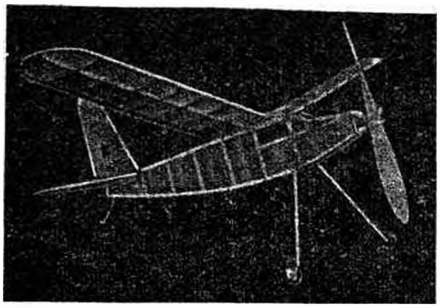
AERO MODELLER

MARCH - 1942
VOL.7 - No.76
ONE SHILLING



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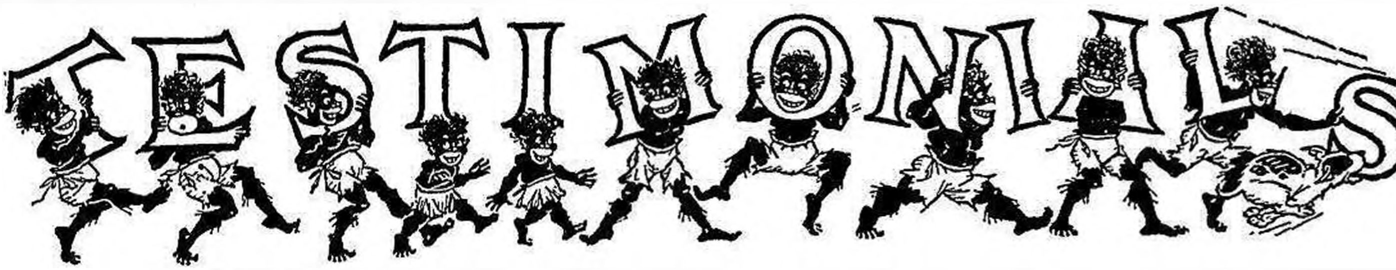

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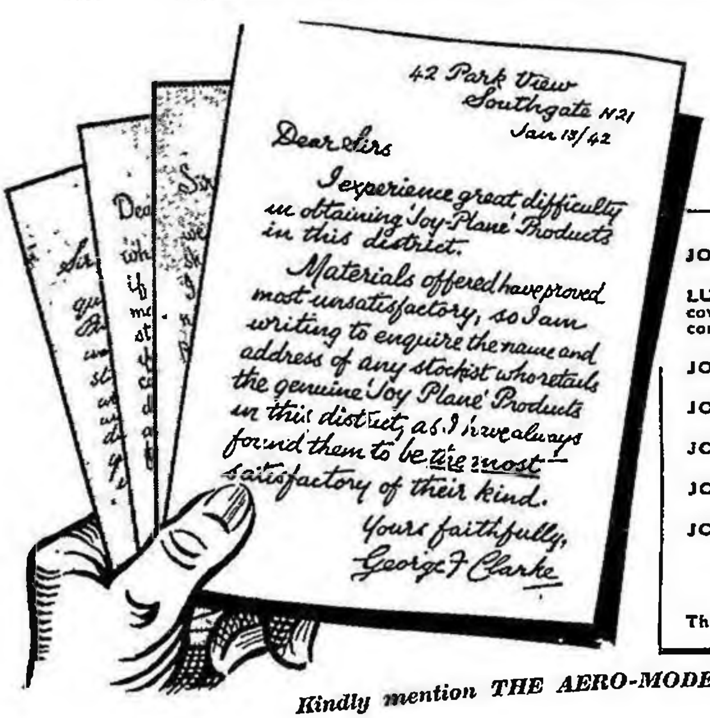

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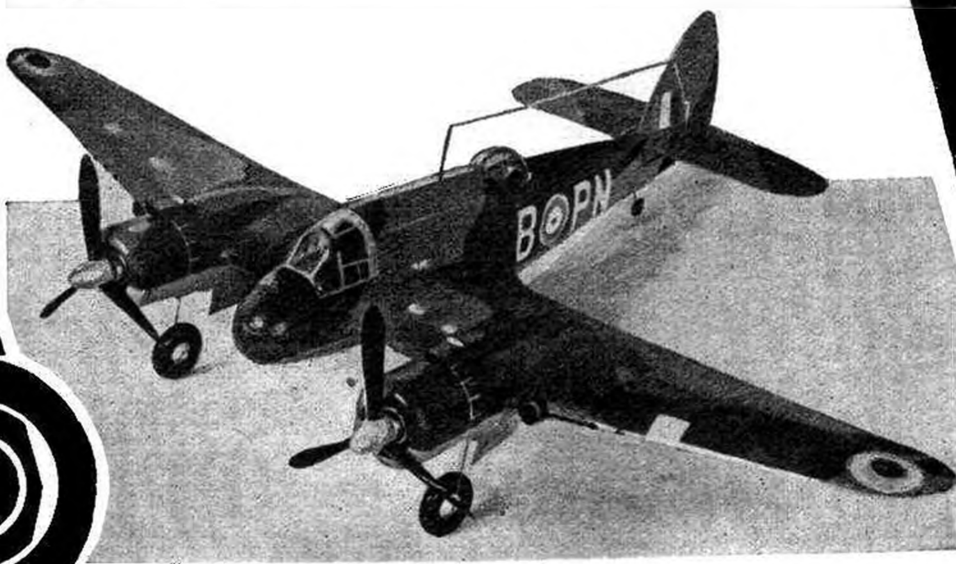

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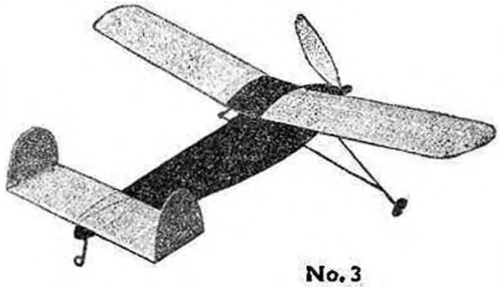

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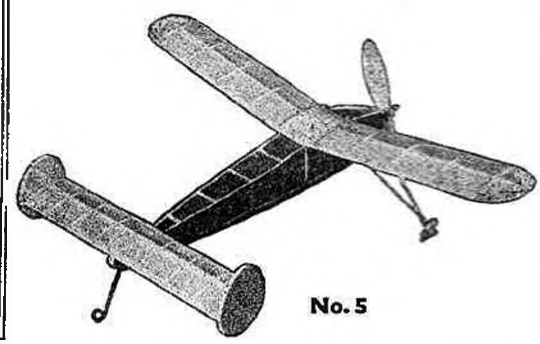

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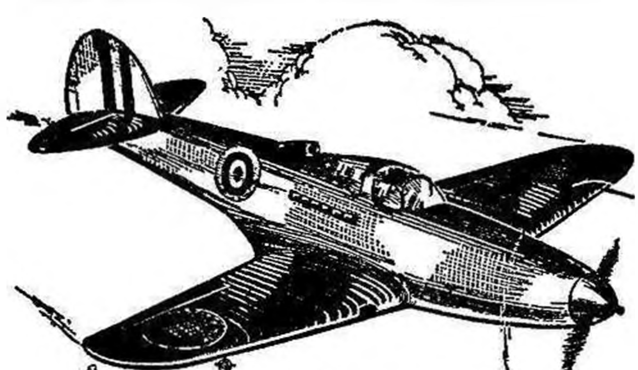

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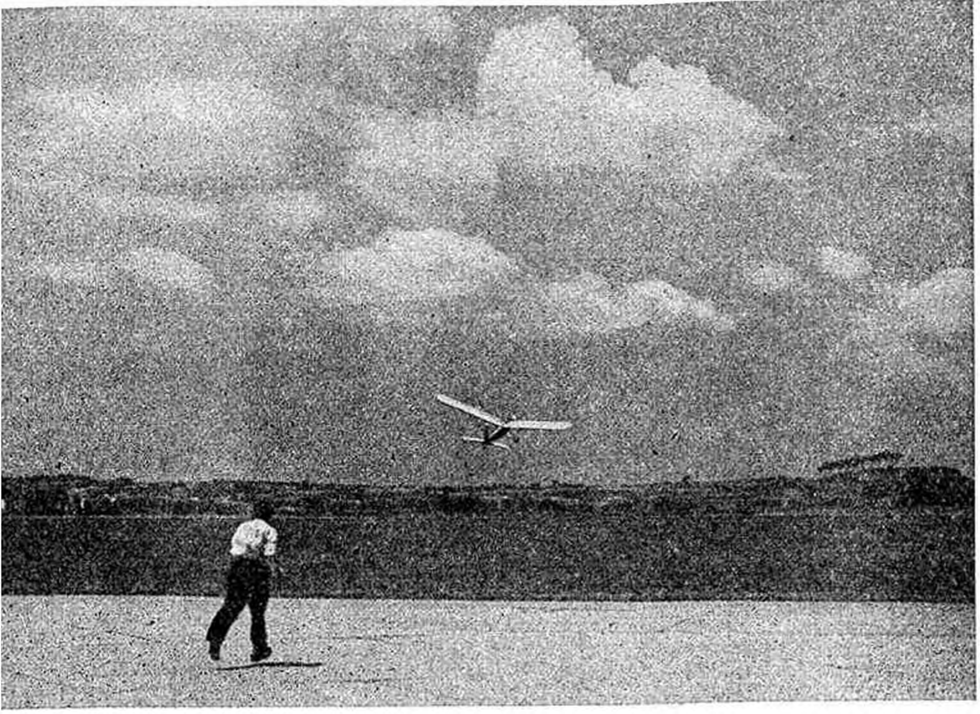


THE SHAKESPEARIAN AERO-MODELLER AT A COMPETITION

By J. L. P.

NOW to the field for flying forth we'll go,
And there upon the sward this magic box
We'll ope, and friends and rivals there shall spy
What from its yawning cavern we shall reach.
We'll see their envious eyes upon our work
As we, with fingers flex'd and hearts athrob,
Do set together there the frail, strong parts
Which, when assembled, all our hopes do fire.
What beauteous lines this wood and tissue bird
Doth demonstrate for all the world to see,
And set atop its wondrous glist'ning sheen
Which we do hope will cleave the scented air,
Are stretched those blood-red wings which we have made
With tender, loving fingers. Now the tail,
With fin set upright like a warrior bold
When on parade before his country's king,
We place with care into th' apportioned spot.
And then upon his wheels our air-borne hope
Next calls to us for pow'r wherewith to rise
Above this troubled earth, and, fancy free,
To fade into the blue of heaven's gate.
With whirr of winder then th' elastic twists.
But little first, for ere the venture starts
A trial we must make to prove all's well.
Then, clear space found in this, our crowded field,
We launch into the air our well-loved craft
And see that all that we have dared to hope
Is now encompassed.
A slow and graceful glide rewards our care,
And sinks to earth our craft with ne'er a shock.
Once more the winding engine turns anew
The strain'd and stretched strength which gives the pow'r
To this the hope of all our work and love.
The hour has come, and round us, breathless, waits
The throng, who wish (or not) to see us win.
Upon the ground once more our craft we place,
And then, as trumpets sound and hourglass turns,
We leave to its devices now this thing
On which are centr'd all our care and hopes.
A breathless moment now, as, poised a trice,
The bounteous 'plane takes life unto itself.
A forward bound, then upwards like a bird,
With wings outspread takes off this lov'd machine.
Its spiral climb, a wonder to behold,
Takes upwards, yet and upwards, to the sky
This craft of ours, and as we wond'ring watch,
Behold, the air, which we do breathe to live,
Doth take upon itself to sweep still more
Towards that sky wherein now sits our 'plane.
This graceful, bird-like creature, pride of heart,
Rides higher still upon the rising air.
Still circling, ever upward goes our craft,
Till we can see no more than tiniest speck.
Then softly, as we watch this air light love,
We see a movement slight towards the west,
Where Phœbus' Chariot now begins to sink
Into the hills with bright and glorious glow.
Towards the setting sun now glides our 'plane,
And as we watch it dwindling there to sight,
As if with sigh, contentedly it slides
Beyond the range of keenest eyes around.
We look with anxious mien to th' official dour
Who counts the moving moments, strictly checked.
" One ninety-three full seconds, out of sight."
Our 'plane this day has made the record flight.

