AERO MODELLER

VOL. V. No. 57. AUGUST, 1940
EIGHTPENCE

The Model of Outstanding Performance

C.M.A. I PRICE 6/6

26½" Wing span. Weight 1¾ ounces. Average duration 90 seconds, best flight to date 2½ hours.

SUPER ENDURANCE MODEL

KIT CONTAINS all ribs ready cut, finished propeller, tissue, cement, dope, rubber, lubricant, best quality balsa, fully detailed blue print, etc., etc.

THE DE HAVILLAND DRAGONFLY. *The Solid Model of the month.*

We are proud to present this model kit of one of the famous light air-liners of the present day. This machine is one of the long line of models that have made the De Havilland company so well-known throughout the world, and this aircraft is doing service in all parts of the British Empire in one form or another. This model looks very attractive when finished in the red and white colour scheme as the illustration shows, and high-gloss enamels of super quality are provided to finish your model in these colours; also six seats are provided to make a delightful model, which incorporates a wealth of detail. Kit includes super detailed blue print, which is prodcued from factory drawings kindly supplied by the De Havilland Company. Six seats, all parts cut to shape, cement, red and white enamels, and everything required to make a super model. Price 4/6.

S.E.5	4/-	BRISTOL FIGHTER	4/3
PFALZ D.12	4/-	FAIREY BATTLE	4/6
MESSERSCHMITT B.F. 109	4/-	D.H. DRAGONFLY	4/6
MORANE SAULNIER 406	4/3	WESTLAND LYSANDER	5/-
SUPERMARINE SPITFIRE	4/3	BRISTOL BLENHEIM	5/9
HAWKER HURRICANE	4/3	MESSERSCHMITT M.E.110	5/9

CHINGFORD MODEL AERODROME

155 STATION ROAD
CHINGFORD, LONDON, E.4

TELEPHONE:
SILVERTHORNE 1052

THE DE HAVILLAND DRAGONFLY 4/6

MODEL AIRCRAFT TRADE ASSOCIATION

Wholesale Distributors of the following

BALSA WOOD, TISSUES, DOPES, CEMENT, WIRE, WHEELS, PROPELLERS, BLUE PRINTS AND ALL MODELLERS' SUPPLIES.

Skyleada Kits
Star Models
Megow Kits
Atlanta Kits
Aero Kits

SEND FOR CATALOGUE AND TERMS NOW

WHOLESALE ONLY

Made by Constructors... for Constructors!

STRONGER, LIGHTER, BETTER!

"JOY-PLANE" PRODUCTS enable you to build MORE EFFICIENT MODELS! Remember SUCCESS depends wholly upon the products you use . . . . . INSIST UPON "JOY-PLANE"!

JOY BALSA CEMENT. Makes the strongest joint of all and is quick and hard drying. 3½d., 7d., 1/2

JOY WATERPROOF DOPE. Gives an oilskin finish. 4½d., 8d.

FIELD CEMENT. For prompt field repairing. 7d.

SILVER DOPE. Silver, not Leady. 7d., 1/-, 3/6

SILK WING DOPE.

WING DOPE (Clear). Finest shrinking quality possible. 7d., 1/-

COLOURED WING DOPE (Opaque and Transparent).

BANANA OIL.
(1) Thick, Waterproofs Balsa Wood. 7d., 1/-
(2) Thin, Waterproofs Tissue. 7d., 1/-

JOY MODEL DOPES (Opaque Colours) including camouflage. 3½d.

RUBBER LUBRICANT. More 'miles' per turn. 4d., 7d.

TISSUE PASTE. The clean and easy adhesive. 4d.

LUMINOUS PAINT. Insist upon "New Discovery" Brand Outfits. Base Coat and Luminous Coat. 1/8, 2/10

JOY-PLANE PRODUCTS ABOVE ALL OTHERS

MODEL AIRCRAFT TRADE ASSOCIATION

Wholesale Enquiries for Special Kit Packs of above lines to Dept. "K"

THE TURNBRIDGE MANUFACTURING & SUPPLY CO. LTD., 52a 62a Longley Road, London, S.W.17

THE AERO-MODELLER

ALLEN HOUSE

NEWARKE STREET, LEICESTER, ENGLAND

Managing Editor : D. A. Russell, *A.M.I.Mech.E.*

Editor : C. S. Rushbrooke

Draughtsman : C. A. H. Pollitt

CONTENTS

VOL. V, NO. 57 AUGUST, 1940

" . . . . from Beasties and Ghosties, and things that go boomp in the night—Good Lord Deliver Us!

Bees, Bats, Butterflies, Gulls, Crows, Pelicans, Pigeons copied in models by Hungarian Inventor

Read this amazing article—illustrated with a number of photographs showing the models in flight—in next month's issue of THE AERO-MODELLER.

AUGUST - 1940
Vol. V. - No. 57

Tel. Leicester 65322

The AERO MODELLER

INCORPORATING "THE MODEL AEROPLANE CONSTRUCTOR"

Editorial

AUGUST 11th is the day that has been announced by the S.M.A.E. as that on which the competition for the " Air Cadet " trophy, presented by THE AERO-MODELLER, is to be held. The contest is to be organised on similar lines to a S.M.A.E. decentralised competition, and once again we ask affiliated clubs to provide official timekeepers for those members of the Air Defence Squadron who desire to fly on affiliated clubs' grounds. Of course, if it is not possible to make local arrangements with one of the S.M.A.E. clubs, Squadrons may appoint their own timekeepers for the competition, but it must be remembered that *two* timekeepers must time each competition flight.

We would particularly draw the attention of all Air Defence Cadet Corps members, who intend forming teams to compete for the trophy, to the full set of rules which were published on page 447 in our last (July) issue. Also published on this page were the rules for a competition to be held at the Headquarters of the Air Defence Cadet Corps, in which the construction and finish of entrants' 'planes would be the deciding factor.

From what we hear, there should be a considerable number of teams entering for this competition, and we hope in our next issue to squeeze in the result just before it goes to press.

Our Plans Service.

Well, at least on one occasion we can boast that we have done something which has pleased our readers! There is no doubt that by the introduction of our Plans Service we have met a need which must have existed for some considerable time throughout the ranks of aero-modellers. Since our last issue was published we have been flooded with orders for plans, dispatching sometimes several hundreds in one week.

We print again, this time on the back inside cover page of this issue, a full list of plans that are immediately available. We would, however, remind readers to check up on the list each month, as from time to time we shall withdraw older models and substitute newer ones.

It should be noted that plans are now available for the " 1940 Gamage Cup Winner," designed by Mr. A. F. Houlberg, A.M.I.Ae.E., Chairman of the Council of the S.M.A.E. Mr. Houlberg, of course, is too well-known to need introducing to our readers; he is a practical aero-modeller whose experience dates back quite a number of years *prior* to the commencement of the *last* Great War! Mr. Houlberg is also an artist of no mean capability, and the plans which we are offering, which are, of course, full-size, have been entirely drawn out by him. In our next issue we hope to publish at least one photograph of this fine 'plane, which won the Gamage Cup with a total time for three flights of 717·4 seconds.

Copland's Wakefield Model.

We cannot pass from a discussion on plans without again referring to those we are offering of Bob Copland's 1940 Wakefield model, and the competition which we have organised in connection with it. Every item of this 'plane is drawn out full size on a sheet measuring 35 in. by 45 in., and in addition there is a sheet, 11 in. by 17 in., on which is shown a three-view lay-out of the completed model, the arrangement of the assembly jig for the fuselage formers, and the airscrew lay-out. These two plans come post free for 1s. 3d. Included with the plans is a two-page leaflet with full detailed building instructions.

And now for a competition in connection with *this* model! Full particulars of this were given on page 302 of the May issue of THE AERO-MODELLER, and a copy of these rules, together with official entry form, will be forwarded to all readers sending in a stamped addressed envelope for them. This competition closes on August 31st next, and is for photographs of the completed model built to Bob Copland's specification. Cash prizes of three guineas; two guineas; and one guinea; together with twenty-five consolation prizes, will be awarded.

The Bedfordshire Model Aero Challenge Cup.

Owing to the difficulty of transport and other matters, Sir Richard Wells, M.P., donor of this magnificent trophy, has agreed (for the period of the war only) that the competition shall be flown as a decentralised contest, similar to S.M.A.E. contests, on September 1st next. Result sheets will be sent out in due course to all clubs who had originally entered, and may be obtained by any *further* clubs wishing to enter the competition now that it is decentralised, on payment of the entry fee of four shillings per team of four. The fact that the competition is to be decentralised should encourage a considerably greater number of clubs to now enter, so we give herewith the name and address of the secretary of the Model Aero Section of the Igranic Social Sports Club, organisers of this contest: Mr. R. B. Hill, Messrs. Igranic Company Limited, Igranic Works, Bedford.

It is with great regret that we record that Sir Richard Wells has lost two of his sons during the last six weeks in the service of their country.

Books . . Books . . Books . .

The latest publication of the Harborough Publishing Co. Ltd., "Airfoil Sections," by Mr. J. W. B. Cruickshanks, is having a ready sale. A preliminary notice of this book appeared in our last issue, and full particulars are given on page 491 of this issue. The book has been well received, and ample supplies are available at model shops throughout the country, and also, of course, direct from the publishers.

"Scale Plans of Military Aircraft," also published by this firm, is having an enormous sale. Unfortunately, there was some some delay in getting the first copies out, due to certain errors having to be rectified, but we are asked to make it clear to readers that ample supplies are now available. Copies may be obtained from any model shop, bookstall of W. H. Smith and Son Ltd., any bookseller, or direct from the publishers.

Evacuation and "The Aero-Modeller."

The recent evacuation movements which have taken place from certain parts of our coast have called for a redistribution of the supplies of THE AERO-MODELLER. No doubt a number of readers who have been evacuated have had difficulty in getting their copies, due to the increased demand in the locality to which they have been moved. To those readers in particular we would say that they *must* please place an order with a newsagent in the new locality to which they have moved, otherwise they cannot be sure of getting their copies. We have a limited supply of our last issue (the July number) available at our offices, and copies may be obtained, price 10d., including postage.

Tail Piece.

In our May issue we recorded the perseverance of some young boys, members of the Forfar Club. Here are some particulars of a "one-man" club, also operating under somewhat unusual difficulties:

"Although I have not gone in for any competition work, I have made some very successful models, but the deck of our ship is not an ideal flying ground, so, in order to overcome this, I made a catapult, which, although rather crude, always gives a good launch. Another difficulty is that all my models land in the water, so I have had to scrap the undercarriage and fit small floats. These, after a little experimenting, have proved quite a success. My best flight has been with a 24 in. Puss Moth—three-and-a-half minutes—but this was partly due to the model being caught in the updraught from the funnel! Another model decided to land *down* the funnel, and so became a complete casualty!"

We would explain that our contributor is a leading stoker on one of His Majesty's battleships. It looks as if the Navy rules the skies as well as the seas! Perhaps we shall now hear of an airman who sails battleships in the local fishpond!

D. A. R.

IN NEXT MONTH'S ISSUE—

★ **FORSTALLING THE "STALL"** ... ... *By Lt-Col. C. E. Bowden*

★ **BIRD AND INSECT FLIGHT SECRETS SOLVED** ... ... *By M. Lorant*

★ **"The Mysterious Model"—Another Story** ... ... *By Arthur Mountstephens*

★ **Wing Efficiency** ... ... *By T. A. Brown*

★ **Testing Rubber Motors** ... ... *By E. J. Powdrill and A. H. MacBean*

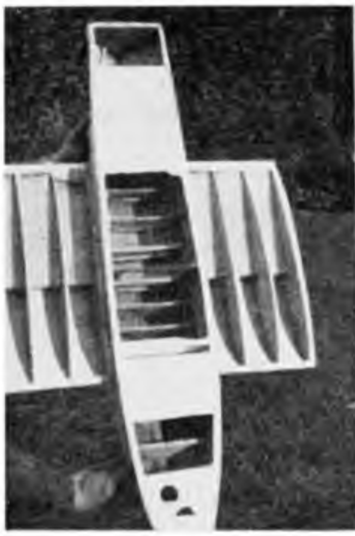
★ **An Exploding Device for Bombs** ... ... *By P. C. Binn*

★ **Designs for the Scale Model Builder—IX** ... ... *By P. G. Chinn*

★ **Petrol Topics** ... ... *By Dr. J. F. P. Forster*

★ **HALF FULL-SIZE SCALE PLANS FOR BUILDING AN AUTOGIRO—"ROTATOR IV"** ... ... *By L. B. Mawby*

A FLYING-BOAT THAT WILL . . . .



By Dr. J. F. P. FORSTER

THE hobby of petrol modelling is not advanced one scrap if we are simply going to build and fly some other fellow's designs. What we need are ideas—new ideas, and not ready-made 'planes, otherwise we in England are going to get into a rut. On behalf of petrol fiends I cannot resist the observation that, as a class, we are not sufficiently catered for in our one great national journal of model aeronautics, and in the past have had, perforce, to turn largely to American magazines for petrol topics.

This is a pity and, far from being the Editor's fault, is entirely our own. He cannot publish matter if it isn't written, and considering the unquestionable superiority and airworthiness of the average British model over its far more numerous American counterpart, British " Petroleers " must by now have plenty of " dope " to hand out to their fellows if only they would put pen to paper. I hope, therefore, that I am not overestimating their capabilities when I assume that not only are they capable of, but many prefer, making their own drawings; and furthermore they are all by now well versed in monococque fuselage construction.

For these reasons I do not propose to enter into meticulous details of construction of the " tail-boom or fuselage proper," but to concentrate, for the most part, upon the hull, and apart from a few sketches valuable space will not be wasted with vast scale plans which are likely to be of real use to only a minority of readers. I hope, therefore, that what follows, including the photographs, may prove of *general* interest as a description of a fairly successful experimental model rather than as meticulous directions for building an exactly similar 'plane.

It will be noted at once that the hull and fuselage are built and remain as two separate units, fitting together with dowels and retaining hooks. The reasons for this are twofold :

(*a*) Portability.

(*b*) The construction of the two units is on entirely different principles, the fuselage being more or less standard monococque practice, while the hull is a combination of " slab-sided longeron and upright " method with a suggestion of monococque planking on formers for the actual bottom.

The hull bottom is in three sections, interrupted by the main and forward steps. (See Fig. 1).

THE BOW SECTION is a fairly wide V shape in cross-section and the " keel " is curved upwards along the whole of its length towards the bow.

THE MIDDLE SECTION is almost V shaped in front, gradually altering aft to a flat bottom with rounded corners at the main step.

THE STERN SECTION in front is exactly the same contour as the main step, but it gradually changes, first to a semi-circle, the lower part of which is " cut off " by the flat bottom (G, Fig. 1); then the convex sides become progressively flatter and ultimately actually concave at the stern. The flat area on the bottom gradually tapers aft, and although the photographs show that in my boat it almost disappears at the stern board, I would recommend keeping it not less than 1 in. in width. Perhaps not so pretty, but as Lt.-Col. Bowden points out, we do need good flotation aft, and it provides a more efficient planing surface.

HULL ASSEMBLY.—This is done in three stages :

First: The side frames (built throughout of $\frac{3}{16}$ in. sq. medium hard balsa) are assembled flat on a drawing of the side elevation (Fig. 1). The bottom longeron (steamed to conform to the upward bend towards the bows) is joined to the other by the five uprights. Both ends are left unjoined.

Second: The step formers are cut from 1 mm. three-ply and used as templates to cut out replicas from $\frac{1}{8}$ in. hard sheet balsa, to which they are firmly glued in a vice. The side frames are now pinned upside down and edgewise to a plan drawing of the hull at its widest part, and their ends drawn together round the step formers placed upside down in their respective positions, the three-ply backing facing aft. The centres of the formers are first cut out for lightness, leaving a margin of at least $\frac{3}{8}$ in. around their circumferences and also a strip about 1 in. across their middles at a level corresponding with the lower longeron. The grain of the balsa runs crosswise and the outside grain of the three-ply runs vertically. The formers must be accurately slotted $\frac{3}{16}$ in. sq. to receive the longerons flush with their sides; they then lie up against, and should be well glued, to the forward sides of the second and fourth uprights.

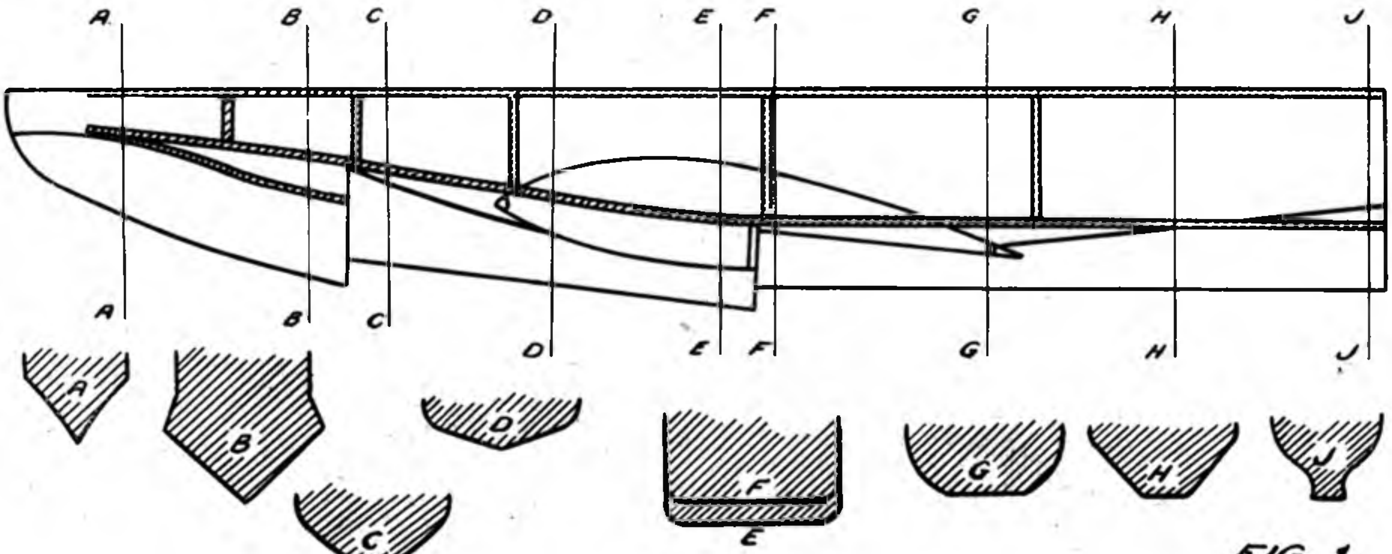


FIG. 1.

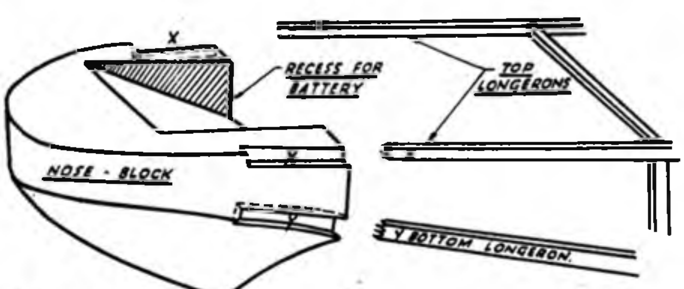


FIG 2

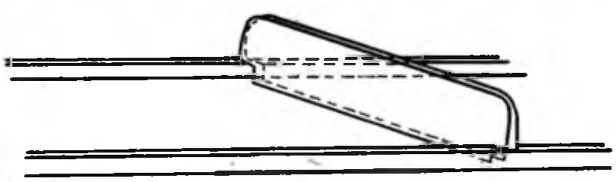


FIG 3

FIG 4

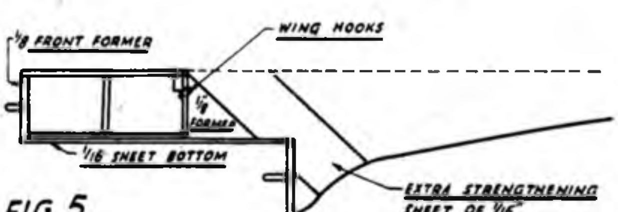


FIG 5

The sternboard, from $\frac{1}{4}$ in. balsa, is also backed by three-ply and two should be cut identically the same, as the other one will be required for the front former of the lower half of the tail-boom. While superimposed in a vice both should be drilled with two $\frac{1}{4}$ in. holes so as to ensure accurate location of the $\frac{1}{4}$ in. dowels which are fixed in the holes in the tail-boom former. The sternboard is also slotted for the longerons, and intermediate $\frac{3}{16}$ in. spreaders are inserted at intervals between the formers at this stage.

The nose-block is then roughly carved from a block of fairly hard balsa, the grain running fore and aft. The sides of the top flat surface are slotted for about 1 in. from the after end to receive the for'ard ends of the top longerons (X and X in Fig. 2), and slots are also cut at the angle between the sides and bottom of the block for the lower longerons (Y and Y in Fig. 2).

The short longerons forming the side angles of the V shaped bow section running from the angles of the forward step are also countersunk into the block, but these are not located until the intermediate formers for this portion of the bottom are in position.

Third: The sides of the hull are now planked from single sheets of $\frac{1}{16}$ in. balsa, using plenty of glue on the outsides of all the uprights and longerons and edges of the step formers and sternboard. When dry, the surplus planking sticking up above the lower longeron is trimmed off with a razor blade. This leaves the sides completely planked over all the area above lower longerons. We now have a rigid structure which can be removed from the base board, if we so desire, where up to now it has been resting upside and pinned down, and we can turn our attention to the insertion of the intermediate formers of $\frac{1}{8}$ in. balsa which carry the three-ply and balsa planking of the hull bottom. Only the step formers, nose-block and sternboard run the full depth of the hull from the top longeron. The intermediate formers are slotted at their upper corners so as to fit between as well as rest up against the bottom longerons as in Fig. 3.

It will, of course, be realised that the first former immediately behind each step must actually lie up against the three-ply backing of the step so as to form a ledge for the forward end of the three-ply bottom of the middle and stern sections of the hull. With 1 mm. three-ply, formers every 2 in. or so are ample, but if balsa is to be used for the bottom I would advise closer spacing. Three-ply will not be pursuaded into following a compound curve, and balsa planking is, of course, easier and, in fact, almost essential for dealing with the stern portion of the sides where they become concave. The bow section and middle or main step can quite easily be done with three-ply, and the whole of the flat bottom and front part of the sides of the large stern portion is done with a single sheet of three-ply cut away to allow for that portion to be covered by balsa, as shown in Fig. 4.

Before planking begins the sponson spars must be placed in position. The main spar, $\frac{5}{8}$ in. deep, is cut from $\frac{1}{8}$ in. hard sheet balsa and is backed by a layer of three-ply, and runs right through the hull projecting 8 in. on either side. With the hull still upside down this is glued into position resting on the bottom longerons against the rear surface of the main step former. The leading edge consists of $\frac{1}{4}$ in. sq., and this lies diamond wise in the angle formed by the bottom longeron and one of the intermediate formers, glueing lavishly with glue and plastic balsa to the former. The trailing edge can be left till three-ply portion of stern is in position.

The outline of the flat-bottomed area of this rear portion is reinforced with $\frac{1}{8}$ in. square stringers countersunk into the formers and forming a "backing" to which the free edge of the three-ply is glued. The balsa planking overlaps the edge of the three-ply by at least an inch, and is subsequently sanded down so as to merge imperceptibly into the three-ply, except along these stringers, where it can be glued edge to edge with the three-ply, the stringers forming a backing to the joint.

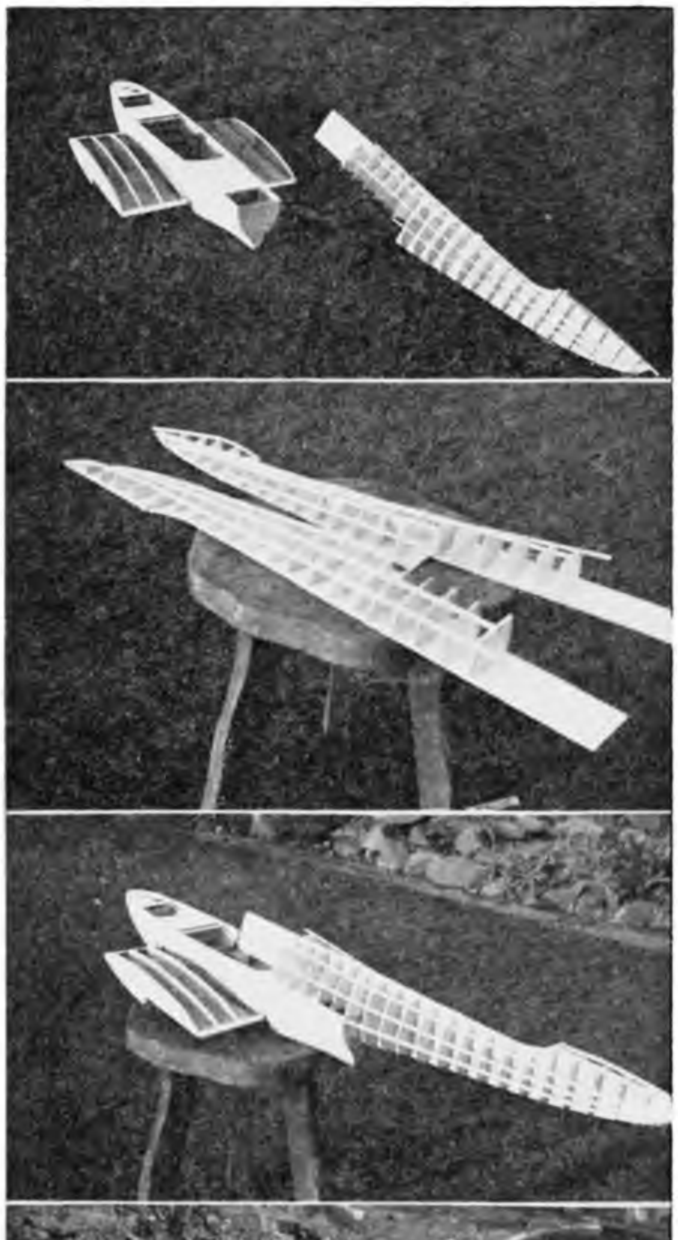
A touch of realism is obtained if this balsa-planked portion is carried a little way up the sides of the hull towards the stern and allowed to overlap the planking already in position, the overlap being left square and unsanded along the line A—B in Fig. 4.

The trailing edge spar (from $\frac{5}{8}$ in. to $\frac{1}{4}$ in.) lies $\frac{3}{4}$ in. lower than the bottom longeron, and the intervening space is filled with small blocks $\frac{3}{4}$ in. × $\frac{1}{4}$ in. × $\frac{3}{4}$ in. glued to the bottom longerons, again in the angle formed by these and an intermediate former.

Sponsons.—It is advisable to brace the spars with ribs as soon as possible, as they are easily snapped off short in their present vulnerable state. Soft $\frac{1}{4}$ in. sheet is used for the sponson ribs against the sides of the hull (to which they are glued and slightly bent along its convex sides), and also for the outboard ribs. The intermediate ribs are from $\frac{1}{16}$ in. or $\frac{3}{32}$ in. sheet. I do not pretend to know what is the effect of these sponsons upon the airflow; whether they provide any great lift or, in fact, the reverse or merely drag. I only know that they *are* very efficient on the water, and if anyone with a wind tunnel can devise an improvement, particularly in their upper camber, he has my wholehearted encouragement to incorporate them in place of my own pet sponson airfoil. The bottom of the sponsons in front and behind the step is covered by single sheets of three-ply.

Tail-Boom and Fuselage.—The hull bottom, including sponsons, is now complete, and the accompanying photographs give a fairly clear idea of its internal structure, and also the external contours of the hull and steps. A point arising from these is the presence of temporary strips of sheet balsa glued across the open top of the hull to prevent the sides springing out. For those experts who go to the length of building jigs this is unnecessary and will probably bring a smile to their faces. The front decking, pilot's cabin and "sheeting in" of the rear part of the hull and top of the sponsons are all left until the rest of the 'plane is complete so as to allow a coat of shellac to be painted all over the inside, and the final location of ignition wiring, coil, battery, etc., to be decided after flotation tests have shown where the weight is required for correct balance longitudinally.

In the accompanying photographs may be clearly seen the construction of the fuselage, and how it joins up to the hull.



The fine lines of the fuselage and high position of the fins are well shown in this photograph.

FITTING HULL AND FUSELAGE UNITS.—Before covering in with $\frac{1}{16}$ in. sheet the rear portion of the hull, a block $\frac{3}{8}$ in. thick should be well glued to the inside of the tail-board and the holes already drilled through the tail-board are continued into *but not right through* this block. This prevents any water seeping along the rear dowels and into the hull. The bottom or rear dowels are now placed into these holes and pushed home so that the three-ply facings of the sternboard and its opposite number below the tail-boom are in perfect apposition. The sheet covering of the top of the hull is cut across exactly along the bottom of the front former of the fuselage, and the back of the cabin (already drilled for the dowels in the latter) is pushed on to the dowels and flat up against the front former and glued into position. Fig. 6 shows this and also how the back of the cabin is slotted round the top longerons of the hull.

