is sacrificed to some extent. No armament is carried, but considerable wireless equipment is needed to maintain contact with the ground.

Several types of light cabin high-wing monoplanes are used in this country for A.O.P. duties. The most powerful of these is the Vultee Vigilant (295 h.p. Lycoming), designed and built in the U.S.A., and which is also used by the U.S.A.A.F. as a liaison monoplane. A British-built machine based on American designs is the Taylorcraft Auster which is produced in three versions, the Mk. I, II and III. The Mk. I was originally known as the Taylorcraft "D", and was used in France during the early days of the war. The current production type and the version now most widely employed is the Auster III. Whereas the Auster I had a 90 h.p. Cirrus motor, the Mk. III has a 130 h.p. Gipsy Major air-cooled motor. The Auster III has flaps, which is a refinement over the Mk. I. The Austers possess a remarkable manœuvrability and can dodge round haystacks and trees, hillsides and hangars at speeds below the stalling speed of fast fighters. So far none have been lost by enemy action. Austers saw service in the Tunisian Campaign in 1943. By flying in slow circles above the target area the Auster can spot objectives and positions which escape the notice of observers in faster reconnaissance machines, such as a Lysander or Blenheim.

The most interesting feature of the A.O.P. aeroplanes is the system of camouflage employed. The green and brown Land Temperate shadow-shading system is used on *both upper and lower* surfaces, as is well illustrated in the photograph of an Auster III in a vertical turn on this page. The light sky undersurfaces would be useless for the A.O.P. machines (although some have been painted this way in the past, notably the early Vigilants), since they habitually operate at low altitudes and the constant "weaving" to avoid enemy ack-ack fire would enable them to be easily spotted from above by enemy fighters when in steep turns, if the undersurfaces were a light colour against the earth background.

The use of shadow-shading on the lower surfaces of wings, tailplane and fuselage gives rise to a further deviation from orthodox R.A.F. markings procedure. On the lower surfaces of the wings the red and blue roundels are used in place of the usual red, white and blue, i.e. the same as those on the upper surfaces. Red, white, blue and yellow roundels are used on the fuselage and the standard "flash" is painted on the fin. A normal R.A.F. serial number is painted in black on the rear fuselage only. Squadron lettering is not employed on A.O.P. machines, but instead, a system of letters and numbers is favoured as on Fleet Air Arm aeroplanes. Two Auster IIIs in use are numbered, NJ 747 and LB 349 and a batch of Vigilants from BZ 101 to BZ 105.

Fighter Markings in Mediterranean Theatre.

It can now be revealed that special tail markings in addition to the usual fin flash were carried by all R.A.F. fighters, i.e., Hurricanes, Spitfires, Tomahawks and Kittyhawks I and II, stationed in North Africa during the campaign against the Axis. The upper surfaces of the tailplane were painted all white and sometimes part of the rear fuselage too. The rest of the machine was painted normally in Mediterranean camouflage with azure blue undersurfaces and midstone in place of green on the upper surfaces.

Grumman Martlets of the Royal Navy were used on land at one period and these machines were finished azure blue all over.

Coincidence in Squadron Letters.

Although many U.S.A.A.F. squadrons employ the R.A.F. method of code lettering for squadron markings there is no fixed understanding as to the respective letters used and there are cases of American letters duplicating British squadrons with quite different functions. A case in point is the Marauder squadron " PN " which is the same as a British Beaufighter squadron. The Marauders of " PN " Squadron are of the B-26B type and form part of the Eighth Air Force day bombing force stationed in England. The national star marking is painted exceptionally far aft on these machines, just beneath the leading edge of the tailplane, and the individual code letter aft of this on the extreme stern. The letters " PN " are painted beneath the dorsal turret. Marauder " 118272 " is PN Q and " 134683 " is PN V.

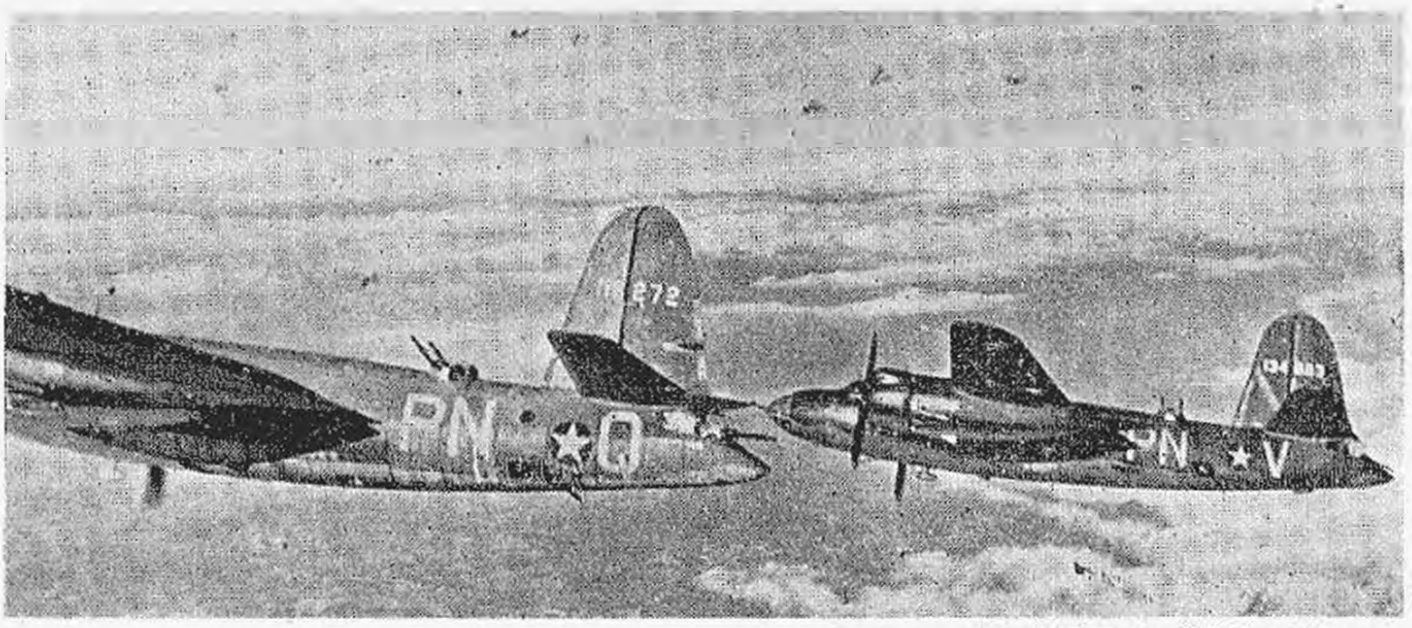


Photo by courtesy of Ministry of Information

SKIN FRICTION ON MODEL AIRCRAFT (*continued from page 19*)

$$Rx = \frac{6300.V.x.}{12}$$

V being the airspeed in ft./sec. as before. Taking x as 2 in. from the nose of the aerofoil of the petrol model mentioned and substituting in (6) we get that for a streamline boundary layer $\Delta = 0.06$ ins. or $\frac{6}{100}$ of an inch.

So our permissible size of projection in this case is $\frac{1}{10}$ of the thickness of the boundary layer.

We can also see that the boundary layer is like a germ, very small but a very big nuisance!

It is of interest to consider the increase of frictional drag of a fuselage by the presence of a rubber band around it a third of the way along, such as would be used to fix a wing on, and which will cause transition at this point.