CONTENTS OF THIS ISSUE

THE AERO MODELLER

Established in 1936

(INCORPORATING "THE MODEL AEROPLANE CONSTRUCTOR")

(Proprietors : Model Aeronautical Press, Ltd.)

THE MODEL AERONAUTICAL JOURNAL OF THE BRITISH EMPIRE

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

Vol. VII - No. 76 MARCH, 1942

ALLEN HOUSE, NEWARKE ST., LEICESTER

EDITORIAL

THE science of telarchics, that is the distant control of mechanism, is one which has engaged the attention of scientists and physicists since the early years of this century. As far back as 1913 a radio-controlled model aircraft was exhibited at an exhibition at Earl's Court, London.

During the past 10 or 15 years quite an amount of attention has been given to the radio control of model boats, experimentors being encouraged to develop in this direction by the weight-carrying capacity of the models used. We remember reading, a good many years ago, the description of a radio-controlled model warship, we believe about 16 feet in length, which could be steered, accelerated, stopped, its guns fired, all by radio.

Mainly in America, and within the past 5 years, considerable researches have been made in controlling model aircraft, the first public demonstrations being given in the 1937 Nationals. About the same time considerable research work was carried out in Germany, mainly on gliders. Quite a simple method of control was evolved for actuating the rudder. At the 1941 American Nationals 8 models were able, between them, to perform spot landings, figures-of-eight, dives, zooms, and we are even told that one of them could successfully loop the loop ; all under the control of a ground station.

The recent article by Mr. Penver has attracted a fair amount of attention and, in addition, some criticism ! In our next issue we shall publish some replies and observations from enthusiasts in *this* country who have not been idle, despite the war. A number of readers write in stating quite cheerfully that they are going to build a radio-controlled petrol 'plane, but too few of them appear to appreciate the difficulties involved, or even that a licence from the Postmaster General to operate a transmitting set must first be obtained . . . and that this is *not possible* in war-time ! Nevertheless we believe that there is a great future for the radio control of model aircraft, and we have no doubt that after the war aero-modellers in this country will quickly catch up with the work which during the past few years has been carried out in America.

The Cierva Autogyro.

Further to the offer announced on page 76 of our last issue, of a £3 prize for a model direct-lift autogyro generally to the design of our contributor, Mr. S. Howard Barnett, we would inform intending competitors that they are not tied to the use of bevelled gears in the drive from the rubber motor to the vertical rotor shaft. We make this concession in view of the difficulties that intending entrants are encountering in obtaining these accessories.

Technical Books.

We would like to draw the attention of readers to page 115 of this issue, on which three books of especial interest to all serious-minded aero-modellers are illustrated and described. The "Design and Construction of Flying Model Aircraft" has been recognised as the standard model text-book for many years ; and "The Design of Wakefield Models" is a clearly written and fully comprehensive treatment on a special type of model.

A sound knowledge of the basic principles of flight is of great importance to everyone interested in aircraft and aviation, and "Simple Aerodynamics" starts from "scratch," as it were, and leads the reader through a thorough groundwork course. In this respect it should particularly appeal to members of the A.T.C. and, at the modest price of 3s., will prove a very sound investment.

Ample supplies of all these books are available, and no good aero-modeller should be without them.

Our Waste Paper Competition.

We have already heard from one Club, the 7 members of which had collected over 1 ton of paper, and would remind Club Secretaries that they should let us have particulars of the amount salvaged by their Clubs as quickly as possible. We propose allowing until March 15th for Club Secretaries to send in to us the necessary certificates of tonnage collected.

The "Trike."

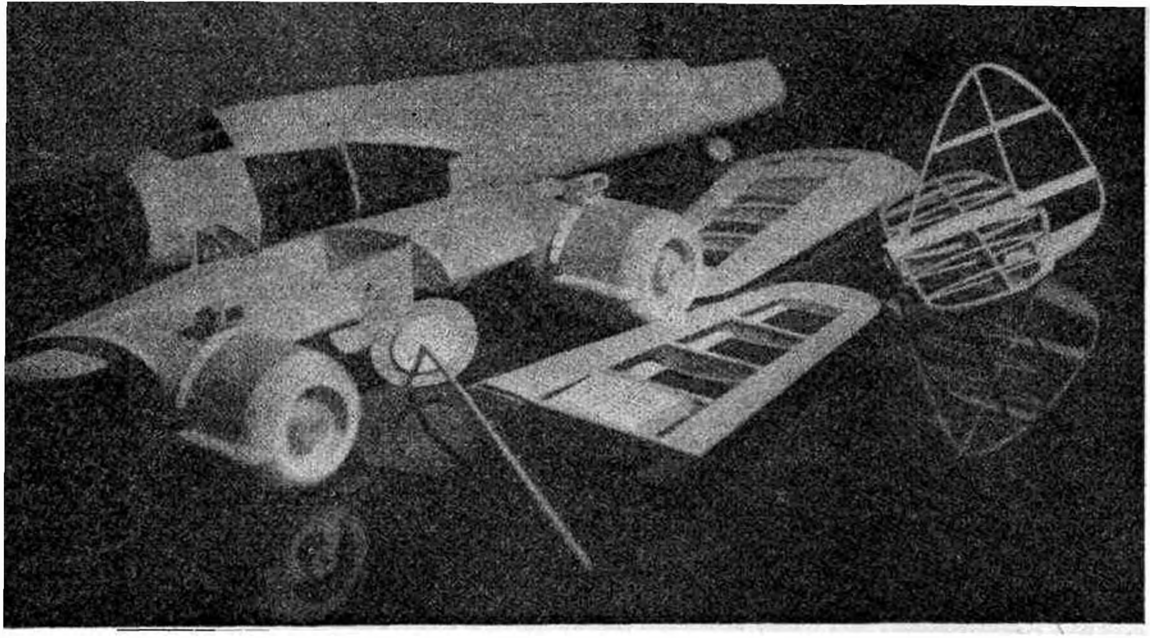
In response to popular demand, we are pleased to announce that fully detailed, full-size working drawings for building this unusual type of model (described on page 64 of the February issue), are now obtainable through the "Aero-modeller Plans Service," price 1s. 6d. post free.

D. A. R.

WITH a view to obtaining greater efficiency some modellers have attached end plates to their wings. One particular example has these on the centre section near the fuselage in addition to the wing tips. It would not appear that these inner plates would have much effect particularly as the model in question was a mid wing or they may even be detrimental to the airflow. End plates at the tip do prevent the "spilling" of air in this region and materially help efficiency, but their effect on lateral stability must also be carefully considered.

UNDERCARRIAGE design has varied considerably during recent years and a number of "tricycles" have appeared. From the point of view of low parasitic drag it would not appear advisable to fit them to contest models unless completely retractable—rather a difficult feat ! Small American petrol model designs still show a considerable number of minowheel undercarriages and the take-off, helped by plenty of power, appears satisfactory. However, there is still a strong prejudice in favour of the more conventional layout for model work.

WHILST some American petrol modellers are trying to reduce the gliding efficiency of their models others are trying to increase it. Streamlining has reached such an advanced stage that the only further method available is to fit folding propellers. This demands extremely sturdy hinges as the blades are subjected to considerable forces whilst



Ready for final assembly. Component parts of the Bristol "Beaufighter" as detailed on pages 119-126, showing detachable nose and tail, wing centre section with motor nacelles attached, and tongue-and-box fitting for outer wing panels.

rotating, but many successful types have appeared. One model at least has a three-bladed folding propeller but no data is available to how it stood up to running tests. A further snag is that with the normal type of hinge where the blades are folded back by air pressure is that starting the engine is extremely tricky. The best solution here would appear to be a mechanical starter working on the hub.

ONE enterprising American aero-modeller has trained his dog to go model hunting for him! The dog is able to keep up with the model and follow it across country until it finally lands. Then the "retriever" endeavours to attract the fond owner's attention to the spot. Apparently, however, the dog does not particularly distinguish its owner's models and is likely to go chasing off after *any* model. We wonder what would happen if it followed a full-size machine!

GOOD aerial photographs have been obtained from cameras attached to kites and model aeroplanes. A petrol model is very suitable for this and the camera shutter can be operated by the time switch. Any small, light camera would do and could even be carried by large rubber-driven models, although the height reached by such types is usually hardly sufficient for outstanding results. The question of the 'plane's attitude at the moment the shutter is operated is of importance as otherwise hours of hard work may lead to some photographs showing mainly the sky.

THE American Davis airfoil has achieved phenomenal success in full-size aircraft design. Readers may remember that it is a "mathematical" section, which, after being tested in a wind tunnel at the California Institute of Technology, was used by Consolidated on their twin-engined Consolidated 31 flying boat. It was so successful that it was then adopted for the B-24 bomber, known in this country as the "Liberator." The main feature of both of these designs is a thin, high aspect ratio wing with a really tip-top performance. The original formulæ given by Mr. Davis for plotting the section are far too complicated for the average aero-modeller but it is hoped soon to present the ordinates in the conventional manner. The section itself is slightly undercambered, maximum depth about 30% of the chord from the leading edge (as in most conventional sections) and, for model work, a maximum depth of about 10% of the chord. (The original formulæ allow a number of sections to be plotted of varying thickness.) Another interesting point is that the leading edge of the section is rather more pointed than usual, and this, in the opinion of certain theorists, should give good results at low speeds.

A SUPER fighter design has been worked out in America incorporating the Davis wing, and, from wind tunnel tests, etc., on a scale model, a top speed of 430 m.p.h. on a 1,100 h.p. Allison engine is estimated with the landing speed not much over 60 m.p.h. Should the full-size job actually live up to these figures it will be a remarkable achievement, as the landing speed of most modern fighters is around 100 m.p.h.

MERRICK S. ANDREWS, of Philadelphia, has beaten the 25-minute mark with a class C indoor stick model, hand launched. His official time was 26 mins. 39.0 secs.

IDEAL weather conditions and efficient design resulting from streamlining American petrol models has brought a spate of flyaways, so much so that some modellers are fitting devices to reduce the glide of their models! One ingenious builder has fitted spoilers to the wings. These spoilers are strips of wood which lie flush with the upper surface during the power flight but spring up into a vertical position when the time switch cuts the engine. In this position they spoil the airflow over the wing, increasing the drag and reducing the lift, so that the gliding angle is steepened. Several others have even fitted parachutes to their models! At the conclusion of the engine run the parachute is automatically released and the model returns to earth suspended beneath it.

A BETTER solution to the above problem would appear to be the use of radio control. This has already become quite efficient in America although the war has temporarily put a stop to it in this country. Quite the neatest "ground station" as yet is the one used by Jim Walker, an American. A miniature joy-stick is so connected to the transmitter circuit that movement as in a full-size machine causes a similar movement on the part of the model. This is certainly an advance over some of the old methods of switches and keys.