The main details of the monococque fuselage can be gathered from the photographs of its skeleton. Briefly it is built in two halves, each on a sheet of $\frac{1}{16}$ in. balsa, which when subsequently glued together form a backbone $\frac{1}{8}$ in. thick. In order to strengthen the cut-out angle of these backbone sheets, another sheet is glued diagonally across the angle on their outer sides before the half-formers are glued in position (so that the backbone here becomes $\frac{1}{4}$ in. thick). Fig. 5 shows this and also manner in which the replica of the sternboard former of the hull with its two dowels projecting forwards is placed $\frac{1}{8}$ in. below the bottom of the cabin backbone to allow for the two layers of $\frac{1}{16}$ in. sheet—one on top of the hull, the other below the cabin backbone.

From this point forwards the rounded or oval tail-boom gradually assumes flat sides and top. At the point where the trailing edge of the wing rests, a hard $\frac{1}{8}$ in. former in two halves takes the strain of the rubber hooks for securing the trailing edge of the wing. Apart from ordinary lift strains, these hooks take considerable upward strains resulting from engine thrust and particularly engine momentum in hard landings. These hooks must be built accordingly. (See Fig. 6).

From this former to the front former (of which two should be cut from $\frac{1}{8}$ in. balsa running the full width of the cabin and drilled for $\frac{1}{4}$ in. dowels, as at the hull sternboard) corner longerons with an intermediate upright and cross-piece run, and planking commences with single 3 in. sheets forming the sides of the cabin (with its already internally cellophaned windows cut out round a penny) and covering most of the tail-boom in one fell swoop.

The fin, stabiliser and wing are next tackled. The wing, built in two unequal halves, has the whole of the centre section and first bay beyond the dihedral angles covered with sheet balsa. The right wing comprises the whole of the centre section, on which is mounted the monococque engine nacelle, and in my boat the flight timer clock is also housed in the centre section behind the nacelle supporting column, which is carved from solid balsa.

The left wing has the stub rib set at the correct dihedral angle, and three strong $\frac{1}{4}$ in. dowels projecting 4 in. slide into three tubes of " windscreen " celluloid in the centre section. The celluloid tubes do not take the strain, but guide the long dowels beautifully smoothly through holes in the strong $\frac{1}{4}$ in. rib down the middle of the centre section. This strong centre rib carries much of the weight, thrust and vibration of the engine, so do not cut it from " pith," but from really hard balsa.

I do not propose, unless requested, to give details of the wing plan or airfoil (the latter is in any case " home-made "). These things are entirely a matter of personal preference. I am not ashamed to admit that I often put off the final decision on wing span as long as possible until I can form a pretty shrewd estimate of the final all-up weight of my 'plane. By so doing, an extra 6 in. at the last moment can be made to do a lot of useful work in reducing wing loading. It should be possible to build this boat to any reasonable scale, and as a guide to anyone contemplating a more or less similar creation, here are the only dimensions really necessary:

Wing span (from tip to tip across dihedral), 6 ft. 6 in.
Overall length, 4 ft. 4 in.
Maximum wing chord, 12 in.
Length of hull (sternboard to nose), 30 in.
Rear wall of control cabin to sternboard, 15 in.
Span of sponsons, 21 in.
Maximum width of hull, 5 in.
Depth of steps (hull and sponsons), $\frac{5}{8}$ in.
Sternboard to main step, 15 in.
Forward step to nose, 7 in.

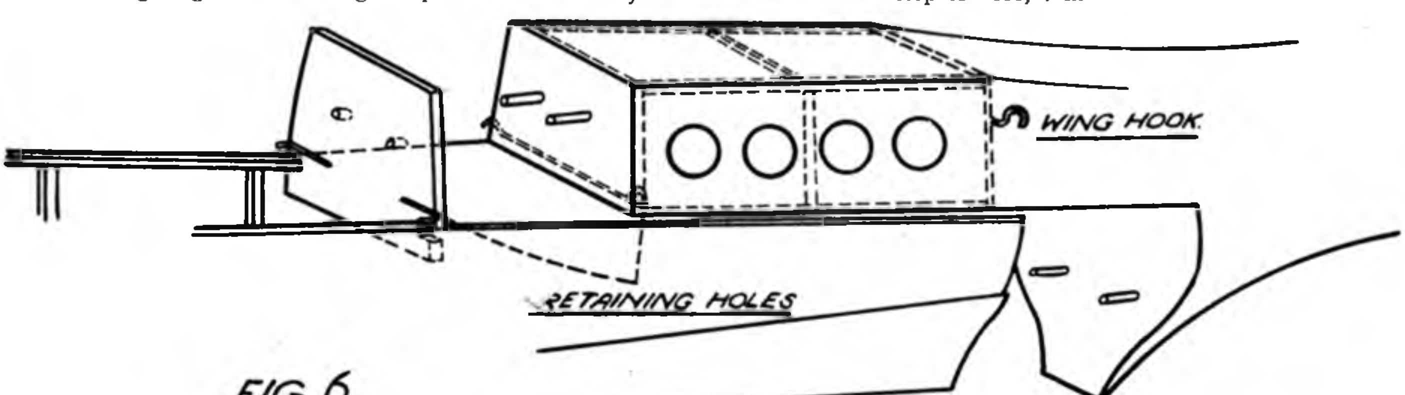
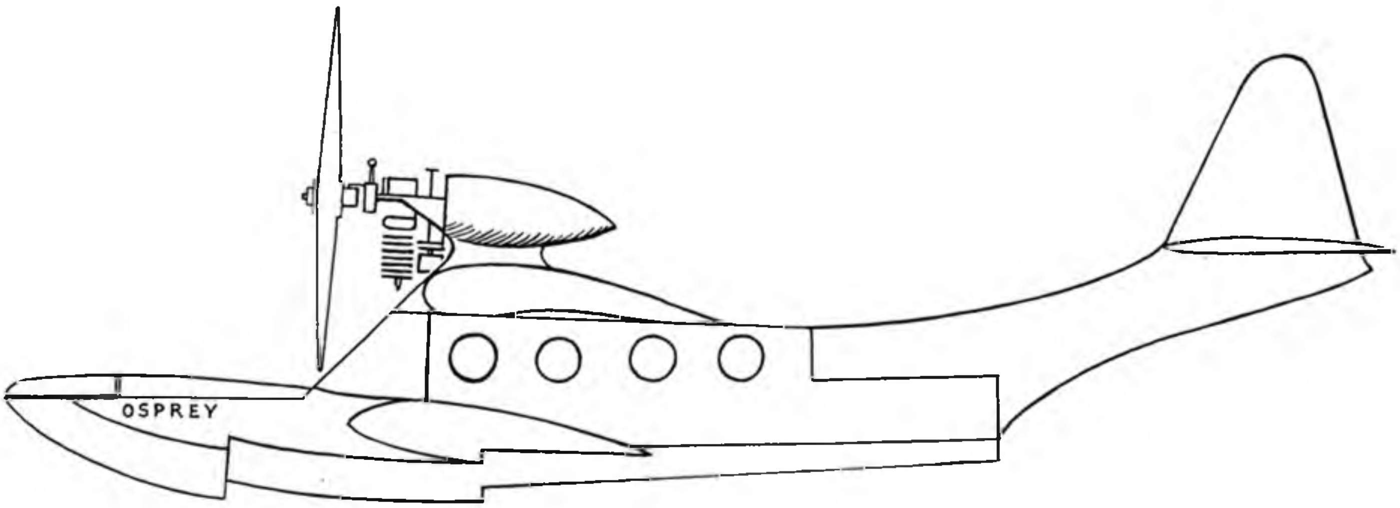


FIG 6



In conclusion, a word or two about the ignition wiring may prove of interest. The hull and fuselage being in two parts, it was resolved to confine the wiring to the hull only, and the fuselage is thus kept dry and light, and multiple connections are avoided.

The battery and " booster sockets " are located in the nose of the hull. A water-tight door, giving access to the battery, and carved from solid balsa, forms the upper part of the nose-block, and is hinged to a former carrying the " scuttle " or decking in front of the windscreen. The coil is housed under the roof of the pilot's cabin, whence the very short H.T. lead traverses an ebonite tube through the block above the windscreen. The two L.T. leads to the engine also traverse this block. The third L.T. lead passes through the top of the rear wall, where it is connected to the flight timer clock housed in the centre section of the wing. I foresaw that starting the engine on the water from a rocking boat, as Lt.-Col. Bowden suggests, is a clumsy process, hence the position of the booster plugs. I now always start up with the hull resting on my knees, and if the boat rocks we all rock together.

PLASTICS IN MODEL AEROPLANE CONSTRUCTION

By J. R. CRESSWELL

APPARENTLY a large proportion of the people who either write or read about such materials as cellophane, xylonite, bexoid, bakelite and casein, are quite in ignorance as to their real composition and properties. As one who has studied these materials, I feel that it is time some explanation was put forward regarding their nature and some of their uses in model aeroplane construction described.

As to their composition: cellophane is a clear film made of viscose, used chiefly for transparent wrappers. Celluloid or xylonite consists of cellulose nitrate, with certain plasticisers such as camphor, with dyes and pigments to give it various colours; it is used for knife handles and many toilet requisites. The so-called "safety celluloid" is made of cellulose acetate, also containing plasticisers and colouring matter; one of its very many uses is for unbreakable windows, as in the civilian type of gas mask. Bakelite is a synthetic resin used chiefly in moulded products, such as door handles. Casein is another resin, and marketed under the trade name of "Lactoid," so also is Bexone, a resin powder for moulding articles, such as combs.

Xylonite and cellulose acetate, marketed under the trade names of "Bexoid" (made by the British Xylonite Co. Ltd., Head Office, Hale End, London, E.4), "Rhodoid," "Celastoid," and several others, are the most useful when making model aeroplanes. They can be obtained in almost any thickness and either clear or pigmented; when only small pieces are required, old knife handles, tooth brushes, etc., may be utilized, generally being made of Xylonite. Pieces can usually be obtained from model aeroplane stores, art shops, or garages, where it is used for windows; if larger pieces are required enquire of the British Xylonite Co. at the above address. As there is no grain in these materials it is easier to fashion them than wood, and they may also be polished very easily. This is dealt with later on.

The five materials, xylonite, bexoid, cellophane, bakelite and casein can be distinguished in the following manner. The first two are both soluble in acetone, whereas the others are not. Xylonite flares up when ignited, but bexoid burns slowly, if at all. Of the last three, cellophane is only made in thin films, casein when burnt smells like burnt fur or milk, and bakelite, being non-thermo-plastic, is brittle when broken, and will not burn.

Cellophane is not thermo-plastic—i.e. it does not soften when heated—and consequently cannot be moulded. It is only made in thicknesses up to about 0·0016 inches, and, except by being laminated, cannot be made in heavier thicknesses. The sole manufacturers are British Cellophane Ltd., of 179 Tottenham Court Road, London, W.1.

Celluloid or xylonite can be moulded by the application of heat. The piece to be moulded should be immersed in hot or boiling water containing, preferably, a little soft soap, until thoroughly heated; then while still hot, moulded by pressing over a wooden mould made to the required shape. When cold it becomes quite hard and assumes the shape of the mould. Celluloid should not be heated over a naked flame, as it is highly inflammable. When a hotplate is used to soften it, it should not be heated above 110 deg. C. (230 deg. F.), otherwise discolouring will take place and the material is liable to ignite. To join two pieces of Xylonite together remove all grease and dust, roughen the parts with sandpaper to obtain better adhesion, moisten with a solution of 40 per cent amyl acetate, and 60 per cent acetone to soften them, then press together. Allow to dry thoroughly before releasing the pressure. Alternatively, a solution of the celluloid in acetone provides a good adhesive.

To stick xylonite to wood, roughen the xylonite and smear with methylated spirits to make it tacky; if it will not soften in the cold, warm the methylated spirits slightly; use a glue made from Scotch glue diluted with a ten per cent solution of glacial acetic acid. Another method is to paint the wood with a mixture of xylonite scrap and the above solution. When dry, paint both with it and press together until dry.

Xylonite may be polished by dipping for one or two seconds in acetone and allowing to dry thoroughly before rubbing up. To clean xylonite, dip in cold methylated spirits and rub well with a soft cloth.

Bexoid, or any of the other plastics made from cellulose acetate, is also thermo-plastic and may be moulded by immersing in hot water containing 10 per cent of common salt to prevent clouding; the water should be at about 80—90 deg. C., and the material should be immersed for up to one minute, according to thickness. If it is found that, when moulding thick material about one-tenth of an inch thick, it does not soften enough, even with boiling water, it should be heated in oil at a higher temperature, up to 140 deg. C., until soft enough to mould. It may be polished by dipping in acetone, as with xylonite. A solution of bexoid in acetone is used to coat the wings of aeroplanes, and is familiary known as "dope."

Casein is thermo-plastic, and should be moulded by immersing in water which is nearly boiling, 93—99 deg. C. (201—210 deg. F.) for two to seven minutes, according to thickness. Two pieces can be effectively joined together with any casein glue. To polish casein use a solution of one part by volume of sodium hypochlorite (17 per cent by volume) with 8½ parts by volume of water, and add 1 oz. of caustic soda to every gallon of liquid. The casein should be immersed in the liquid at 60—70 deg. C. (140—158 deg. F.) for two or three minutes, and then rinsed in water at 70—80 deg. C. (158—176 deg. F.). All the above chemicals may be obtained from any chemist.

Plastics have very many uses in the aircraft industry; windows, gun turrets, navigation lights, propellers, camera fronts and instrument dials being only a few. Similarly in model aeroplanes, both scale and flying models, they are extremely useful, such things as wheels, propellers and windows can be fashioned more easily than from wood. Because it can be moulded easily and is light and strong, thin sheets can be used very successfully when moulded to the required shape for wing and fuselage sections of flying model aeroplanes.

DO NOT CONCENTRATE ON WAR

Do not concentrate your thoughts upon war subjects. You will find it very worrying and very bad for the nerves.

Read, write, sketch, paint, study your vocation; anything that will occupy your mind and your time. Make use of your spare time by concentrating upon something useful.

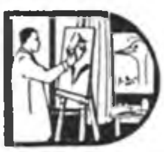
During the last war many people learned how to write short stories, etc. To-day a number of them are world-famed authors.

By becoming efficient in your vocation you can give the best service to your country and to yourself. The more you increase your earning power the better it is for the country and for yourself personally.

War or no war, earning power always brings its possessor to the front. It is no use waiting for better times. The ideal opportunity never arrives. We have to make the best of existing conditions. Therefore, delay is useless; it is worse, it is harmful.

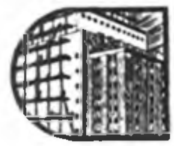
DO ANY OF THESE SUBJECTS INTEREST YOU?





Accountancy Examinations
Advertising and Sales Management
Agriculture
A.M.I Fire E. Examinations
Applied Mechanics
Army Certificates
Auctioneers and Estate Agents
Aviation Engineering
Banking
Blue Prints
Boilers
Book-keeping, Accountancy and Modern Business Methods
B.Sc. (Eng.)
Building, Architecture and Clerk of Works
Builders' Quantities
Cambridge Senior School Certificate
Civil Engineering
Civil Service
All Commercial Subjects
Commercial Art
Concrete and Structural Engineering
Draughtsmanship. All branches
Engineering. All branches, subjects and Examinations
General Education
G.P.O. Engineering Dept.
Heating and Ventilating
Industrial Chemistry
Institute of Housing
Insurance
Journalism
Mathematics
Matriculation
Metallurgy
Mining. All subjects
Mining. Electrical Engineering
Motor Engineering
Motor Trade
Municipal and County Engineers
Naval Architecture
Novel Writing
Pattern Making
Play Writing
Police, Special Course
Preceptors, College of
Press Tool Work
Production Engineering
Pumps and Pumping Machinery
Radio Communication
Radio Service Engineering
Road Making and Maintenance
Salesmanship, I.S.M.A.
Sanitation
School Attendance Officer
Secretarial Exams.
Sheet Metal Work
Shipbuilding
Shorthand (Pitman's)
Short Story Writing
Speaking in Public
Structural Engineering
Surveying
Teachers of Handicrafts
Telephony and Telegraphy
Television
Transport Inst. Exams.
Viewers, Gaugers, Inspectors
Weights and Measures Inspector
Welding
Wireless Telegraphy and Telephony
Works Managers





If you do not see your own requirements above, write to us on any subject. Full particulars free.

Study at Home in your Spare Time

CAN YOU CHANGE MY EXPRESSION?

IF SO, YOU MAY BE THE ARTIST that COMMERCE IS WAITING FOR

Just try it for yourself, trace or draw the outline then put in the features.

There are hundreds of openings in connection with Humorous Papers, Advertisement Drawing, Posters, Calendars, Catalogues Textile Designs, Book Illustrations, etc., etc.

60% of Commercial Art Work is done by "Free Lance" Artists who do their work at home and sell it to the highest bidders. Many Commercial Artists draw retaining fees from various sources; others prefer to work full-time employment or partnership arrangement. We teach you not only how to draw what is wanted, but how to make buyers want what you draw. Many of our students who originally took up Commercial Art as a hobby have since turned it into a full-time paying profession with studio and staff of assistant artists—there is no limit to the possibilities.

Let us send full particulars for a FREE TRIAL and details of our course for your inspection. You will be under no obligation whatever.

Jim Duck **ART DEPT. 119**

I HAVE HELPED THOUSANDS OF OTHERS

. . . and when I say thousands, I do not exaggerate, as I can produce well over 10,000 unsolicited testimonials from grateful students who, through our Postal Training, have achieved their life's ambition.

If it is your desire to make progress and establish yourself in a good career, write to us for free particulars on any subject which interests you, or if your career is undecided, write and tell us of your likes and dislikes, and we will give you practical advice as to the possibilities of a vocation and how to succeed in it. You will be under no obligation whatever. It is our pleasure to help. We never take students for courses unless we feel satisfied they are suitable. Do not forget that success is not the prerogative of the brilliant. Our experience of over thirty years proves that *the will to succeed* achieves more than outstanding brilliancy.

Dept. 119, THE BENNETT COLLEGE, SHEFFIELD

EVERY DEPARTMENT IS A COMPLETE COLLEGE: EVERY STUDENT IS A CLASS TO HIMSELF

JOURNALISM

Short Story, Novel and Play Writing

There is money and pleasure in Journalism and in Story Writing. No apprenticeship, no pupilage, no examinations, no outfit necessary. Writing for newspapers, novels or pictures is not a gift; it is a science that can be acquired by diligent application and proper guidance. It is the most fascinating way of making pastime profitable. Trained ability only is required, we do the training by post. Let us tell you all about it.

DEPARTMENT OF LITERATURE 119

If you attend to this now, it may make a wonderful difference to your future.

COUPON— CUT THIS OUT

To Dept. 119, THE BENNETT COLLEGE LTD., SHEFFIELD

Please send me (free of charge)

Particulars of....................................

Your private advice about......................

(Cross out line which does not apply)

....

....

PLEASE WRITE IN BLOCK LETTERS

NAME..

ADDRESS...

....

....

DURATION SPECIALISTS

Wing span 37 in. Wing area 142 sq. in.

This sensational new Duration Model has already been acclaimed as the outstanding model of 1940. Designed by experts, it appeals to beginner and experienced modeller alike.

- Kit is absolutely complete and the 1,000-word instruction sheet makes building simple and flying success a certainty. Finished super-thrust prop., bushed wheels, ball race, etc., and all ribs ready printed.
- The box you receive your Lancer in will hold the finished model and last you for years.

PRICE 12/6, carriage 6d.

*There are still kits left of Britain's No. 1 48 in. span super-streamliner, "**FLYING MINUTES**," price 18/6, carriage 9d. With finished prop. and spinner 2/6 extra.*

Send 2d. stamp for latest lists

MODEL AERO SUPPLIES
146 Spring Hall Lane
HALIFAX
Phone: Halifax 61201

HALFAX

THE
SPRITE
33 in. span
PRICE 10/9
Carriage **6d.** extra

FIRST MODEL DOES 20 MIN. ! !

For his first model Mr. N. Hayes, of the Ashton and District M.A.C., built a SPRITE, and after getting many good flights it was caught in a thermal after a take-off from grass. After about 10 minutes, only the flashing of the propeller in the sunlight could be seen as the model circled round at a terrific height, and after over 20 minutes the model landed not more than three-quarters of a mile away. Since this flight Mr Hayes has lost his model after a flight of about 4 minutes out of sight.

Dozens of other SPRITES in this district have been making flights of over 2 minutes, many of these models being the first ones to be built by the owners.

Get YOUR Sprite NOW from :

ASHTON MODEL AERO SUPPLIES
58 OLDHAM RD • ASHTON-U-LYNE • LANCS
MEMBERS OF M·A·T·A

2½d. stamp brings price list.

ANOTHER NEW KEELBILD KIT

"ALBATROSS" SAILPLANE

PRICE 6/- *Plus* **6d.** *Postage*

42 in. wing span 2½ oz.

Built on the famous "Keelbild" system. Flights up to 4 minutes recorded to date. Printed out formers, wing ribs, cement, true to scale drawing, etc.

MA
MODEL AIRCRAFT TRADE ASSOCIATION

Full Kit of Parts 6/- 6d. Post

Drawing only 1/3. Post 2d.

Please send 4d. for fully illustrated Catalogue.

THE MODEL SHOP
2 COLLEGE ROAD, BARRAS BRIDGE
NEWCASTLE-ON-TYNE

Dealers and Modellers should note that if it comes from ———

The Balsa Wood Co.
LTD.

it is the best procurable

WHOLESALE STOCKISTS OF HIGH GRADE
BALSA

The Balsa Wood Co. Ltd.
Africa House
London
Kingsway
W.C.2

THE AIRFOIL AFLOAT

By **WILL REYNOLDS**

THE sail is so much akin to the wing that aero-modellists will find much of interest in the study of modern sailing, whilst the advent of the aeroplane has thrown much light on the manner in which a sail goes to work.

The sail has been evolved throughout the centuries. It is easy to imagine that the first intention was merely to proceed in the same direction as the wind, but it would soon become apparent that a boat suitably rigged could be sailed at right-angles, or even, to some extent, against the wind.

How is this possible? To an aero-modellist this will be understood from the diagram. The centre line of the boat is roughly at 45 degrees to the wind. The sail, however, is capable of being controlled so that the angle of incidence may be altered at will. Lift is produced at right-angles to the wind, which lift, it will be seen, tends to force the boat sideways and forwards. A boat's hull is (or should be) so shaped that forward movement is easy when compared with sideways movement. Much of the sideways drift is thus overcome whilst the boat is forging ahead under the influence of the forward component of the lift. The sail has automatically assumed an airfoil section.

Let us consider how aeronautical research has been turned to the advantage of the yacht designer and the sailmaker.

First, and most noticeable, is the increase in aspect ratio. Most people must have wondered at the enormous masts of the America's Cup challengers, or, as a further example, the mast of a 12 ft. racing dinghy, which is about twenty-two feet high. The cut of a sail has been refined of late. Fishing boats and slow moving working boats used to have their sails cut very full, that is, in use they assume a slow moving high lift section.

Yacht crews a few years ago were at pains to stretch their sails very flat and tight. Nowadays sails are cut so as to take up when on a wind, a desired airfoil section, and it is frequently the practice to loosen the sail upon the spars during light winds. This can be easily understood, for a slow moving thick section is thus taken up by the sail and maximum lift obtained. When the wind pipes up and is passing across the sail at good velocity, the crew tighten the canvas on its spars and a thin high-speed section is formed. Now a helmsman endeavours to take advantage of every harder puff of wind, for it is found that a boat can sail closer to the wind in hard puffs, which, upon consideration, is in accordance with aeronautical theory, i.e. the same lift may be obtained with a smaller angle of incidence if the speed is increased. A good deal of attention is paid to the trailing edge or leach, as it is called. If it is too tight it will prevent the air to windward from readily leaving the sail, causing undue drag. To flatten the after-part of the sail, battens are let into the canvas, this also allowing a curved leach. All this tends to make a modern sail remarkably like the upper surface of an elliptical wing. Sails have even been tried with a set of ribs, but as these have to be inverted when the boat is put about (it will be realized what is the " upper " and " lower " surfaces on one tack are reversed when the ship goes about), sails with ribs must be unhandy, this factor—handiness in a seaway—causes theoretical improvements to be waived to some extent.

As the sail is not rigid and the angle of incidence is (with the notable exception of a Chinese junk) controlled only at the foot (root), the upper part sags to leeward, or, as an aero-modellist would say, the sail has wash-out. If the

upper part of the sail is working efficiently the lower part is almost stalled. Borrowing from the principle of slots in the leading edge of a wing, the jib of a yacht is used to correct the direction of wind flow on to the lower part of the mainsail.

Streamlining is considered in a modern yacht. The most obvious source of drag is the mast. This is now frequently of hollow modified streamlined section. The mast of a modern racing dinghy is of an egg-shaped section, the blunt end, of course, leading. Right down the after or narrow end is a groove, into which fits the bolt rope (the rope sewn to the edge of a sail to bind it). The sail is thus faired into the mast and unnecessary sources of disturbance of the airflow eliminated. A further step is to make the mast swivel instead of being fixed with the major axis of its section along the centre line of the yacht. This swivelling mast has only been introduced in yachts of very advanced design, but compare it in principle with swivelling wheel spat. One difficulty which must be overcome is that the wire stays needed to support the mast interfere with the swivelling action. These wires themselves cause drag, which, although unimportant in a cruising boat, where strength would be more important, are undesirable in racing

(*Continued on next page*).

WING CONSTRUCTION —— By W. KUYSER, B.Sc.

MANY fierce arguments are waged on the relative merits of various wing sections and, after the tumult and the shouting have died away, it comes out that most of the wings used have ribs spaced so widely apart that the inevitable sag completely changes the section. Thus, before one can claim advantages for a certain section, one must be sure that the wing is perfect in every respect. To ensure this, surface spars, which introduce ridges, must be eliminated and the ribs placed much closer to each other.

Experimenting along these lines, I have come to the conclusion that ribs should be spaced at a distance not greater than a fifth of chord, and have evolved a method of construction which fulfils these requirements, and which I have not seen described previously. Spars are rendered unnecessary by making the leading and trailing edges do the work. Nothing but $\frac{1}{32}$ in. sheet balsa is used, and this gives a wing amply strong for spans of Wakefield size.

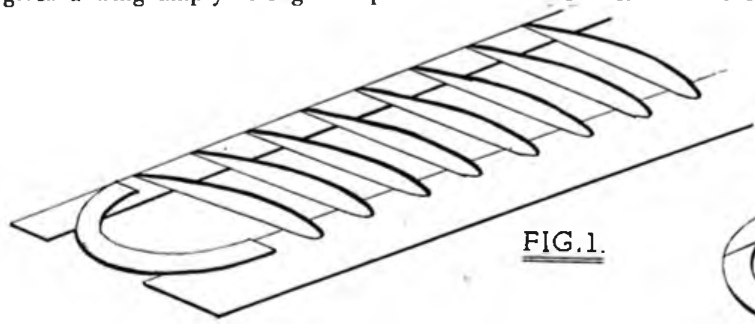


FIG. 1.

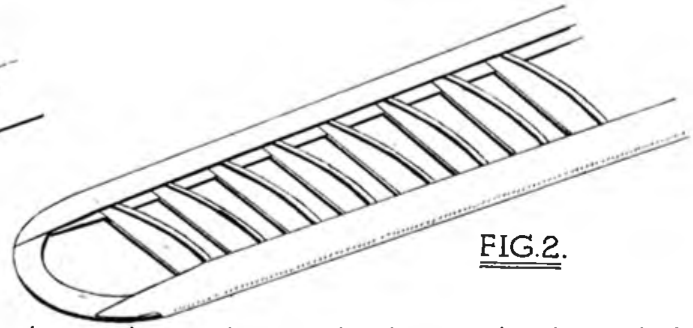


FIG. 2.