The drag co-efficient for a partly streamlined, partly turbulent boundary layer is given by :—

$$C_{Df} = \frac{0{\cdot}074}{R_T^{\frac{1}{5}}} - \frac{B}{R} \qquad (8)$$

where B is a constant for any particular case being found from :—

$$\frac{1{\cdot}40}{\sqrt{R_T}} = \frac{0{\cdot}074}{R_T^{\frac{1}{5}}} - \frac{B}{R_T} \qquad (9)$$

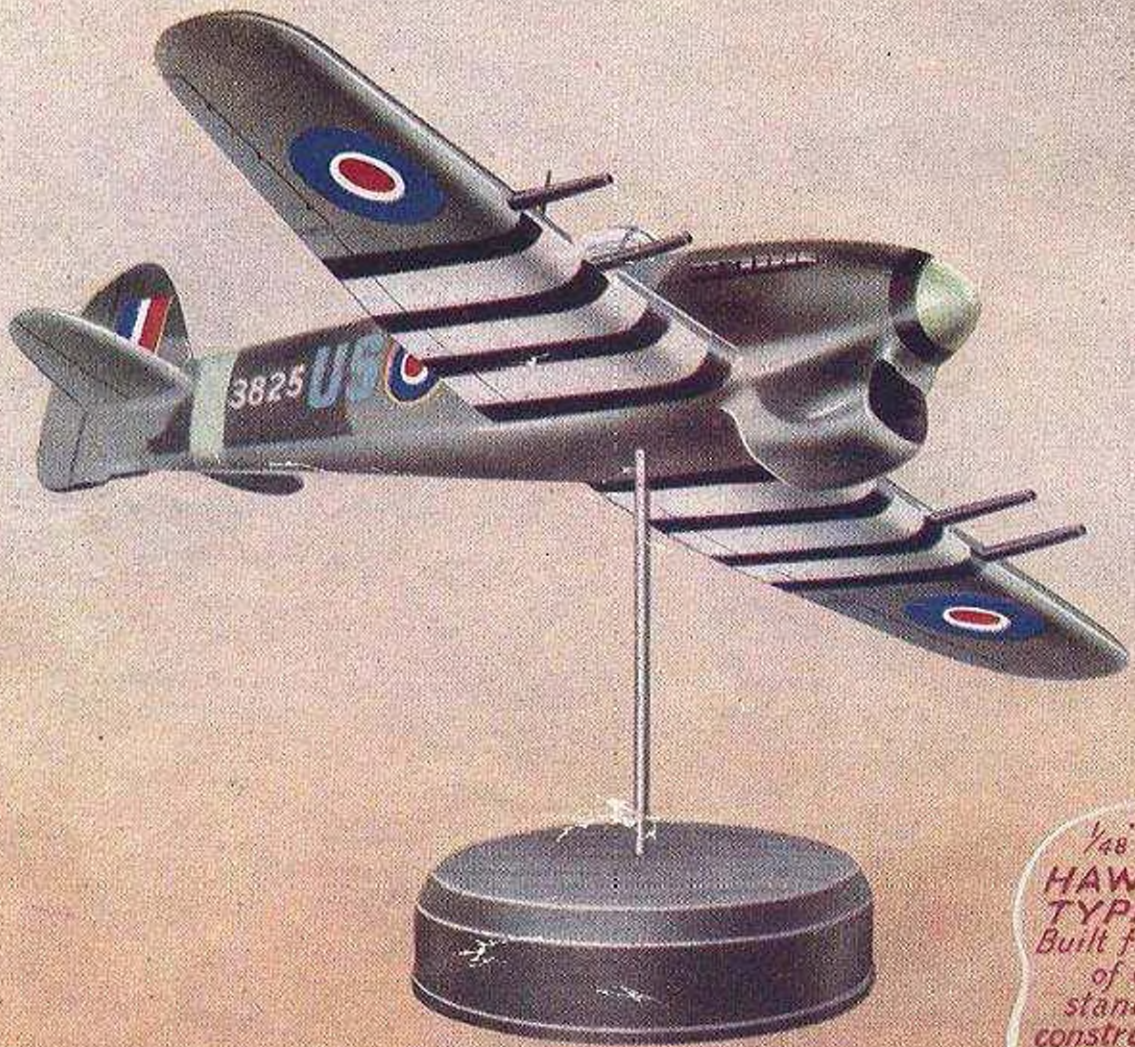
R_T being the transition Reynolds Number given by $\frac{6300.v.V.}{12}$, y being the distance of the point of transition from the nose in ins.

Considering a Wakefield model fuselage, we find that B is in the region of 325 for the case of a rubber band breaking up the flow as mentioned.

Then substituting in (8) we get a C_{Df} of about 0.005 as against a C_{Df} of 0·0025 from (3) for a fully streamline boundary layer. This shows that an external rubber band for fixing a wing on an otherwise well streamlined fuselage doubles the frictional drag, and thus almost doubles the total drag of the fuselage, the form drag of a well streamlined shape being only about 5 to 10 per cent. of the total drag.

Thus we can see one direction in which the aeromodeller should strive for greater efficiency, and to this end it is hoped that this article will have aided all those enthusiasts who require some facts on which to base their researches.

For accuracy and detail



1/48th Scale
HAWKER
TYPHOON
Built from one
of our
standard
construction
sets.

AUTHENTIC MODELS

ASK FOR THEM BY NAME
AT YOUR USUAL DEALER

AEROPLANES DESCRIBED XI

THE 4-CANNON MUSTANG

BY H·J·COOPER

Next Month : The Lockheed Electra

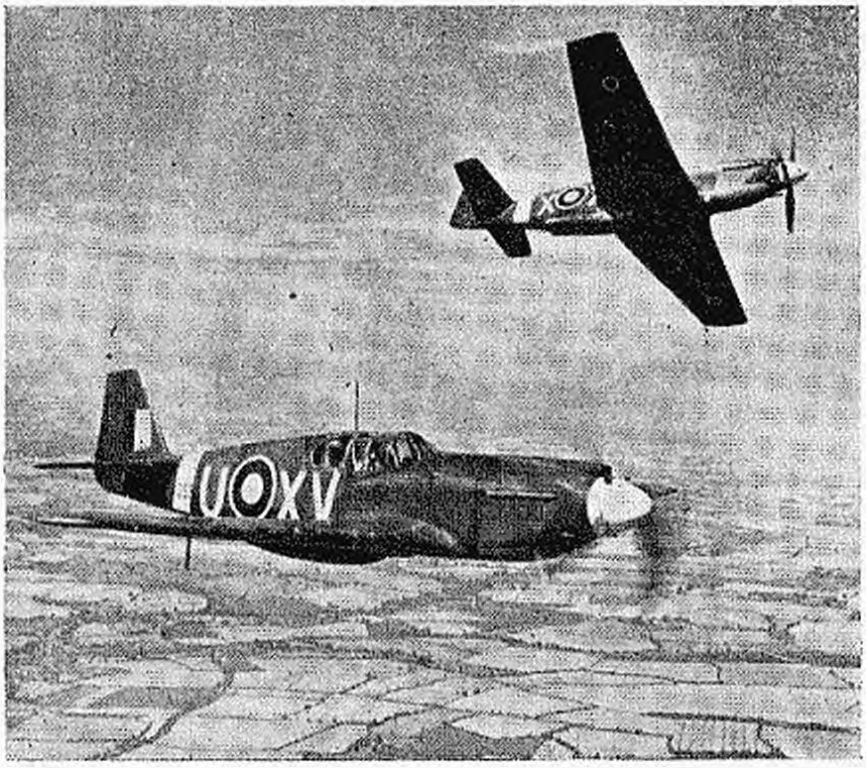


Photo by courtesy of the Air Ministry.

MUSTANG monoplanes have been in service with Army Co-operation Command since the spring of last year, and apart from their normal a.c. duties have spent much time in tree-top raids wrecking trains on the enemy-occupied Continent. Many squadrons are in service.

The introduction of a single-seat fighter to Army Co-operation squadrons is an innovation, and the Mustangs are now employed on the duties formerly undertaken by Westland Lysanders, which are no longer used operationally.

The Mustang is produced by North American Aviation, Inc., of Inglewood, California, and was designed originally solely as a single-seat fighter, in which capacity it is operated by the U.S.A.A.F., and designated the P-51. Its manufacturers call it the N.A.73 Apache.

Its angularity of wing outline is somewhat mitigated by an unexpected sleekness of fuselage, and its simple construction results in an easy aerodynamic form. The straight lines give an impression of speed not at all misleading.

The wing is a low cantilever of high-speed section. It consists of two panels bolted together at the fuselage centre-line and is built up on two spars of flanged aluminium alloy sheet, and is covered with aluminium-coated alloy. The flaps and ailerons are similarly constructed and covered and are attached to the rear spar. The wing tips are detachable.

The fuselage is built up on four longerons and aft of the cockpit extends into a semi-monocoque structure. The frame and skin are of aluminium-coated alloy. The fuselage is built in three sections comprising the nose, or motor section; the centre (cockpit) section and the tail section, which are bolted together.

The tail unit is constructed as is the wing. The fin and tailplane are semi-monocoque structures and the movable surfaces are metal-framed with fabric covering.

The undercarriage consists of two single-leg units which retract inwards into the fuselage by hydraulic operation, and is completely enclosed by neat fairing plates, which when retracted form part of the wing contour. The tail-wheel is fully swivelling and is enclosed by doors when retracted. An interesting note about the Mustang's undercarriage is that during the final stages of assembly wooden wheels are fitted to conserve rubber, and rubber-tyred wheels are not fitted until the machine is ready for its flight tests.