A STYLE of R.T.P. flying adapted to petrol models is now enjoying great popularity in America. The 'plane is "tethered" by a stout cord as in normal R.T.P. work but there are auxiliary cords connected to the controls. In this manner, it is claimed, the model is under perfect control from the take-off and certain manœuvres can be undertaken, such as dives, zooms, etc., in perfect safety. Throttle, elevators and even ailerons are so connected. Speed contests are also run on similar lines and some amazing figures are quoted. One model, it is claimed, is capable of 100 m.p.h.! Some time ago there was a newsreel picture of an Australian aero-modeller flying a high-wing petrol model under similar conditions, but it appeared that in this case only the throttle (and possible the elevators) were controlled by the "pilot."

LT. COL. BOWDEN, the "grand old man" of British petrol modelling, gave a full account of the use of slots on petrol model wings in THE AERO-MODELLER some years ago. Certain circles in America now believe that the use of slots will become universal and there is no doubt that they do aid stability. Rubber-powered model wings are too small for slots to have any marked results but even small petrol models benefit by their use. Slots on the outbound wing panels will often prevent a spin should the model stall and thus assist lateral as well as longitudinal control.

BUILD THE "WAD-20" A TRICYCLE DURATION MODEL

Designed——————by W. A. DEAN

Here is an interesting, unorthodox model, designed by a coming expert in the hobby. All Dean's models have just that little difference that the majority do not have, and we are sure you will be pleased with this latest design. The original model has a fine performance, and the balsa shortage should be no handicap in the building of this model, any of the many substitutes being usable for building.

ORIGINALLY this model was intended to be built to Wakefield specifications, but owing to balsa being practically unobtainable in my district, I decided to cut down the size by one quarter. It may be of interest to the reader to know that even then my model was largely constructed from material taken from an old "Wakefield." The amount of usable wood that comes to light on stripping these old duration jobs, is surprising.

The main idea behind the design of this model was to produce a sturdy streamliner of particularly rigid construction, incorporating a tricycle undercart. The scheme for the Wakefield was that after the model had left the ground the rear legs would retract, leaving the remaining front one on which to make a landing. This was abandoned as being unsuitable in view of the reduced size. By the way an alternative undercart arrangement to the fixed tricycle is to detach the rear legs. R.O.G's. can still be made, the front leg and the twin fins then providing the three points. Whichever type is used you will at least have a model with a unique type of undercart.

So far tricycles seem pretty rare in the model world—to the best of my knowledge there hasn't been more than a couple of photographs of this type in THE AERO-MODELLER. I suppose the main objection to them is the increased weight. Although if the arrangement I referred to earlier is used, the mysteries of the "different" take-off can be explored, and the rear legs removed for real duration attempts.

As will be seen from some of the accompanying photographs, a dihedralled tail-plane was first tried. I have made several models using this type of tail-plane, most of which have performed very well, but this model was different—perhaps it was the rather high power.

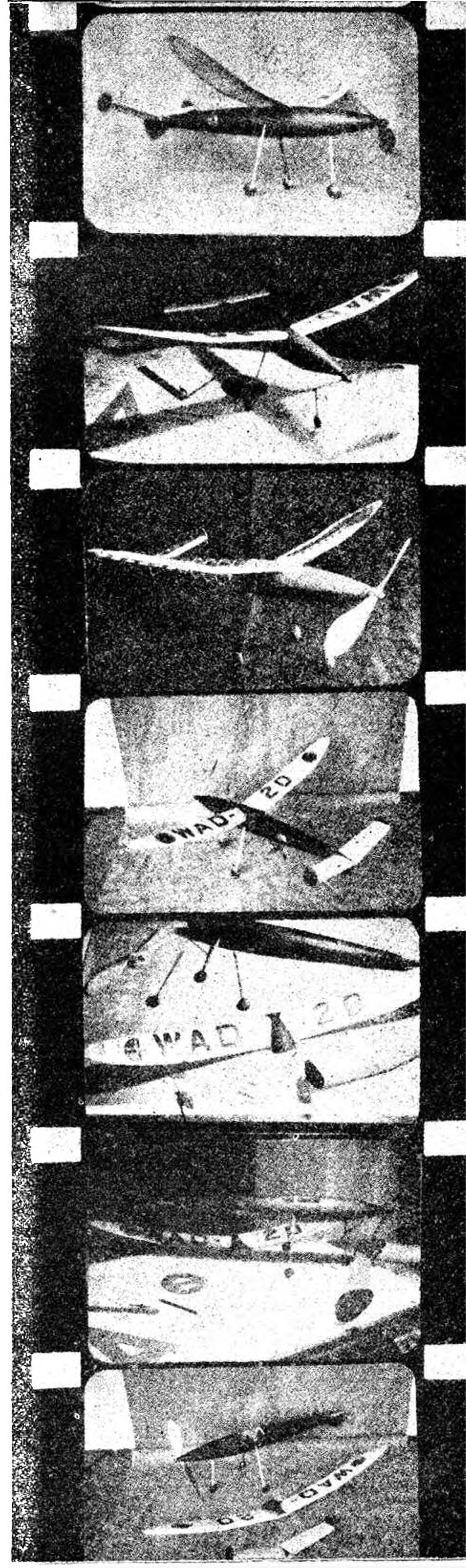
Anyhow, after two week-ends during which I executed some very amusing but highly dangerous flying, I decided to fit another tail unit before some of the other modellers became eligible for a portion of N.G.A. insurance . . . ! So I flattened the Vee out and fitted two conventional type rudders, thus getting rid of most of my troubles right away. Still, I intend to have another try with the original type of tail-plane at a later date, although I must say that it is encouraging to read that the designers of most "big stuff" also have tail-plane difficulties. Still, I did do it in two, which is one up on the designers of "The Boeing Clipper 314" who made no less than three modifications to theirs!

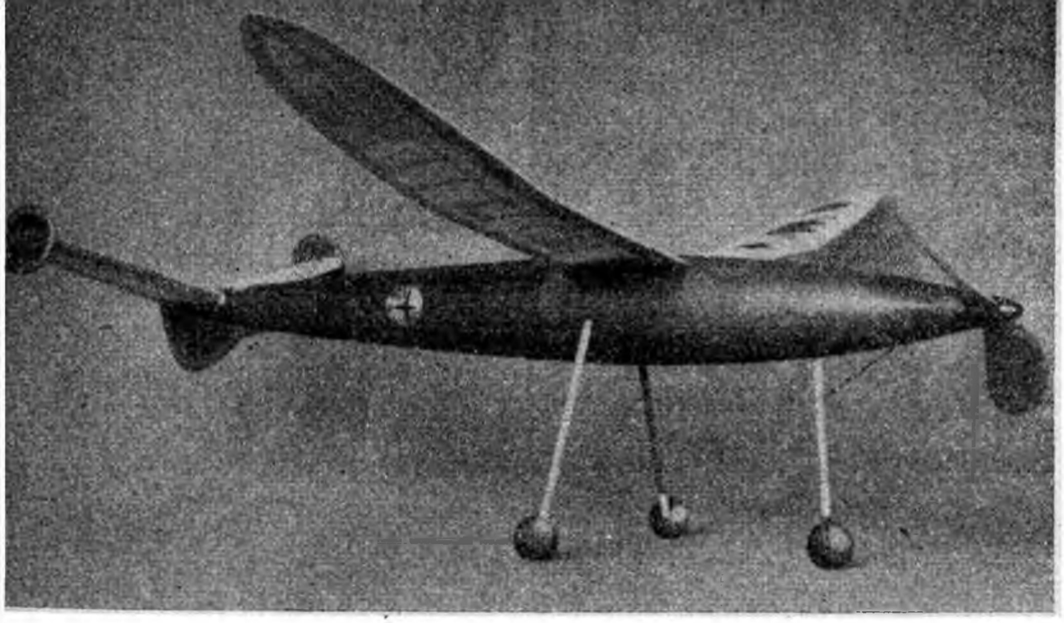
I feel quite ashamed of using best part of 2 oz. of rubber to get a 150" job up, after we read of Mr. C. A. Rippon's "George" clocking up 80–100 seconds on just half that amount. But I am afraid that one ounce hasn't got nearly enough "kick" to satisfy me. I always have believed in "getting them up there," and take my word for it, that much power really does give a sensational climb.

A glance at the plans will show the reader that, for its size, the construction of the model is quite involved. This is mainly on account of the large amount of sheet covering used. This type of construction is well worth the extra trouble as it is unusually strong. Also, it greatly simplifies the tissue covering, there being practically no awkward curves to negotiate.

A few words about the fuselage may iron out one of the worst wrinkles with regard to that member. It should be noted that the formers up to F.8 only are slotted to receive the stringers. Rear of this point the stringers lay on top of the formers. The reason for this being to provide a sound seating for the forward sheet covering.

Having briefly outlined the model, we can now pass on to the building instructions. Just one word of warning. As some parts of the construction are rather unorthodox, the plans should be studied carefully before starting to build and the following instructions closely adhered to in order to turn out a satisfactory model.





The Fuselage and Undercart.

First of all mark out all the formers on to a sheet of 1/16 in. sheet by means of compasses. Cut them out about 1/16 in. oversize all round and then cement them on to another piece of 1/16 in. sheet (cross grain). Weigh down with heavy books or flat irons and leave to dry. While waiting, start on the undercart. The front leg is made up as a complete unit and a paper tube rolled for the rear legs. The wheels, by the way, are made from fairly soft balsa, covered with black paper and given about four coats of banana oil.

If by this time the formers are set, cut them out, lightly paste thin card on to them, mark out their spacing on a piece of 1/8 in. square birch and thread on to it as shown on the drawing.

Now cement the eight basic 1/16 × 1/16 in. stringers in position. Make sure that they are in perfect alignment as the successful building of the fuselage is mainly dependant on them from this point, next cement the front landing leg assembly to F.3, and the tube for the rear legs to F.7. The front portion of the fuselage can now be covered with 1/16 in. sheet. Use eight pieces of medium balsa, starting from the rear and working forward to F.1. Paper clips, pins and rubber bands are handy to hold the sheet down whilst the cement is drying.

When this has been completed, the nose former "C" should be cemented to a piece of 1/8 in. sheet which is carved roughly to shape and them in turn cemented to F.1. Allow to set and then sand until flush with the sheet covering. Next, make the tail plug fixing from 1/8 in. blocks and then the remaining 1/16 × 1/16 in. stringers can be added. The fuselage is finished by cementing the celluloid observation panel in position.

The Wing.

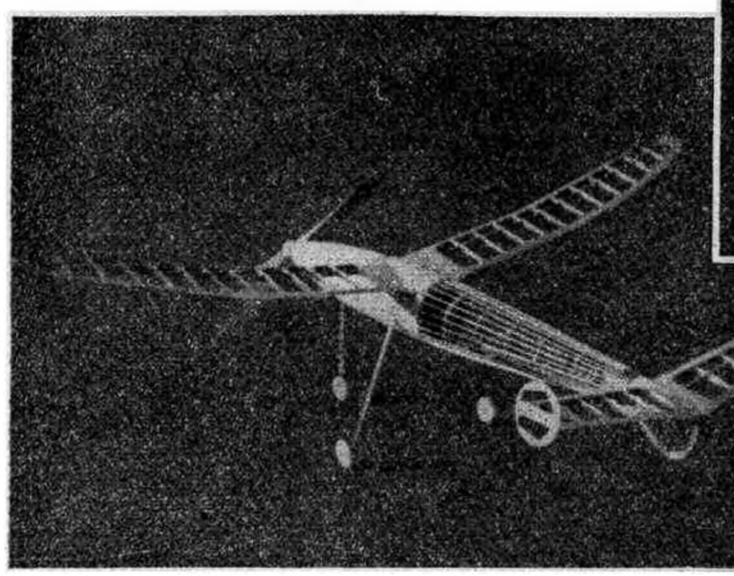
Commence this member by tracing or pin-pricking the ribs on to medium 1/16 in. sheet. The fourteen W.1 ribs can be roughly cut to shape, clamped together and then sanded down to the correct profile together. The best procedure for the remaining ribs is to make them in pairs.