Let us take as an example a 36 in. span, tapering from 5 in. to 3 in. chord, rib-spacing 1 in. This calls for 18 ribs per half span, and these are best cut out in the manner described in "The A.B.C. of Aero-Modelling." Templates of the root and tip ribs are made out of three-ply and 18 pieces of $\frac{1}{32}$ in. balsa pinned between. The excess material is then cut away until the two templates are joined by straight lines, thus making sure of uniformity of section. The bottom half trailing edge ($\frac{1}{32}$ in. × $\frac{1}{2}$ in. × 20 in.) is pinned down to the plan, as also is the leading edge ($\frac{1}{32}$ in. × $1\frac{1}{2}$ in. × 20 in.). Sketch 1. The ribs are then glued on top at the requisite intervals, and the tip, made from two thicknesses of $\frac{1}{32}$ in. cross-grained and shaped to taste, is added at the end. The root-rib should be glued leaning slightly outwards at an angle from the vertical equal to the dihedral. The top half trailing edge is placed over the rear ends of the ribs, making a hollow triangular spar. While this is drying, do the same for the other half of the wing. Now, with everything well pinned down to the plan, the surplus width of the leading edge is folded back over the ribs which have previously been smeared with glue. Do this slowly and carefully, breathing on the wood while you bend it, and you should have no difficulty. Leave this to dry while you do the other half. Next, the ribs should be capped with $\frac{1}{32}$ in. × $\frac{1}{8}$ in. strips top and bottom, joining the leading edge to the trailing edge. This strengthens the ribs considerably, and saves the trouble of merging the edges into them. Sketch 2. Sheet in the last inside bay top and bottom with $\frac{1}{32}$ in. sheet and trim away the excess material at the ends. Glue the two halves of the wing together, at the same time incorporating the required dihedral.

In covering, the grain of the tissue should lie fore and aft, as most of the shrinking takes places at right-angles to the grain, and thus any slight tendency to sag is eliminated. With superfine cross-grained tissue this is unnecessary, as the shrinkage is equal in all directions.

All this sounds very complicated, but actually is easier than the conventional method. There are no notches to cut, no spars to be fitted and sanded, and the wing is considerably stronger. Some people may like to fit a stub-spar in the centre, but two layers of tissue, well doped down on the centre-section, will serve just as well.

THE AIRFOIL AFLOAT. *Continued from page 473.*

yachts. High tensile steel wire is used, but steel of streamline section is occasionally used, whilst their number is decreased as far as possible. Further to cut down windage, the halliards may be run down inside the hollow mast.

When a yacht is running before the wind, that is, it is simply being blown along, the sail is allowed to stand out at right-angles to the centre line of the boat, and so present a large area to the wind. The force, however, is exerted on one side only of the yacht, this resulting in a powerful turning movement, which must be corrected by the helmsman. To partially overcome this, and to add more area, an auxiliary sail (called a spinnaker) is rigged out on the opposite side to the mainsail. The spinnaker is used only for running before the wind, hence it can be designed specially for the job. This has resulted in a sail shaped almost exactly like a parachute.

A sail may be reefed. When the stormy winds blow, the effective area is reduced. The logical analogy is a telescopic wing which reduces in area as speed is increased! Alternatively, aero-modellists may care to try their skill at constructing a telescopic mast, the height of which may be reduced when the sail is reefed.

They're the tops!

YOU KNOW YOU'VE GOT THE BEST WHEN YOU'VE GOT KEIL KRAFT

NEW KEIL KRAFT RANGE
OF 24" FLYING SCALE SERIES KITS

INCLUDES ALL "ACE" TYPES

SPITFIRE · HURRICANE · MILES MASTER
FAIREY BATTLE · LYSANDER · BLACKBURN SKUA
CURTISS XP.40 · HEINKEL He 112 · MESSERSCHMITT 109

4/-

SPECIAL DURATION SERIES

Look for this Carton at your Local Dealers

ACHILLES 24" SPAN, CUT-OUT RIBS **2/6**
AJAX 30" SPAN, CUT-OUT RIBS **3/6**

SEE THEM ALL AT YOUR DEALERS

KEIL KRAFT KITS

Manufactured by E. KEIL AND CO. LTD., LONDON, E.2
The old established model aircraft suppliers.

EASY TO BUILD

SOME NOTES ON PETROL 'PLANE EXPERIMENTS

(Top left)

Fig. 1. The Baby "Seagull" flying-boat, with "Phantom" 3 cc. engine inverted. The circular petrol tank can be seen over the engine.

(Below)

Fig. 2. The system of construction of the Baby "Seagull." Detachable wings and power egg are clearly shown, with coil in the middle of the "egg." The wing platform and the dihedralled tail unit are features of the model.

EXPERIMENTS on petrol models may be somewhat curtailed during the period of the war, partly owing to general economy and also to the difficulty of obtaining engines and light alloys, and partly due to the fact that so many of the petrol enthusiasts are engaged in war activities.

It therefore seems to be worth while to record on paper ideas and results obtained up to the beginning of the present unpleasantness, so that in our spare moments we can still think in the subject, even if some of us cannot do much practical work. It may also help the younger enthusiasts to still keep at it, and it will all help us to get back to practical experiments as soon as the war is over.

At the end of 1938 I was home on leave from Gibraltar, and THE AERO-MODELLER published some results and impressions I had formed in connection with the very small petrol engines of around 3 cc. that were becoming so popular in America.

Some readers may remember a little model of exceedingly simple design that I described in THE AERO-MODELLER. It was called the "Porlock Puffin," and was flown very successfully by midget engines ranging from the little 2·4 cc. "Elf," "Hallam Baby," and "Trojan," to more powerful engines, such as the latest "Spitfire," the "Atwood Phantom," and the "Ohlsson 23." All these engines are around 3 cc.

It may also be remembered that I suggested that there were several really fundamental considerations that should be embodied in the design of a model that would be a really reliable flying machine on very limited engine power. They are :—

(1) The model should carry not less than a 4 oz. 4-volt flash lamp battery to prevent missfiring or loss of power on cold days. This is the only way to obtain real reliability in this cold climate of ours.

That the cheaper type of flash lamp battery, such as the "Wolco," from Woolworth's Stores, is usually more successful than the more expensive type, because it gives out its greatest energy more rapidly.

That until we could get a *real baby accumulator*, with its greater output, we did better to fly the weight of 4 oz. than the lesser weight of smaller penlight cells in our cold climate. I found that in the warmer climate of Gibraltar little engines would operate on penlight cells. I often wonder if this is the reason why the Americans seem to be able to use these little batteries successfully.

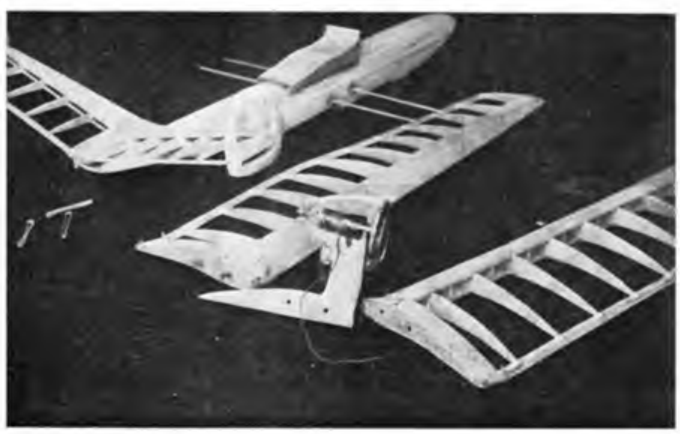
(2) To cope with the above slight extra weight we decided that we must have a comparatively large wing area in order to keep a light wing loading.

(3) That a light wing loading made our model into a soaring glider, and that as such the model required very little horse-power to fly it, which was what we wanted.

(4) That we had to keep our head resistance as low as possible to obtain the above results. In this connection it was decided that we must *not* fly our wing at too great an angle of incidence in order to keep the "drag" down, and that we required a fairly high lift wing section, but it must offer the minimum drag consistent with good lift.

(5) That a high aspect ratio, i.e. a small chord in relation to span, produced good gliding and soaring, and was, therefore, essential. *But* that we must not allow the chord to be too narrow because that curious thing called "scale effect" creeps in, and we find that a wing section is more efficient if it is fairly large. It is important to remember that there are three variables: Velocity, air density, and wing area, but that the internal friction or viscosity of the air always remains constant. Thus, if a model goes faster and has a larger wing area, it obviously strikes more air molecules and strikes these harder, and therefore gains more lift, but as the speed and wing area go up the internal friction of the air molecules does not increase. The larger and faster wing therefore gains over the smaller and slow wing in efficiency.

Incidentally, that is where a lot of our enthusiasts of the rubber-driven machine go wrong when seeking after efficiency



AND DESIGN IN 1939

By C. E. BOWDEN

In our next issue we shall publish a special article by Lt.-Col. Bowden, entitled "Forestalling the Stall," in which he fully describes his experiments with anti-stalling devices.

(Right)
Fig. 3. Bowden high-wing monocoque model, 7 ft. 6 in. span, engined by a 9 cc. Brown or 6 cc. Cyclone engine.

for the Wakefield Cup. They forget "scale effect," and on certain taper wings the tip-chord is too small.

Have you noticed how the American type model, with its simple rectangular wing of good chord throughout its span, walks away so often from our beautifully streamlined tapered wing British models, although the American generally uses a slab-sided fuselage? One of the chief reasons for this is that the wing of the American type is more efficient throughout its *whole length* in the small-sized wing that we *must* use for the Wakefield rules, whereas a tapered wing is really too small at the tips in these small sizes.

Any petrol model man of experience will tell you that a really large model flies far more steadily and efficiently than a very small one.

(6) That a certain amount of weight is actually advantageous for soaring and good gliding, provided that we keep the wing loading light. The weight creates energy and speed into the wind.

I described this effect and its reason in another article in The Aero-Modeller last year on bird and soaring flight, and I have since carried out further experiments with two sizes of tow-line gliders. The large one of over 6 ft. span and considerable weight proved itself far and away superior to the little fellow of 30 in. span except in very calm weather. One had only to observe the marvellous gliding of the German model gliders compared to our small British models. In every case the Germans used large wings and built their models on the heavyish side.

(7) Airscrew pitch must be approximately correct for the flying-speed of the model.

Well, those were the main points, I think. Since the simple "Porlock Puffin" (described in The Aero-Modeller) of 5 ft. span was built, and successfully flown, I have got down to cleaner and more interesting designs for the baby engines, incorporating the desirable points I have enumerated above. The success of each model as a flying machine has been so marked that I feel sure that the ideas of last year are sound and worth using as a basis in any design where very limited engine power is available, such as is generally the case in the little 3 cc. engines with their comparatively heavy weight of ignition gear.

Greater Power Output of New 3 cc. Engines.

Here I must remark upon the extraordinary power output of the little "Ohlsson '23'" engine. Not only does it seem to stand in a class of its own, as far as the baby engines that I have tried, but it is so effortless and vibrationless in its huge power output, that even larger models may be used for baby engines, and yet this engine may be used in the smallest models, as the engine is very controllable on its variable ignition. A close runner-up appears to be the little "Atwood Phantom" engine. Since I bought mine (it was one of the originals) I believe this latter engine has been improved, with larger port areas, etc. There is no doubt that the little fellows are improving in power output from the early engines. Those who may have been discouraged by the performance of the early engines should try a really modern baby of good repute.

Improved Baby Models.

My first baby machine, of 1939, which had a "Phantom" engine in it, was a small flying boat. Fig. 1 shows the model. This model, at the slightest provocation, attempts soaring flight. It has a wing span of 5 ft. 6 in., and is kept very stable laterally on the water by large airfoil section sponsons. These also help the take-off by offering an easy planing surface on the water.

An interesting point about this model is the dihedralled tail-plane, with its two little end fins. This permits a very light type of construction, and if the tip fins are very slightly set to look outwards, the model is kept very straight into the wind for the take-off. This is a very important point for a good water take-off. Any tendency of a model flying boat to swing allows a sponson or float to dig in and the take-off is ruined. Fig. 2 will probably interest the reader, as it shows the method of construction well. The power egg has the coil mounted inside it, also *all* ignition wiring, so that it is kept well clear from spray. There is no time switch, as salt water gives such a lot of trouble with the mechanism. Duration of flight is controlled by the amount of petrol placed in the tank. There is plenty of space over the sea, and therefore a two-minute flight can always be permitted, whereas it would be dangerous on land to fly without a time-switch. Below the power egg the engine support is made from 3-ply wood well varnished. This 3-ply support is sandwiched between the two wing halves, and the dowels of the left wing pierce the support and then go into the right wing centre section. The whole is kept together by the usual elastic bands to wire hooks, and also kept down to the wing platform by elastic bands to hooks on the hull.

The hull is planked with $\frac{1}{4}$ in. × $\frac{1}{16}$ in. balsa planks, covered with silk, doped and painted to waterproof. The sponsons are stepped and built on to the four birch spars

(Top left) Fig. 4. Bowden low-wing monocoque model, engined by a 6 cc. Cyclone. The N.G.A. transfer can be seen on the fin. This is an excellent flying model.

(Below) Fig. 5. Typical wing construction. Notice reinforced dihedral angle joints with 14 s.w.g. spring steel wire. Also reinforcing strip of $\frac{1}{16}$ in. sheet balsa below trailing edge spar.

(Right top) Fig. 6. A slotted highly tapered wing model, with an Ohlsson 23 engine. The wing-tip in-built slots can be seen in the photograph.

(Centre) Fig. 7. A large rubber-driven model with wing-span of 5 ft. 6 in., built by the author, with monocoque fuselage.

(Bottom) Fig. 8. The small monocoque elliptical wing model for 3 cc. engines. The fuselage is planked and wheel spats are fitted. The trimming tab for the fin can be seen. Weight of model, 2 lb. 4 oz., with Atwood " Phantom " engine, 3 cc.

that can be seen protruding from the hull. The sponsons are faired, and therefore strengthened where they meet the hull by plastic balsa wood.

In-built Slots for Wing Tip Control.

Continuing with our powered glider type of models for baby engines, Fig. 6 shows a special model I built with a large wing area packed into a 5 ft. 4 in. span. This model has a very highly tapered wing, but the wing tips were kept at 5¾ in. chord in order to keep them efficient. The central root chord is 14 in., and as the reader probably knows a highly-tapered wing has structural advantages, but suffers from the disadvantage that the tips stall before the centre section. Therefore this type of wing is liable to drop a tip and get into a nasty crash if the machine is near the ground when a stall occurs. This has happened in the full-sized world to many highly-tapered wing machines, and was the subject of considerable consternation in the case of one of the American training machines bought in large numbers by this country for training purposes. Slit slots were fitted to remedy this defect.

I did not want the drag or the complication of the normal slots that are added to a wing, but I did want to see what effect in-built slots would have on a model with highly-tapered wing tips.

So I built a high-wing model and a low-wing model, and built slots *into the wing*. These slots are permanently open, but yet do not appreciably add to the drag of the model when it is flying on an even keel.

The results were quite extraordinary. The slots were built to keep the airflow going over the wing tips, and were about 8 in. to 10 in. long on each wing near the tips.

One can deliberately stall both these models, and the machines will sink without the trace of dropping a wing tip. They get back into a glide, and then push their noses up again for the next stall and sink. There is none of that dangerous spiral instability caused by a wing tip dropping.

For interest's sake it is well worth building a model with these in-built wing tip slots, although one must admit that if a model is really well designed and adjusted it should not get into a stalling attitude.

On the other hand, how often one sees one's model brethren flying their models in a series of stalls due to incorrect thrust line position. And one often sees the horrid result of these stalls when one wing drops! It is necessary to place these in-built slots at the correct position just behind the leading edge, if they are to be effective. The correct entry gap and exit gap is also important.

The Elliptical Wing.

I built two little elliptical wing models of 4ft. 6 in. span each. One model was built as a super stability model, with a rather high wing position on its cabin, and the wing has a polydihedral wing. The other model has the same area wing and tail-plane, but has a light planked monocoque fuselage and wheel spats. The elliptical wing, as most aero-modellers know, is the most efficient wing form known, but is rather harder to build well. It has the great advantage that quite a large area can be obtained, and the wing span can be kept down, and yet the wing is efficient. The span of these wings is 4 ft. 6 in., and the chord at the root is very large (11 in.), and therefore the airflow is very efficient, as already explained early on in this article. Nevertheless, the tips are of good section, and the aspect ratio is kept suitably high.

The wings on these models are set at a quite small angle of incidence, and the models have a fairly fast but beautiful floating and " endless " type of glide, due to their light loading and clean frontal area.

The little monocoque model has a particularly beautiful and flat glide, but it is quite fast owing to its exceptionally clean lines.

It is painted with a very high gloss, which assists matters. An " Ohlsson 23 " and a " Phantom " engine are fitted to these models.

The superstability cabin model I named " War Baby,"

as it was completed just as war broke out. Fig. 8 shows the little white painted "Monocoque Midget," as I called the second model.

Polydihedral Wings.

Many people dislike the polydihedral type of wing, as used on the "War Baby." But if one is searching for *exceptional* lateral stability one must admit that this form of dihedral makes the model absurdly stable, especially if the wing is placed high. Dick Korda won the "Wakefield" with a polydihedral wing, and Carl Goldberg's petrol models have rather swept the board in America this year with this form of dihedral.

I have used it on my large towline glider, and nothing in the way of air disturbance seems to be able to upset this model. The German gliding experts used it a great deal on their large gliders before the war.

Anyway, it is worth using if one wants an exceptional type of stability. It is obvious that it will be more effective than the normal dihedral, because the righting leverage is largely towards the wing tips, and the leverage out there is greater than near the centre of the wing. Normal dihedral is quite sufficient for normal decent weather flying, but it is fun to have a special model for bad weather!

The Larger Model.

The larger type model is a far easier proposition to design, build and fly, because it is not so critical in design, constructional weight, or adjustment.

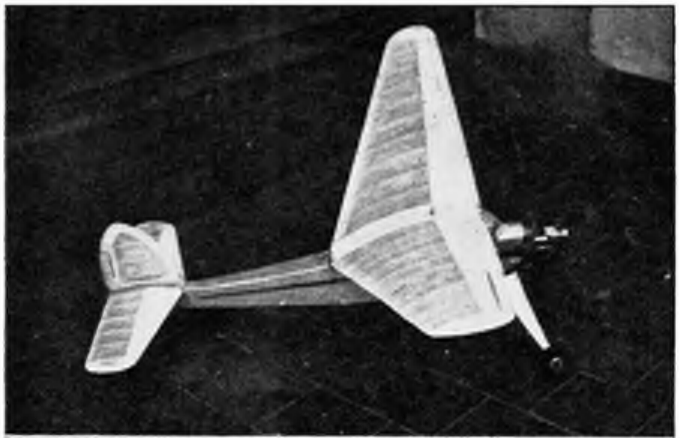
The large model generally flies and glides delightfully, and there is something particularly satisfactory in watching a large model in operation.

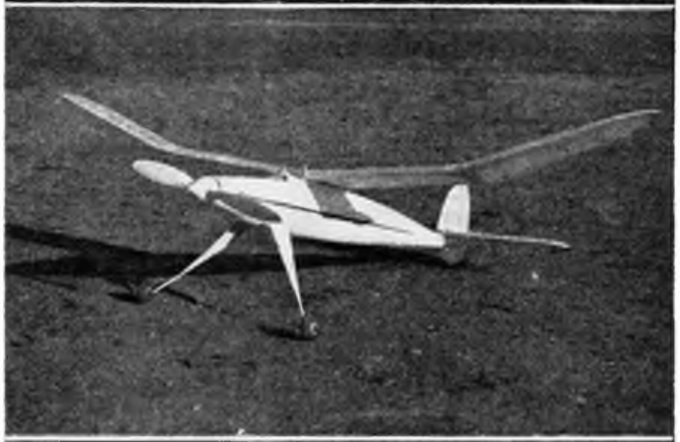
The engines are usually easier starters and operators. I have built so many large models in the past that I have rather neglected them in 1939. But not altogether!

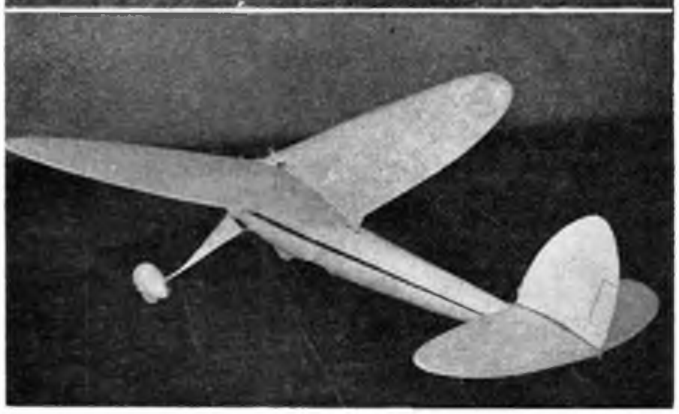
Fig. 3 shows a 7 ft. 6 in. span monocoque high-wing model that has proved itself a very successful flying model. The wing construction may interest readers, as shown in Fig. 5, as such a lot of nonsense is talked about complicated construction of wings with masses of internal strutting and many spars to obtain rigidity. I have built wings up to 10 ft. span on the system shown, and have never had any trouble with lack of rigidity, breakage or warping.

I utilize four main points in construction. A balsa sheet covered leading edge from the front spar to the two main central spars. This forms a very strong hollow spar and good aerodynamical entry for the wing. A ·8 mm. 3-ply covered centre section, where the wing-joint stresses occur, combined with a system of hooks and elastic binds to keep the two wing halves together. Two little short ½ in. long dowels are used as locaters only. (See Fig. 2 of the flying boat wings). Thus when the model eventually turns over on to its back as even the best model will one day do, the load on the dihedralled wing tips will make the centre section elastic bands give, and not crack the main wing spars, or long dowels, if these are fitted.

The third point is to make the trailing edge, which is always inclined to warp on model wings, of ¼ in. × ⅛ in. balsa, and then glue all along below this spar and the rear ends of the ⅛ in. sheet ribs. Now add a 1/16 in. sheet strip of balsa about 1 in. wide underneath. The final point is to use the silk covering of the wing in lieu of the mass of bracing struts advocated by some people. It is far lighter and much more efficient. But to utilise the silk in this way, ***one must use one thick coat of real full strength glider clear dope***, and let it set hard with weights on the wing to prevent warping. Once set hard the wing







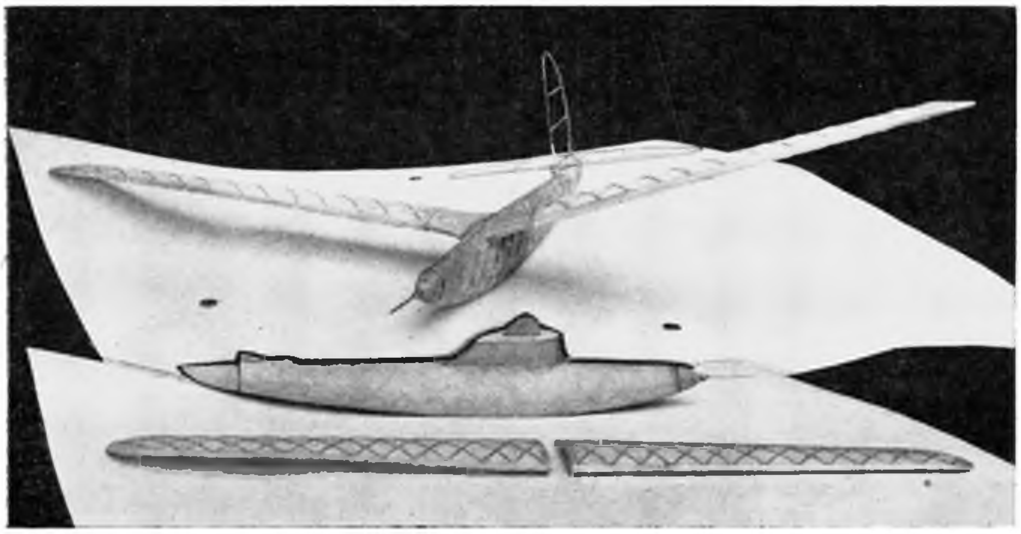
will be immensely strong! To use ordinary model dope with many coats is both a waste of time and a producer of non-rigid wings, and a saggy surface in damp weather.

Incidentally, the wheel spats on the wheels of the model shown in Fig. 3 are made from three pieces of block balsa laminated with glue and hollowed out. They are of no real value, but certainly add to the appearance of the model, and provided they are set at the correct angle do not often suffer damage on a stable model.

Fig. 4 shows a simple monocoque low-wing model. I am exceedingly fond of a low-wing model, and if it is properly designed a low-wing model is very stable, except in very dirty weather.

I wanted a certain amount of appearance consistent with practical flying performance. The model shown is the result, and it has proved itself a good flying model, with an excellent glide after the power is off, in decent weather

(*Continued on page* 482).



GEODETIC

By E. N. BRAY

A VERY vital factor in the construction of model 'planes has, I venture to think, not received the attention it deserves, viz. torsional rigidity of the frame, whether fuselage or main-planes. The most common section is a rectangular one, and has no torsional strength in itself and depends chiefly on the covering, with the result that in damp weather it is dangerous to fly The reason for this shape is undoubtedly the cross-section to length rule. This rule in early days may have been justified, but in my opinion should now be modified to read that the outline of the section should touch each of the four sides of a rectangle whose cross-section complies with the rule.

The simplest case is a circle within a square (Fig. 1), but any elliptical or ovoid cross-section would apply equally well (Fig. 2).

I have never made a fuselage of rectangular cross-section: it is ugly and bad from nearly all points of view. The only thing that can be said for it is that it is easy to construct and easy to attach wing and tail. It is now much more common to meet oval or round cross-sections. I used to use a large number of bulkheads and a large number of longerons laid flat on the outside of the bulkheads. This tends to give rigidity, and, when covered, the tissue does not sag between the bulkheads. It is, of course, heavy, but one has the satisfaction of a shapely job, and withal strength.

As regards wings, a common design is shown in Fig. 3. This has little torsional rigidity and easily warps. The modified design in Fig. 4 uses exactly the same weight of material but is more rigid. The horizontal strips, A, are diagonals, and are, of course, additional weight, between the four central spars (see plan view below). This makes a natural spar which is almost rigid. A solid covering of balsa, whether for fuselage or wing, of course, gives absolute rigidity. I first tried longitudinal planks, but the construction was very difficult. I then hit on a method which was as follows:

First make a former of, say, whitewood, the shape of the fuselage. Paint it with paraffin wax and then cover it with strips of strong tissue (Fig. 5). You can put these on damp, or wet it afterwards. Each strip is in one piece and lapped over the bottom edge (see Fig. 6). The thickness of the tissue is exaggerated for clearness.

The former can be painted with gum along the bottom edge; this holds the strips temporarily, but when dry the tissue will not stick to the wax. All this is important, because by lapping over each strip on itself and to its neighbour you have a shell of paper very easily removed.

I then cut strips sufficiently narrow to take the curves, say, about 1/15th of the length (Fig. 7) from sheet balsa on the bias. These are, of course, easily curved to shape, and the grain will be logitudinal when applied to the former. The strips are then glued to the tissue on the former, each side, of course, being covered separately. If the strips are accurately cut they will all fit perfectly side by side. Use quick-drying aero glue, seeing that the edges especially are well glued.

I will defer the subsequent operations until I come to the geodetic construction, because they are common to both.

Now the weight of solid planking is a serious drawback for rubber models, but for petrol 'planes you could hardly better it.

Of course, I had heard of Vickers geodetic construction, but it had always seemed too difficult—for my powers, at all events, till I had hit on the former idea as described above.

Substitute narrow strips for the wide ones, criss-cross them, and the thing is done (Fig. 8).