An Allison V-1710-39-F3R twelve-cylinder liquid-cooled motor of 1,150 h.p. is fitted to the Mk. I. In the latest version a Packhard-built Rolls-Royce Merlin vee motor is installed and develops 1,280 h.p. It drives a 10 foot 9 in. diameter three-bladed Curtiss electrically-operated airscrew. Fuel tanks are contained in the wing roots and hold a total of 170 U.S. gallons. A 12-gallon oil-tank is situated forward of the motor bulkhead. An ethylene-glycol radiator and oil-tank regulator are located in a tunnel below the fuselage.

In the Mustang the pilot is accommodated in an enclosed cockpit, the cover of which is hinged on the starboard side. A bullet-proof screen is fitted forward, and in an emergency the whole cover may be quickly jettisoned.

A camera is fitted on the port side behind the pilot's head, and a cine camera synchronised with the guns is installed in the nose below the motor.

The Mk. I Mustang is fitted with two ·50 guns on either side of the motor cowling, and a ·50 and two ·303 machine guns in each wing. The cannons of the new version are of 20 mm. calibre and are mounted two in each wing. The fire power is now 850 lbs./minute.

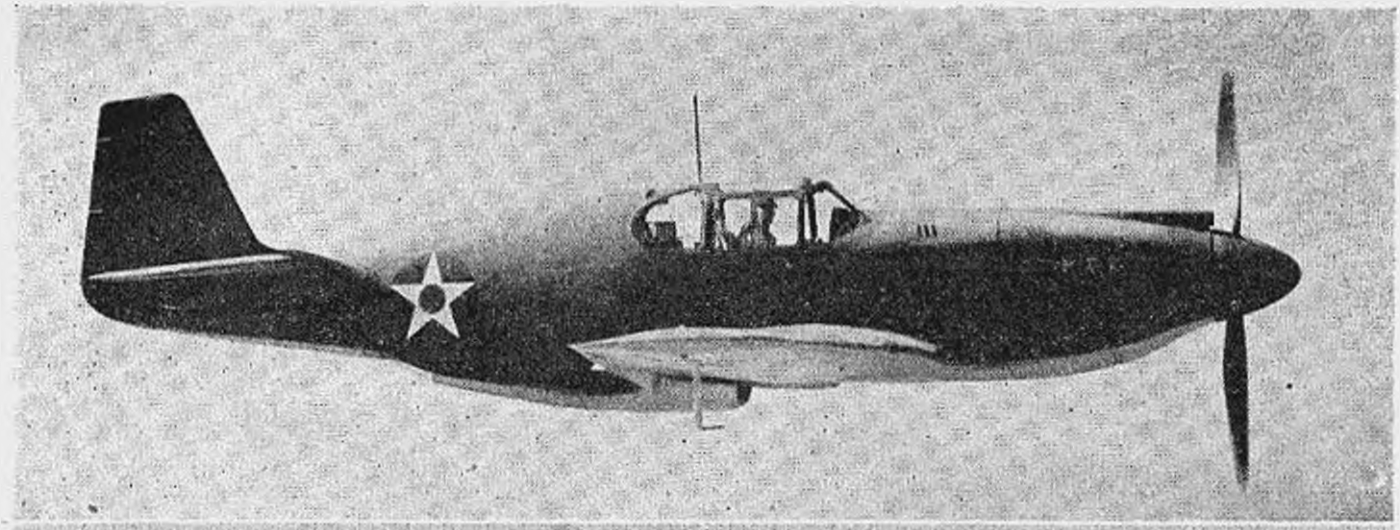
The cannon-Mustang has a maximum speed of about 360 m.p.h. at 13,000 feet, which is 10 m.p.h. lower than the former version, while it operates at 310 m.p.h.

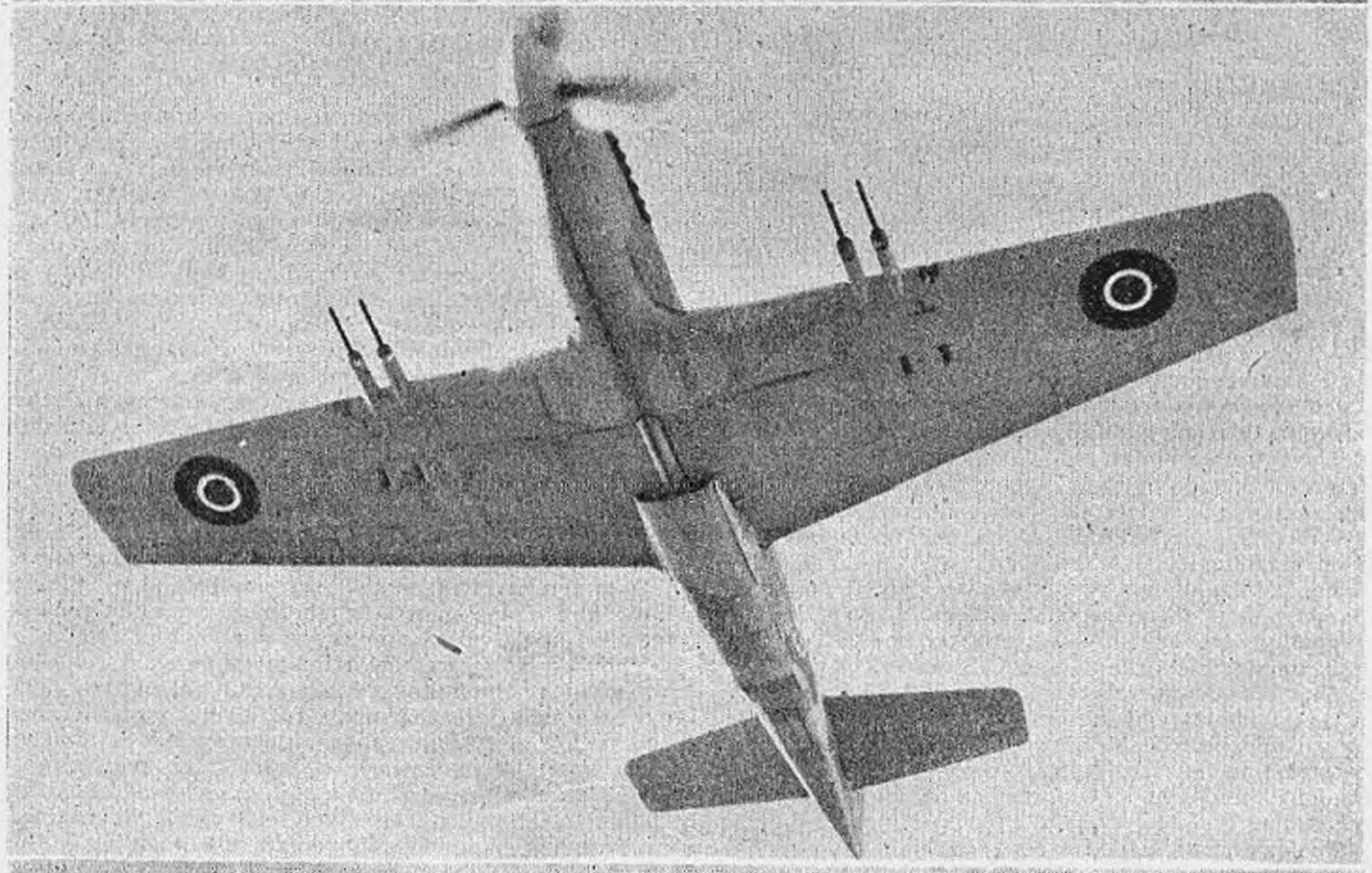
When the Mustang first became operational in this country, it was thought, not without some justification, that to the spotter it would present confusion with the Me 109E, but in a comparative analysis and in actual practice the two types are remarkably different. The long nose of the Mustang, together with its large radiator duct and angular fin and rudder, render it immediately recognisable.

Mustangs are camouflaged on the sides and upper surfaces with dark sea grey and dark green, while the undersides are light grey. The usual roundels are carried above and below the wings and on the fuselage, and the flash is painted on the fin. Mustangs are flown by squadrons FX, 4HB, RM, VH, and XV. Machine G of RM squadron has the serial number AM 148; F of XV squadron is AG 639.