Next make the main spar, seeing that the three joints are quite secure, and cement all the W.1 ribs in place. The spar should be pinned down to the plan, each side being dealt with separately. When dry cut the leading and trailing edges and cement in place.

In order to finish the outer panels prop one side of the wing up, so that the outer section of the main spar can be pinned to the plan. Add the remaining ribs for that panel. Pin prick the leading and trailing edge members on to sheet and out two of each to ensure both sides being identical. Cement to ribs, allow to dry and repeat for other side.

The sheet covering on the leading edge is in eight pieces. Start with the centre panel by cementing pieces of 1/64 in. sheet to the leading edge. When set smear cement up to about 1 in. back on each rib. Curve back and hold by means of elastic bands or pins until set. Repeat process for outer panels, only first cutting the front edge of sheet to fit curved leading edge. Cut capping strips oversize and position by dab of cement to rear of sheet covering. Bend back to follow rib profiles when dry, trim to correct lengths and cement. The tips are made from pieces of 1/8 in. sheet and sanded to shape after being cemented to the main spar.

The centre-section is perhaps the trickiest part of the model. First of all, cement the centre-section brace and the four formers (C.1, C.2, C.3 and C.4) in place. Then cover between the two second ribs as shown on the plan, keeping to the wing profile. Now the wing should be attached to the fuselage by means of rubber bands. Obtain perfect alignment by means of a piece of cotton stretched from the rear end of the fuselage to each tip in turn.



Check the wing for incidence and then cement lightly to the fuselage. The centre-section formers may now be covered with several pieces of 1/16 in. sheet and sanded until an unbroken line with the fuselage is achieved. Cut away from the fuselage and cement a piece of 1/8 in. sheet to C.1 to make a snug fit on the inside of F.5.

The Tailplane.

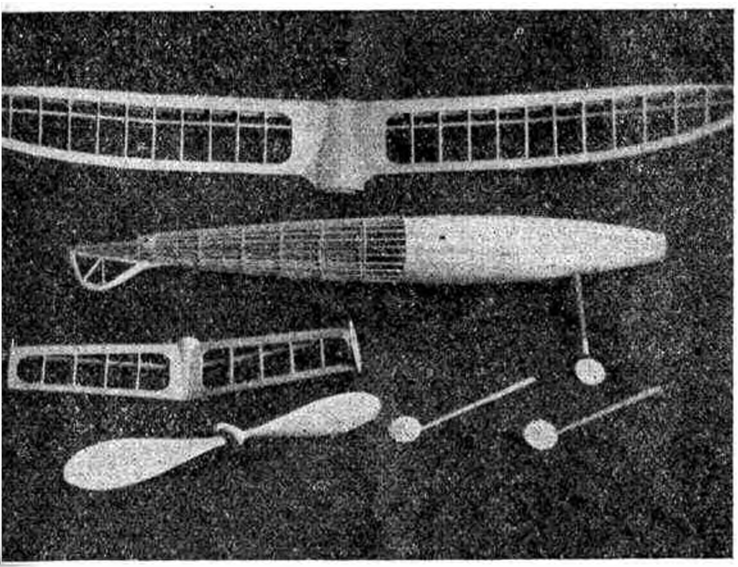
Construction is similar to the wing, including the sheet covering. The same method of lining up with the fuselage is used, the tailplane being cemented in position when the 1/16 in. sheet cover is attached. The cover in this case can be made from a single piece of sheet. Make the rudders from 1/16 in. sheet and cement them to the E.6 ribs.

Propeller Assembly.

Make the propeller as detailed on the plan and cement former " A " to the rear of it at right angles to the prop. shaft. The spinner is made from three pieces of hard balsa, pieces being cemented to the sides and another piece forming the nose. Carve and sand to shape, then remove the nose and hollow out to about 1/16 in. thickness.

Attach former " B " to a piece of 1/8 in. sheet, trim flush with fuselage and cement to 1/8 in. plug, cut to fit F.1.

Fit the brass bushes as shown. The remaining details such as prop. shaft and free wheel are made up and then the nose of



the spinner replaced. Finish off by giving four coats of banana oil, sanding lightly between each coat.

Covering.

The colour scheme I used on my model was as follows:—Red fuselage, spinner, wheels and fins; white wings and tail-plane.

Banana oil is the best adhesive for attaching tissue to the sheet-covered parts, Grip-fix or some similar white paste being used when covering the remaining portions.

Commence by covering the fuselage rear of F8 with four pieces of tissue applied lengthwise. As the stringers lie practically flat, no difficulty should be encountered in obtaining a wrinkle-free surface. But to make sure, it is just as well to use the following method :—Take a piece of tissue and attach it to one of the basic stringers so that an equal portion is left free to cover three stringers on either side.

When dry, apply paste to the outer stringers and attach the overhanging portions of tissue to them. About 1/8 in. overlap of tissue should be left to paste on to the sheet-covered part of the fuselage. Trim away all surplus with a sharp razor blade. Repeat for the remaining stringers.

The forward part of the fuselage is next covered with eight separate pieces of tissue. Work forward slowly, smoothing the paper down as you go with a finger dipped in banana oil.

The wing is covered in eight pieces. Start on the top surfaces by attaching a piece of tissue to the centre-section. Allow to dry, then apply paste to the leading and trailing edges as far as the last W.I. ribs. Pull the tissue towards the tip until it is fairly taut, then smooth down on to the leading and trailing edges.

The outer panel is covered in a similar manner ; this time, first of all securing the tissue to the last W.I. rib. Finish the other side in the same manner.

The reason why capping strips are essential on a wing employing a Grant M-9 section will readily become apparent on starting to cover the under surfaces. On a section as deep as this, it is practically impossible to get the tissue to stick to the ribs unless capping strips are used.

The wing is completed by covering the centre-section and fairings with the same colour tissue as the fuselage.

The tail-plane needs no explanation as regards covering, except that two pieces of tissue are used.

Club markings can be made from ordinary black tissue, using postcard templates.

The complete model is first of all water doped by means of an old scent spray. The fuselage is then given three coats of dope and the wing and tail surfaces two.

Flying.

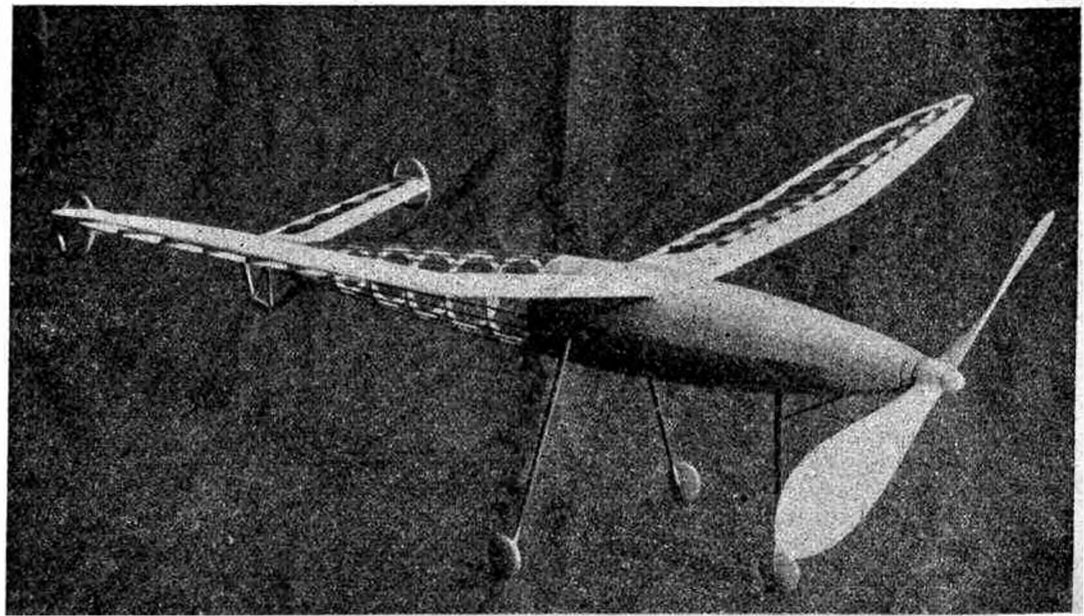
The usual instructions about test flying in long grass especially hold good for this model, on account of its rather high wing loading. First of all try hand launches from shoulder level. If desired a movable weight of the type Bob Copeland uses can be fitted. This, together with slight adjustment of the tail surfaces, should prove sufficient for trimming the glide.

When a satisfactory glide has been achieved give a few turns and hand launch into the wind. If the model tends to stall under power, up to 2 degrees of downthrust may be added. As you get to know the model, gradually increase the winds until the maximum is reached. According to the makers of the rubber I used, the safe limit to give is just above 700 turns, but I have had well over that amount. In fact, when the motor is well run in, and of course well lubricated, 900 is much nearer the mark.

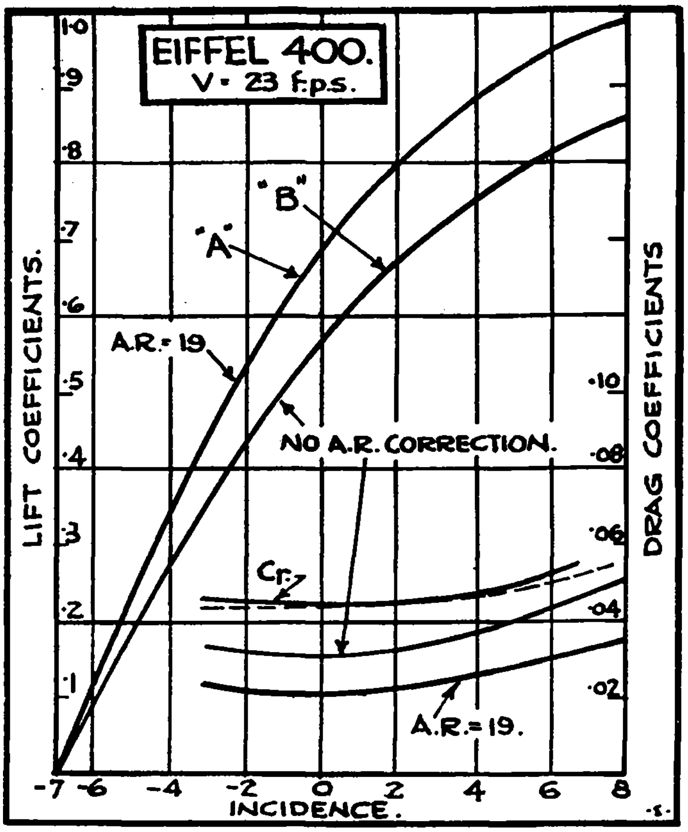
On full winds, duration is about 80-120 seconds, regardless of thermals. The best flight to date with the rear legs removed has been 150 seconds.

As the rear legs fall behind the C.G. the movable weight will have to be moved forward when they are removed, in order to restore the C.G. to its correct position.