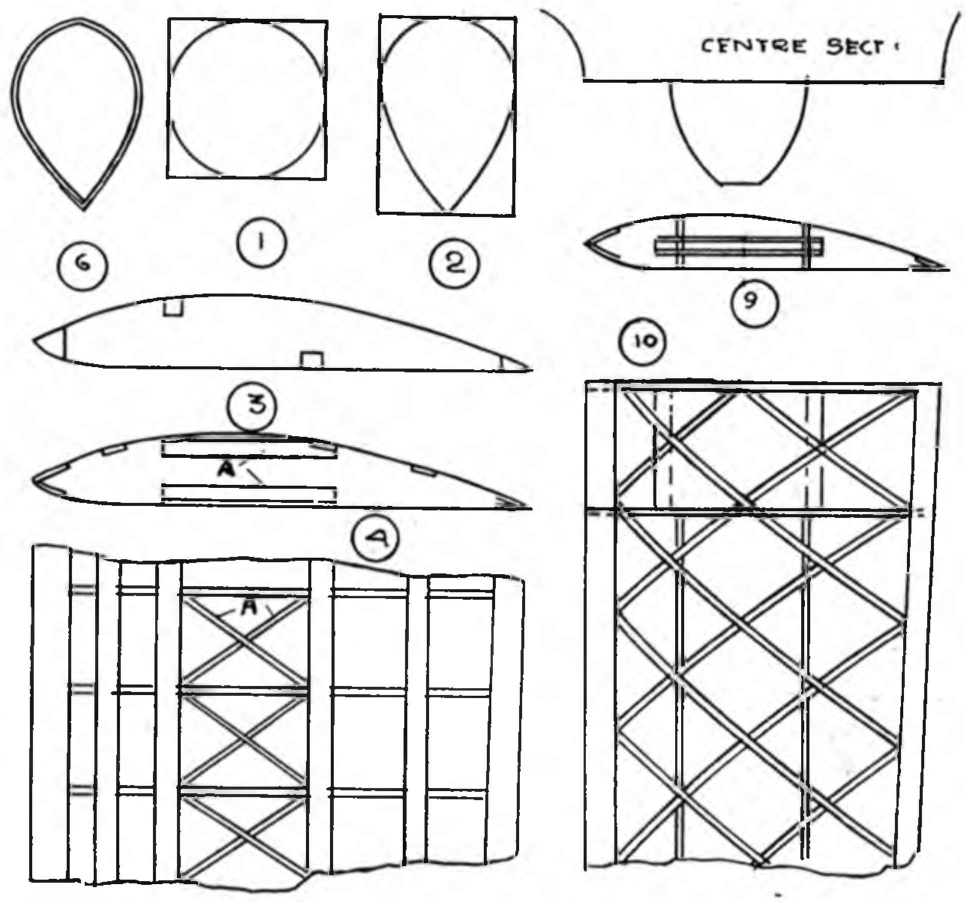
I tried it, and the effect is marvellous. It is, in fact, absolutely rigid—that is to say, if you twist it, something breaks before it gives. You have no longitudinals, except two strips in the top and two in the bottom edge (which are for finishing the edges and anchoring the strips) which simply butt up against them, and you have no bulkheads. The inside is perfectly smooth—nothing for a broken skein to catch on.

In my first few attempts I crossed the one set of strips over the other; but that looks ugly when covered, so latterly I put on one set of strips and then cut the crossing ones out with little pieces to fit in between: it is tedious but quite easy to do, and if well glued, especially where the ends butt up, just as strong.

Now to return to the last state, which is when the former is covered with either the planks or geodetic strips. When dry, run a knife between the edges of the longitudinals in top and bottom edges to cut the paper, and any glue there may be between the edges. Then prise off one end, slide in a piece of strong paper about 1 in. wide and work it carefully backwards and forwards, and you will find it quite easy to remove first one half and then the other. You will now find pieces of tissue and glue sticking to the edges, and these must be cut off so as to have perfectly smooth edges. Each half fuselage is incredibly frail and must be treated with great care. The longitudinals were $\frac{3}{16}$ in. × $\frac{1}{32}$ in. and the geodetic strips $\frac{3}{32}$ in. × $\frac{1}{32}$ in., or even $\frac{1}{16}$ in. × $\frac{1}{32}$ in.

There is one thing I forgot to say, and that is each strip

CONSTRUCTION

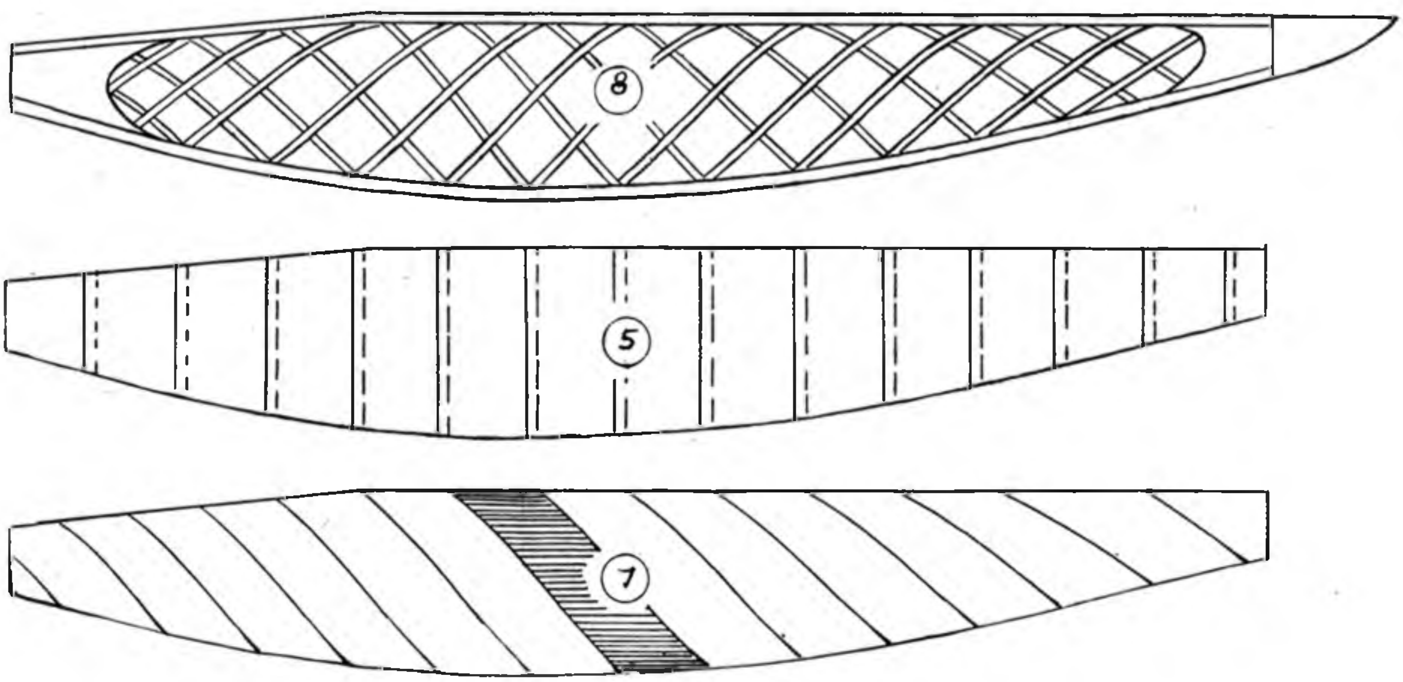


must be steamed to the shape of the former, or when removed it will try and resume its original shape. They only want damping and rubbing over any hot rounded surface, like the nose of a small gas stove; or heat a 1 in. diameter iron rod, the strips being rubbed at an angle to the rod (because they will be at an angle to the axis of the fuselage former), some one hand, some the other.

Now you glue both edges of both halves, having first made the nose and tail ends with their square openings to receive motor and tail end with hook. Glueing together is the only difficult part, and has to be done very rapidly before the glue dries. It may be possible to use a slower drying glue, but then you would have to wrap tape all along the fuselage to keep the edges together while drying; whereas with quick-drying glue you can hold the edges till the glue dries, continually moving your fingers along to close the edges that open, sometimes adding a little glue as necessary.

Before glueing together, any strengthening pieces to take wings or tail must be glued inside, and a piece where the model is held for hand-launching, because, from a collapsible point of view, the construction is frail. It is also well to fill in a part at nose and tail with solid sheets; this is done at the very first, after glueing on the longitudinal strips. The construction of wings is exactly similar, except that you can cover the formers with one sheet of tissue if you put it on wet. I always make my wings in two halves, with

(*Concluded overleaf*).



BUILD THIS 19½ in. SPAN 'PLANE

FULL-SIZE PLANS ARE IN THE CENTRE PAGES OF THIS ISSUE

GEODETIC CONSTRUCTION.—*Continued from page* 481.

a centre section; the drawings (Figs. 9 and 10) show the construction. There is a box in the wings and a spade-shaped projection in the centre-section, or vice versa. A piece of elastic holds the wings together, and if they hit the ground they slide off the spade. This method is, in my opinion, very superior to dowels.

It is impossible in one article to make everything quite clear, but I shall be only too glad to reply to any queries from interested modellers.

The objection may be raised that for every new 'plane you want new formers, and this is, of course, true, but it is not much more trouble than making jigs, which are frequently necessary to get a good job; and you do get a really scientifically constructed 'plane.

Here are some dimensions and weights, without rubber, nose or tail pieces or surfaces, because these may vary and prevent a proper comparison by modellers with their own construction:

Fuselage: 15 in. long, 2 in. maximum depth, 1⅛ in. maximum width with wing roots. Weight, 8 drachms.

Half-wing: 13 in. long, 3 in. chord tapering to 2 in. Maximum thickness ⅝ in. tapering to ⅜ in. 1½ in. from end, when it tapers to nothing. Weight, 4 drachms.

Total weight, fuselage and wings: 1 oz.

SOME NOTES ON PETROL 'PLANE EXPERIMENTS AND DESIGN. —*Continued from page* 479.

conditions. It looks interesting in the air, and I have refused to be led astray by making it too scalish at the sacrifice of good flying performance. It can be seen in the photograph that the low-wing is detachable, and held up to the fairing by elastic bands. The tail-plane and the fin and its fairing are also detachable.

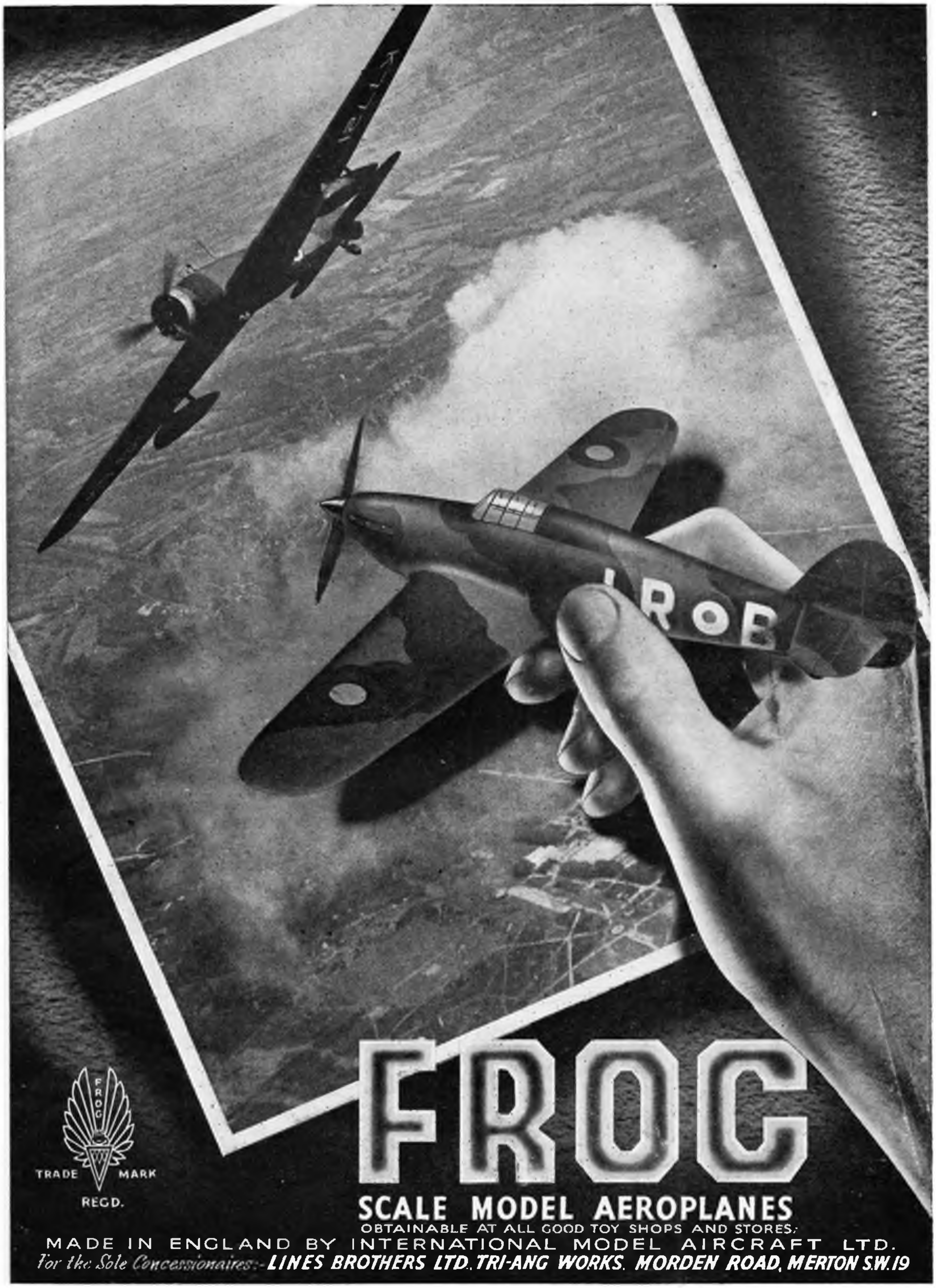
Unfortunately, each one of these models would require too much space to describe how to build it in detail, and I fear I have already spread myself more than I should. I feel the editor must be rather restive by now!

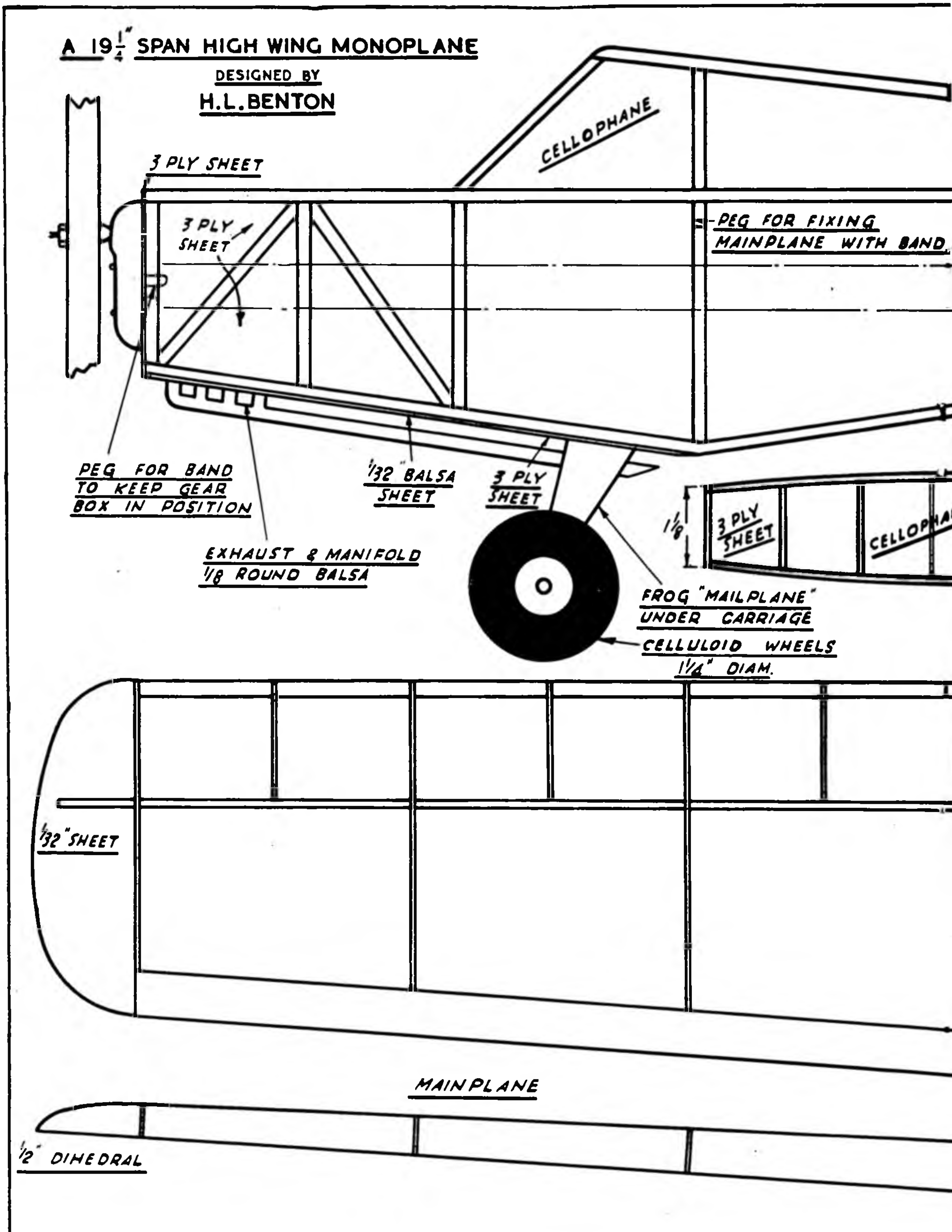
The main points of the low-wing model are: 6 cc. "Cyclone" engine, 6 ft. 2 in. span, 4 lb. 9 oz. weight. The fuselage is made on a balsa backbone with half-oval balsa formers. ⅛ in. × ⅛ in. balsa stringers are then added ½ in. apart. The whole is then covered with $\frac{1}{16}$ in. balsa sheet. I usually use this method with my larger models, whilst for the smaller monocoque models I use a balsa backbone and half-ovals of balsa on each side of the backbone are spaced about 1¾ in. apart. Finally, I plank the fuselage with $\frac{1}{16}$ in. × ¼ in. soft balsa planks, and heaps of aero cement.

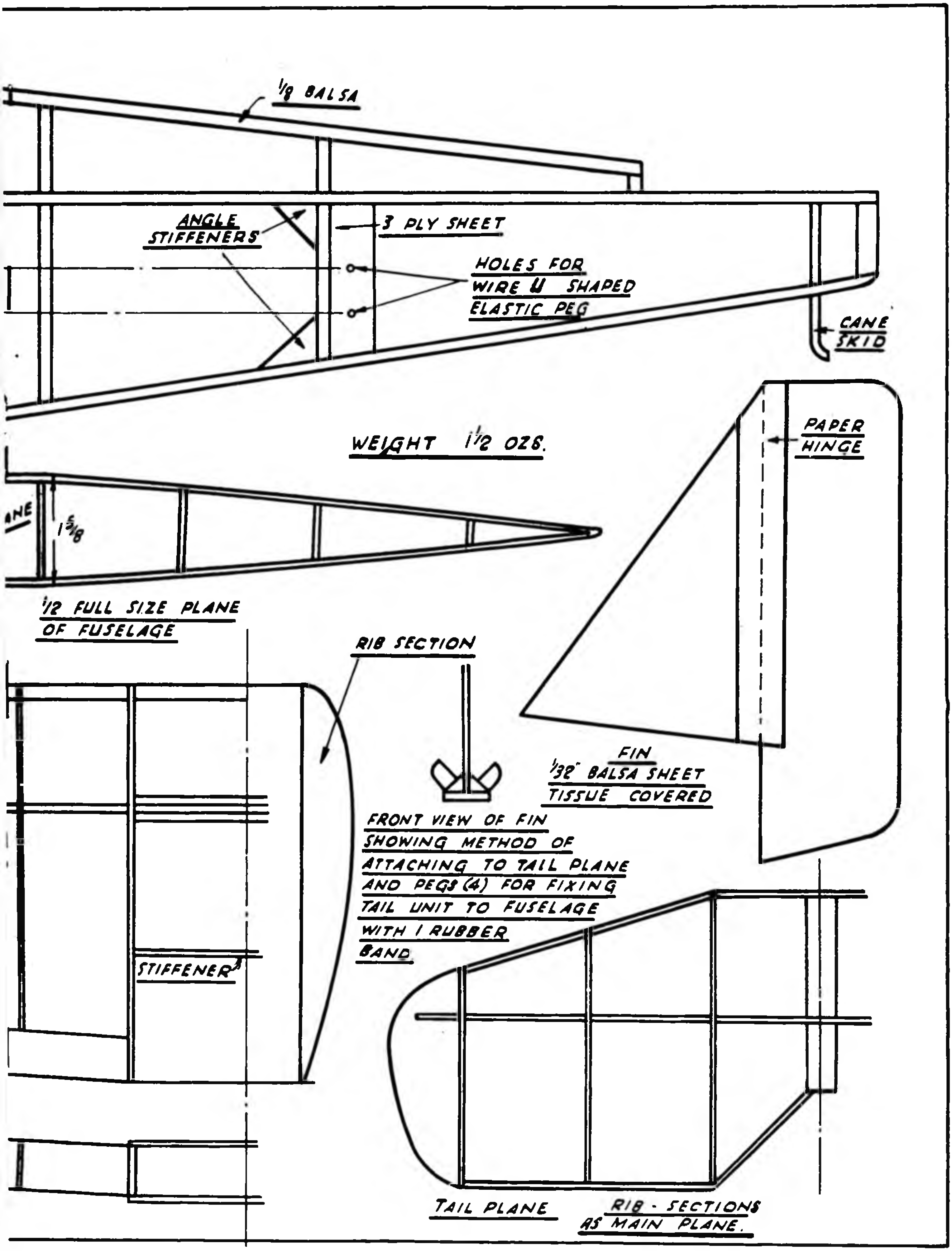
I always cover the whole fuselage with silk and photopaste. Then dope with glider dope, and finally paint to obtain a high gloss.

A final tip: If your midget petrol engine will not fire well on a flash lamp battery for flight, try altering the plug points. These must not be set too close together. Larger engines are not so easily affected by minute adjustments of plug points.

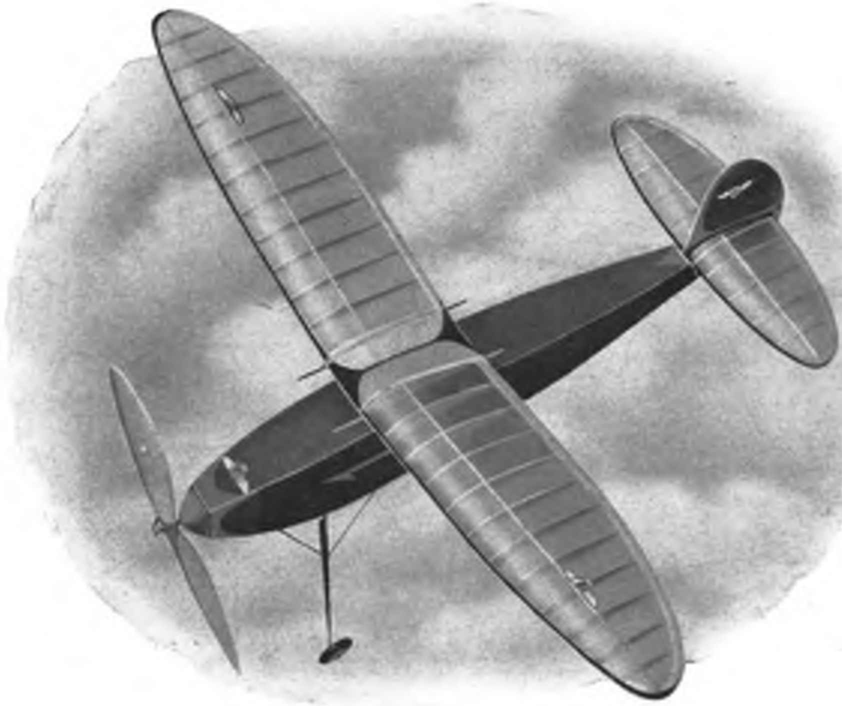
Just to relieve the petrol-vapour, I include one photograph of a rubber-driven model, 5 ft. 6in. wing span, with planked monocoque fuselage, that I have built myself as a general purpose model for amusement. It is also built on the powered glider principle, and gives some very interesting flights of moderate duration with excellent gliding ability, due to its clean lines, super stability, and large wing area. (See Fig. 7).


FROG
TRADE MARK REGD.
SCALE MODEL AEROPLANES
OBTAINABLE AT ALL GOOD TOY SHOPS AND STORES.
MADE IN ENGLAND BY INTERNATIONAL MODEL AIRCRAFT LTD.
For the Sole Concessionaires:- LINES BROTHERS LTD. TRI-ANG WORKS. MORDEN ROAD, MERTON S.W.19


A 19¼" SPAN HIGH WING MONOPLANE
DESIGNED BY
H.L. BENTON
3 PLY SHEET
CELLOPHANE
3 PLY SHEET
PEG FOR FIXING MAINPLANE WITH BAND
PEG FOR BAND TO KEEP GEAR BOX IN POSITION
1/32" BALSA SHEET
3 PLY SHEET
EXHAUST & MANIFOLD 1/8 ROUND BALSA
1 1/8
3 PLY SHEET
FROG "MAILPLANE" UNDER CARRIAGE
CELLULOID WHEELS 1¼" DIAM.
1/32" SHEET
MAINPLANE
½" DIHEDRAL


1/8 BALSA
ANGLE STIFFENERS
3 PLY SHEET
HOLES FOR WIRE U SHAPED ELASTIC PEG
CANE SKID
WEIGHT 1 1/2 OZS.
PAPER HINGE
1 5/8
1/2 FULL SIZE PLANE OF FUSELAGE
RIB SECTION
FIN
1/32" BALSA SHEET
TISSUE COVERED
FRONT VIEW OF FIN SHOWING METHOD OF ATTACHING TO TAIL PLANE AND PEGS (4) FOR FIXING TAIL UNIT TO FUSELAGE WITH 1 RUBBER BAND.
STIFFENER
TAIL PLANE
RIB - SECTIONS AS MAIN PLANE.

THE "CLOUDCRAFT" LATEST



CLOUDCRAFT "COMMANDER"

The Cloudcraft Commander possesses beautiful lines and its appearance will satisfy the most discriminating model builder. Although a first-class competition model, it is not difficult to build, and should be within the capabilities of any constructor.

It conforms to full Wakefield specification, apart from its slightly lower weight. This can easily be brought up to the required figure, i.e. 8 oz., by the addition of a larger rubber motor.

The Commander features the Grant X-8 wing section, well known for its stable and slow flying qualities, and consequently has a very flat, slow glide, which will take full advantage of thermal currents.

Wing and stabiliser are fully detachable, for ease of transport, as also is the nose-block and sprung shock-proof landing gear.

The wing span is 39 in., and area 199 sq. in.
Stabiliser span 16 in., and area 63 sq. in.
Overall length, 33 in.
Weight, 6½ oz.

The kit is complete in every respect, and contains everything required to build this grand model, with an allowance for wastage.

The kit contents are as follow: Eight sheets of clearly printed balsa wood, with every part numbered to eliminate all guesswork. Ample strip balsa wood. Large tin of shrinking dope. Tin of coloured dope for decoration work. To give a super finish, a bottle of high gloss preparation is included. Monster tube of cement. 30 yards of fresh rubber. Tube of rubber lubricant. Ample tissue covering. Tin of tissue paste. Brass tubing. Completely finished 15 in. dia. propeller. Finished propeller shaft. Comprehensive and easy-to-follow plan.

REMEMBER—EVERYTHING IS INCLUDED—EVEN VALVE TUBING FOR THE PROPELLER SHAFT

KIT **15/6** PRICE
Postage 6d.

PLAN AND SET OF PRINTED SHEET WOOD, 5/-. Postage 6d.

25 in. WING SPAN FLYING MONSTERS

Hawker Hurricane

Messerschmitt Me 109

Fairey Battle

Leopard Moth

ALL FOUR KITS SHOWN ABOVE, 3/- each BY POST 3/4

The Cloudcraft "ACE"

32 in. wing span cabin duration model
A splendid flyer with graceful lines.

KIT PRICE **3/-** By post 3/4

DEALERS—SEND FOR TERMS!

CLOUD (Model) AIRCRAFT

304-6 HIGH STREET, DORKING, SURREY

Telephone 2385 (2 lines)

★ **Wholesale Department—290 HIGH STREET DORKING, SURREY**

62-page Catalogue 3d., postage 1½d.
including article by Mr. Howard Boys on Building and Flying models

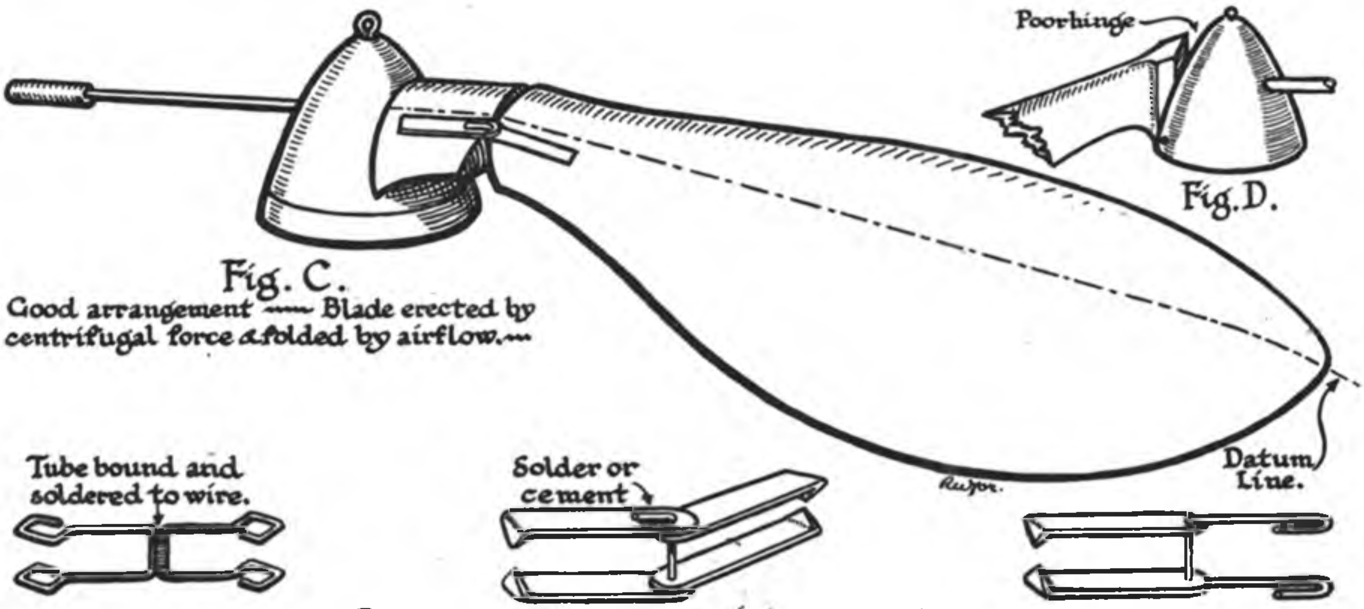
The Cloudcraft "COMMODORE"

29 in. wing span. Low wing cabin duration model. Just the kit you have been waiting for. A quality kit.