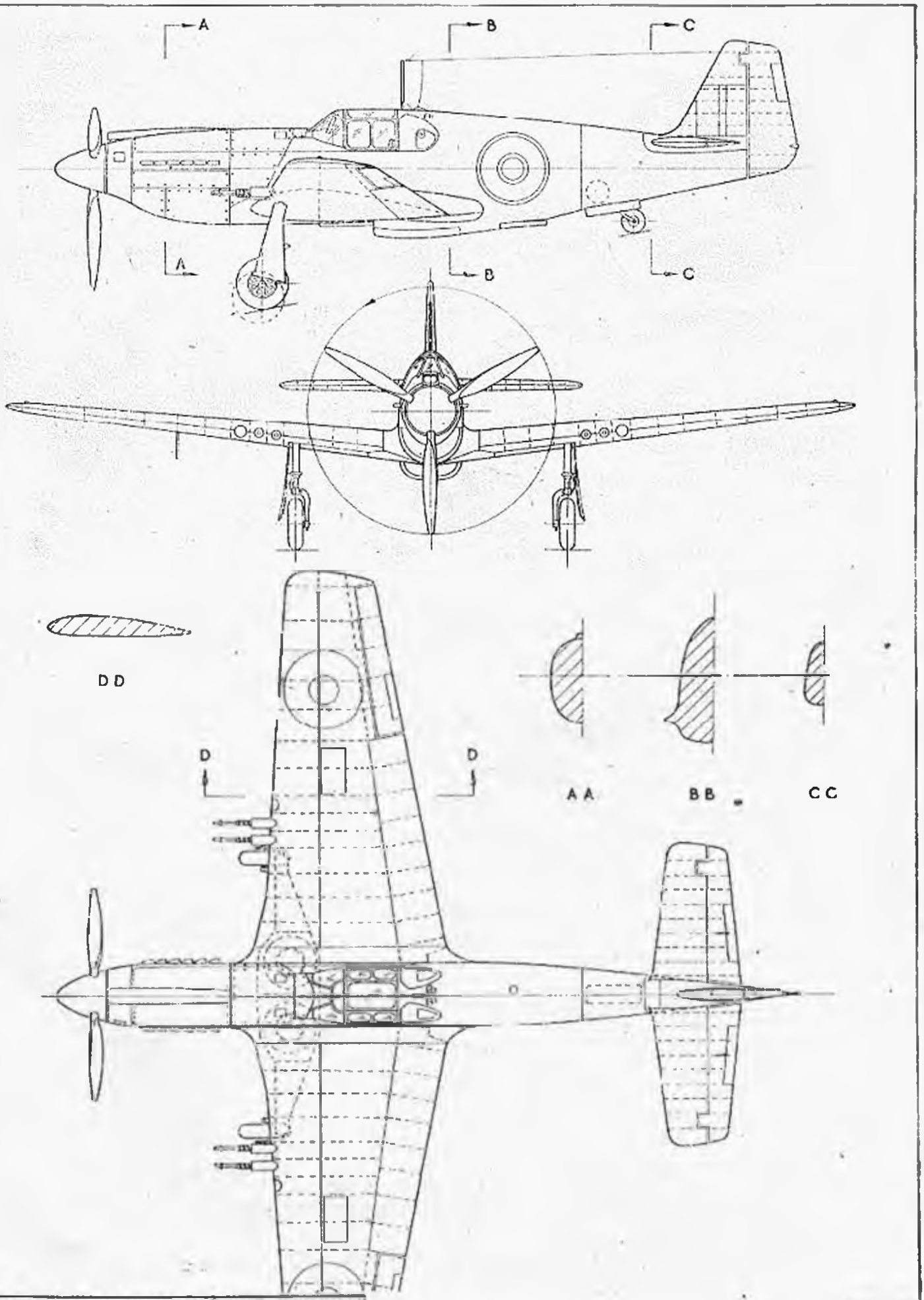
The following particulars, issued by the Air Ministry, apply to the Mustang I :

Span : 37 ft. 3 in.; length : 32 ft. 3 in.; height : 9 ft. 10 in.; wing area : 236 sq. ft.; loaded weight : 8,157 lbs.; maximum speed : 370 m.p.h.; service ceiling : 30,000 ft.





Photographs by courtesy of North American Aviation Inc., The Ministry of Aircraft Production and the "Aeroplane."



NORTH AMERICAN MUSTANG FOUR CANNON

FT

"The Master and his pupils." H. A. C. Hassall, Esq., demonstrates how to handle a plane for power winding.

WELL, well—here we are once again with another Xmas on our doorsteps, and the war still going strong in spite of all our hopes, and wishful thinking in past years! However, it still takes more than a war to stop us flying our models, even though the rubber types have to take more and more of a back seat, and I once again wish all those stalwarts who refuse to let conditions, shortages, wind and gremlins get them down a very hearty Christmas, and many helpings of turkey—even if it has to be an ersatz concoction of spam and spinach!

L/AC Sparkes writes from the Transvaal giving some "gen" on modelling over in that part of the globe, and you will be interested to hear that petrol models are almost 100 per cent. in the picture. Sparkes is on an R.A.F. aerodrome, and the lads there have made a fine workshop from an aeroplane packing case, fitted up with electric light, tables, etc., and the chaps enjoy a real busman's holiday building models after playing around with the real thing all day.

Supplies are getting difficult there, balsa now being almost non-existent. However, a local substitute has been found, known generally as Yarwood which, while being only slightly heavier than balsa, has the disadvantage of being of a "crumbly" texture. Petrol engines are plentiful in South Africa, and Sparkes is running an Ohlsson and an O.K.-49. One trouble in that climate is the high rate at which rubber perishes, as one plane found to its detriment, when the mainplane holding bands gave way when in a dive! Nuff said.

The majority of designs are to the extreme parasol, motor stuck on front type, so detested by the Editor, and this does not say much for the originality of ideas in that part of the world. Conditions as experienced there should be ideal for experimentation with good class scale jobs. What about it, Sparkes & Co.? Here's your chance to show a spot of individuality and get away from that spate of American "freaks."

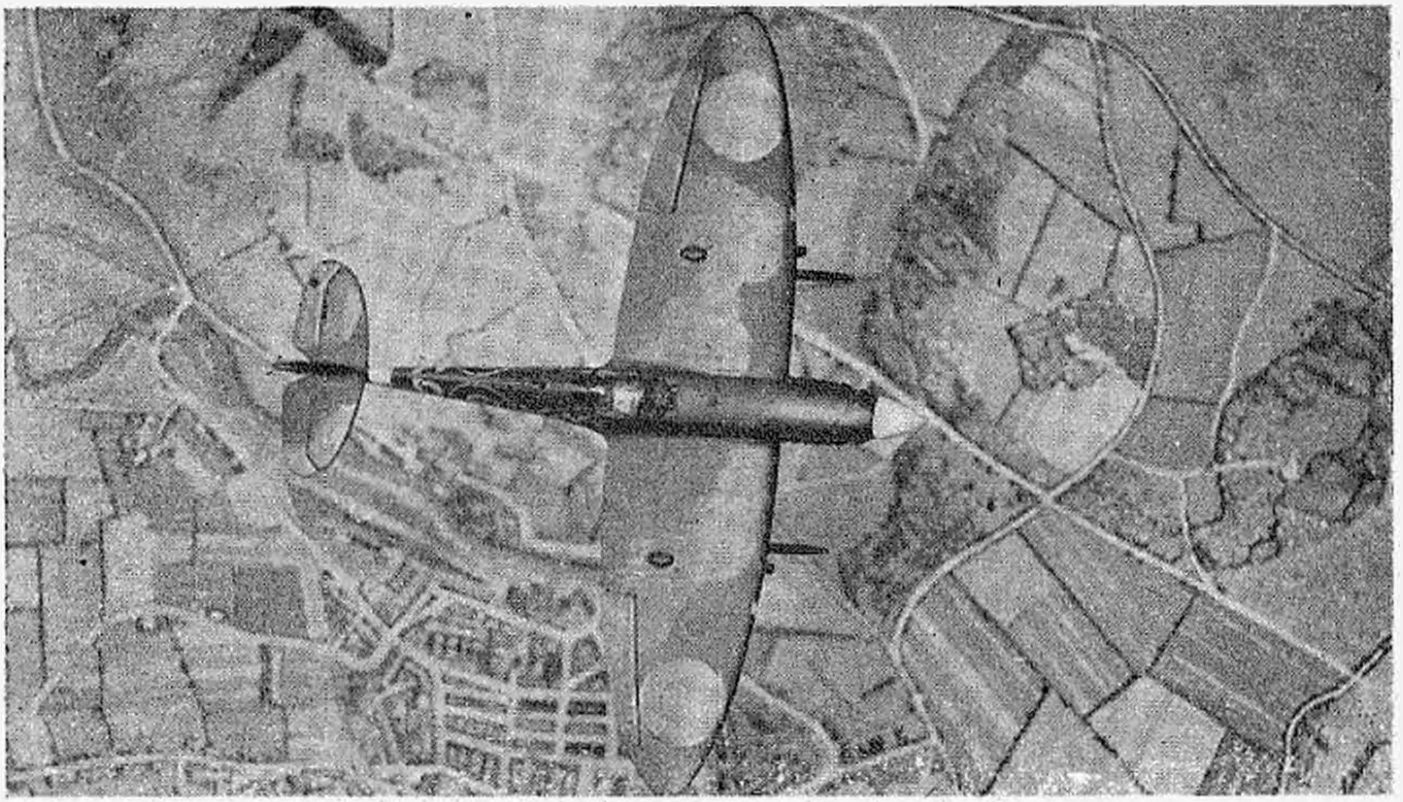
At a meeting of the S.M.A.E. held on the 26th September, Mr. D. A. Russell made some suggestions which, if carried out, would mean great changes in the movement, and possibly a radical and far-reaching effect on future activities. Chief among the suggestions is that the time has arrived when the Society requires the services of a paid secretary—the work even under current conditions being more than an official can carry out properly in an honorary capacity. The advantages of a qualified person devoting his full time to this work are obvious, and Mr. Russell is preparing a memorandum to be presented to the A.G.M. for consideration, showing how the necessary expenses, etc., can be met.