The model should be adjusted to fly in large circles to the right. Make sure that your model has sufficient turn to resist the torque on full power. I speak from experience, because mine hadn't, and that's why my model now sports a new prop. assembly.



DESIGNING FOR



IN article 3 it was decided, primarily, that the wing section that would be used on our model would be the Eiffel 400. It was shown how a graph, without the correction of aspect ratio, would be constructed at a low speed, namely, 30 f.p.s.

In this article it is proposed to deal with the following: (*a*) Produce a graph at speed of projected 'plane, which is 22·7 f.p.s., say 23 f.p.s.; (*b*) to show the general importance of aspect ratio; (*c*) to correct this graph for aspect ratio to the one to be used (–19); (*d*) the $C_d/C_l^{1.5}$ value to be discussed, its true aspect on the 'plane commented on; and (*e*) how this is to be affected by the rest of the model's outline and drag values.

First things first. As detailed before, the final correction other than that for aspect ratio is the reduction from the 30 f.p.s. to the 23-25 f.p.s. region. It is here that we may be allowed to consult R.A.F. 6 again, although so recently banned from our meeting. Studying the graph(s) of R.A.F. 6 for the speeds concerned you will come to the conclusion, as I have done, that this part of the correcting business is very, very small—one might say negligible. But perhaps we had better set our consciences at rest and make the correction. It will only be an approximate one, since we are using quantities ranging by such small amounts that an *average* will have to be taken. Points will be plotted and, following usual practice—but not in father's footsteps—"joined" by as smooth a curve as possible.

Here is the plan: *Reduce* the lift coefficient of Eiffel 400 at 30 f.p.s. by the following amounts—below 0°, none at all, 0° to 3°, 2·4 per cent.; 3° to 6°, ·6 per cent.; from 6° to the stall (C_l maximum), ·7 per cent.; *increase* the drag coefficient by – below 0°, rather less than 4 per cent.; 0° to 3°, 7 per cent.; 3° to 6°, by 3 per cent.; from 6° to C_l max., 2·1 per cent. Not so approximate, really, huh? I will not bother you any further with this, for it's a bit tough; suffice it to say that the graph given, still uncorrected for aspect ratio, may be used with few, if any; qualms.

Since the topic that we are now about to deal with is aspect ratio, perhaps a little dissertation on it will not come amiss. Aspect ratio, let there be no mistake, is a simple answer to very many rather complex things.

To get a proper understanding of what aspect ratio is we must start way, way back at the beginning. The whole thing originates from what some call "span-loading" lift, or pressure distribution. These phrases are self-explanatory; the most efficient type of lift distribution is that called "elliptic" loading, which means that the graph of lift generated at innumerable points along the wing span, against the span, results in an ellipse.

Hence, following directly from this, it is said that a wing of an elliptical plan form, or—as is more popular—"double ellipse" form, is the most efficient type. But I am straying from the point.

We all know that all along the top of the wing is a pressure that is negative in value to the natural, atmospheric pressure; that along the bottom of the wing is a positive pressure greater than atmospheric. The great point is that *no matter what the plan form* of the wing, greater negative, or positive, pressure is at the centre of the span, and that from this point it diminishes outwards to the tips, i.e. the top surface becomes *less negative* near the tips, and the bottom becomes *less positive* near the tips. It is a natural physical law that, if an inequality of pressure exists in the same fluid, an attempted flow will be made to "level" the pressure throughout the fluid, i.e. from high pressure to low pressure.

A little consideration of the above-given pressures will show that an attempted flow will take place *inwards* on the upper surface and *outwards* on the lower. This flow is impeded and left incomplete by the velocity of the fluid, and the now rotating air streams are swept away, to become what we know as vortices (with a long e, please!), one being generated at each tip.

The result of this is that the air just outside the flow of each vortex is given an upward impulse, and that on the *inside* a downward sweep, both being gradually "damped" out, varying with the speed and distances from the trailing edge of the wing and also with the wing chord itself.

Clearly, the smaller the wing chord the weaker the vortex; the smaller the tip chord the smaller is the vortex, which all leads up to the fact that, for any given area, the smaller the wing chord the better, the more efficient the wing as a whole. In other words, the higher the aspect ratio the better the performance characteristics are.

It has been said by the practical chappies that this business of cutting down the chord should not be carried too far; I agree with them for many reasons—not all of them theoretical. Consider, for instance, building a *very* high aspect-ratio wing of, say, about 25 (!); visualise, if you can, the number of ribs, the difficulties of obtaining enough strength in the structure to stand the stresses involved. *Colossal!* Then again, if there are any "sags" or inaccuracies in the building of the wing, the inefficiency caused will vary directly as the aspect ration.

In wings of low aspect a similar flaw would probably make little difference, but in a high-aspect job can bring down the performance quite a bit.

So you see that if we are to build high-aspect wings we must get good finish, with little or no sag between the ribs. We'll let it rest at that.

And now we come to the method of correcting the graph of Eiffel 400 at 23 f.p.s. to a new aspect ratio.

You will remember that aspect ratio of the 94 f.p.s. graph of R.A.F. 32 is 5; that that of the 32's 30 f.p.s. graph is 9; and that the ratio of Eiffel 400 at 92 f.p.s. is 6.

Query.

What is the aspect ratio of graph A produced for Eiffel 400? (As in most mathematical problems, we will give the unknown a predetermined value and correct to this figure.) To cap it all, the aspect ratio of the new projected design is to be 19.

Now it is quite obvious that we cannot go blithely multiplying figures and cancelling them with religious accuracy, then proudly put the result upon a graph, and stand back and admire the handiwork without *first* having introduced an aspect-ratio correction *right through* from the source. And further, it is of little use working out to seven places of decimals the angle at which the wing has its best efficiency for the job in hand—it is obvious that if the figures given in the uncorrected graph were used not much would come of it, as the figures would be very wrong, the method definitely unsound. (This is a figure determined by the author when designing the complete 'plane, with which you will become acquainted a little later.)

DURATION IV. By G. W. Jones

You remember that "C"—the coefficient to be entered on the Eiffel 400 23 f.p.s. uncorrected graph—was found by the fraction xp/y.

Note: $x = C_l$ for Eiffel 400 at 94 f.p.s. at
$y =$,, R.A.F. 32 at 92 f.p.s. at
$p =$,, R.A.F. 32 at 30 f.p.s. at

What it is intended to do is to reduce c at its source, i.e. $\frac{xp}{y}$ to the aspect ratio of its greatest value. This will be A.R. = 9 for "p." We will then have an "equation" giving c in term of a certain aspect ratio, and this will be similarly corrected for the new higher aspect ratio.

CORRECTION 1.

To the lift coefficient:

The usual correction of an increase of 2 per cent. for each unit increase, and an increase of L/D ratio of 8 per cent. unit A.R.

To correct to aspect ratio 9, therefore,

$$C_9 = \frac{1{\cdot}06x.\ (p)}{1{\cdot}08\ y} = {\cdot}98\ \frac{xp}{y}$$

$\therefore$ $C_9 = {\cdot}98C$, where C is the uncorrected value on graph "A."

To correct C_9 to the new aspect ratio (19):

$$C_9 = {\cdot}98 \left(\frac{xp}{y}\right) \text{ and to } C_{19},$$

$$C_{19} = 1{\cdot}2 \left({\cdot}98\ \frac{xp}{y}\right) = 1{\cdot}176\ \frac{xp}{y} \quad \text{and } \frac{xp}{y} = C,$$

so the lift coefficient on graph "A" must be multiplied throughout by 1·176 or 1·18.

CORRECTION 2.

To the drag coefficient:

$$D_9 = \frac{{\cdot}855x.\ (p)}{{\cdot}818\ y}$$

(see above)

$$= 1.045 \left(\frac{xp}{y}\right)$$

To aspect ratio 19:

$D_9 = 1{\cdot}045$ (D).

$$\therefore D_{19} = {\cdot}666\left[1{\cdot}045\left(\frac{xp}{y}\right)\right]$$

$$= {\cdot}696 \left(\frac{xp}{y}\right)$$

$$= {\cdot}696\ (D).$$

Or the figure given for drag in graph "A" must be multiplied throughout by the coefficient ·696, say, ·7.

Now we come to the sinking-speed coefficient of the airfoil. Values of $C_d/C_l^{1.5}$ have been found and placed in graph form.

This shows us the angle of incidence necessary for minimum sinking speed for a *flying wing*, that is, for the wing only.

The $C_d/C_l^{1.5}$ figures dealt with so far are properly wing figures. To obtain the minimum figure for a complete 'plane the reasoning is simple. The fuselage, etc., do not contribute anything to the lift of the 'plane, and so their only sphere of influence upon the sinking speed must be in the drag one.

Properly, the sinking speed of a 'plane is given by

$$V = \sqrt{\frac{W2}{pS}} \times \left(\frac{C_d}{C_l^{1.5}} + \frac{C_f}{C_l^{1.5}}\right) \quad \text{or, more conveniently,} \times (C_T/C_l^{1.5})$$

Where C_T is a coefficient containing a compound of both the lifting and non-lifting components' drag variations.

The drag of fuselage is known by

$D = KAV^2$. (V = miles per hour).

The coefficient C_T is found by finding the drag at, say, normal flying speed, and then, treating this value as if it were the drag of a wing of Wakefield area, find the coefficient of this imaginary wing by:

$$C_d = \frac{2D}{psv^2} \text{ (v is feet per sec.)}$$

Example:

Take any mythical job at 14·3 m.p.h., 20·6 f.p.s. Then the drags are:

Fuselage	..	·0994 lb.
Tailpiece	..	·00852 lb.
		·00355
		·000616 lb.
Total	..	·1085 lb.
= app.		·11 lb.

$$C_d = \frac{2D}{psv^2} = \frac{{\cdot}22 \times 144}{p200 \times 20{\cdot}6^2} = {\cdot}02.$$

$\therefore C_T = ({\cdot}02 + C_d)$ at any angle,

and the real ratio that determines the rate of descent, in this case, of the 'plane is $({\cdot}02\ C_d)/C_l^{1.5}$.

Hence, the $C_d/C_l^{1.5}$ value of the section is increased by the "appendages," which are very necessary.

Let us suppose that, as above, our C_T coefficient is rated at (C_d ·02). Now this is taking the model flying in the ideal condition, that is, with fuselage *along the line of flight*.

Now, in the graph drawn the value of minimum sinking speed is shown at 4°, and it is obvious that the practical furtherance of the efficiency here obtained is to place the fuselage beneath the wing (*not* the wing above the fuselage, for the wing is the determining factor) such that when the wing is at 4° the fuselage lies upon the presumed line of flight.

The C_T value, then, will be a minimum at 4°. But we must not forget that as the wing changes incidence so does the fuselage, and an increase of drags—in all spheres—will take place.

So on graph "B" the C_d value is increased, at 4° by ·02, obtaining C_T value of ·046. However, at 3°, as at 5°, a larger increment of drag will be added.

It has been found that a circular fuselage (which I always use on Wakefields, at any rate) increases its drag coefficient by about 3 per cent. in the change from 0° to 4°.

Hence, since 4° on the "airfoil scale" is now our zero, the 0° value of C_d will be increased by 3 per cent. (·02) to become C_{T4} and the angle 8° increased by 3 per cent. (·02), to become $C_T + _4$. The three values will be guided by a smooth shallow curve and continued as necessary; then added to the C_d figures proper and obtain our C_T figures.