KIT PRICE **4/-** By post 4/4

SINGLE-BLADE PROPELLERS

By R. BURNS



Brass for large airscrews, aluminium for small.

THE author of this article devised the method described, by which it is possible to produce a propeller blade from sheet wood, in an attempt to economise on balsa. Actually, it was found much less laborious than carving, and the finished result is identical with the block-produced article.

In the following the steps needed to produce a propeller of 18 in. dia. × 24 in. pitch are explained. Might I suggest that a small scrap of ¼ in. sheet balsa be used as a trial, making a propeller of one-third that size, so that the unusual carving needed may be practised?

(1) Laying Out the Block.

The blade face is drawn, Figure A, and the pitch diagram, Figure B, in the usual way, and the sections required are drawn on this latter at each section line. Since the blade is 3 in. wide, use a definite airfoil. R.A.F. 32, reduced by 40 per cent, looks likely as a start, and later you can use others for different purposes. It is advisable to be definite about this, because we now have a propeller as wide as some of our light-weight wings, and we should use as much care to be accurate with our sections as we would in making wing ribs.

Now we draw through each point a line parallel to the pitch line at the centre of the blade. These lines are shown as dots and dashes, and the angles are all 40½ deg. in this case. Now a rectangle is drawn, with two sides parallel to our dot-and-dash lines, and of such a size as to enclose each of our required airfoils exactly. These give the sections of our block, and we find it is going to be ¾ in. thick, instead of about two inches, as usual. There is obviously going to be a good deal less cutting needed to reduce this to the desired final shape. In drawing the rectangles a 45 deg. set square sliding on a ruler is the easiest thing to use.

Laying out the block is a matter of transferring to a piece of wood ¾ in. thick a diagram similar to A, using, however, the widths of our rectangles as the distances of the outline from the centre. The result is shown. Actually it is almost identical with A, and in a small propeller A can be used instead. Even here the differences are usually less than 1/16 in., except at the hub. This shape is cut out.

The rear face is marked to show the top of the block, and the position of the T.E. and the front face is marked to show the top, and the L.E. I usually mark this as a strip of definite width, leave it square-faced, and then finally rub it to the radius of the airfoil nose with sandpaper.

(2) Setting the Pitch.

If you look at the hub in the pitch diagram you will see that the vertical line passes through it at 49½ deg. to the face, and we want a hole through our blank at the hub, at this angle, and passing through the centre of the block halfway through. I do it by rubbing the stump to a good surface at the end, and drawing a line through the centre of it, square to the face. Now through the centre of this line draw another, at 49½ deg. to the face, and where it cuts the top draw a line parallel to the datum, to cut the hub station. Where it has cut is where our hole is started, and you should use a cardboard angle to keep it right. See it is square the other way.

To test, put on a short length of 16 g. wire on your bench, and see that the blade is at 40½ deg. when the wire is plumb. Thus we ensure that the pitch is right.

(3) The Last Job—Carving.

The block should be carved on top to the greatest height line, and then the lower surface is carved by using a long, straight-edged knife and cutting from the T.E. mark to just below the L.E. Go slow at first. The work will

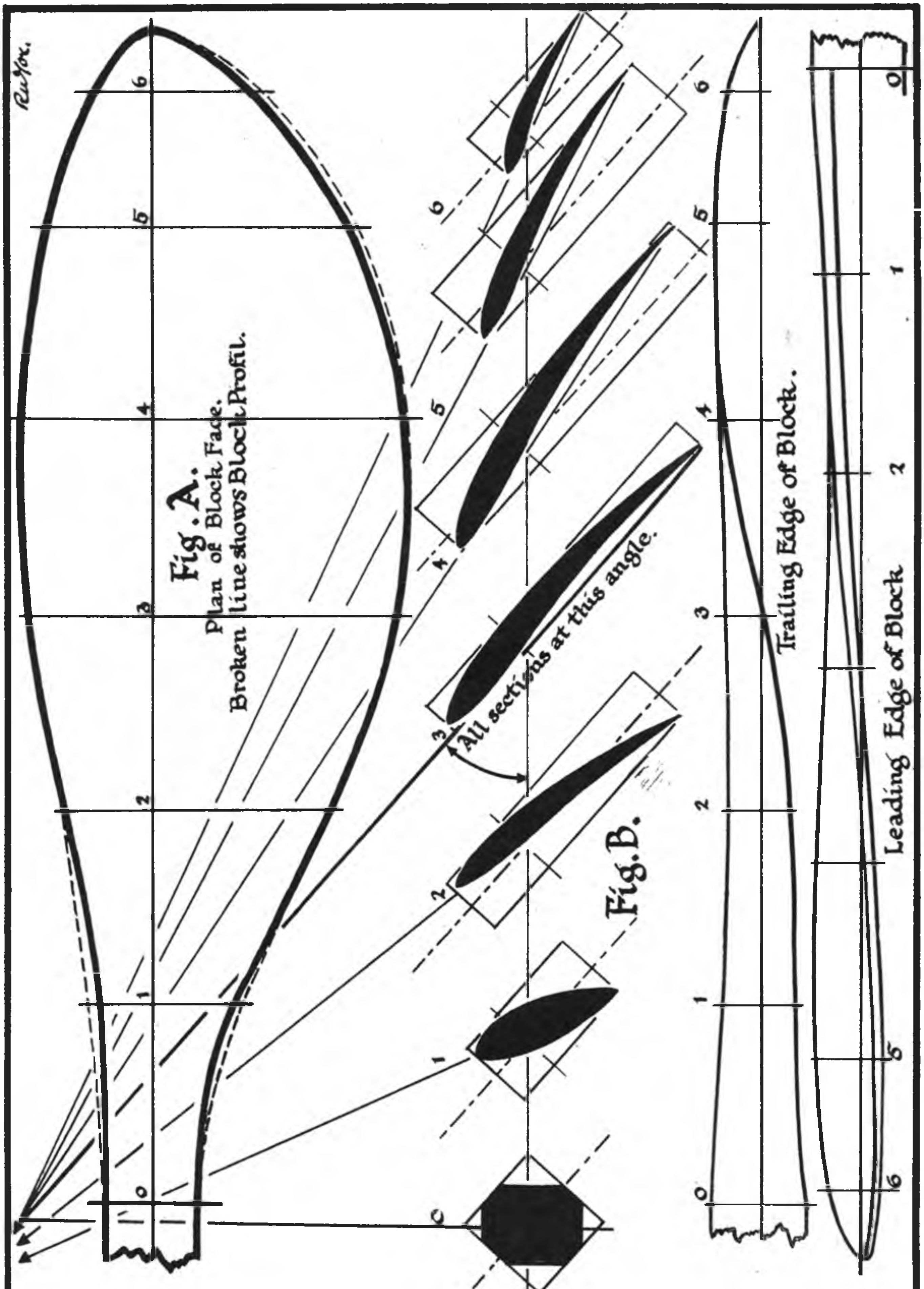


Fig. A.
Plan of Block Face.
Broken line shows Block Profil.
Fig. B.
All sections at this angle.
Trailing Edge of Block.
Leading Edge of Block
0
1
2
3
4
5
6

suddenly become familiar once you get to a certain point. Put in the under-camber. The top can be carved in a number of ways. I usually draw a few tangents on the sections, and cut from the one line joining their ends on the block to the other. This gives a number of facets, and on rubbing off the crests we get down to the desired shape. It is necessary to take care, as the facets do not run all the way from tip to hub, but bearing that in mind it is easy enough. In such a wide blade it is definitely worth while to make templates for the blades, at least from the point one-third out along the blade to the tip.

(4) Hinges.

I have an idea that the folding of the blade is best accomplished by using a normal type of rubber hook-up tensioner, to stop the blade in a vertical position, and allowing the wind to blow it over, when it will fall to the folded position and be out of the way for landing, somewhere on the top or on one side of the 'plane. To make this easy working the hinge should be in line with the C.G. of the movable part of the blade, not behind it. I usually put the hinge ⅛ in. behind the datum line, Fig. C, which brings it ahead of the blade C.G. This allows centrifugal force exerted by the propeller in spinning to help hold the blade erect. My first attempt at a folding propeller had the hinge at the rear face of a large spinner an inch behind the blade root, and trouble was met at the take-off because the blade was actually folded back 30 deg. by the centrifugal forces, Fig. D, in which position the blade was stalled and the thrust reaction which I had hoped would keep it erect was too small to overpower the other force. The take-off was no use unless into a strong wind!

As to making hinges, I have used three sorts, all shown in the diagrams, but if you get an easy-running one with no play you are on the right lines. Some experiment with a pin put into the blade before you put the hinge on will soon show the best hinge line. I usually notch the back of the blade, and fit the hinges before I cut through the front part.

The counterweight of lead can be put on by making a paper tube, tinning a piece of bicycle spoke, making a balsa plug for the bottom of the tube, and putting the tinned end of the spoke up through this from below. Then you melt some lead and pour it into the tube, which is held by the spoke in pliers. On removing the scorched tube a niece little cylinder of lead will result. If not, try again. The end of the spoke is pushed a little way into the blade stump, and the propeller tried for balance, and by cutting off bits of the spoke the length needed to leave the lead rather too heavy is found. Now the spoke end is hammered to flatten it, covered with glue, and pushed well into the stump. The lead should still be a little too heavy, and final balance is by filing it.

RUBBER TENSIONERS AND WHY!

BY S.E.CAPPS.

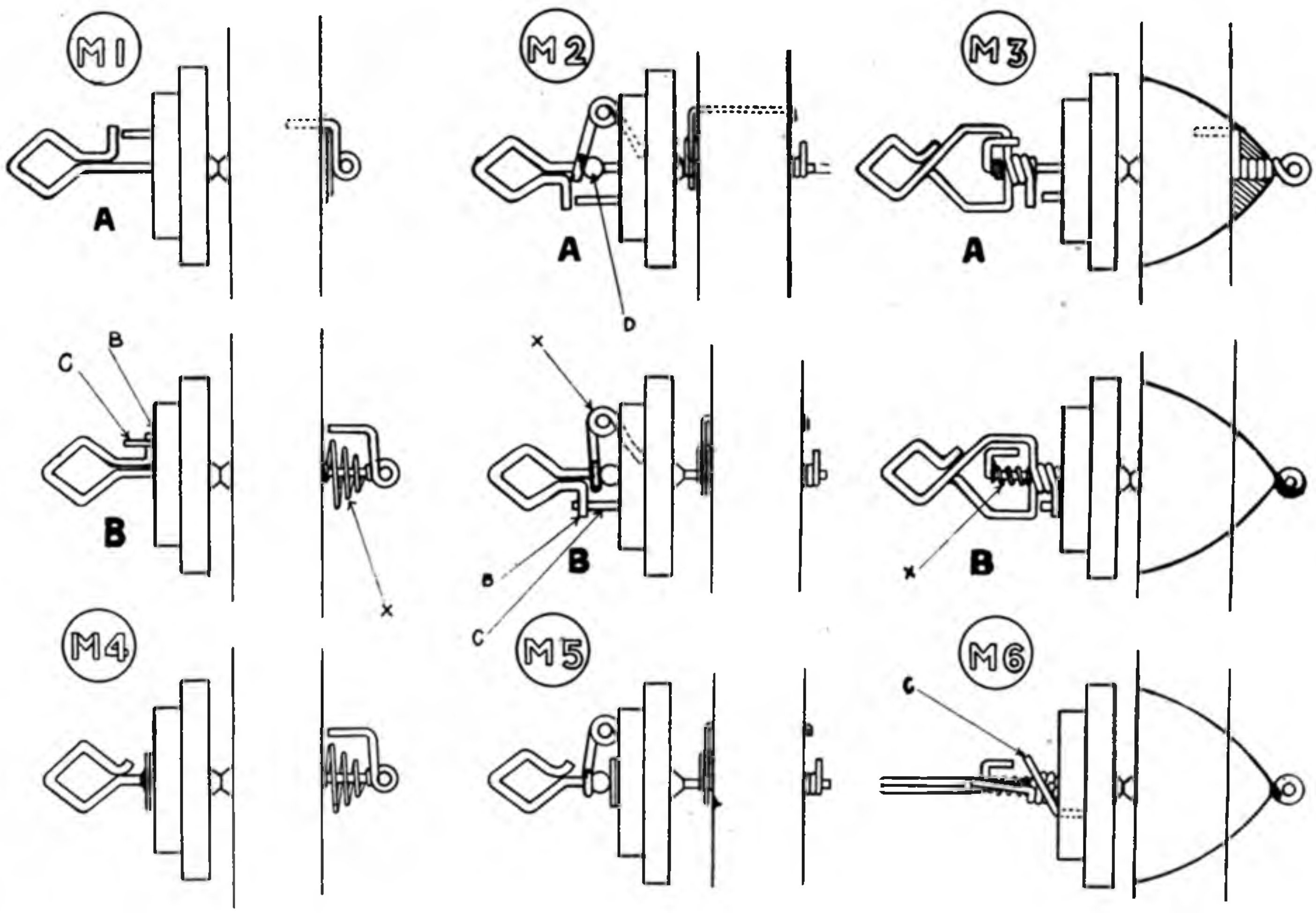
TO obtain the greatest number of effective turns on the rubber motor of a model is the aim of all flyers of models, but for those who indulge in contest flying it becomes a real necessity that the motor run should be as long as possible.

To-day, probably ninety out of every hundred flyers prefer the direct-drive long-run motor to the more complicated multi-skein motor geared to the airscrew shaft. The popularity of the former is undoubtedly due to its simplicity of operation.

However, long motors cannot be used in a model unless certain precautions are taken to ensure the even distribution of the rubber weight along the fuselage bottom when unwound. Failure to take these precautions usually leads to bad landings at the end of a flight. This is caused by the weight of the motor bunching at the tail or at the nose, because the length when unwound is much greater than the distance between the two hooks. The sketch shows what actually happens, and it will be understood that anything to stop this trouble, and at the same time retain the effectiveness of the long motor would be appreciated. Described in this article are a few easily-made mechanical methods of stopping the motor skein before it is slack enough between the hooks to affect the balance of the model. These are the most easily constructed, and are the more efficient of the many known methods tried.

M1 shows a very simple arrangement, the spring X being the controlling element. This should be just strong enough to draw spindle forward and engage arm B with projection C when motor is almost unwound. The strength must be found by experiment. Figs. A and B, M1, show the working of this method.

M2 is similar to M1, but the spring X is located on the back of the noseblock, the airscrew shaft being pushed forward by pressure on ball D. These balls can be either brass, bronze, or steel, and should be drilled to fit the shaft and soldered in place. Alternatively, a cup washer can be used, but is not so free from friction. A and B, M2, show the operation, and it will be noticed that with this way the airscrew can be removed from the shaft, if necessary, and is perfectly free to revolve devoid of all except shaft friction when freewheeling.



M3, A and B. This method is probably a little more difficult of construction than those described, but should not be beyond the skill of the aero-modeller. The advantage of the gadget is that while retaining all the efficiency of the two former methods in operation there is no need of elaborate freewheeling device for the airscrew. Study of the sketches shows that the airscrew can revolve in either direction when motor has finished. Furthermore, full use can be made of this fact to include a fully-shaped spinner on the airscrew hub.

Spring X here again is the controlling factor, and its correct tension can be found by a few simple experiments. In this method it will be seen that the rubber hook is formed in a closed loop, as shown, and arranged to float freely on the airscrew shaft being forced towards noseblock by spring X, and for arm B to lock up against pin C when motor finishes.

M4 and M5 are adaptations of M1 and M2. Instead of using a catchpin a small disc of metal is soldered to the shaft, and between this and the noseblock a corresponding disc of leather is placed. The spring X, when in operation, pulls the shaft, and causes the disc to press against the back of noseblock, and so forms a brake which prevents the motor from completely unwinding. M6 is an advance design of M3, but is different in one point. The catchpin C is set into the noseblock at an angle, and is considerably longer than that used in M3. The idea of this is that when spring X causes the loop hook to slide back along shaft, it will, as soon as it catches on inclined pin C, be immediately forced up this incline by the remaining power in the motor. This will have the action of actually pulling the motor tight between the hooks. All pressure of spring X is thus removed from the shaft, allowing the shaft to revolve freely when coasting. The remaining factor that is important is that the motor cannot creep unwound further until it is released by the flyer.

M7 is a design incorporating M3 in a geared drive. There are slight alterations in the operation of loop hook, which does not free completely, as in M3. It will be seen in the sketch that it slides back as before, and catches in the pin C, but does not free itself from the shaft. The reason for this alteration is that if hook did free completely, the skein attached to it would only be locked, and the one on the other hook or hooks would revolve through the gears until they were unwound. The action as it is locks the whole unit up directly the loop-hook catches against pin C.

In conclusion the writer would state that all the devices described here are easy to construct, being made from the sizes of spring steel wire on sale in all model stores, and will be found to work efficiently if fair care is used in construction and operation. No special parts requiring skilful manipulation of expensive equipment are used or required, and the builder can be assured of much greater durations if attention by the means described above are taken to control the length of the motor used.

The double locking action used by combining M3 in a twin gear drive is illustrated opposite.

A LETTER TO THE EDITOR

DEAR SIR,

I read with interest Mr. Arnold Wathew's article on "Downthrust," but I think he is entirely wrong; at least as far as duration models are concerned.

Most of us design our duration models on the "powered glider" basis, and that is the first argument against Mr. Wathew's case—gliders do not have thrust lines.

What we do is set our fuselage so that it offers the least resistance during the glide, and, generally speaking, this means that it travels along its centre-line, and therefore the fuselage centre-line is the obvious datum line from which to set the other components.

According to the results for R.A.F. 32 by Powdrill and MacBean—or rather according to a graph I drew of these results—this section has its maximum L/D at $2\frac{1}{4}°$, and its lowest sinking speed ($L^{1.5}/D$) at $3\frac{1}{4}°$; therefore we are quite justified in setting our wing at 3° to the datum line.

If we were to take the thrust line as our datum, how should we deal with side-thrust? Should we have to speak of the settings as "fuselage 1°, wing 99°, fin 2°, etc., to right side of thrust line in plan view," instead of simply "1° right thrust"?

No, thank you, Mr. Wathew, I think most of us shall stick to "downthrust."

I am, yours faithfully,

J. H. MAXWELL.

M7

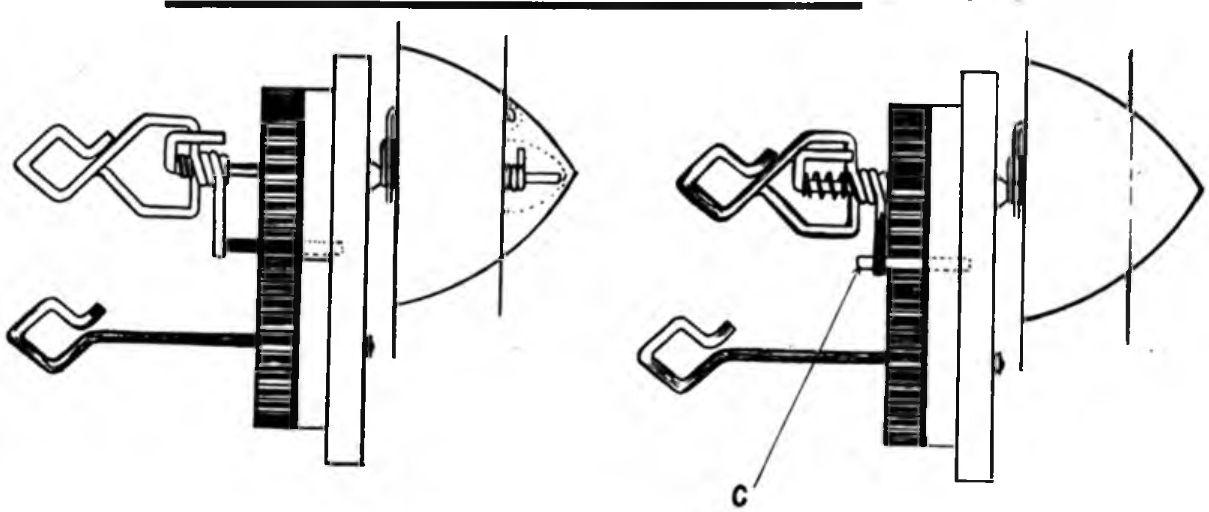


Photo courtesy of "Flight"

THE FINISHING OF

IT is an undoubted fact that the average solid scale modellist does not pay a fraction of the attention which he should to the finish of his work. From photographs sent in to this journal it is obvious that while constructional work is usually excellent, the builder often spoils his craftsmanship by a poor finish. Occasionally it is only a few badly drawn lines, but more often than not it is the general finish. So let us deal with the problem from the very beginning.

In the first place, if you have the patience and ability to spend a lot of time on one model, carve it from hardwood. This is likely to be a long job, but there is no doubt whatever that a better finish can be given to hardwood than to balsa.

On the other hand, if you insist on using balsa there is no reason why you should not obtain almost as good a finish *if you keep to monoplane types*. It would be practically impossible to obtain a very smooth surface on say, the interplane struts of an 8 in. span Handley-Page 0/400 if they were made of balsa. With the Hurricane or Spitfire, where the sandpaper block can be applied after the model has been assembled, it is a different matter.

If you insist on building balsa biplanes then a compromise should be made by carving the fuselage, wings and tail surfaces from balsa and using hardwood struts. But more of that anon.

Before commencing construction of your model obtain not only an accurate plan, but also as many photographs and coloured drawings as possible. If one is building say a Spitfire from balsa the whole model may be completed and fitted together with the exception of the undercarriage and wireless aerial. When everything has been found to fit correctly we must dissemble the entire model and commence the finishing treatment.

The various parts should, of course, be sandpapered as smooth as possible in the first instance. Everyone seems to have his own special formula for wood filler, and they vary from clear varnish to melted toothbrush handles! Actually there is nothing better than ordinary dope—the thicker the better. This should be brushed on and left to dry, and then sandpapered.

The surface will begin to improve immediately, but for the best results at least six coats and, of course, six courses of sandpapering are necessary. The model may then be reassembled, and this time the various parts can be cemented into place. Finally, two or three coats of coloured dope, not enamel, may be applied as desired.

If a silver finish is desired silver dope may be used, but there is a preparation on the market known as "Silvercote"—and if you think that the proprietors are presenting a free sample to the writer for this mention you are mistaken—which is normally used for grates and which will be found to give an excellent surface. Quite a number of model supply stores stock this particular paint.

When sanding the assembled model care is necessary, particularly around the tail surfaces, to prevent any breakage, but one need not press hard with the sandpaper. Wherever possible the block should be used, particularly on the wings, for this will give a much better surface than if the paper were simply held in the fingers.

If the prototype is shadow-shaded mat paints which have a dull surface must be used, and in this case a very shiny finish is not required. Indeed, a shadow-shaded model with a glossy finish has rather an odd appearance.

If the model is a biplane the main parts may be made from balsa and assembled with hardwood struts. Cherry sticks, normally used for cocktails, are excellent for this purpose, especially if they are sanded to an oval section. All the balsa parts must be treated in the manner described before assembly, and only the final coat of coloured dope should be applied when the model is complete. In any event no bracing wires should be added until the paint job is finished.

If hardwood has been used throughout, the finishing presents no particular problem, being a matter of sandpaper and more sandpaper until the surface is smooth.

Next we come to the vexed question of lettering. The problem of neat lettering is one which puzzled the writer

SOLID SCALE MODELS

By H. McDOUGALL

for a good number of years. Indeed, more time has been spent pottering about with tins of paint and scraps of paper than on models themselves, but the results have been well worth while, for a method of making transfers has been originated.

It is possible to obtain nowadays quite a large range of ready-made transfers, and as various sizes of R.A.F. cockades are available they may be purchased presuming, of course, that the machine is a military one. It is well worth while writing to the various makers of these materials stating one's exact needs, for very often they can meet the demand.

Now about home-made transfers. We will require a tin of art enamel, a sheet of glazed paper, a tin of ordinary white paste (not the liquid kind), a tube of fish glue, and finally a tube of rubber solution, such as is used for patching the inner tubes of bicycle tyres.

The first step is to smear a coat of paste on to the paper. Allow this to dry and then add a coat of fish glue, and when this has dried brush on the enamel. Leave this overnight to set, and last of all cover with rubber solution. A number of sheets of various colours can, of course, be made at the same time, for they will not deteriorate provided that they are not kept for an unreasonably long time.

We may now draw out on the back of the sheet the shapes of the letters required, and then cut them out with a pair of scissors, and the transfers are ready for use. Application is fairly simple. Place the transfer in position on the wood and apply heat to the back, or alternatively heat the rubber solution and then press the transfer firmly to the wood.

When it has stuck firmly in place wet the paper so that the water soaks through and softens the paste. The paper must then be rubbed off—not torn off. It must be done carefully, and can be accomplished by simply rubbing with the forefinger, which must be kept moist. Eventually the paper will become pulpy and roll off, leaving the enamel behind on the wood, and the job is complete.

The paste is essential to keep the enamel from touching the paper, while the glue is intended as a hard base for the enamel to adhere to. The rubber solution is, of course, intended solely to hold the transfer in place.

All lettering and squadron insignia may be added in this manner, but the small figures with which Service machines are marked may be drawn directly on to the wood. It might be possible to make a transfer of them also, but unfortunately while one would gain the advantage of having a flat surface to write on, the figures would have to be written backwards, which somewhat complicates matters.

The final task is to mark out the ailerons, elevators and rudder. A mapping pen dipped in Indian ink is best for this job, and an ordinary bevelled ruler can be used for drawing the lines.

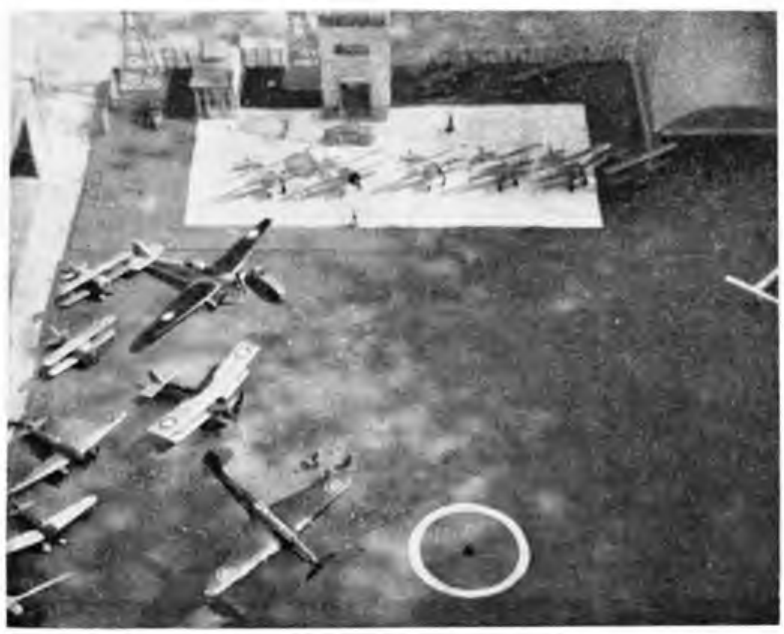
A rather more difficult problem is that of marking out the joints of the aluminium cowling, particularly if the model is a biplane, such as the Gloster Gladiator. The difficulty is that as rulers are not usually made of rubber they cannot be persuaded to bend sufficiently! The problem is to find some kind of bevelled edge, and can be solved by sticking two cigarette cards together, with one edge of the top one overhanging about $\frac{1}{16}$ in. This miniature " ruler " can be bent to any curve and yet will guide the pen in a straight line and prevent any smudging. Having completed the painting, it only remains to add the rigging or radio aerial.