Another suggestion that will find great support from all over the country is that election of officers be conducted by a card vote—or in other words by a postal ballot. This I know from experience will be welcomed by the many clubs who are unable to be represented at meetings of the Society.

Mr. H. E. Perrin, Vice President of the S.M.A.E., and for many years secretary to the Royal Aero Club, has retired from the secretaryship, and I am sure all my readers will join me in wishing him the best of luck. Mr. Perrin has been a very good friend of aeromodellers in this country, and his material assistance to the Society from time to time has been very valuable.

Somehow or other the British model flying boat record, set up by H. S. Sayers of the North Kent M.A.C. in 1940, has never been made public, but details are now to hand, and I am pleased to place on record here that the record still stands to this chap's credit with a time of 42·3 seconds. When is someone going to have a crack at this time? And don't forget that there is still available the offer of a guinea prize for the best time put up by a flying boat during the season. Time someone took this cash off Mr. Rippon!!

For the second time this season the MERSEYSIDE M.A.S. took their models to the Clwyd Hills, the object being to again raise the British H.L. glider record. However, this time a strong wind was blowing, which took the models out of sight far too quickly for the venture to be successful. Nevertheless, some good



A "Spitfire IX." Built and photographed by P. W. Murton.

times were put up, best time being set up by P. B. Jones (N'thern Heights) model, which went o.o.s. after 2 : 30. I. S. Cameron came next with 1 : 55, R. F. L. Gosling with 1 : 15 and K. Bretherick with 1 : 30—all o.o.s. Jones, who is stationed with the R.A.F. up there, has been doing quite a lot of flying with the Merseyside boys. (I am told that the reasons for the lack of entries in later comps. this season are : heavy rain all day made entries impossible for the M.E. No. 1 Cup, and with all Wakefield models lost in the Gamage Cup do, no models of this type were available for the Gutteridge event. 'Ard luck I calls it.)

The BRISTOL & WEST M.A.C. has had the worst of weather for competitions this year, but this relented on the 19th September, when a gala day was held. They say everything comes to him who waits ! ! A. H. Lee put up a good show when winning the Packer Cup contest for Wakefield types, aggregating 432·1 secs. His model was a low-wing, geared up job, with a prop. only 11 inches in diameter. J. Weber won the club biplane event with 2 : 35.5, while old timer R. T. Howse won the scale event with a "Fairchild Ranger," clocking 22·8 secs.

J. Bailey of the NEWTON ABBOTT & D.M.A.C. has raised the club junior record to 1 : 38, aggregating 4 : 02·1 when winning the duration comp. R. Gill won the senior event with an aggregate of 2 : 34, best time 1 : 02, so it seems that the youngsters are walleping the oldsters for a change !

On Sunday, August 22nd, a dozen BLACKHEATH M.F.C. members visited Chingford Plain for the Chingford Club's Annual Gala, and won a taste of everything, including the Chingford Club's Inter-Club Team Cup, which they hold for the next twelve months. R. H. Warring won the open Duration event, with Ron Galbreath third. "Galley" then took out the rubber and inserted a nose weight to win the Open Glider event *with the same model*—time 148·5 secs., only 10 secs. less than his 3rd place rubber-powered time. This is one way of getting over shortage of materials. The model is a slab sider Wakefield with single leg retracting undercart. and in happier "brown rubber days" went up off the board like a kite.

The club is now starting a Sidcup Section under the temporary Secretaryship of W. Marney, 47, Days Lane, Sidcup. Already over 20 members are in line, and the use of a hall *free* has been arranged. The parent club will, of course, continue to meet at Ladywell, but it is proposed that senior members shall visit the Sidcup meetings as often as possible to give talks and demonstrations, and in the same way Sidcup-ers will attend at Ladywell. Another exchange arrangement is being worked with the Bromley Solid Club, members visiting them to talk on Flying Models, while their experts are coming to Blackheath to tell us how to make prize-winning solids.

R. V. Bentley is the winner of the BLACKPOOL & FYLDE M.A.S. Championship Cup, a junior, D. H. Whittaker, being the runner-up and winner of the junior event. The clubroom has been discontinued, but meetings are now held every Thursday at the Layton Junior School, Lynwood Ave., Westcliffe Drive, Layton, Blackpool, where new members and visitors will be welcomed.

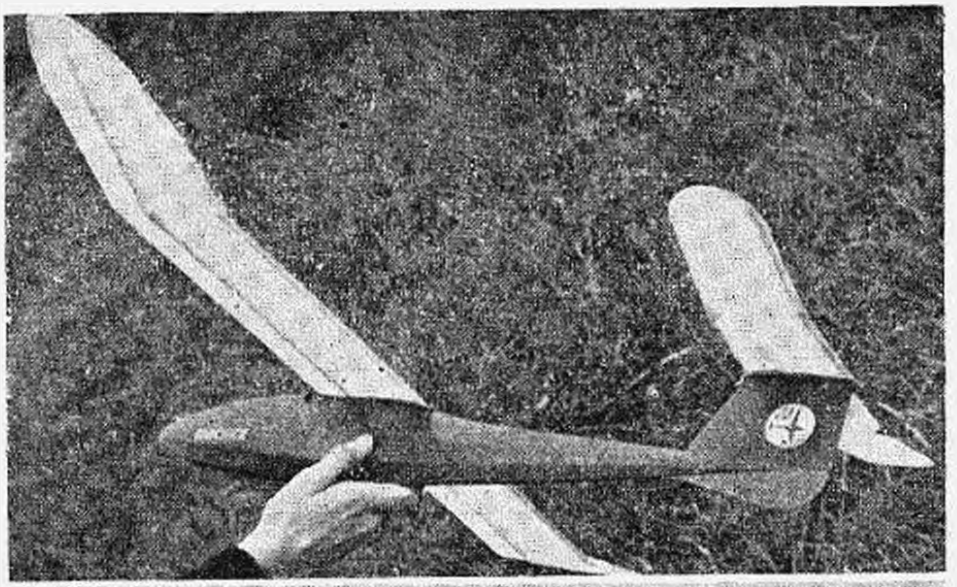
The BURY & D.M.A.C. is now in its third year and making good progress. Owing to lack of a suitable flying field, times are not high, the club records at present being.