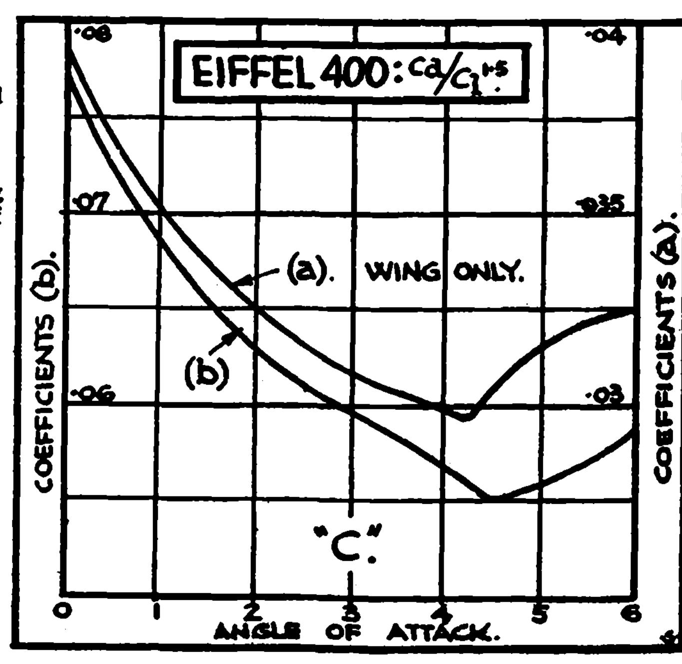
Graph "C" shows the value of minimum sinking-speed angle of incidence (*a*) for the wing only, and (*b*) for the 'plane complete. It would appear in (*a*) that a sort of "peak" or "turning point" occurs at approximately 4° 4'. As in the L/D ratios, which generally have strong slopes to them, this has a sort of *locum optimum*, about which point performance falls away.

The graph of $C/C_l^{1.5}$ then is modified by the drag of the non-lifting components; in the rotation of the calculus the smaller becomes the Δ D fus. the more nearly does $\frac{dy}{dx} =$ for the $C_T/C_l^{1.5}$ graph approach the $\frac{dy}{dx} = 0$ value of the $C_d/C_l^{1.5}$ graph.

That is, *the more streamlined are the non-lifting components the more nearly does the sinking speed of the 'plane approach the "ideal" condition, i.e. the flying aircraft.*

The ideal of a flying wing must, however, be abandoned for many reasons.

It should also be pointed out that the work on $C_d/C_l^{1.5}$ ratio for wing section is not a waste of time; for any given aeroplane the wing of lowest $C_d/C_l^{1.5}$ ratio will produce a sinking speed the minimum for the sections built or selected.

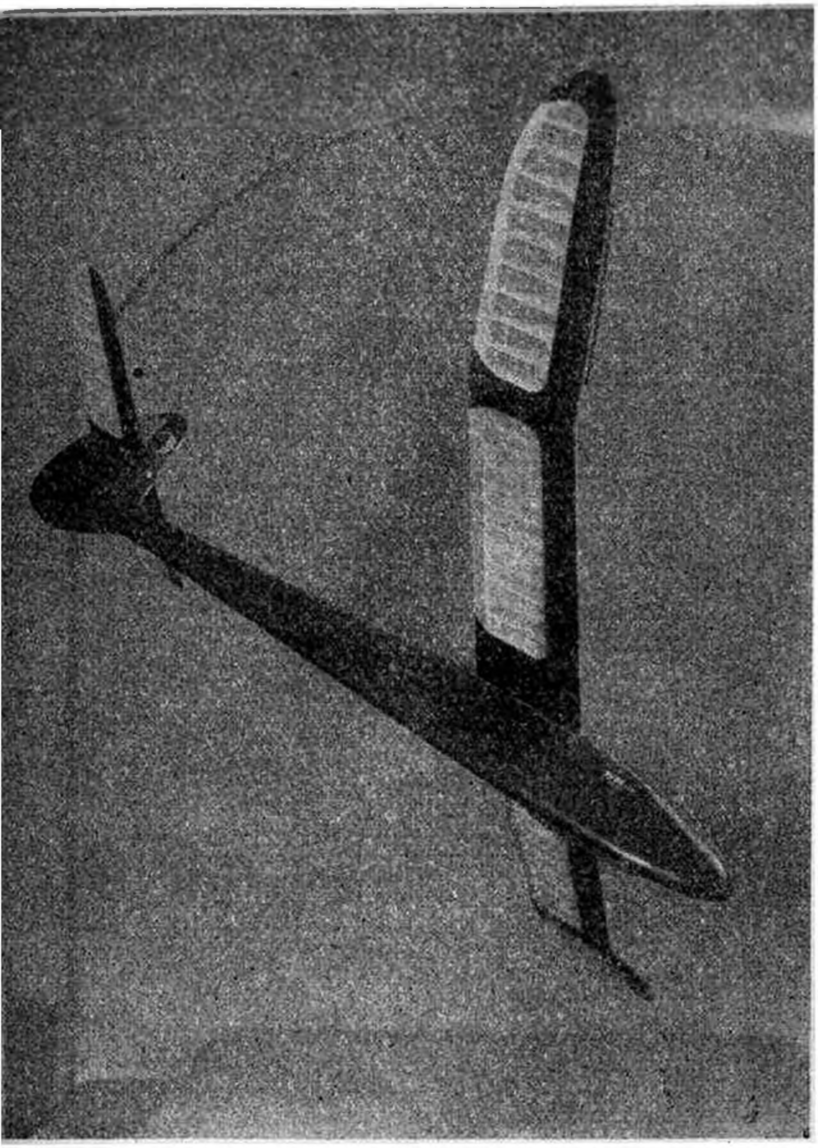


SAILPLANES

Their Design and Construction

By LEOFRIC GEORGE TEMPLE

PART—II



IN my previous article I explained why I think a fairly large machine is most likely to give continued satisfaction, and also what points to examine when choosing an airfoil. Now I shall try to show readers what we must aim for in laying out the general arrangement drawings of a proposed sailplane.

Most important of all is the reduction of drag; some people call this streamlining, but it amounts to the same thing. We cannot afford to lose much of the efficiency of our machines through faulty attention to detail design, so let us produce a model with really low parasite drag. We can do this by having no sudden changes in shape in any of the component parts, by making sure that the fuselage—the chief offender in the production of skin friction—is of a satisfactory shape, and by finishing off the entire machine to the best of our ability. I will deal first with the fuselage.

The minimum cross-sectional area allowed under the present rules is given by the formula $A = L^2/200$, where L is the overall length of the machine. It has been found that the most efficient shapes for fuselage formers are elliptical, circular and egg-shape; the first of these is the best from a purely aerodynamic point of view, but if we are going to place the wing at the point of maximum fuselage width (to obtain a wide seating for the wing mount) it will mean that the wing is somewhat low and prone to tear the fabric on landing. The same applies to the circular cross-section, so I advise the use of an egg-shaped section with the point downwards; the wing can be set high on the fuselage and still have plenty of width for its mounting. This shape also gives us wing roots needing only the minimum of filleting. The one disadvantage of this type of cross-section is that unless one is careful, too much weight may be added high up in the structure, which places the centre of gravity too high; we can, however, counteract this by building a heavy keel and lower part of the fuselage—and we need plenty of strength low down to take the shock of landing on the (almost always) unsprung skid.

In plan form the fuselage should have its greatest width at about one-third of the length back from the nose; this is correct both from an aerodynamic and structural standpoint, as we can put the wing roots at the point of maximum width. Unfortunately, all sailplane fuselages are bad from the point of fineness ratio, being a great deal too narrow, but we need not worry too much about this.

The side elevation is largely a matter of personal choice, but here again we must consider drag; for instance, a fuselage having the wing set on top of an unstreamlined cabin is bad, and the lines should flow continuously from nose to tail. If, in a normal landing, the model touches down with the skid and tail simultaneously, this imposes less strain on the rear than if the tail always came down with a bang, so I suggest a side elevation in which the fin has a proportion of its area below the fuselage, and extends a little lower beyond the datum line than the main skid. Too thin a rear portion is bad in any fuselage, and always means trouble sooner or later. I do not think the "pod-and-boom" type of model has any particular merits except that the weight is kept well forward. Anyone designing a sailplane should certainly consider embodying a planked or sheeted fuselage. The strength is enormous, they are very difficult to tear open even in the worst landings, and they are not very much heavier than a fabric-covered job.

There are several ways of erecting the basic structure of a planked fuselage: we can use a central keel extending from top to bottom completely through the fuselage, with half-formers on each side; use a square central boom with the formers strung on to it at the appropriate positions; build a conventional square or triangular "slabside" frame and put little deckings on to each cross-brace to give it the right shape; or we can just use the formers, held in a jig, as the basis on which to plank. Of these methods, the square boom is perhaps the simplest, and as long as the holes to take the boom are accurately cut in the formers, it does not need a jig to set it up. A few small-section stringers may be added before the planking is begun, and help to keep the structure rigid.

The formers themselves are easily cut from hard balsa sheet, and if it were not for the present shortage of this wood, I should not advocate other methods except for the very largest machines. However, we have to think how to build models needing as little balsa as possible nowadays, and those who specialise in sailplanes are fortunate, as they can make efficient machines entirely without balsa.

Built-up non-balsa formers are made heavy or light, according to the stresses imposed on them—heavy at the nose and wing roots, the rest fairly light, as they have small loads to carry. For these heavy main formers we can cut two sheets of .8 mm. ply, of the exact outside dimension of the former, and sandwich between them a frame built of $\frac{1}{16}$ in. spruce (fig. 2a); if exceptional stresses are imposed on a former, the framework may be $\frac{1}{8}$ in. square spruce. For the light formers, plain hoops of $\frac{1}{16}$ in. square spruce, glued round the outer edge of a web of .8 mm. ply will be amply strong (fig. 2b). Planking can be $\frac{1}{16}$ in. balsa, $\frac{1}{8}$ in. balsa substitute, or thin ply. It pays to cover the fuselage, after planking, with silk or bamboo paper, as this does a great deal to prevent planks springing apart after a lot of hard use. Another good plan is to plank the belly with ply for about the first third of its length if the rest is balsa planking; it prevents scored planks if landings are made on stony ground.

There are many ways of fitting the wings to the fuselage, but I strongly advise the use of some non-rigid fitting, as a rigidly fixed wing on a big machine is simply asking for trouble.

One of the best methods is to make the wing in two halves, dowelled together in the centre, and to rest it on a platform cut out of the top of the fuselage. The ends of the platform should slope at an angle so that in a crash the whole wing will slide off. It can easily be held in flight with rubber bands concealed in the interior. See fig. 3a.

A type of fitting which I have originated for medium-weight models and used with great success is shown in fig. 3b. It consists of a tongue of duralumin about 1/16 in. thick (for machines of 2½—4 lbs. weight) bolted and glued into the fuselage structure and bent to the correct dihedral; you will see that the metal tongue is bevelled sharply on the front edge, and also, less sharply, on the rear. This is so that in whatever attitude the machine lands the wing can always swing either back or forwards. These tongues project through carefully shaped wing roots of ply and plastic wood and slide into boxes in the wings. The boxes are made from ply, or heavy balsa faced inside with thin ply, and are most satisfactory if a strip of rubber about ¼ in. wide is fixed inside them front and rear—otherwise there may be trouble owing to the sides being pushed out after much use.

These boxes must be very accurately set in the wings to ensure equal incidence on both sides; it is best to mount the wings in a jig while the boxes are inserted and glued. Note that they must be fixed to the spars and not to the first few ribs only.