And finally a word about actual colour schemes. It is unfortunate that pictures of machines in their correct colours are not easy to come by, but most military machines are now shadow-shaded, the official colours being dark green and earth brown, paint of the correct shade being obtainable from any good supply stores.

The red, white and blue R.A.F. cockades were for a time used on shadow-shaded machines with a broad yellow band round the outer edge, but these have now given way to an entirely new type with a red centre and blue outer ring apparently intended to harmonise with the general colour scheme which is thus unbroken by the band of white in the old style cockade.

Machines coloured all silver have not yet entirely disappeared, particularly among the older types being kept in reserve. The only other colour used for R.A.F. machines is yellow, training machines such as the D.H. Tiger Moth, and the Airspeed Oxford being painted this colour.

A certain amount of experimentation with shadow-shading for seagoing aircraft, such as the Blackburn Skua, has been done, and the main difference seems to be in the use of straight edges between the different shades, but apparently no definite scheme has been decided upon as yet.



A well-equipped airport constructed by Mr. H. H. O. Hill, of Swindon.

All you need to know about

AIRCRAFT IDENTIFICATION

is contained in this book, which is essential to all members of the OBSERVER CORPS, AIR CADET CORPS, as well as to all aero-modellers who are keenly interested in the aircraft now being flown in the present war.

The book contains photographs and plans of 39 of the most modern fighter and bomber aircraft of the Air Forces of Great Britain, France, America and Germany. Plans are all to the popular 1/72 scale and are suitable for the "solid" or "flying scale" enthusiast. 27 single-page plans of fighters and single-engined bombers, and 12 double-page plans of twin-engined fighters and bombers, with a photograph, performance figures, dimensions, etc., of each. Beautifully produced on art paper, bound in stiff card cover illustrated in full colours. Size 11 in. by 8½ in. Over 100 pages.

CONTENTS

27 SINGLE-PAGE FIGHTER PLANS

Supermarine "Spitfire."
Hawker "Hurricane."
Hawker "Henley."
Gloster "Gladiator."
Boulton and Paul "Defiant."
Blackburn "Skua."
Blackburn "Roc."
Fairey "Battle."
Fairey "Albacore."
Gloster "F5/34."
Westland "Lysander."
Bloch 151.
Dewoitine 510.
Morane-Saulnier 406.
Curtiss Hawke 75a.
Messerschmitt B.F.W. M.E.109.
Heinkel 112.
Henschel Hs.126.
North American N.A.50.
Grumman F2-F1.
Curtiss P.40.
Seversky P.35.
Douglas 8.
Curtiss Wright 21.
Curtiss "P.37."
Curtiss "Helldiver."
Vought-Sikorsky S.B.2U-2.

12 DOUBLE-PAGE BOMBER PLANS

Bristol "Blenheim."
Bristol "Beaufort."
Vickers "Wellington."
Armstrong-Whitworth "Whitley."
Handley-Page "Hampden."
Potez 63.
Amiot 370.
B.F.W. Me.110.
Heinkel He.111k.
Dornier Do.17.
Dornier Do.215.
Curtiss A-18.

Immediate delivery guaranteed

IMPORTANT NOTICE

The first edition is nearly sold out. Get your copy before our present stocks are exhausted, and send 3/10½ to include postage, and get your copy per return.

PRICE

3/6

Postage and packing 4½d.

FROM THE PUBLISHERS:

HARBOROUGH PUBLISHING COMPANY LIMITED
ALLEN HOUSE, NEWARKE ST., LEICESTER

DESIGNS FOR THE SCALE MODEL BUILDER—VIII

By **PETER GARROD CHINN**

BEING of the opinion that not enough publicity is given in this country to French warplanes, I am starting off this month's article with a bomber of the Armee de l'Air, the LeO 45. Considering that there is no British bomber of similar size with the performance of this machine, I think you will agree that it is worthy of some attention in this series. The LeO 45, with a gross weight of approximately 10·5 tons and a wing span of 73·75 feet, is smaller than our " Wellington " or " Whitley," but larger than the " Hampden." The latter is probably the LeO 45's nearest equivalent. In appearance it is not unlike the Potez 63 multi-purpose machine (see January AERO-MODELLER), having similar shapely lines and a dihedralled twin-fin tail-unit.

The LeO (Liore-et-Olivier) 45 is a twin-engine cantilever low-wing, all-metal monoplane. Accommodation is provided for a crew of four : pilot, navigator, radio-operator, and gunner.

The production type is fitted with Hispano-Suiza 1.100 h.p. 14-cylinder twin-row radials enclosed in Mercier low-drag ducted cowlings. The oleo-pneumatic undercart retracts into the engine nacelles, doors being fitted to the latter to cover the retracted gear. The tail-wheel is also retractable.

With a maximum speed of 310 m.p.h., the LeO 45 is one of the fastest bombers in service with the Allies. It is capable of reaching an altitude of 13,120 feet in 10 minutes, and has a range of between 745 and 1,430 miles, according to load carried. Its wing-area is approximately the same as that of the " Hampden," but being heavier, its wing-loading (over 35 lb. per square foot) is thus greater than that of the British machine, which partly accounts for its high speed. However, in spite of the relatively high-wing loading, landing speed is low—60 m.p.h. is the actual figure given—which speaks well for the general efficiency of the machine. A service ceiling of 26,740 feet is claimed, which tops that of the " Hampden " by more than 4,000 feet.

It would appear, however, that a point on which the LeO 45 does not compare too favourably with big British bombers, is armament. One Hispano shell-gun on a flexible mounting in the fuselage above the trailing edge of the wing, and one small-bore machine-gun in a retractable turret beneath the fuselage are carried, whereas the revised armament now fitted to the " Hampden " consists of six small-bore machine-guns with a much wider field of fire. However, no doubt a heavier armament will be fitted to the LeO 45 if engagements with enemy machines prove its present armament to be inadequate.

Next, we have a couple of new fighters.

The job of designing a modern single-seater fighter is not an easy one. The modern fighter, if it is to be an " all round " machine capable of catching and tackling bombers, of " dog-fighting " with opposing fighters, or of escorting bombers and reconnaissance 'planes over enemy territory, must have a high maximum speed, a high rate of climb, good manœuvrability, a long range, and a heavy armament.

No one design can excel in all these qualities.

For instance, high speed necessitates high power and low drag, which means a higher wing-loading. The high loading will then affect manœuvrability, ceiling and climb, as well as raise the machine's minimum flying speed and thus make it more difficult to handle at low speeds, perhaps to the extent of rendering it totally unsuitable for night flying. The designer must, therefore, " balance " his design, so that his machine will have a good all-round performance, and not excel in, say, manœuvrability at the expense of speed, climb, ceiling, range and fire-power.

Our " Hurricane " is a good example of what we might call " balanced design." The " Hurricane " has a wing-loading of about 25 lb. per sq. ft., which, despite the machine's large size, gives it better manœuvrability than the smaller German fighters. Its climbing speed (initial 2,400 f.p.m.), is almost as good as German machines with much lower power-loadings. Service ceiling is high—34,000 feet, and maximum range (850 miles at 200 m.p.h.), is good for a fighter not intended for long-range work. Finally, with a maximum speed of 335 m.p.h., the " Hurricane " ranks among the fastest service fighters. (The speed of the latest " Hurricane," fitted with the " Merlin II " developing about 1,250 h.p. on 100-octane fuel, approaches 350 m.p.h.).

However, bomber speeds are increasing, and to meet that increase fighter speeds must go up to the 400 mark and over. Wing-loading will go up, and manœuvrability (which has been a decisive factor in the success of Allied fighters against German fighters) will suffer. (This, of course, does not mean that new Allied fighters will be inferior to their German counterparts—obviously the wing loading increase will be on both sides). Which brings me to the Heinkel 113, the latest German single-engine single-seat fighter. This machine is an example of high speed gained by high wing-loading.

The He.112 (March AERO-MODELLER), from which the new Heinkel has been developed, has a wing-area of approximately 183 sq. ft., giving a wing-loading of around 35 lb. per sq. ft. The He.113 has a wing-area of less than 160 sq. ft., which, when added to the fact that the new 1,500 h.p. Daimler-Benz motor fitted must be heavier than the 1,150 h.p. version with which the He.112 is equipped, must mean a very high loading indeed. The actual figure must be near 40 lb. per sq. ft., probably over.

Obviously, all efforts in producing this machine have been concentrated on getting a high maximum speed (probably 400 m.p.h.). Manœuvrability must be poor and landing speed extremely high.

As regards appearance, the He.113 is rather disappointing. One might well imagine that a development of the He.112 would be well streamlined and beautifully proportioned. Instead, it has a tendency towards " bluntness " of line. The perfectly elliptical shaped wings of the He.112 have been replaced by a straight taper type, and the fuselage outline, when compared with the He.112, appears to be somewhat unsymmetrical.

It has been said that the new Heinkel was designed to replace the Messerschmitt Me.109, which is about the best German " dog-fighter." but it is doubtful whether the He.113 will achieve any greater degree of success in this capacity than the Me.109. The Me.109 is the most manœuvrable of German fighters, so it is obvious that the He.113, which must be less manœuvrable, will be no more of a match than the Messerschmitt. The Heinkel seems to be more suited to tackling bombers. Its high maximum speed would enable it to engage a bomber quickly, and, of course, the necessity for good manœuvrability is considerably less when tackling large machines. The armament with which the He.113 is apparently equipped—one medium-bore shell-gun and two machine-guns—also suggests that the machine is primarily intended for engaging bombing and reconnaissance 'planes.

There is no British fighter with a wing-loading approaching that of the new Heinkel, of course (although some of the " hush-hush " machines, of which rumours are current, will probably have high loadings), but in America the Vultee " Vanguard 61 " has a similar wing-loading and power, thus making it suitable for comparison with the He.113.

The Vultee " Vanguard " was designed by Mr. Richard Palmer, who also designed the machine in which Howard Hughes, the well-known American pilot and film magnate, broke the world's land-plane speed record in 1935 with a speed of 352 m.p.h. (This accounts, no doubt, for the similarity in appearance between the two 'planes).

At present, manufacturer's performance figures are only available for the " Vanguard 48C," a low-powered version fitted with a 1,050 h.p. " Wasp " motor. The gross weight with this motor is about 6,450 lb., which gives a wing-loading of approximately 32·75 lb. per sq. ft. Performance figures are: Maximum speed, 358 m.p.h. at 15,600 feet; landing speed, 72·9 m.p.h.; cruising speed, 316 m.p.h.; cruising range, 738 miles (or 1,800 miles with maximum fuel load); climb to 19,680 feet in 6·7 minutes (initial rate of climb being over 3,300 f.p.m.); service ceiling, 34,300 feet. Thus, although the " Vanguard 48C " has a similar wing loading and power, plus the extra drag of an air-cooled radial and a higher power-loading, it has a far better all-round performance than the Messerschmitt Me.109.

As regards armament, the " Vanguard " is more powerfully armed than any fighter at present in use either by Germany or the Allies. Ten machine-guns are carried—eight of a similar type to those fitted to our own fighters, and two heavy ·50 calibre guns. It is possible with these guns, incidentally, to remove barrels and mechanisms for servicing without disturbing the mountings, which should be particularly useful in actual war service.

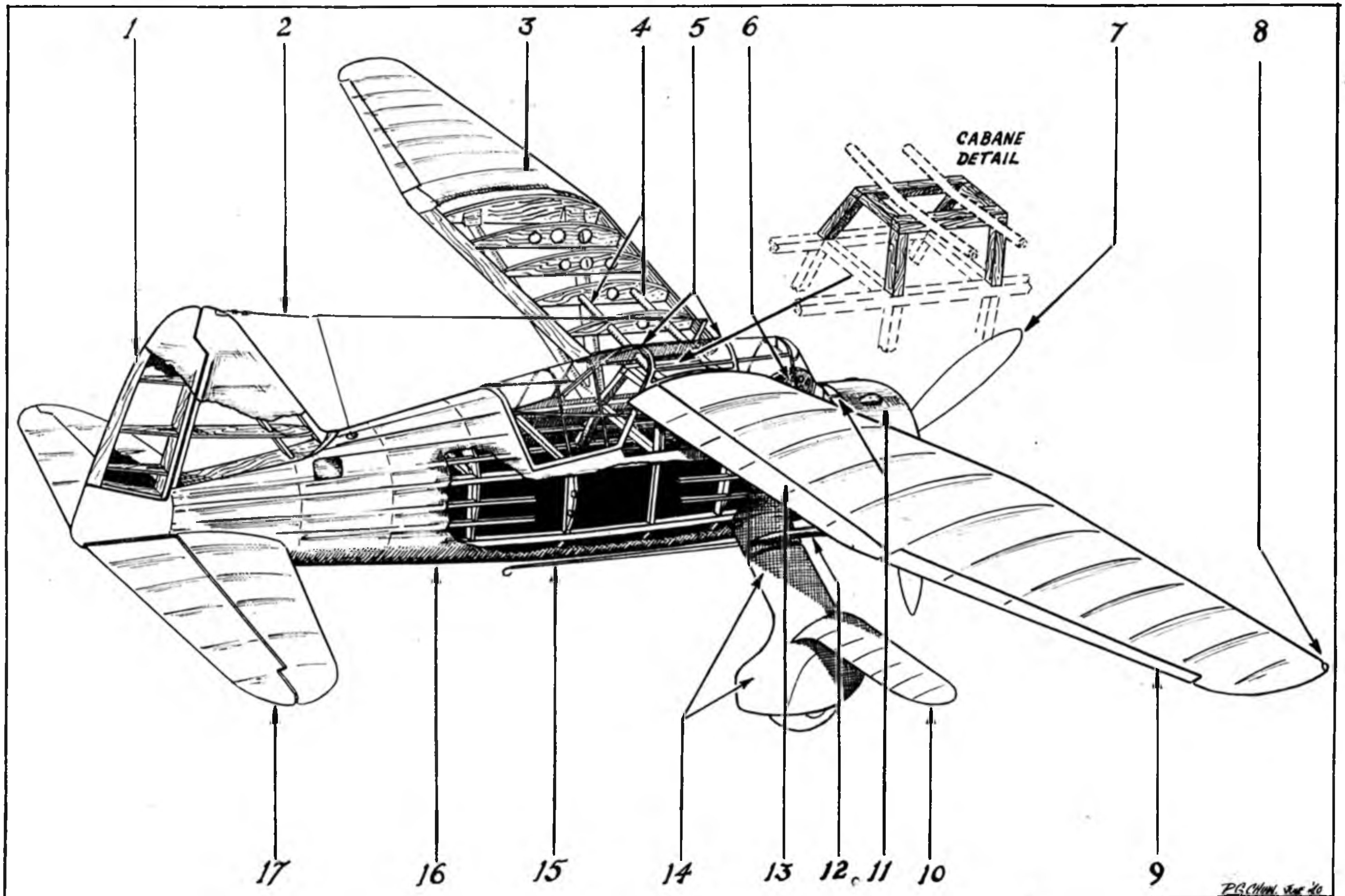
The " Vanguard " model 61 is equipped with the Pratt and Whitney " Double Wasp " of 1,500 h.p., and with this motor the wing-loading is raised to about 40 lb. per sq. ft., and speed and climb are improved, although ceiling is probably slightly reduced. Undoubtedly, the maximum speed is 400 m.p.h. or more, and the manufacturers claim that 15,000 feet can be reached in 4½ minutes. It is unlikely that the Heinkel could equal this performance. Landing speed is raised by about 10 m.p.h., and thus is not nearly so high as that of the He.113.

In appearance, the " Vanguard " is exceptionally " easy on the eye." The fuselage is well-proportioned and finely streamlined. Wing and tail surfaces are attractively tapered with carefully rounded tips, and are nicely faired into the fuselage. The wide-track undercart is retractable, and is completely enclosed when raised, as is the tail-wheel. There are no external excrescences at all.

The model 61 has its " Double Wasp " motor completely enclosed, like the Curtiss P.42. A long-chord cowling and a large spinner form streamlining better than that normally obtained with a liquid-cooled in-line type motor. Cooling the " Double Wasp's " 18 cylinders is effected through a scoop under the forepart of the cowling and a system of ducts around the motor.

The structure of the " Vanguard " is entirely of metal.

(*Concluded on page* 498).



1. Movable rudder.*
2. Dummy radio aerial.
3. Wing structure: Deep leading edge, perforated ribs with tissue covering.
4. Wing dowels.
5. Removable section of cabin enclosure.
6. Dummy instrument panel.
7. Three-bladed flying propeller.
8. Dummy navigation light.*
9. Movable aileron.*
10. Detachable bomb carriers.*
11. Radial engine cowl and cooling gills.
12. Detachable wing-struts.
13. Movable flap.*
14. Soft balsa spats and undercart leg.
15. Dummy message pick-up hook.*
16. Fuselage structure: Basic structure of longerons and cross-members, formers and stringers added. Tissue covering.
17. Movable elevator.*

* Denotes optional.

STREAMLINING AND ITS BEARING ON DURATION MODELS

By G. W. JONES

THIS short treatise is intended to clear the air for a few of those misguided individuals who think that to streamline a model is to commence upon a vicious circle, i.e. that the more you streamline a model the faster it becomes, and the faster it becomes the harder it is to control and the smaller its chance of holding a thermal having once encountered one. This very logical piece of argument seems to have confused the average English model builder, and doubts have arisen in his mind. This is due, however, to the wrong approach. We in England were amongst the first to really begin to design streamlined models, while Americans still persisted in slab-siders, mainly, I believe, of the " diamond " type.

When the minimum weight of the " Wakefield " (and this is the type with which I am here interested) was raised to the half-pound mark, aero-modellers the world over began to think; they seem to have come to the following conclusion: that the model should fly as slow, and have as slow a sinking speed, as the new loading permitted.

The first thing to be done was to build an old type model with a much stronger construction and a lot more power to bring inside the new weight ruling. Comparing this second model to the old type, the only effect was to increase the speed, with a corresponding loss in performance. This state of affairs did not appeal to modellers. Something was wrong; streamlining was in " fashion," and for many modellers this was reason enough to adopt streamlining . . . besides, they looked good.

But here comes the point. We designed streamlined models. We flew them. They flew a lot faster. " So what? " said the average modeller. " If you streamline anything, any type of machine, it goes faster . . . etc." . . . And there it was left.

Now to come to a few words that ought, in my opinion, be engraved upon the brains of every aero-modeller.

The point of streamlining a model is to reduce the drag of the non-lifting components of the aircraft as much as possible in order that this loss in drag may be ADDED to the drag of the wing; this means that for every $\frac{1}{16}$ oz (·06 oz.) you gain in streamlining the non-lifting parts of the aircraft, you can ***add to the drag of the wing,*** which, in turn, if the L/D ratio of the wing be taken as 16, will accrue you an ***extra ounce of lift,*** flying ***at the same speed as the unstreamlined model—only with the WING AT A GREATER ANGLE OF INCIDENCE.***

For example, take two models of the same loading, one being streamlined, to fly at the same speed—their power units, as well as general outline, being the same—the two models must have *the same total drag.* But the streamlined model has less drag from its non-lifting parts and therefore more drag available for the wing; the wing must, therefore, to produce this extra lift, be flown at a higher angle of incidence; this new lift force is the product of the lift/drag ratio and the amount of the available drag for the wing

One can easily see that by doing this we increase our chances of ordinary duration, as well as that of soaring flight, enormously, as our model now has a very *low forward speed, plus a high lift/drag ratio for the whole aircraft, giving an extremely low sinking speed.*

Perhaps in this article I seem to have repeated myself too many times, but I feel that the point cannot be too strongly stressed. The sooner we stop flying our streamlined jobs at three degrees and raise it to something like six degrees the quicker will the Wakefield Cup be back to the Old Country again.

DESIGNS FOR THE SCALE MODEL BUILDER.—*Continued from page* 496.

Fuselage and wing- and tail-surfaces (except control-surfaces) are metal covered, flush-riveted and butt-jointed. Practically the whole of the fuselage forward of the cockpit is covered with rapidly detachable metal panels for quick servicing and inspection.

The " Vanguard " has been flown by Wing-Commander Addams, the Air Ministry representative in the U.S., who tests out American 'planes before orders are placed by the Purchasing Commission. He is stated to have remarked that the " Vanguard " was one of the finest fighters he had ever handled.

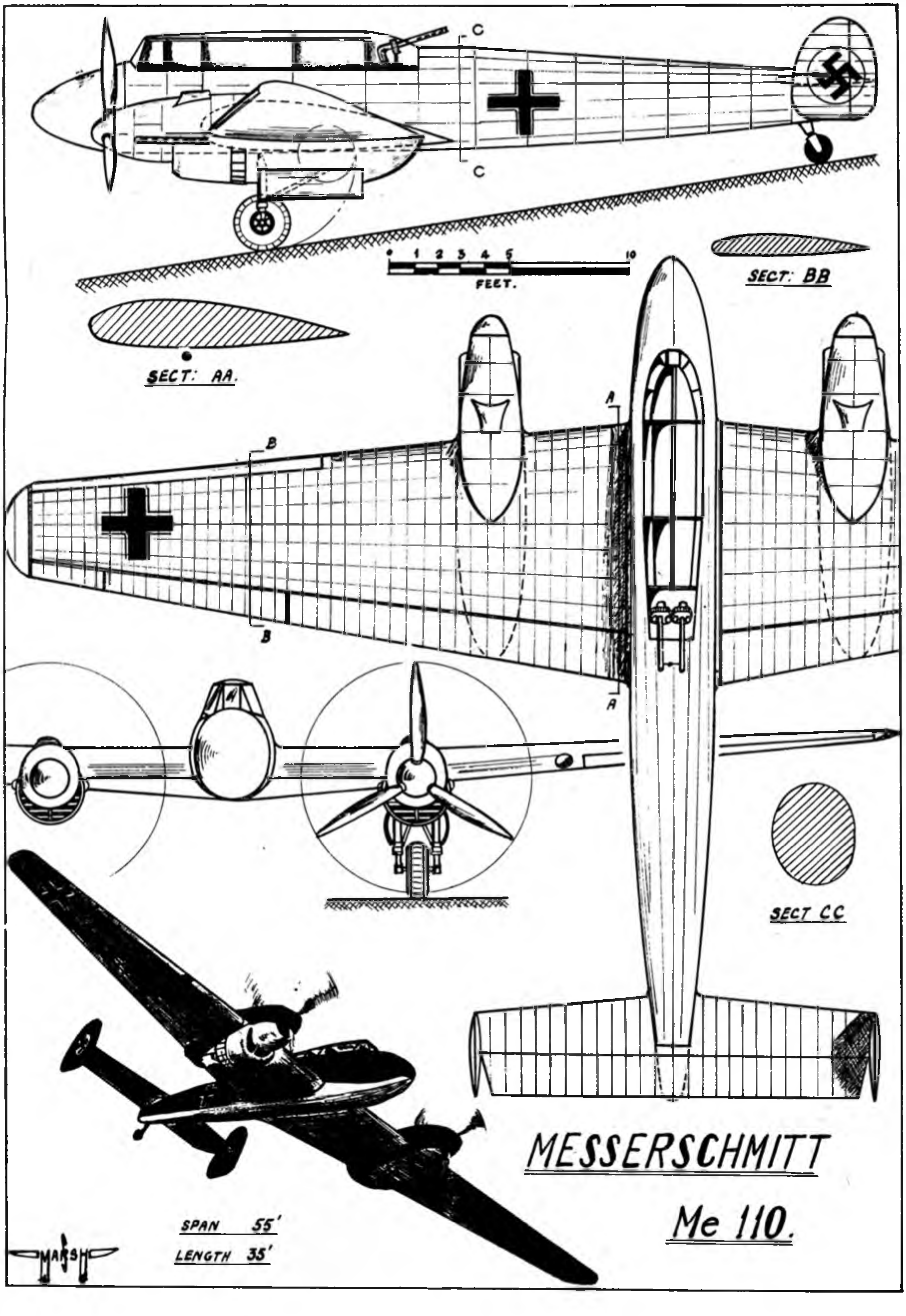
Well, space is getting short, and I fear the Editor will be blue-pencilling (in two senses!) my MS., so, on to this month's " cutaway " model drawing, the Westland " Lysander." A description of the full-size machine was given in the June article.

The model in the sketch is suited to a scale of ½ in. to ¾ in. to the foot, giving a span of between 25 in. and 37½ in. The fuselage of this model consists of a basic structure of longerons and cross-members, with formers and stringers added, thus following the type of structure used on the full-size machine. The two wing-panels are connected with bamboo or hardwood dowels. These dowels are tied to the cabane section (which is built rigidly on to the main fuselage framework) with rubber. Part of the cabin enclosure is made detachable to give access to the centre-section and to prevent damage in the event of a crash and the wings being knocked up. The wing struts are, of course, provided with snap fastenings.

BOOKS REVIEWED.—*Continued from page* 501.

engine specifications, and performance figures are given for each aircraft, together with several hundred words devoted to a description of each 'plane's external markings, colours, etc. Most of the photographs illustrating the 'planes have been provided by the courtesy of the Editor of *Flight,* and all of them are clearly printed and reveal a number of external features which would be of assistance to solid scale modellers. Plans are drawn to the popular 1/72 size which, whilst meeting the wishes of most enthusiasts, limits the draughtsman to omitting some of the finer profile lines, since the scale is so small. However, this is no way detracts from the value of the book, which should have a ready sale not only amongst solid scale enthusiasts, but all aero-modellers, and, in fact, all those now affected by the nearness of the war to this country. The book should be of particular interest to all members of the Air Cadet Corps, and obviously a copy should be in the library of each squadron's headquarters.

The book is bound in a stiff card cover, and on the front page is an extremely attractive design, as shown on page 501, which is printed in full colours.


C
C
0 1 2 3 4 5 10
FEET.
SECT: BB
SECT: AA.
A
B
B
A
SECT CC
MESSERSCHMITT
Me 110.
SPAN 55'
LENGTH 35'
MARSH

BOOKS ON MODEL AND FULL-SIZED

Lords of the Air. By Harry Harper. R.T.S. Lutterworth Press. 8s. 6d. net.

No man living has been more closely in touch with the developments of the aeroplane than has Mr. Harper. He has seen flights of the pioneers, has personally known many flyers, and has made his own contribution to the organising of the world's air routes. His accounts of these things are vividly described in this book, dedicated "to all the gallant pioneers who have made possible our present defensive strength in the air."

The book is cloth bound, and contains 200 pages and a considerable number of half-tone illustrations. It makes most interesting reading, from the description of Bleriot's first flight across the English Channel to the description of the development of Britain's first air lines across the length and breadth of the world.

People well known in the aeronautical world, such as Latham, who made a famous flight in a gale in 1909; the Hon. C. S. Rolls; A. V. Roe; H. V. Grahame-White; that well-known character, Samuel Franklin Cody; Moore-Brabazon; T. O. M. Sopwith; Sir Alan Cobham, and others, pass across the pages of this vivid book.

The style is frank, and at times quite humorous, and makes easy and interesting reading. This is a book which should find a place in many school and home libraries, and would make an ideal present to the modern air-minded youth.

"The Design and Construction of Flying Model Aircraft," by D. A. Russell, A.M.I.Mech.E. Harborough Publishing Co. Ltd. 6s. 6d. net.

In five evenings I read this book through *twice,* worked out many of the formulæ, and derived much pleasure and instruction therefrom. It is often said by reviewers of novels that "it was impossible to lay the book down." I do not know how often this has been said of a technical book, yet I think that anyone who has our hobby seriously at heart will agree that this phrase may aptly be applied to Mr. Russell's book.

Its great value lies in the fact that it seems to be the first attempt to put model aeronautics on to an engineering basis. Many folk are scared of a square root symbol who, if they would only trouble to polish up their school mathematics, would never again be contented to design their aeroplanes by rule of thumb methods. Although the technical section of Mr. Russell's book contains an amount of "facts and formulæ" none of it is beyond the scope of the intelligent layman.

The theoretical side of the volume is well supported by the practical considerations of construction. All the information cannot here be enumerated in detail, yet I would particularly commend the chapters on engine tuning and testing, landing gears, and wings and fuselages. The book is particularly well illustrated and set out.

In all this mass of valuable data there is only one criticism which I have to make. In future editions I hope that Mr. Russell will delete the paragraph wherein he recommends the use of metal polish and lubricating oil to "run in" small engines. I feel that this advice is liable to be abused, for really there isn't *room* for the thinnest layer of metal polish between the cylinder walls and, say, a cast-iron piston on engines of the very smallest sizes. With alloy pistons, which are fitted with rings, the process may be permissible, yet inexperienced ones may be tempted to try it on some of the many engines which are fitted with a ringless steel or C.I. piston, which has been carefully lapped to a fit.

For the rest, the whole of the book is so excellent that I can confidently recommend it to all serious aero-modellers.