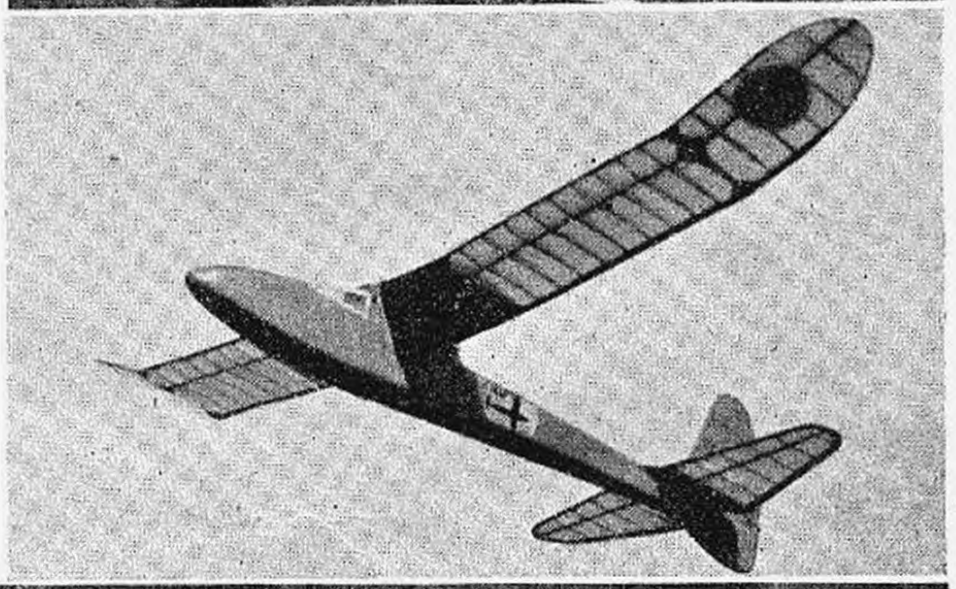
Under 150 sq. in.	D. Winterburn	1 : 35
Over 150 sq. in.	G. Ashworth	1 : 30
Glider	D. Winterburn	1 : 38
R.T.P.	J. E. Simpson	56

J. Greenhalgh won a recent solids comp. with his finely detailed Airacobra.

As is the case with the majority of clubs these days, juniors form the bulk of membership of the CROYDON & D.M.A.C., and they are certainly making the seniors look to their laurels. For instance, Brian Mulley

clocked 17 : 30 with a lightweight glider at Mitcham Common on the 18th September, and lost it the next day with a flight of 22 minutes o.o.s. It has been suggested that he uses a calendar instead of a watch in future! R. Ladd has put up the club Wakefield record to 13 minutes with his model "Snipe"—apparently it caught a thermal over the local margarine factory. The coveted Clarke Trophy was won this year by Mr. Pitcher with an aggregate of 5 : 02·2, "Pea" Green placing second with a time of 4 : 04·4. Tony Brown has proved a most formidable contestant this year, having won the Paterson Glider Cup with an aggregate of 3 : 53, the Franconi Cup for scale models with a beautiful replica of the 1911 Bleriot Monoplane (making the one flight required with 39·1 seconds in a howling gale) and bagging most of the r.t.p. contests lately.

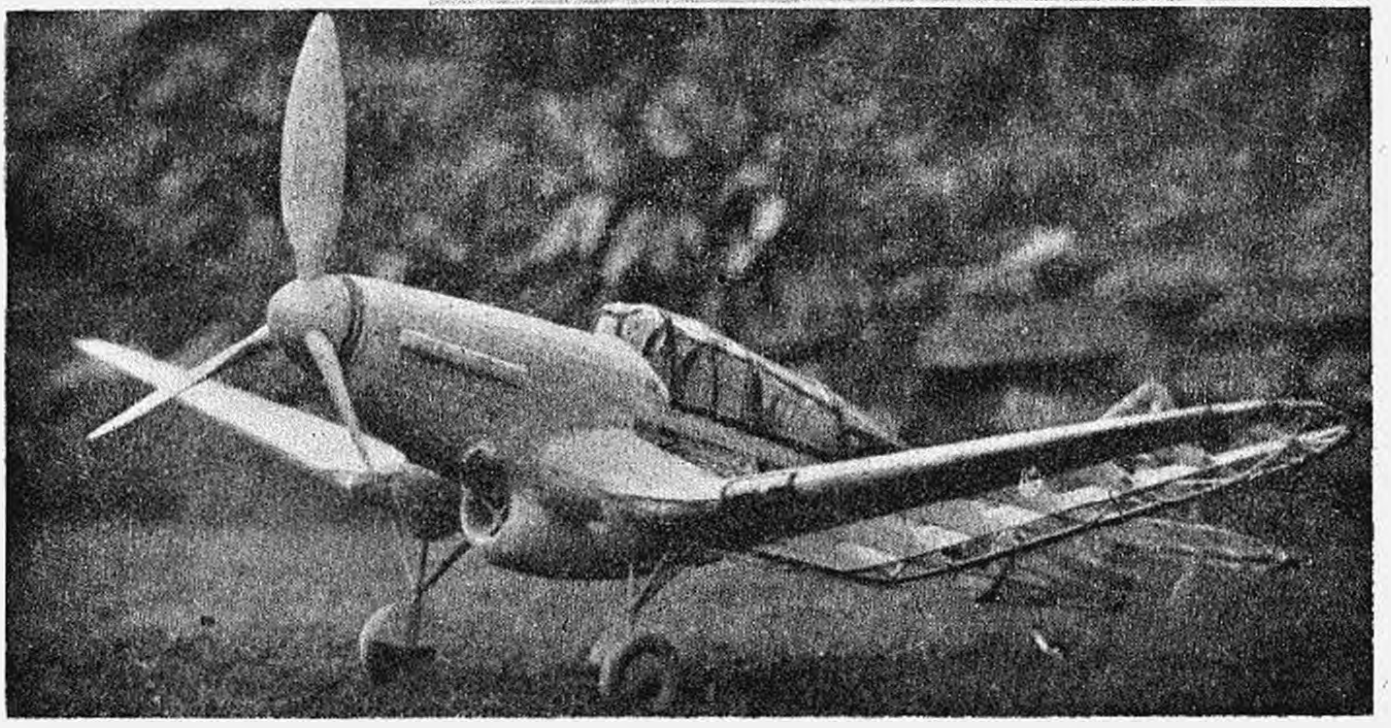


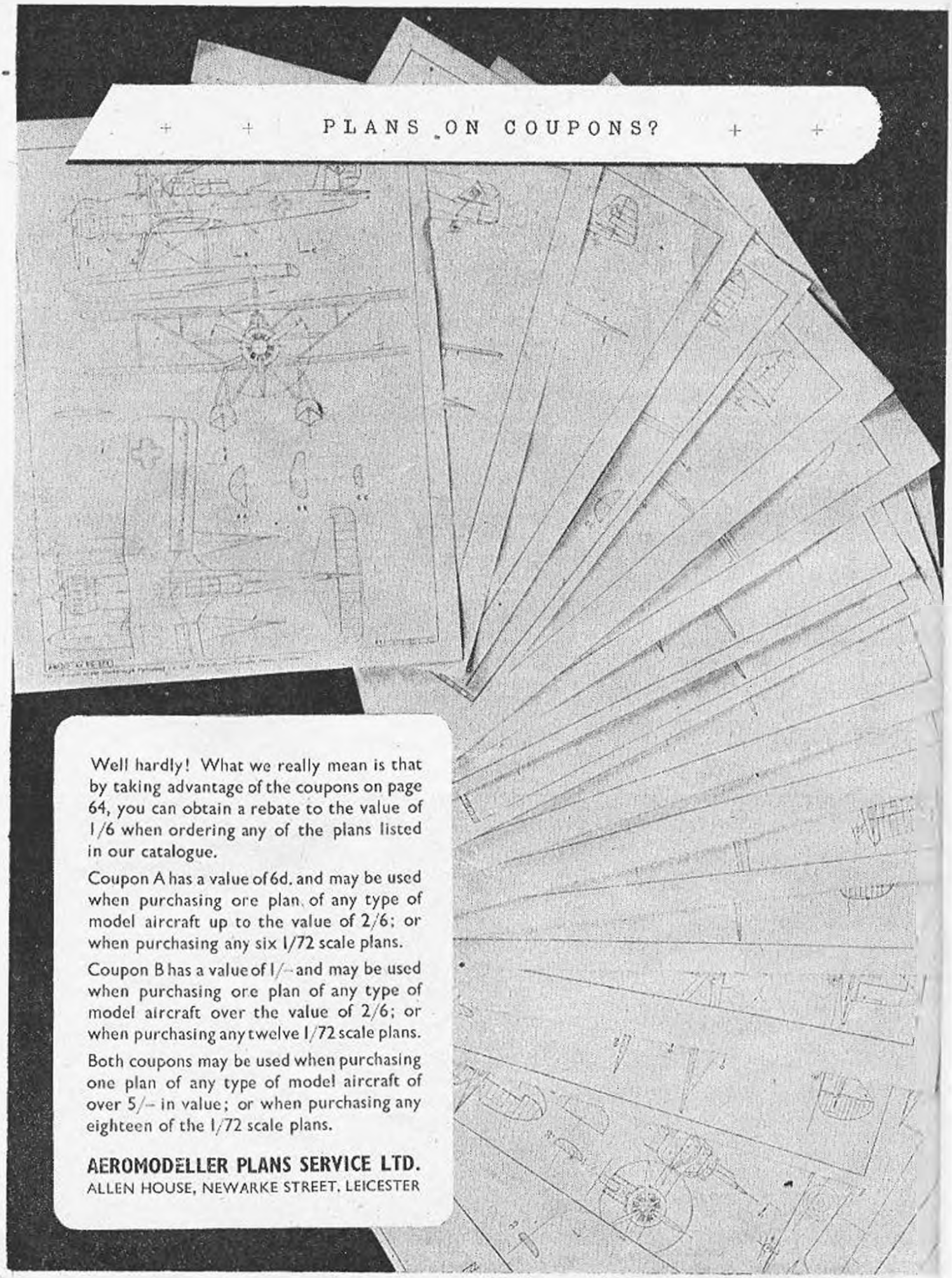


Top photograph shows I. S. Cameron's lightweight glider, the "Dabchick." Span 40", length 25", weight 3 ozs.