I have also used this system with a tongue built up from several thicknesses of ply, glued under pressure, but though it is very strong, it is bulky and needs a thickened wing root to take the box. The metal tongue can flex slightly in a wing-tip landing, but the ply one cannot—therefore if ply is used, the wings themselves must be stronger to take the shock.

Realising that most designers have their own ideas on the subject of wing fittings, I have only outlined two successful types, and have no intention of upholding them as the only practical ones, but they both possess the virtue of being made without balsa.

In conclusion, strutted wings are generally more trouble than they are worth, and should, I think, be avoided.

Tail units on any aircraft should be kept light, so we try to get our sailplanes' tails as small as possible. There is, however, no hard and fast rule to determine the exact proportion of tail area to wing area. The maximum area allowed is 33 per cent. of the wing area used, and by careful design we can make it much less. A swept-back wing with good anti-stalling tips allows about the minimum of tail area, but as a general rule about 25 or 20 per cent. of the wing area is a suitable size.

The fin area depends on the fuselage shape and the position and dihedral of the wing, but as a general rule there is no need for a fin larger than 15 per cent. of the wing area. Avoid a very deep and long nose and you will not need a huge fin.

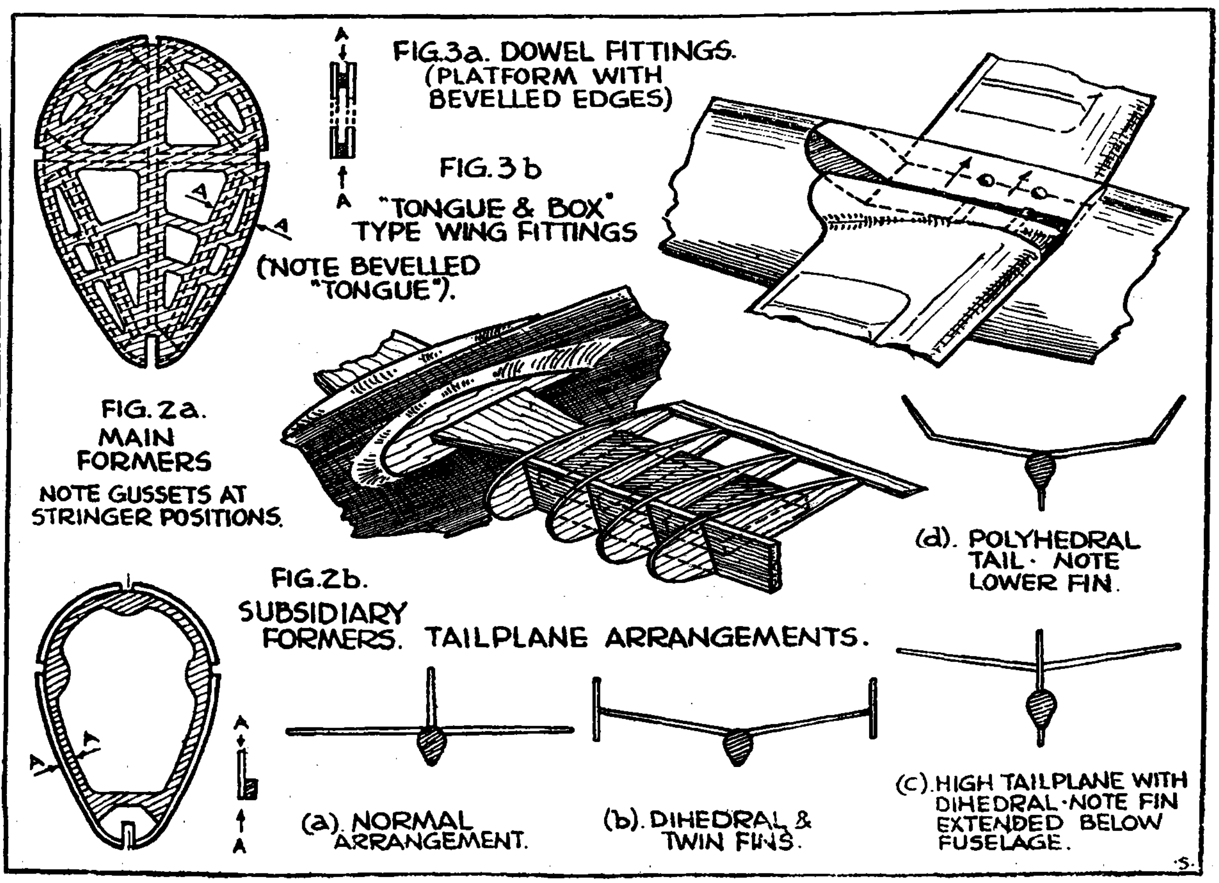
I have found after many experiments that a tailplane of lifting section, used in conjunction with a centre of gravity near the trailing edge of the wing, produces much better flights than a flat, non-lifting stabiliser. I know many people will disagree, but it has been well tried and has proved itself: stalling is almost prevented, and the flight of a machine so equipped is remarkably steady. To combat spinning after a stall, one of the chief bugbears of sailplane flying, set the tailplane high on the fin and give it about 15 per cent. dihedral.

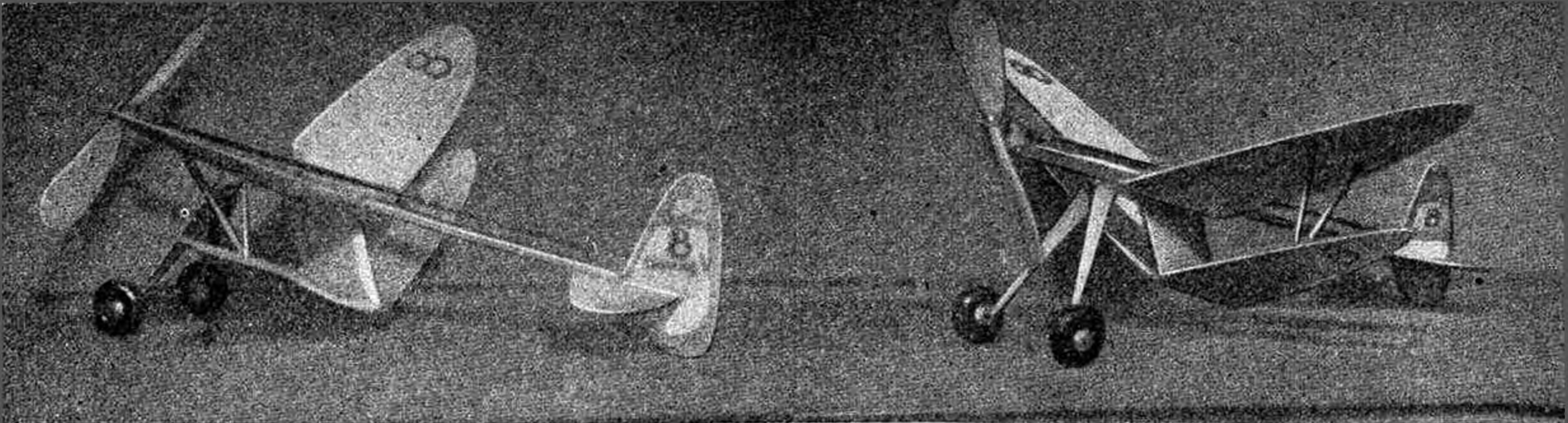
The tail unit can be built either in one piece or with the fin detachable. I prefer the former, as no changes of trim are possible. Some different arrangements are shown in fig. 4, and all are quite satisfactory in use. If you decide on a non-lifting tail, it is very easily made from a spar of spruce or hard balsa with an outline of balsa or reed cane, and sheet balsa ribs; but a lifting tail is thicker and is more on the lines of a small wing. Spars made from sheet balsa or thin ply with a flange of 1/32 in. square material at the bottom are admirable, and the 1/16 in. balsa ribs are easy to notch on to the top of the spar. The leading and trailing edges must be balsa or some very light substitute such as obeechi, and it is a good idea to sheet in the leading portion of the tailplane with stiff paper or balsa, just as we do on wings. In fact, anyone capable of constructing a "Wakefield" wing will have no difficulty, as the sizes of wood are almost identical.

Tailplanes and fins should be covered with bamboo or tissue paper unless the machine is rather a heavy one, in which case use silk—if you can get it! Give the completed tail two or three coats of dope and a coat of varnish, or two coats of glider dope if you used silk, and a strong job will result.

In the final article of this series I will talk about the wings of model sailplanes.

The photograph on the opposite page is of the "XPS-841"—a 7 foot span polyhedral sailplane—designed by Mr. Temple Weight is 36 ozs. Wing area 480 sq. ins. Wing section Göttingen 387. Full size scale working drawings, size 30 × 60 ins. are obtainable through the Aeromodeller Plans Service. Price 6/- Post free.





THE "DOODLEBUG"—a 7 in. span Biplane.

By G. WEBB.

THIS miniature biplane was originally built for experiments at the lower end of the speed range; from observations on small paper gliders, for example, it was found that in some cases a left aileron or wing-tip turned down produced a left bank, presumably owing to aileron drag being greater than the effect of the induced lift, a phenomenon which has since been observed on the rubber-powered Doodlebug. However, directional control is satisfactory with the use of rudder alone, which is large enough to be quite sensitive.

The model has proved such a consistent performer that it has been deemed good enough to pass on to other modellers, who will doubtless gain much amusement from its "Doodlings" from land or water. Conversion to a seaplane is easily effected by the removal of the lower wing and the attachment of small balsa floats, as shown on the plan.

Flights of about 30 seconds are the most which can be reasonably expected, but even this seems a long time when the model is hopping around the rafters. "Doodlebug" may of course be flown outdoors in calm weather.

Construction should be kept as light as possible, as the wing-loading of the original was only about 1¼ ounces per square foot. But the model is quite robust and practically crash-proof, the wings merely falling away in the bad landing. If sheet balsa is not available, the wings and tail unit may be cut from any thin veneer, or even from 1/32 in. plywood sandpapered to a very thin section, and a hardwood stick would be quite satisfactory for the "fuselage."