L. H. S.

Models for Flying. By L. H. Sparey and C. A. Rippon. Percival Marshall and Co. Ltd. 3s. 6d. net.

The combination of such a practical engineer as Mr. L. H. Sparey and such an "old hand" as Mr. C. A. Rippon, augured well for some pleasant hours' reading when I commenced to read "Models for Flying" by these two aero-modellers.

Mr. C. A. Rippon needs no introduction to readers, as his name has quite recently been before them all as the designer of the "Air Cadet."

Mr. Sparey has achieved distinction by designing and constructing a number of petrol engines of various sizes.

"Models that Fly" is bound in a stiff card cover, a small reproduction of which accompanies this review, and is printed on art paper and runs to approximately two hundred pages, clearly printed, with close on two hundred illustrations.

Commencing with a chapter on the "Modern Trend," the authors describe generally the various types of planes on model aircraft now being built, illustrating with a number of appropriate photographs and sketches, these latter are well and clearly drawn, and add much to the value of the book.

The chapter on fuselage construction commences with a description of the several ways of building a Wakefield type of model, and then passes to the description of monocoque construction. This is extremely well described. An example of the care taken by the authors in making their book is understandable and as useful as possible, is shown by the fact that over a dozen photographs and sketches are used to illustrate this type of construction.

AIRCRAFT —— *Reviewed*

"Tail units, propeller, and rubber motors," is an interesting chapter devoted to these important parts of models. Here Mr. C. A. Rippon illustrates his ingenuity in the designing and constructing of gearboxes and flexible drives, of which he is one of the pioneers in this country.

"Flying Scale Models" is well illustrated by a number of photographs of models built by Mr. J. H. Towner and other modellers.

A valuable feature of this book is that it covers a wide field, and therefore should be of interest to *all* newcomers to the hobby. A glance through the chapters of the book shows the large number of types which may be built:—

Chapter 5 is on Gliders.

Chapter 6 on Indoor Flying Models.

Chapter 7 on Model Speed Aeroplanes.

Chapter 8 is, in my opinion, too short, consisting as it does of only two pages devoted to the trimming and adjusting of duration models. Admittedly the notes are by Mr. Bob Copland, and "every word is worth a guinea!" But in a book intended primarily as a guide to all types of aeromodellers, this chapter might well have been extended somewhat.

Chapter 9 is devoted to Petrol Engine Model Aircraft, and deals in a general way with the construction of the more or less straightforward type of model, whilst Chapter 10 is presumably mainly the work of Mr. Sparey, and deals with model engines and their mountings. A very good chapter indeed.

Following are chapters describing the building of several models: There is a "Round-the-Pole" model, a high-wing duration 'plane, a biplane, a flying boat, a low-wing monoplane, and a high-wing petrol 'plane—the "Premier Lion."

Reduced scale drawings of these models are given, together with general descriptions as to their building.

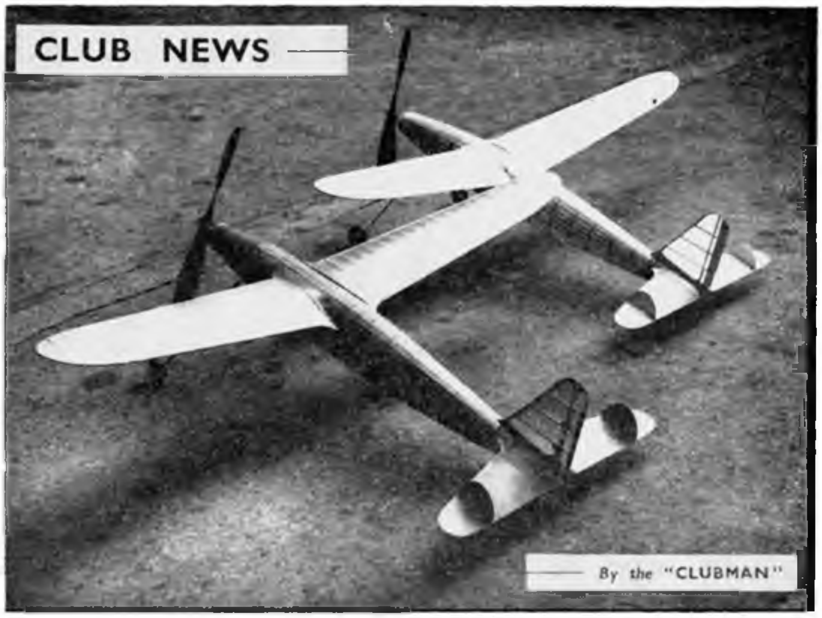
As above stated, this book specialises in no particular type of model, but deals chiefly with practically every type built, and in that respect it forms a valuable addition to the range of books available to aero-modellers. D. A. R.

Scale Plans of Military Aircraft. By C. A. H. Pollitt. The Harborough Publishing Co. Ltd. 3s. 6d. net.

"Spot the Planes" is an apt title for this book, size 11 in. by 8½ in. British, French, German and American military aircraft are fully described, each with a large photograph and three-view scale plans. Twenty-seven single-engined aircraft and 12 twin-engined aircraft are described, plans of the latter extending to 17 in. by 11 in. in the form of "fold-over" pages.

A general description,

(*Continued on page* 498).



WELL chaps, I am glad to see that most of you have taken my words to heart this month, and have kept your reports both short and to the point. This makes my task a lot easier, especially under the present circumstances, where I have got to cut to the bare limits, and your co-operation is most welcome.

There is not much to say in my preliminary talk this month apart from congratulating those of you who are still keeping the flag flying, and it is quite heartening to see how many clubs are really buckling down to things, even under the increasingly difficult circumstances. There is no doubt about it, these times find out those with backbone, and anybody with enough grey matter can put two and two together and be able to judge which are the clubs worth supporting in the future. It is sad to see one or two cases where, in spite of a lot of talk in pre-war times, certain bodies folded up their tents and faded away quicker than the proverbial Arab. Naturally many things happened which were outside the control of most clubs, but I am certain that the clubs that are continuing need a really big hand from us for keeping things going so well, and it is my experience that the majority of those continuing are those who have overcome the biggest difficulties in the way of key men being called up, etc., and all the more credit is due to them.

The second S.M.A.E. competition of this season, namely the " National Cup " event, received a very good response, a total of 27 clubs competing. This does not seem to lag much behind peace-time support, and just bears out what I said above. Honours have been distributed fairly evenly, and I am pleased to see our old friends of Bristol and West once again placing first. Birmingham came second, Wirral third, then we shift down south to West Sussex, back up north to Blackpool, south again to Barnes, then up with a wallop to Fife. It is stimulating to see the Scottish clubs making such a good show (you will note that Glasgow placed eighth on the list), as this rather gives the lie to complaints I have heard from time to time that the Scottish clubs receive no consideration. Obviously no club gets anywhere by just sitting down and complaining of lack of attention; the only way is to start jumping around and make people take notice of you, and it seems as if at least two clubs in the braw, breck North are putting a good foot forward. Incidentally, I wonder just how much the Fife activity is due to a spot of stimulation from our old friend Montgomery, late of Blackheath?

While the nature of the "National Cup" event this year has not met with universal approval, I am glad to see that even some of those that objected to the type of event did not let their objections keep them from competing. This is the spirit; after all, the competition is the thing, and because a certain set of rules do not happen to coincide with one's own ideas, this should not prevent mucking in with the rest on the one or two occasions where we do not see eye to eye on things.

A fair number found it difficult to keep down to the duration required, but all things considered, it is amazing how close some chaps were able to get to the mark. You will notice that right up to the fourteenth position there is only a margin of 7·4 sec., which is pretty good going when you consider that nine flights had to be made for the event. It seems as though this was one of the times when the much sought after thermal was cussed up hill and down dale. Our old friends Igranic must have run into a whole flock of them, as they just about doubled the score to be flown! However, that's all in the fun of the game, and if everybody had a good day's flying that's all that matters.

" NATIONAL CUP " RESULTS.

		Points.	Error.
1.	Bristol and West	658·4	1·6
2.	Birmingham	658·1	1·9
3.	Wirral	662·0	2·0
4.	West Sussex	657·7	2·3
5.	Blackpool	662·5	2·5
	Barnes	657·5	2·5
6.	Fife	662·8	2·8
7.	Harrow	656·75	3·25
8.	Glasgow	655·2	4·8
9.	Bath	664·95	4·95
10.	Batley	654·9	5·1
11.	Bournemouth	654·5	5·5
12.	Cardiff	666·45	6·45
13.	Blackheath	667·4	7·4
14.	Lancs	647·5	12·5
15.	Torquay	676·0	16·0
16.	Luton	688·5	28·5
17.	Halifax	609·4	50·6
18.	High Wycombe	596·0	64·0
19.	Bedford	585·5	74·5
20.	Hornchurch	516·6	143·4
21.	Egham	484·0	176·0
22.	Brighton	844·55	184·55
23.	Yeovil	443·9	216·1
24.	Ilkley	397·7	262·3
25.	Weston-super-Mare	386·3	273·7
26.	Igranic	1131·0	471·0

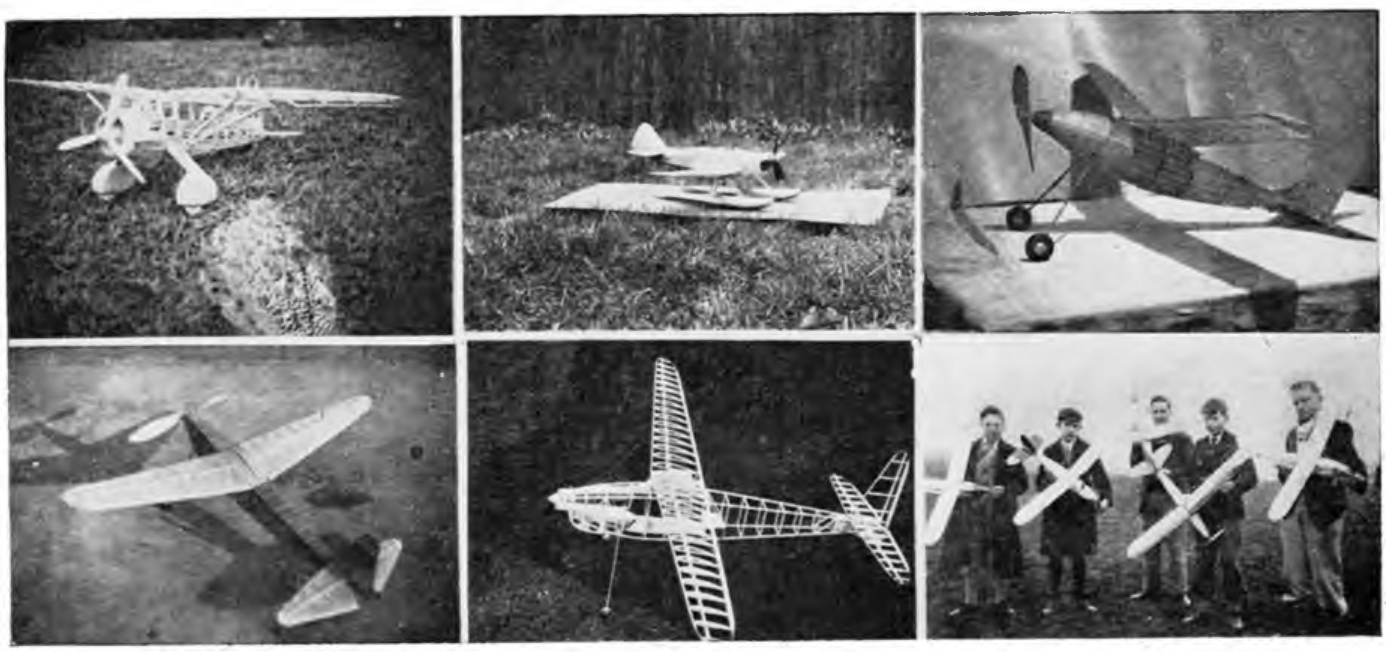
Just one thing before I go on to cutting up your reports. The Editor has pulled me over the coals for omitting a club report, following which he received a rather stiff letter from the club in question. Now, hang it all, I can't be blamed for everything, and actually the matter is out of my hands and rebounds back on to the head of our esteemed Editor. You must realise that when paging up the book a certain amount of leeway has to be made, as it is impossible to judge exactly the lengths of the various articles, etc. Therefore, we find at times that there is a slight margin to be made up, or adversely something to be cut, to be able to get all the matter into the pages correctly. Therefore something has to be scissored, and this is what happened last month, and unfortunately it was our section which came under the guillotine. It is just too bad that one or two particular clubs happened to drop into the particular section that was cut out of last month's news, but there you are—you know what heartless people editors are; just go and have a look at one or two films of an American newspaper office. However, my apologies to those who came under the axe, but don't be too hard on the poor old " Clubman," because it's not always his fault. And so let's see what you have all got to say this month.

My first remarks apply to the sender of this month's heading photograph. This shows two finely-built G.B.3's, the constructor being A. Galeota, of the HIGH WYCOMBE M.A.C. Now besides good model workmanship, the photographic excellence makes that a really worth while picture, and shows what can be done with just a little thought and care. We receive a great number of photographs at these offices, but it would amaze you how small is the number which can really be classed as good photographs. We get one that shows a really fine section of a back fence with a little model lost to sight amidst rows of rockery and flowers and, while the fence is in focus, the model is anything but, and looks just like a " ghost piece ;" on the opposite score we get a really clear photograph of a model that it would have been far kinder to have snapped through a gauze sheet, or whatever it is that these expert photographers use when they take shots of our favourite film stars. You've seen the sort of thing—beautiful blonde with misty eyes, the whole thing beautifully misty. I wonder what the same fair damsel would look like if snapped with one of these cruel newspaper photographers' cameras fitted up with powerful flashlight? Perhaps it is just as well we don't know!

The LEICESTER M.A.C. are now using a new ground on the Stoughton Road, and the change of ground seems to have pushed duration up, as Messrs. F. W. Davies and R. Plowman have both clocked flights of 9 min. O.O.S. Incidentally, these two flights were not officially timed, which gives rise to a point I have had in mind for some time. (I feel that a good many clubs do not make good use of their official timekeepers, and I would suggest that more co-operation by these officials and their members would be welcomed. I have had a great number of reports recently of potential record-breaking flights, which cannot be recognised owing to the fact that timekeepers were not available, and it seems rather a hit and miss state of affairs when this sort of thing happens). R. Bristow, a junior member, won both the Nomination Duration and Spot Landing Competitions recently.

In spite of fairly poor flying conditions, Mr. V. D. Wilkins, of the TROWBRIDGE AND D.M.A.C., made a good average of 90·5 sec. to win a recent R.O.G. Duration Competition. W. T. Morris placed second with an average of 45·26 sec. Both these fellows lost models in fly-aways a few days before the competition, that of Wilkins being timed O.O.S. 12 min. 14 sec. This club sent me their competitions list for 1940, and I must congratulate them on their successful attempt to keep things going.

Another club to strike gusty conditions for a competition was the ABERDEEN M.A.C., but Mr. A. Mutch managed to average 53·2 sec. in spite of losing his models in trees on two flights. Mr. T. W. Murray, the runner-up, clocked 52·4 sec., which I think is close enough competition for anybody. A rather amazing freak flight is reported from this club, as during this competition a model which had just been launched was hurled on to its back by a gust of wind, when to everybody's amazement the wing was blown upside down on the fuselage, transforming it into a low-wing



(Top, left to right) A 25 in. Lysander constructed by J. Carter, of Farnborough. . . . V. W. Erlebach, of the General Aircraft M.A.C., adapted this Miles Magister for float work. . . . Stream-liner by W. Louch, of the South Birmingham Club.
(Bottom, left to right) A " Hawk " built by Ivor Lewis, of Newport. . . . Here's a spot of nice construction by D. E. Johnson, of Wellington. The model is a Fillon Wakefield built from **AERO-MODELLER** ***plans. . . . Flight of Air Cadet models built by the Dormers Wells M.A.C.***

monoplane—then it flew on for a flight of 21·8 sec. Now where are all these general purpose machines?

A bit better luck was experienced by the ILKLEY M.A.C. when good flying conditions prevailed for their inter-club meeting with the KEIGHLEY BOYS. Some good times were put up altogether, and the Ilkley lads ran out the winners eventually by 24 points to 11. The complete list of results is as follows:

NEAREST 30 SEC.

1. K. Anning ... ... 28·8 sec.
2. G. Bolton ... ... 28·5 ,,
3. J. Townsend ... ... 27·2 ,,

UNDER 30 IN. 16.6.40.

1. K. Anning ... ... 237·0 sec.
(Total 3. Lost O.O.S.).
2. R. Crowe ... ... 203·2 ,,
3. J. Townsend ... ... 32·0 ,,

NEAREST 45 SEC. (Best of two flights).

1. J. Townsend (Ilkley) ... ... 45 sec.
2. K. Anning (Ilkley) ... ... 44·0 ,,
3. R. Crowe (Ilkley) ... ... 47·2 ,,

HAND-LAUNCHED DURATION. (Total three flights).

1. R. Crowe (Ilkley) ... ... 161·1 sec.
2. J. Horsman (Keighley) ... 151·2 ,,
(Lost O.O.S. first flight).
3. J. Townsend (Ilkley) ... ... 150·2 ,,

TEAM CONTEST (NATONAL CUP). (Nearest 660 sec.).

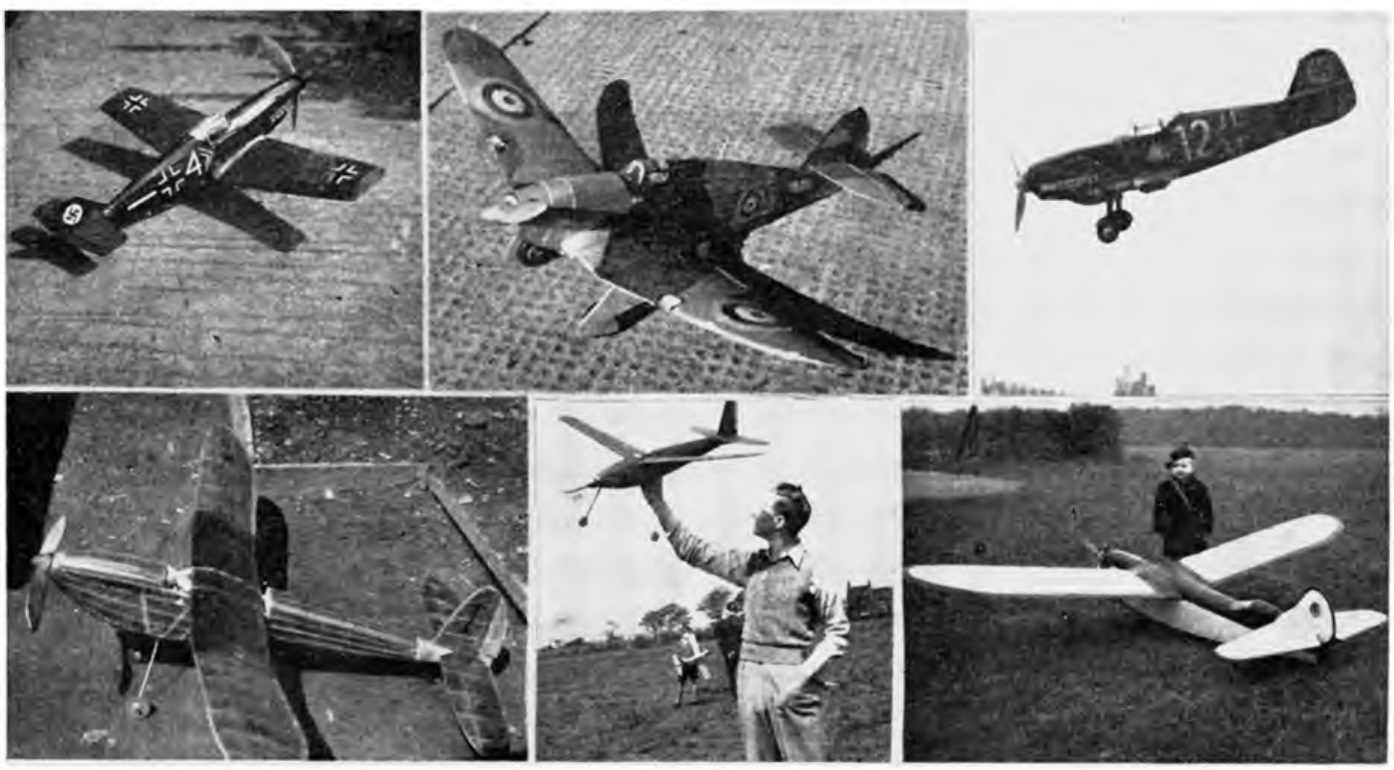
1. Ilkley ... ... 397·7 sec.
2. Keighley ... ... 315·8 ,,

GLIDER CONTEST. (Total three flights).

1. R. Bailey (Keighley) ... ... 89·2 sec.
2. J. Townsend (Ilkley) ... ... 28·0 ,,
(One flight only).
3. J. Jameson (Ilkley) ... ... 17·0 sec.
(One flight only).

We have a very interesting report from the BRIGHTON AND D.M.A.C., the chief item of which is the fact that, subject to confirmation, Mr. J. C. Lucas broke the seaplane record for a loading of 5 oz. to the square foot, his time being 2 min. 18·7 sec. R.O.W. This is mentioned as being a world's record, but I do not know whether wing loading for items such as this is taken into account for this sort of thing. However, we shall know more when this record comes up for confirmation by the S.M.A.E. Mr. W. Boxall won the competition for approved design of club models with an aggregate time of 210·3 sec. Mr. F. S. Thomson won the hand-launch gliding with a time of 2 min. 18 sec., Mr. W. Finch the winch-launch event with 2 min. 12 sec., and Mr. I. C. Lucas the tow-launch gliding with 110·3 sec. Mr. J. Tugwell broke the club biplane record with a figure of 95·3 sec. R.O.G.

There seems to be a spot of trouble down Brighton way, as I am told that when the club turn out, six or eight chaps (non-members), some of whom are past members of the club, but who broke away sometime ago, create a certain amount of dissension by turning up and flying on the same ground. This is not objected to, but it is their conduct which is causing the snag, and the members of this club feel that they may be blamed for the deficiencies of some of these others. The trouble is they are flying uninsured petrol models, and I feel that the Brighton club is acting in good faith in bringing this to the attention of other aero-modellers. There is far too much of this sort of thing going on, and when, as in this case, these rebels pick on another club's ground to carry on their activities, obviously the club are going to get some of the repercussions and



(Top, left to right) Messerschmitt built from AERO-MODELLER *plans, constructed by A. Beard, of Thame. . . . 22-inch span Hurricane built by Mr. Brown, of the Wirral Club. . . . Another Messerschmitt constructed by 15-year-old Mr. Jewell, of Walworth. (Bottom, left to right) Cahill's "Clodhopper," built by Roy Bailey, of Walthamstow. . . . W. Heggingbottom, of Ashton, with his Chasteneuf model. . . . How's this for a well-built petrol model? A grand piece of construction by W. Patterson, of Croydon.*

any trouble that arises. This is not playing the game, and I would ask these chaps to either mend their ways or settle their differences with the club and join up with the rest. It just seems damn silly to me to have chaps interested in the same hobby continuing at sixes and sevens in this childish manner.

A large attendance has been maintained at the NORTHERN HEIGHTS M.F.C. flying meetings throughout the month in spite of the persistent rough weather.

Three club contests have been held. The first, the N.H. Gala Shield, flown on June 9th. This is a nomination duration contest, the object being to put up an aggregate of three flights as close as possible to 330 sec. The results were:

1. A. G. Bell	... ...	+13 sec.
2. D. Weaver	... ...	−20½ ,,
3. S. Yelloly	... ...	+33 ,,

An open duration contest for the Wilson Cup was held on June 16th. The wind was extremely strong and bumpy all day, and many found great difficulty in getting off the board.

1. A. G. Bell	...	aggregate	383·75 sec.
2. S. Yelloly	...	,,	190 ,,
3. S. Collins	...	,,	179 ,,

The unusually large difference between first and second was due to failure to get off the board on one flight each by the runners-up.

A cheery report from the CARDIFF M.A.C. informs us that Bud Morgan has broken the club record with a flight of 3 min. 13 sec. O.O.S. whilst flying in the "Gamage Cup." Arthur Gear has put up the Wakefield record in this club after a very fine flight that had some funny consequences. I quote the report in full here for you to get the full benefit and humour connected with this particular flight. It seems that after all we have a few laughs left to us.

"'Flying Minutes' has had a rare experience and is now called 'Flying Hours.' On June 16th Arthur Gear released his model 'F.M.' from the race-course, and it soared up and up into the blue. Well, after about 8 min. it was realised that there was only one watch timing it. The one and only watch was stopped at 9 min. 37 sec. as the 'Minutes' disappeared from the sight of the timer. Several days elapsed before word was heard about the 'plane. The police rang up Arthur Gear to know if he would collect his 'plane from St. Nicholas (about six to eight miles as the 'Minutes' flies), as it was cluttering up the cop shop. So Arthur trips along, and oh boy, what a juicy-wuicy story the copper-in-chief told him. Now sit back and open those eyes of yourn—this is absolutely authentic from the horse's mouth. 'My notice was drawn to the fact,' said the policeman, 'that an infernal machine had appeared from the sky and had fallen into a field that was being ploughed up by some farm labourers who were afraid to approach it. They sent one of their number for the police, and when said police arrived on the scene of the dastardly action the rest of the country bumpkins were poking holes in the fuselage and wings (having got over their first fright), as they said, to 'let out Hitler's poison gas.' I then took charge of the machine and brought it to the Police Station.' Perhaps this is the occurrence that started some silly rumours about Parachute Troops landing at Peterstone-super-Ely, a few miles from St. Nicholas. Ah well, it is a curious world."

In spite of certain clubs having difficulty in getting to the ground of the HORNCHURCH M.A.C. owing to this being situated within the 20 mile coastal restriction limit, this club's annual invitation meeting was a great success and favoured by fine weather. S. Smith, of ILFORD, made the best flight of the day with 261·6 sec., the model being lost. This machine was a high-wing diamond fuselage type, the fuselage being yellow, wing and tail-plane red, with the name "Cobber" Kain on the nose. Any information of this machine will be welcomed by the Secretary of the Hornchurch Club. The final results were:

Popular Contest. (Nearest to 41·5 sec.).

C. Darch (Westland M.A. Club), 39·4 sec.

Open Duration.

S. Smith (Ilford M.A.C.). Aggregate three flights, 342·6 sec.

Glider Contest.

J. Dodds (Ilford Club). Aggregate three flights, 146·9 sec.

Wakefield Type Contest.

M. Hall (Hornchurch M.A.C.) Aggregate three flights. 203·5 sec.

Members of the CHESTER M.F.C. now have access to a local aerodrome for their competitions, thanks to the Air Ministry official in charge. (Some folk have all the luck—instead of getting a ground we lost ours at the beginning of the war!). Photograph reproduced elsewhere shows a sailplane built by D. B. Phillips, this being a scale model of the "Kakadu." Wing span is 10 ft. with a wing loading of 6½ oz. per square foot, and the best time to date is 1 min. 42 sec. Mr. Wilde states that flying these large gliders is far thrilling and well worth the extra work entailed in the construction, and I can endorse his remarks in this particular respect.

The WARWICKSHIRE CLUB is still hanging together, but competitions have been a little disorganised. Meetings have been arranged for evenings to suit the many members who are working seven days a week. Unfortunately the flying field has now been covered with large obstacles, but the club is hoping to keep going in some way, even though it has to go to indoor flying.

"Uncle" Gunner, of the WOKING AND D.M.A.C., won a recent competition with an average of 95 sec., much to the delight of his fellow members. Secretary Biggs was second with 85 sec., but there seems to have been some doubt as to whether his model was coming or going!

The FULHAM MEN'S INSTITUTE CLUB have been very active at Wimbledon recently, putting in a great deal of flying with a number of varying type machines. Mr. T. N. Simpson has designed a very successful parasol model incorporating folding airscrew and mono wheel undercarriage, which not only retracts into a self-closing recess in the fuselage, but re-extends itself for the landing. What about letting us have details of this for The Aero-Modeller, as I am certain many enthusiasts would be interested in this particular gadget?

The MACCLESFIELD M.A.S. report considerable flying activity with the advent of good weather conditions, and two club records have been raised considerably. Mr. Eifflaender breaking his own record with a Wakefield model with a remarkable flight of 17 min. 23 sec. This flight was watched for 35 min. through field glasses. Mr. Turner raised the club glider record from 86 sec. to 5 min., and had another 3 min. flight with a brand new glider, both being of his own design.