Middle photograph is the ever popular "Ivory Gull" built by P. Holt from AEROMODELLER PLANS SERVICE drawings.

Photograph below shows an uncovered view of R. H Marsh's Miles Master.





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THE UP-TO-DATE MODELLER'S COMPLETELY MOBILE WINTER FLYING EQUIPMENT

The BISHOP'S STORTFORD & D.M.A.C. now numbers 25 members, with club records as follows :

Glider (tow launch)	M. Champness	60 secs.
Duration (Junior)	A. N. James	45 secs.
R.T.P.	M. Champness	50 secs.
R.T.P. Speed	A. N. James	19·8 m.p.h.

Meetings are held every Thursday evening at St. Michael's Hall, Bishop's Stortford, from 7.30 to 9.30 p.m.

The OTTERY ST. MARY & D.M.A.C. opened activities with a Wings for Victory exhibition in the local Town Hall, and proved quite an eye opener to the local A.T.C. Membership, whilst small, is keen and the following records should soon be broken. Duration : R. O. Woodley, 47 secs. ; Glider (H.L.) R. A. Kent, 23 secs. ; and Glider (tow launch) R. A. Kent, 40 secs.

In spite of a high wind, A. W. Cripps won the BRADFORD M.A.C. " Brown Muff Trophy " for the most points gained during the season. A later contest was run on unusual lines. Members had to get in as many flights in one hour as possible, the best duration deciding the winner. A. W. Cripps won the duration section with a time of 1 : 09, while R. Gallagher won the glider event (one h.l. and one winch-launch combined) with 2 : 58. F. M. Gallagher made the best flight of the day day with 2 : 21 o.o.s.

Efforts are being made to revive the NORTH KENT M.A.C. (never knew it had died, as a matter of fact !) and interested modellers are asked to contact either of the following : T. Wickens, 73, Burnell Ave., Welling, Kent ; A. R. Parker, 3, Evesley Ave., Barnehurst, or A. S. Sayers, 123, Halford Way, Dartford.

The CARLISLE PARK M.A.C. won the Bedfordshire Cup with a team of " Mick Farthing Lightweights," J. R. Lewis setting up a new club record of 2 : 33 in the process. F. A. Balmforth holds the Wakefield class record at 2 : 08, while M. Beals holds the glider figure at 58 secs.

The HAYES & D.M.A.C. celebrated its 10th birthday in September, with an exhibition at its birthplace—the Fairey Aviation Co. canteen. Several of the original members are still with the club, Mr. Lambert having been secretary for seven years. Things have changed a bit during the club's lifetime—balsa has appeared and disappeared, petrol models have come and gone; and now gliders are with us again. The Hayes boys are building gliders tough like gas-jobs. Two of them (both six-footers) have floated away this year to the " Isle of Cumulus "—wherever that is !

Owing to a mix-up in the Dundee area, plus vile weather, the Clyde Model Dockyard Trophy was re-flown on the 18th September, resulting in a win for P. Russell of Stirling, who clocked 1 : 11, followed by S. McKenzie of Glasgow with 1 : 06.6, and W. Bishop, Rosyth, 1 : 05. The Glasgow club championship ended with a tie between McKenzie and G. Leask, the latter winning in the fly-off.

During the last two or three months, gliders have come into their own in the WALTHAMSTOW M.A.S., and on October 10th, K. Oliver broke the existing glider record of 2 mins. 20 secs. by putting up a flight of 9 mins. 8·4 secs. with a " Mick Farthing " job. This plane seems very popular and so far four have appeared.

Indoor flying has again started at Markhouse Road School, the best R.T.P. flight to date this season being 70 secs., although everyone is anxious to beat the club record of 1 min. 55 secs. An interesting programme has

(*Continued on page* 60.)

THE SOCIETY OF MODEL AERONAUTICAL ENGINEERS

1943 COMPETITION SEASON

We can now look back on the best season in the society's competition history. Entries received totalled 945 from 35 clubs, which represents an increase of 46 per cent. on 1942 figures, and over 80 per cent. on 1941. For the first time in history Gamage Cup entries were exceeded by later events—Pilcher Cup attracting 161 and M.E. No. 2 Cup 173. This is splendid, particularly in the fourth year of the war. But—and it is a big but—there are still many clubs who have not yet found their competition feet. War work and essential duties may take their toll of would-be entrants, but still more clubs should be seen in the competitions. The result of the Plugge Cup should encourage all—no matter how small in size—to have a go! Bushy Park, winning for the second year in succession, are chased home by Pharos, a club of under twenty members, most of them juniors, indeed one of their regular competitors in S.M.A.E. events is only 13. Need we say more?

COUNCIL MEETING—26th SEPTEMBER, 1943

Press Secretary. Mr. Hills tendered his resignation as Press Secretary, and Mr. Laidlaw-Dickson was invited to occupy that office until the A.G.M.

Affiliations. Four clubs were granted affiliation: Agricola M.A.C., Brentford & Chiswick M.F.C., No. 99 Folkestone Squadron (A.T.C.) Model Club, and Willesden & District M.A.C.

Royal Aero Club. Mr. Perrin, after 21 years as Secretary of the Royal Aero Club, has retired. The Council instructed the Treasurer to forward a cheque from the society to the Presentation Fund, for Mr. Perrin. Throughout its existence, the S.M.A.E. has had cause to be grateful to Mr. Perrin for his work on their behalf.

DELEGATE MEETING—17th OCTOBER, 1943

1944 Competitions. Next year's programme was given a preliminary shake-up in anticipation of the A.G.M. Mr. Towner gave details of the past season as a guide for the future. It was generally agreed that the record figures achieved were in a large measure due to the introduction of more "Open Events" of the free-for-all type. The possibility of making all comps., where the donor of the trophy places no special restrictions on it, "Open" next season will be further discussed. Wakefield promotion event, the Gutteridge Trophy, would of course remain untouched, as well as the Thurston Glider F.A.I. event; so "purists" need not be unduly alarmed.

Glider Line. In view of the makeshift, tree-hemmed flying grounds many clubs are compelled to use in war-time, it was felt that an increase of tow line length to 360 feet might find supporters.

Sportsmen. Delegates enquired how the society could be assured that all clubs "played fair" in decentralised comps. It was agreed that no possible "Gestapo" method could help, nor would indeed be a desirable thing; but the Council were alive to the opportunities available to the unscrupulous and would give their careful attention to any reports NOT anonymous—that they received on the matter and they had the right to refuse doubtful entries, pending enquiries.

Dethermalisers. How dethermalisers can best be developed, and whether they had a useful place in competition rules, were considered. Bob Copland raised this matter at the last Delegate Meeting, and clubs were urged to carry out experiments. The Technical Secretary (Mr. Houlberg) will be pleased to advise members and clubs on the best lines of research.

National Committees. A growing need for the Scottish and Welsh Clubs to have special representation, in view of their somewhat different flying and general conditions, was expressed. It was felt that National Committees, co-ordinated by means of a Central Committee, might do useful work and encourage the more distant clubs to come in. Now that long journeys are officially discouraged, besides being very expensive, some measure of local administration might be beneficial. Clubs were urged to consider this point, and advance their views at the A.G.M.

Dinner. A growing feeling that an S.M.A.E. dinner would be welcomed was expressed. It was agreed that the success of club functions already arranged should be watched, and if response justified it in those cases, one would be held early in the New Year, for formal presentation of Certificates and a general "get-together."