The WIRRAL M.A.S. have been lucky enough to find a perfect flying ground at West Kirby. This is in the form of a beach about two miles long and perfectly flat. When

(Top, left to right) A 24-inch span Fokker D.VII built by P. L. Smith, of the Lancashire M.A.S. . . . A scale model S.E.5 in flight. Builder, L. Dallimore, of Trowbridge. . . . This month's "query" picture. Is this a model or a full-size machine? Write in and tell us your views, and reasons.
(Bottom, left to right) Do you stretch your rubber? Members of the Stockton-on-Tees Club demonstrate—and how! . . . Members of the Fulham Institute Club, with a few unorthodox models. No, that's not a boomerang Mr. Knight is using for a tail-plane! . . . Just about to unhook. A fine shot of a glider built by Mr. Phillips, of Chester.

the tide is out a good afternoon's flying can be enjoyed, and as a matter of fact several members have so far forgotten the time that they missed the last bus and had a ten-mile walk home. Two important records have been broken, Mr. B. V. Haisman putting up the glider record to 2 min. 22 sec. and Mr. Blackman bagging the hand-launch duration figure to the time of 5 min. 21·5 sec.

Gliders are proving very popular in the SKYBIRD CLUB No. 374, where the record stands at 78 sec.

Some good fun has been experienced in the SALISBURY AND D.M.E.S., where K. Scammell and C. Sellwood have been attacking records to good purpose. Sellwood holds the biplane hand-launch and R.O.G. figures at the moment with times of 2 min. 44·5 sec. and 3 min. 23·5 sec. respectively. It is interesting to note that this latter time is only a fraction below the British hand-launch record for biplanes. Sellwood and R. Sheppard tied in a unique steering contest event, while J. Lailey still holds on to his first place in the "Neil Cup."

Following the inter-club event staged by the Speldhurst Club the return meeting under the sponsorship of the ANDERIDA M.A.C. was staged on June 2nd and flown under ideal weather conditions. As these two clubs now stand even, a deciding contest on neutral ground will be staged in the near future. Full results are as follow:

Inter-Club Team Event.

1. Anderida M.A.C. (average of four flights) 73·6 sec.
2. Speldhurst M.A.C. (average of four flights) 60·1 ,,

Nearest to 45 Sec.

1. G. Gibbons (Anderida) ... ... – 45·25 sec.
2. W. Leppard (Anderida) ... ... – 40 ,,
3. B. Stack (Anderida) ... ... – 39·5 ,,

Open Duration Contest.

1. B. Stack (Anderida) ... ... 120·27 sec.
2. D. Saunders (Speldhurst) ... ... 80·25 ,,
3. A. Turley (Speldhurst) ... ... 76·5 ,,

The recently formed CROSBY M.A.C. are going ahead and its membership is steadily increasing. The club R.O.G. and hand-launch records both stand to the credit of D. Marsh (times of 74 sec. and 90 sec. respectively), this chap placing second to A. Littleton in a recent competition.

Mr. R. F. L. Gosling, of the BRADFORD M.A.C., whose record glider flight was reported last month, has since put up the club catapult launch record to 1 min. 25·5 sec. A number of members flew in the "Gamage Cup" event, but owing to windy conditions no outstanding flights were recorded, although earlier in the day Gosling's "Itzme III" was lost O.O.S. after a flight of over 5 min., being subsequently recovered from over five miles away. Mr. G. A. Adcock has been doing some fine flying with his new Wakefield model, being clocked for over 5 min.

Since the rally organised by the BEVERLEY AND D.M.A.C., a number of good durations have again been put up. Mr. Elwell has raised the hand-launch record to 15 min. 30 sec. and the R.O.G. to 7 min. 6 sec. Both these figures are for the under 150 sq. in. class. Mr. R. Ragg broke the catapult launch glider with a time of 3 min. 27 sec. with a converted petrol model 6 ft. span.

The following are the results of the third inter-club competition staged by the STOCKTON-ON-TEES M.A.C.:

Under 30 in. Wing Span.

	1st.	2nd.	3rd.	Av.
1 J. W. Wright (Stockton)	79	62	71·5	70·3
2. R. W. Buck (Darlington)	52·5	51·25	50·5	51·2
3 Mr. Butterfield (Darlington)	40	36·5	59·5	45

Over 30 in. Wing Span.

1. W. B. Patterson (Stockton)	101	113	132	115·3
2. J. Fraser (Stockton) ...	80·5	116	88·5	81·5
3. R. Johnson (Stockton) ...	74·5	65	100	79·3

Nearest to 60 Sec.

Winner: J. Cresswell (Stockton). Time of 61·25 sec.

KNOCK-OUT CONTEST.

Winner : J. Cresswell (Stockton).

WAKEFIELD TYPE.

J. Cresswell (Stockton) ... 77 79·5 79 78·5

Long working hours are restricting the activities of the HALIFAX M.A.C., but the enthusiasm is still at its usual high peak. A bit of a grouse regarding the "National Cup" event I have already dealt with at the beginning of this month's news.

The WASHINGTON M.A.C. is organised on R.A.F. flight lines, each operating under squadron leaders. The club record has now been raised to 2 min. 57 sec.

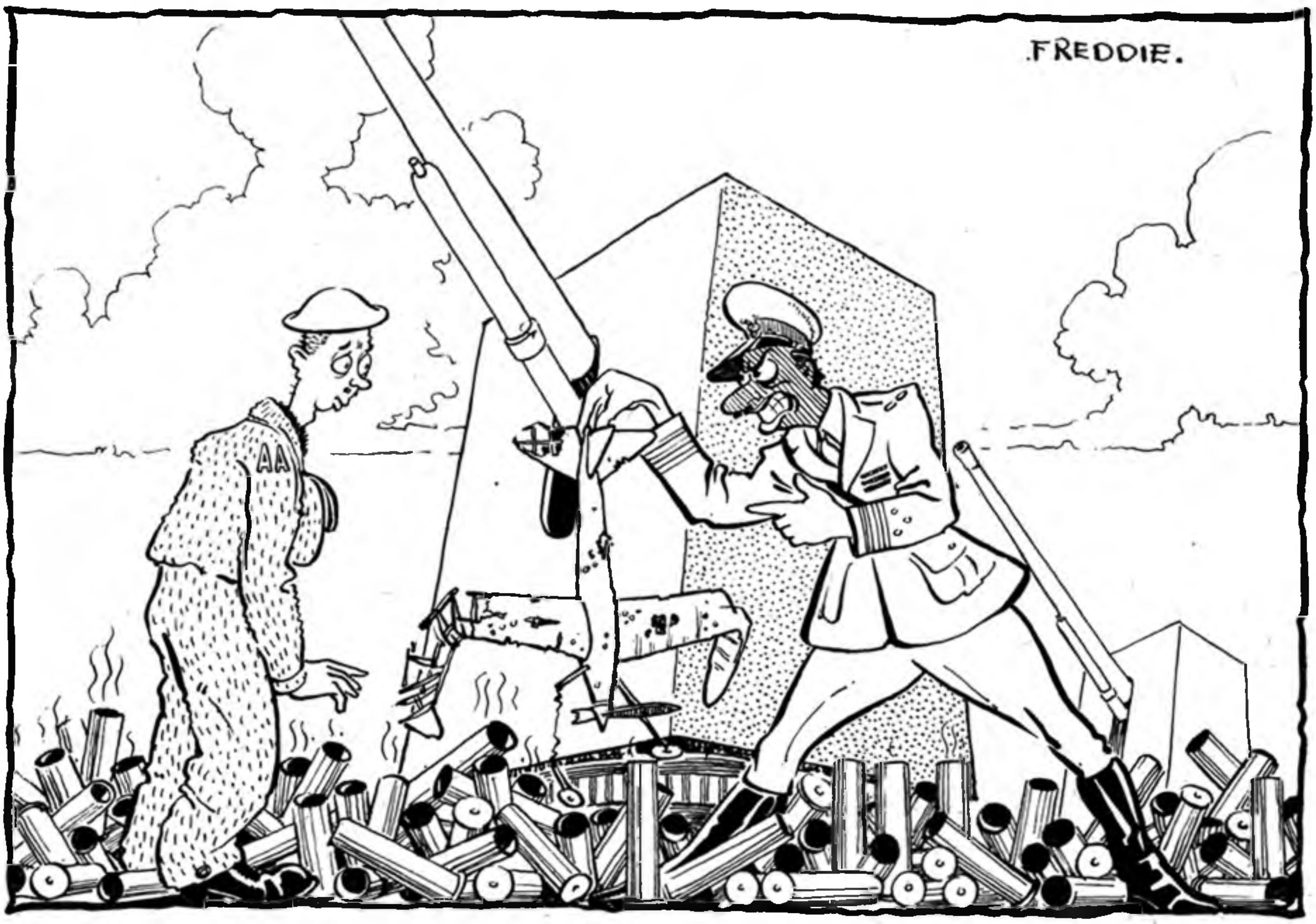
The Wallington, Norbury and Beckenham Clubs have now amalgamated with the CROYDON AND D.M.A.C. which, I think, is a very good move, especially under present conditions. Mr. Buxton now holds both the heavy-weight and light-weight duration records with times of 3 min. 22·5 sec. and 5 min. 22·4 sec. respectively. His sister, Miss A. Buxton, bagged the Club Duration Cup for Juniors with a flight of 2 min. 22 sec. Mr. Balfour won a very popular petrol model trophy, his three flights totalling 120·3 sec., with a motor run of 30 sec. on each flight. A number of very fine models are making appearance in this club, Miss Green, the secretary, trying her hand with a new autogyro, and Mr. Davis has turned out a really super glider.

I am told of a model that caught fire owing to the strong sun, A.F.S. exercises being carried out by the use of lemonade—what a waste!

An open duration event, staged by the LANCASHIRE M.A.S. on the occasion of the "National Cup," was won by B. Coulthurst with a total time of 441·5 sec., followed by F. Bailey (409·9 sec.), and H. Hill 283·5 sec. In spite of a fairly strong breeze, there were thermals galore, and three models were lost completely.

May and June have been months of thermals and broken records by the ASHTON AND D.M.A.C. In one day the under 150 sq. in. hand-launch record was broken three times, each flight being over 4 min. The final holder is E. Brown, whose time was 6 min. 55 sec. A new member, N. Hayes, flew his first model for over 20 min., but as the flight was not officially timed it could not be claimed as a record. Hard luck.

Flash! Joe Young, of HARROW M.A.C., made a flight of 31 min. 5·1 sec. This flight was timed by two official S.M.A.E. timekeepers and, subject to official confirmation, makes a new British biplane record. (What about world record as well?). This is the fourth O.O.S. flight this chap has had in six weeks, his previous time being 7 min. 38 sec., 4 min. 32 sec., and 15 min. Owing to the fine weather and the ploughing that has gone on round their particular ground ten models have been lost completely.



973 SHELLS FOR *THAT* ! * ? — ! * !

REMEMBER THIS DATE

BLACKHEATH MODEL FLYING CLUB

OPEN DAY

EPSOM, 18th AUGUST, 1940

CONTESTS INCLUDE :

Team of Three. Duration : Nearest to 60 sec. R.O.G.
Gliders (all types), Tow-launch, 150 ft. Line.
Scale and Semi-scale R.O.G.
General Purpose Duration R.O.G.

SUBSTANTIAL CASH PRIZES AWARDED.

For further information please apply :
HON. SECRETARY, MR. M. W. WHITE,
77 Manor Road, Brockley, S.E.4.

W. Luck, of the SOUTH BIRMINGHAM M.F.C., recently lost his model after a flight of 8 mins. 22 sec., this setting up a new record for the club, while a spot landing contset was won by C. K. Driffield. Models of all types are under construction by the members, including four petrol models.

And so, off for my spell of duty with the Parashooters! We live in troublous times, milords—and even though I still don't know the right end to hold a blinkin' rifle, I suppose I'll find out quick enough if the emergency arises. Still, I'm one of those super-optimistic folk who refuse to think that such things can happen to England, so we go blithely on. May the printing date of this issue see my hopes confirmed!

Carry on, aero-modellers!

THE CLUBMAN.

MISCELLANEOUS PRIVATE ADVERTISEMENTS

HIGH-WING Cabin Petrol 'PLANE, 6 ft. 6 in. span. Gwyn Engine. Time Switch. £2 10s. 0d. Also 4 ft. span duration model. 16 in. prop. 12s., perfect. Joined up.—Smith, 8 Riverside Drive, Mitcham, Surrey.

Small Traders' Announcements

The charge for these insertions is 5/- each prepaid for a minimum of 30 words, extra words charged at rate of 2d. per word.

BEDFORD.—Golding's, 107 High Street. Good stock of Cloud, Halfax, Atlanta, Scalecraft, and Tower Kits. Large stocks of accessories, carrying cases, etc.

BERKHAMPSTED.—J. W. Wood & Son, 20 Lower King's Road. M.A.T.A. For Flying Scale, Duration and Solid kits, by Cloud, Veron, Aeromodel, Keelbild, Penguin, Skybird, etc. Selected balsa, and full range of accessories.

CHISWICK, W.4.—G. W. Jones, Bros. & Co., 56 Turnham Green Terrace (Chiswick 0858). Stock balsa wood and cut special sizes, as required. Agents for Club, Cloud, Aeromodels, and Scalecraft kits. Caton's rubber. Joy-plane products. Large stocks of propellers and all accessories.

CHISWICK.—A. A. Baker, 526 High Road. Large stocks kits, balsa, and all accessories. Blue prints, M. & M. wheels, propellers, etc. Agents for all leading model supply stores. Splendid selection. 'Phone CHI. 3816.

EDINBURGH.—"Calling all aero-modellers." Whatever your requirements Frank Royle, 54 South Clerk Street, is at your service. Fullest range of kits, balsa wood, petrol engines, accessories. Illustrated catalogue, 3d. post free.

EDINBURGH.—Wade & Co., 40 Chambers Street, Edinburgh. Over 70 different models in stock—and besides this wide selection we now have models of the Bolton Paul Defiant at 1s. 3d. each.

HERNE HILL, S.E.24.—T. W. Standivan, 1 Milkwood Road. 'Phone BRI. 3741 for all model aeroplane supplies. Cloud, Keilcraft, Skyleada, Keelbild, Studiette, Megow, and all accessories. Open Sunday morning. Satisfaction guaranteed.

HARROW.—A. H. Matthews, 15 Peterborough Road. For model aircraft supplies, balsa wood, cements, dopes, Japanese tissue, piano wire, celluloid wheels, plywoods and hardwoods of every description.

HAYES.—Stan Gilks, 36 Barnholme Lane. Post enquiries only, dopes, balsa, tissues. Petrol engines bought and sold. We can send quotations. Everything in stock for petrol and rubber models.

IPSWICH, Suffolk.—A. J. Sneezum & Sons, 31-35 Norwich Road. For Joy-plane products, Caton's rubber, and all model aeroplane supplies. Aeromodel, Atlanta, Elite, Frog, Skyleada, Studiette, Tower, Cloud, Veronite, Penguin, Scalecraft, Skybird, Truscale kits.

ILFORD.—Whitehead's Model Airport, 718 Eastern Avenue and 11d Broad Street Market, Dagenham. We stock and/or supply everything advertised in THE AERO-MODELLER. Balsa wood—all sizes kept in stock.

LONDON.—City Models, 11a Union Court, E.C.2, off Old Broad Street. All Aero Supplies. 9d. kits to new built up Quaker Flash Gas Model, £7 10s.

LEICESTER.—Aero-modellers! C. Farmer can supply all your requirements. Kits, balsa, tissue, propellers, wheels, dope in bottles or sold loose, wire, cement, Caton's rubber, etc. Local agent for Baby Cyclone engines. Call and have a chat. The address is 183 Green Lane Road. 'Phone 27722. Also THE AERO-MODELLER in stock.

STAFFORD.—Aircraft Models, South Walls. Is just the place to call and see a good variety of models and obtain advice on the best way to buy from modellers like yourself.

TRURO.—John Langdon, St. Mary's Street. 'Phone 2207. Stockists of model aero supplies. Kits from 9d. to 70s. Cloud, Sweeten, Joy-plane, and 'Drome products. Balsa wood and all accessories.

TWICKENHAM'S Aero Model Shop.—Beazley's, 138-140 Heath Road. Have good stocks of kits, balsa, tissue, dopes, and accessories. Agents for Cloud, Keilcraft, Frog, Scalecraft, Skyleada, and Joy-plane products. Join the new Twickenham Club.

WOLVERHAMPTON.—The Aero-modeller's Rendezvous. Start & Sons, 61 Victoria Street. Kits by all popular makers; selected balsa, spruce, cements, etc., and a complete range of materials and accessories.

WILLESDEN'S leading Aero-model Suppliers. Wood's Sports Ltd., 98 Chamberlayne Road, Kensal Rise, N.W.10. Comprehensive stocks of all kits, materials and prints. Write for free catalogue. 'Phone LADbroke 1414. Buses Nos. 6, 46, 52, 70 stop at door.

WORCESTER.—A. N. Cutler, Bridge Street. For balsa, dopes, tissues, elastic, propellers, cements, etc. In fact, all accessories for the Aero-modeller. Stockist of 'Drome, Studiette, Skyleada, Scalecraft, etc. 'Phone Worcester 4137.

LOOK TO YOUR STOCK OF RUBBER—*NOW*

It may not be easily procurable later.

CATON'S SUPER POWER AERO STRIP

is the best model motor power obtainable; a fact testified by leading aero-modellers and competition results.

Ask for

CATON'S RUBBER IN SEALED BOXES

CATON LTD., Mermaid Court, Boro', London, S.E.1

ARE YOU LOOKING FOR AN OUTSTANDING MACHINE? YOUR NEEDS WILL BE SATISFIED WITH

" THE VICTRACE "

Length 37". Span 44" Weight 8¾ oz. Maximum Duration Non-Soaring 3 min. (conforms to '39 Wakefield rules).

Kit includes:—Ball Race R.T. bobbins, rubber lubricant, dope, Hi-gloss finish and prop. blank, all parts clearly printed on first-grade balsa.

Post Free 17/6. Finished prop 2/- extra. Blue Print only 3/6 post free.

Other Prints and Kits "The Rocket," "Fleetwing," "Firefly," "Albatross," etc.
Send 1½d. stamp for list

SUPER MODEL AIRCRAFT SUPPLIES
(E. W. EVANS)
220 Wellingborough Road — NORTHAMPTON

M.A.R.S. THE PROPELLER SPECIALISTS

TYPE 'L.B.' (Ho-Wood)

Most popular propeller—sales exceed any other propeller. Durations up to 18 min. recorded.

Diam. ... inches	5	6	7	8	9	10	11	Post
Unvarnished	4d.	5d.	6d.	8d.	10d.	1/-	1/3	2½d.
Varnished	5d.	6d.	7d.	9d.	1/-	1/2	1/5	"
Diam. ... inches	12	13	14	15	16	17		
Unvarnished	1/6	1/9	2/1	2/5	2/9	3/2		3½d.
Varnished	1/8	2/-	2/4	2/8	3/-	3/6		

TYPE "T.D." (Ho-wood) 3-BLADED Propeller with Spinner. Unvarnished. Widely used for Scale Models. Very popular.

Diam. .. inches	5	6	7	8	9	10	11	12
Price	1/8	2/-	2/4	2/10	3/2	3/7	4/-	4/6
Postage	2½d.	2½d.	3d.	3d.	3d.	3½d.	4d.	4d.

TYPE "T.V." (Ho-wood) NEW 3-BLADED Propeller with Spinner Boss and VARIABLE PITCH Blades. Unvarnished. Just the Prop. for that Scale Model.

Diam. .. inches	5	6	7	8	9	10	11
Price	1/10	2/3	2/7	3/2	3/7	4/-	4/6
Postage	2½d.	2½d.	2½d.	2½d.	3d.	3d.	3d.
Diam. .. inches	12	13	14	15			
Price	4/10	5/3	5/9	6/3			
Postage	3d.	3d.	3½d.	3½d.			

TYPE "K." Scale type with Spinner. Just the thing for Flying Scale Models.

Diam. ... inches	5	6	7	8	9	10	11	12
Unvarnished	1/4	1/7	1/10	2/2	2/5	2/9	3/3	3/9
Varnished	1/7	1/10	2/2	2/7	2/11	3/3	3/9	4/3

Postage 5 in. to 9 in., 2½d.; 10 in. to 12 in., 3d.

NOTE NEW ADDRESS **J. W. KENWORTHY**
295 Charminster Rd., BOURNEMOUTH

PIONEERS OF THE TRADE

BALSA WOOD

Basswood, Birch, Spruce, Satin Walnut, Pine, Whitewood, etc. all prime well-seasoned stocks cut into Strips, Sheets and Sections

E. & S. PROPELLER BLOCKS BIRCH PLYWOOD etc.

WHOLESALE TO THE TRADE ONLY

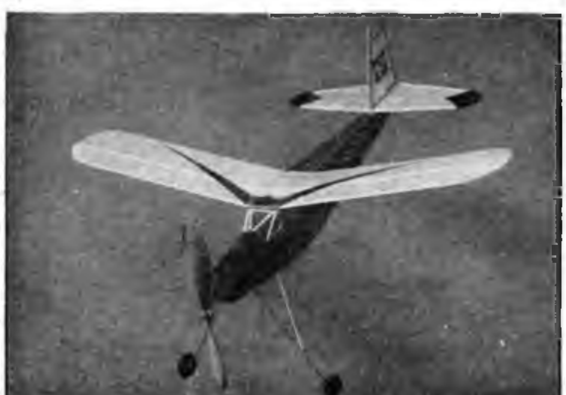
Our Wood can be obtained from your local dealer.

W. G. EVANS & SONS

EVERTON BUILDINGS

Stanhope Street, Euston Road, London N.W.1

Phone—EUSTON 3614 (2 lines)



The DEWFLY

Designed by G. H. TUCKER

Span 30 in. **Weight 2¾ oz.**

This popular model is ideal for competition or pleasure flying, as it has a remarkable performance under all conditions, with an average duration of 120—150 sec. We thoroughly recommend this model to beginner and expert alike. Complete kit **9/6**

Carriage 9d. *Blue-print only* 2/-. *Trade Supplied.*

Manufactured by :

DEWFLY (MODEL) AIRCRAFT

(C. P. DYNE LTD.)

72 Falcon Rd., 155 Falcon Rd., BATTERSEA, S.W.11 — 14 The Triangle, Loxford Bridge, BARKING — 213 London Rd., MITCHAM

THE "AERO-MODELLER" PLANS SERVICE

Announcing our new list of fully-detailed working drawings, from which you can build replicas of some of the finest model aircraft in the world. Designed by well-known experts, satisfaction and fine performance is guaranteed.

Beginner or expert, you will find something to interest you in this comprehensive list compiled by a staff with wide experience of the aero-modeller's needs.

---

* The "G—ADAR"
(By D. A. Russell, A.M.I.Mech.E.)
A high-wing cabin petrol-engined Monoplane suitable for most types of engine of from 9 c.c. to 14 c.c. Two large drawings.
Span, 8' Price 10/6 post free.

The "A.P.6"
(By Dr. Ing. F. Piatelli)
A super type Continental Glider, of a class becoming increasingly popular in England. Fully detailed drawing 40" x 41".
Span, 6' Price 5/- post free.

The "KIRBY KITE"
(By Dr. Ing. F. Piatelli)
Clever reproduction of the well-known English Sailplane. Drawing 40" x 27".
Span, 6' Price 3/6 post free.

The "STOTHER'S GLIDER"
(By K. L. Stothers)
All balsa, mid-wing Glider, holder of club records. (Wing in two halves for easy transport.)
Span, 5' Price 1/3 post free.

The "WESTLAND LYSANDER"
(By Howard Boys)
A finely designed, large flying scale model of one of the most popular types in this class of model. Drawing 41" x 40".
Span, 50" Price 5/- post free.

The "AIRSPEED ENVOY"
(By H. J. Towner)
A beautiful flying replica of the twin-engined low-wing Monoplane, designed by a recognised expert in this class, and containing many interesting features. Drawing 40" x 29".
Span, 52" Price 3/6 post free.

The "MILES KESTREL"
(By H. J. Towner)
A triple-geared replica of the popular low-wing Monoplane, this is one of the finest flying scale models yet built. Drawing 40" x 27".
Span, 39" Price 3/6 post free.

** The "COPLAND'S WAKEFIELD MODEL"
(By R. Copland, world record holder)
Bob Copland, long famed for his designs and flying of the high class contest type of model, has designed this machine on the latest aeronautical practice. Of super streamline, shoulder wing category, this model embodies the best ideas yet produced.
Span, 44" Price 1/3 post free.

**The "De H. MOTH MINOR"
(By G. W. Day)
A simply constructed replica of the new De Havilland training machine. Strong yet light construction makes a useful flying model, with an average performance of 45 seconds. Drawing 30" x 22".
Span, 35" Price 2/- post free.

** THE "SUPERMARINE SPITFIRE"
An all balsa miniature of the well-known British Fighter 'plane. Flights of from 30 to 35 seconds.
Span, 15" Price 1/3 post free.

** THE "MESSERSCHMITT M.E.109"
Flying scale model of the much publicised German Fighter machine. Drawing 30" x 22".
Span, 19½" Price 1/3 post free.

** The "HEINKEL He 112"
Another German Fighter type model, featuring detachable wings. Average performance 35 secs. Drawing 23" x 18" Span, 18½" Price 1/3 post free.

"VIPER II"
(By C. Rupert Moore)
A well-designed semi-scale model, containing many practical and unusual features, combined with a high flight performance. Two drawings 36" x 30".
Span, 48" Price 6/- post free.

** The "AIR CADET"
(By C. A. Rippon)
An advanced design, yet suitable for the beginner in aero-modelling, this model has proved exceptionally successful, and possessed of super performance abilities. Strong enough for all purposes, yet with the duration of a streamliner.
Span, 38" Price 1/3 post free.

** "TOOTS II"
(By R. A. Cherry)
Cabin type, high-wing Monoplane of semi-scale appearance. Winner of many contests, and has made many flights of over two minutes.
Span, 26" Price 2/- post free.

The "1940 GAMAGE CUP WINNER"
(By A. F. Houlberg, A.M.I.Ae.E.)
Winner of the first main competition of the 1940 season, with a total time for three flights of 717.4 seconds. Consistency, coupled with sound design by a well-known aero-modeller, makes this an asset to any collection of contest models. Drawing 30" x 40". Span, 44" Price 3/6 post free.

**The "SPARROWHAWK"
(By J. Van Hattum, A.F.R.Ae.S.)
A good design for the beginner, this model is designed by a well-known Dutch aero-modeller, famed for his many successful designs and instructive writings on aero-modelling.
Span, 30" Price 1/3 post free.

The "PTERODACTYL"
(By S. E. Capps)
An unusual type of model for those who like something out of the ordinary.
Span, 60" Price 2/- post free.

The "J.B.3"
(By J. Bezemer)
A high-wing cabin type Monoplane suitable for the beginner.
Span, 36" Price 2/- post free.

"A BABY R.O.G. MICROFILM INDOOR MODEL"
(By J. S. Isenberg, Canada)
Can be flown in an ordinary lounge or small hall, for flights of two minutes and longer.
Span, 13" Price 1/6 post free.

WATCH THIS SPACE

This list will be supplemented from time to time by the addition of the very latest designs—all of proven ability. The enormous success of this feature has confirmed the need for a service of this kind, and it will be developed from month to month.

IF IT'S GOOD — WE'RE INTERESTED.
IF IT'S THE BEST—WE HAVE IT!

The "FIREFLY"
(Canadian Stick Model Record Holder)
(By F. J. Rogerson)
A high performance "Class C" model, with stick type fuselage. Holder of the Canadian record with a time of 20 min. 26 sec. (Unofficially timed 28 min. 13 sec.) Simple construction with super performance.
Span, 34" Price 2/6 post free.

(Note: All items marked * include a copy of "The Aero-Modeller," containing a full description of models. Items marked ** complete with fully-detailed building instructions.)

SEND NOW

and take advantage of the only service of its kind in Model Aeronautics.

THE "AERO-MODELLER" Allen House, Newarke Street, LEICESTER

(All previous lists cancelled). ***(Dealers write for trade terms).***

Made and printed in Great Britain by the Sidney Press Ltd., London and Bedford, for the Proprietors and Publishers, the Model Aeronautical Press Ltd., Allen House, Newarke Street, Leicester. Trade Distributors: Horace Marshall and Son Ltd., Temple House, Tallis Street, London, E.C.4—C1601. Sole agents for Australia and New Zealand: Gordon and Gotch (Australasia) Ltd. Registered at the G.P.O. for transmission by Canadian Magazine Post.

Appendix - Links to the plans

A flying boat that will . . . by J.F.P. Forster

Detailed description and photographs of a new model flying boat.

Document Page: 9

A 19 1/4" Span Rubber High Wing Monoplane (Full size) by H.L. Benton

Union page added

Document Page: 28
Document Page: 58

A 19 1/4" SPAN HIGH WING MONOPLANE

DESIGNED BY

H.L. BENTON