PLUGGE CUP RESULTS

	Gamage Cup	Weston Cup	M.E. No. 2	National Cup	Pilcher Cup	Flight Cup	M.E. No. 1	K. & M.A.A. Cup	Thurston Glider	Total	Position
Bushy Park	412	319	463	152	375	265	218	297	342	2783	1
Pharos	252	292	327	114	422	340	219	348	301	2735	2
Merseyside	435	304	402	148	432	277	—	221	307	2529	3
Croydon	241	180	430	151	373	227	208	191	321	2322	4
Birmingham	403	264	408	156	342	231	214	—	246	2264	5
Streatham	308	229	398	142	168	233	211	253	216	2188	6
Aylestone	353	—	331	147	350	317	—	327	337	2171	7
Hayes	278	210	365	149	440	—	217	—	350	2015	8
Cheam	211	—	417	153	319	313	143	264	175	1995	9
Walthamstow	343	212	423	155	397	101	—	—	221	1858	10
Bristol	110	289	313	136	173	—	—	304	181	1806	11
Harrow	326	—	327	137	114	91	215	—	149	1659	12
Sale	265	—	181	139	275	195	213	—	337	1625	13
Leeds	17	280	114	150	285	213	210	177	113	1619	14
Luton	163	—	352	145	397	—	—	181	311	1582	15
Blackheath	360	266	153	141	244	149	—	—	163	1485	16
Blackpool	178	—	399	—	—	251	209	249	168	1154	17
Surbiton	—	320	234	101	102	—	216	80	289	1102	18
Northern Heights	48	—	320	154	198	287	—	106	271	1384	19
Leicester	348	—	257	140	192	—	—	—	65	1002	20
Stratford-on-Avon	—	98	388	—	141	101	—	189	76	996	21
Thames Valley	174	—	196	—	260	293	—	—	—	923	22
Carlisle Park	322	104	348	138	—	—	—	—	—	912	23
Oxford	159	—	286	143	9	—	—	—	—	570	24
Cardiff	—	—	—	—	328	—	—	—	239	567	25
Easthourne	360	142	43	—	9	—	—	—	—	554	26
Rhyl & Prestatyn	117	—	—	—	226	—	—	—	49	392	27
Igranic	—	—	—	—	239	—	—	—	—	239	28
West Yorks	238	—	—	—	—	—	—	—	—	238	29
Ilkley	—	—	—	—	128	—	—	—	95	223	30
Edinburgh	—	—	—	—	115	—	—	—	—	115	31
East Birmingham	—	—	—	—	65	—	—	—	—	65	32
Newton Abbot	—	—	—	—	62	—	—	—	—	62	33
Halifax	—	—	—	—	—	—	—	—	51	51	34
Total Entries	118	15	173	82	161	50	46	51	102		
Adjustment of bonus on 100 per cent. of Gamage Entries		+70	—17	—45	—9	+67	+69	+66	+31	—	

been arranged for the winter, and two of the most popular items seem to be R.T.P. camps. for "Freaks" and speed models. The club is lucky enough to have a hall where microfilm jobs can be flown and comps. are being held for these.

An inter-club meeting between the BIRMINGHAM M.A.C. and King's Heath club resulted in a one-horse race for the K.H. boys—most of the promised entries failing to put in an appearance and leaving finally one man as their representative. Nice work—I don't think!

The inter-club meeting between Birmingham and the LEICESTER M.A.C. was cursed with the usual high wind, following being the results:

			Aggregate 2 flights.
Open Duration:			
Winner	D. W. Harrison	Birmingham	124·8 secs.
2nd	C. Doughty	Birmingham	117·5 secs.
3rd	F. W. Davies	Leicester	92·6 secs.
Open Glider:			
1st	D. Blair	Birmingham	98·2 secs.
2nd	R. Monks	Birmingham	52·8 secs.
3rd	S. Seville	Leicester	49·3 secs.
Nomination:			
1st	C. Doughty	Birmingham	
Team			
Winners		Birmingham	

The following are the Club Trophy winners for the 1943 season:

			Aggregate 3 flights.
Everard Cup	F. W. Davies	3 min.	6·2 secs.
Farmer Cup	J. Scattergood	1 min.	57·8 secs.
Hilary Cup	M. H. Taylor	1 min.	3·8 secs.
Aero Modeller Cup	F. W. Davies	1 min.	31·5 secs.
Stafford Cup	J. Marsh	2 min.	57·9 secs.
			Best flight of season.
Caton Trophy	B. A. Germany	2 min.	49·3 secs.

During the flying season, the NORTHERN HEIGHTS M.F.C. has obtained quite a number of successes in National Contests; coming third in the National Cup, R. Copland obtained 5th place in the Flight Cup and 3rd in the Gutteridge Trophy; also in the Gutteridge Mr. Jeffries obtained second place, D. Lofts 5th and Norman Lees 10th. Mr. Cox was placed 8th in the M.E. No. 2 Cup.

The best times put up were: 709 secs. by Mr Jeffries when he lost his model o.o.s.; 563 secs. by R. Copland and 331 secs. by D. Lofts. These times were all in the Gutteridge Trophy.

During the summer season they have been holding two weekly meetings, one on Tuesday evenings at Southgate, and one on Saturday afternoons at Holloway. These have now been discontinued and a general weekly meeting is held at the old Clubroom at the Argyle Hall, Seven Sisters Road, Holloway. Fortunately this hall is large enough to permit of indoor flying and limited free flying with microfilm models.

On October the 8th and 15th Mr. Cox was flying a "Push-Pull" R.T.P. model, approx. 20 in. span, ¾ oz. weight with a relay gear mechanism, the prop. at the rear of the model starting first and then, when the power is almost exhausted, the front airscrew is brought into action. So far, the results obtained, although promising better things, are not high, as the model is more or less experimental and several snags have been encountered which can be overcome in the next model. The idea, however, is definitely worth following, as Mr. Cox showed with a relay geared lightweight during the flying season.

Results of the STREATHAM AEROMODELLERS Open Day contests, held on Epsom Downs, September 26th.

Duration Contest.

1. Worby	Cheam	.. .. ..	375·3 secs.
2. Brown	Croydon	.. .. ..	369·6 ,,
3. White	Blackheath	.. .. ..	348·6 ,,
4. Warring	Blackheath	.. .. ..	338·2 ,,
5. Wyer	Cheam	.. .. ..	280·4 ,,
	30 entries		

A 1/72nd Scale Tiger Moth, built by P. M. Woodbridge.

Glider :

1. Wyer	Cheam	400·5 secs.
2. Brown	Croydon	400·0 ,,
3. Wasall	Hayes	275·0 ,,
4. Brookes	Croydon	261·6 ,,
5. Briggs	Cheam	252·1 ,,

12 entries

Team :

1. Cheam	1313·3 Pts.
2. Croydon	1217·0 ,,
3. Hayes	1064·5 ,,
4. Blackheath	936·3 ,,
5. Bushy Park	768·65 ,,

Blackheath M.F.C. have now decided to hold their Grand Indoor Marathon Rally on January 16th at the Sportsbank Hall, Sportsbank Street, Catford, S.E.6. There will be prizes to the value of £7. 10s., for best individual flight team, event and nomination. There is space for at least three poles, one of which will be class B.

The Club's Indoor R.T.P. programme is already in full swing. R.T.P. meetings have been held at the club's headquarters and also at the new Sideup Section Hall. Bill White has lightened his 1942 model to come into Class A, but so far has failed to repeat last year's figures. Junior members are very strong in models, and special club prizes have been offered to encourage them, including an " age and experience " handicap event.

Ron Galbreath has turned to Canard models. With a super lightweight of 1 oz. weight, 20 in. span and 65 sq. in. wing area (mainplane) he achieved progressively improving flights on a recent Sunday, until he was clocked 108 seconds hand-launch. Owing to damage to the undercart an attack on the British Record had to be deferred, but this figure stands as a new club record for its class. " Galley " used his favourite " Schuchowsky " wing section.

The club have accepted a challenge from Bushy Park M.F.C., who want a chance to reverse their First Round defeat in the London Cup.

New clubs notified this month are :

TETBURY & D.M.A.C.

F. H. Donn, The Ridges, Avening, Stroud, Gloucester.

EAGLE M.A.C.

B. Hildebrandt, 83, Addison Road, Guildford, Surrey.

SHEPPEY ARTS & CRAFTS CLUB

L. Taylor, 18, Strode Crescent, Sheerness.

MALLING M.A.C.

C. F. Medgett, Brome Cottage, West Malling, Kent.

H. Durdy, of 28, Wheatly Hall Road, Doncaster, wishes to form a club in his district. This also applies to R. A. Ford of 18, Dawlish Drive, Ilford, Essex. Will those interested please contact these chaps at once.

Well, that's the lot for this month, and I hope you are not too full of oranges and nuts to enjoy it ! ! Still, it hasn't been too bad a season when you look back, though a number of comps. have been well and truly cursed with bad weather. However, that is one thing we cannot control, and as long as we don't let it stop us from flying altogether, we will maintain progress. Makes you wonder what can be done when there is nothing to stop us going all out, doesn't it !

Cheerio, and again, all the best for the festive season, war or-no war.

THE CLUBMAN.