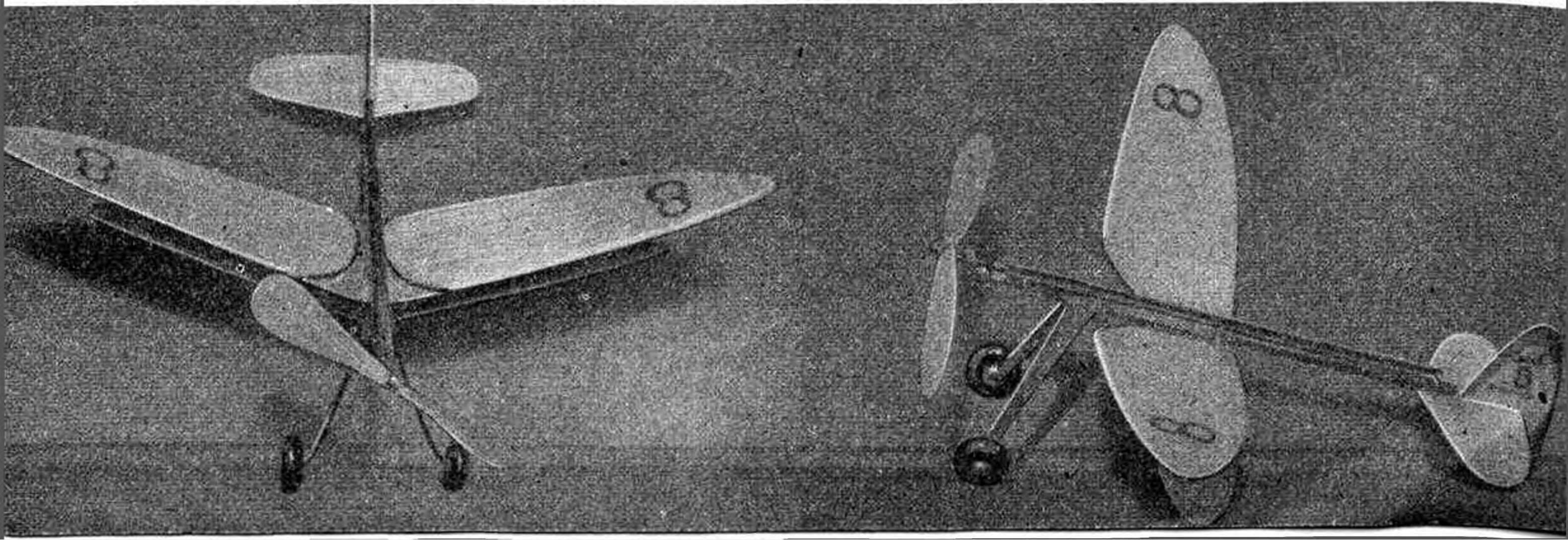
The main stick is cut from a length of 3/32 in. by 3/32 in. stock, to which a thrust bearing is cemented and bound after it has been cut from a piece of thin sheet metal and bent to shape. Tail surfaces are 1/64 in. stock, well sanded down, and the rear motor-hook is next cemented in position after being formed from thin wire or bent dress pin.

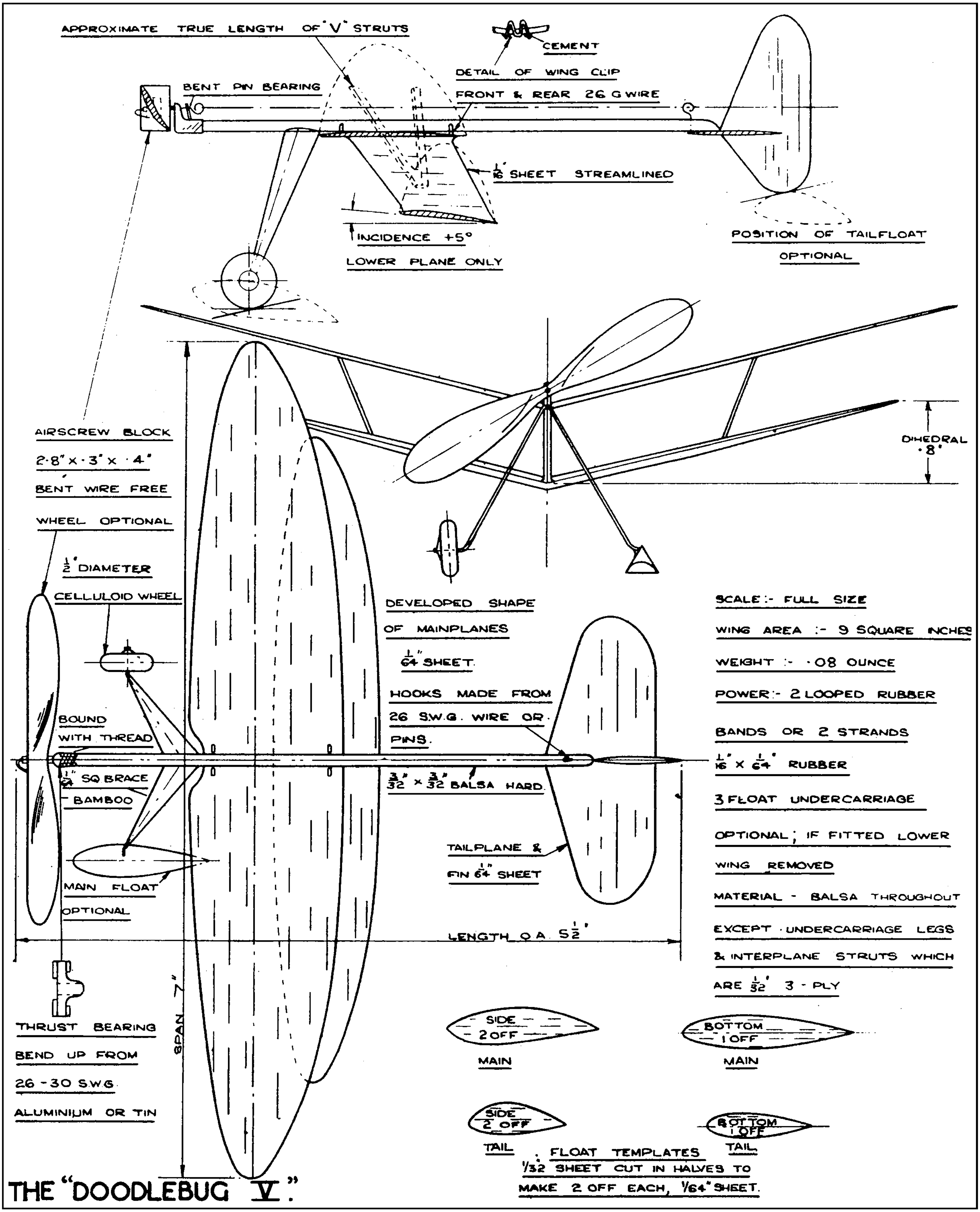
The undercarriage consists of two 1/32 in. plywood legs, which are thoroughly cemented to the stick in the position shown, with a thin strip of bamboo for reinforcement. This is extended to form an axle for the wheels, which are ¼ in. diameter celluloid or balsa, held on by a blob of cement at the end of the bamboo, or by dress pins cemented to the plywood legs.

The airscrew is next carved from a small balsa block of the dimensions given on the plan, and is attached by means of a bent pin or thin wire hook, with a small bead for clearance. A thin rubber band 4 in. long is sufficient to power the model, or two shorter bands may be used looped together.

The wings are next cut to the shape of the true view shown on the plan, and are sanded to a sharp point on the trailing edge, the leading edge being slightly rounded. They are then scored at the centre-line with a penknife or razor blade and carefully bent to the requisite dihedral. The wire wing-clips are next cemented in position on the top of the upper wing, and cement is run down the joint to retain the dihedral. The centre-section strut is shaped from a piece of sheet balsa and fitted between the wings at the incidence shown. The inter-plane struts are next cut from thin plywood or cane, and the whole wing unit is assembled on the stick.

When flying the model, a maximum of about 300 turns may be given if the rubber is lubricated; a free-wheel made by bending the end of the airscrew shaft is optional, but it is hardly necessary as the "ceiling" of the model is only about 40 ft. When fully wound "Doodlebug" clears the ground after a run of only about a foot, but a little practise may be necessary before the knack of releasing fuselage and airscrew simultaneously is acquired, as airscrew torque is considerable. When floats are fitted, the lower wing is unnecessary; the take off run is about 2 ft., and the nearest puddle makes a convenient landing place!





APPROXIMATE TRUE LENGTH OF "V" STRUTS
CEMENT
DETAIL OF WING CLIP
FRONT & REAR 26 G WIRE
BENT PIN BEARING
1/16" SHEET STREAMLINED
INCIDENCE +5°
LOWER PLANE ONLY
POSITION OF TAILFLOAT
OPTIONAL
DIHEDRAL ·8"
AIRSCREW BLOCK
2·8" x ·3" x ·4"
BENT WIRE FREE
WHEEL OPTIONAL
1/2" DIAMETER
CELLULOID WHEEL
BOUND
WITH THREAD
1/64" SQ BRACE
BAMBOO
MAIN FLOAT
OPTIONAL
DEVELOPED SHAPE
OF MAINPLANES
1/64" SHEET
HOOKS MADE FROM
26 S.W.G. WIRE OR
PINS.
3/32" x 3/32" BALSA HARD.
TAILPLANE &
FIN 1/64" SHEET
LENGTH O.A. 5½"
SPAN 7"
SCALE :- FULL SIZE
WING AREA :- 9 SQUARE INCHES
WEIGHT :- ·08 OUNCE
POWER :- 2 LOOPED RUBBER
BANDS OR 2 STRANDS
1/16" x 1/64" RUBBER
3 FLOAT UNDERCARRIAGE
OPTIONAL; IF FITTED LOWER
WING REMOVED
MATERIAL - BALSA THROUGHOUT
EXCEPT UNDERCARRIAGE LEGS
& INTERPLANE STRUTS WHICH
ARE 1/32" 3-PLY
THRUST BEARING
BEND UP FROM
26-30 S.W.G.
ALUMINIUM OR TIN
SIDE
2 OFF
MAIN
BOTTOM
1 OFF
MAIN
SIDE
2 OFF
TAIL
BOTTOM
1 OFF
TAIL
FLOAT TEMPLATES
1/32" SHEET CUT IN HALVES TO
MAKE 2 OFF EACH, 1/64" SHEET.
THE "DOODLEBUG V."

"QUESTIONS AND ANSWERS"

Questions will be answered through the post,* provided *a stamped addressed envelope is sent. Following is a selection from recent replies which are of general interest.

Q. Could you please give me an explanation as to how the Mattioli-Randisi disruptors effect the airflow passing over an aerofoil?

A. That a wire placed parallel to and in front of the leading edge of an aerofoil has a beneficial effect is well known, but exactly what does happen to cause this is not at all clear.

Examination of the lift curve of an aerofoil fitted with a disruptor shows that the peak, i.e. the stall, is flat. In fact, when the critical angle is reached the lift remains approximately constant with increasing angle of attack, to a certain point when it falls off rapidly. The drag increases all the while, of course. Thus the aerofoil plus disruptor exhibits anti-stalling properties which may be used to considerable advantage in controlling longitudinal and lateral stability. At full-scale Reynolds Number the drag of such a system is slightly greater than that of a normal aerofoil, hence the lift/drag ratio is lower.

It would appear that the disruptor causes a *turbulent* airflow over the aerofoil and this, not being so readily displaced as purely luminar flow, prevents a sudden breakaway of flow at the critical angle. Note that the disruptors do not *prolong* the lift curve as does the Handley Page slot, but that CL max. is approximately the same, although it is obtained over a range of several degrees angle of attack *past* the critical angle. Thus the circulation must remain constant once the critical angle is reached.

This luminar flow also brings in the question of "scale effect," and model experiments seem to substantiate the belief that the disruptors do, mainly, *turbulate* the airflow.

Now turbulence in the main airflow means an increase in drag, which we have noted previously, but turbulence in the *boundary layer*, i.e. the "envelope" of air adjacent to the surface of the aerofoil, gives a decrease in drag.

Now, at the model end of the aerodynamic scale we find larger drag coefficients and early stalling points for our aerofoils. A model fitted with disruptors appears to approach more nearly *full-scale* characteristics due to the fact that turbulence has been induced into the airflow. This seems in complete agreement with the previous statement that disruptors are "turbulators." There is an article pending for a future issue of THE AERO-MODELLER on drag reduction by "turbulation."

Q. I should like a definition of the term "Reynolds Number."

A. The simplest definition that can be given of the Reynolds Number as applied to aerodynamics is that it is a measure of *aerodynamic scale*. It will probably be necessary to elaborate on this point.

In the answer above reference was made to "scale effect" and it was pointed out that model characteristics differed from full-size characteristics. Suppose we build a model wing one-twelfth scale of a full-size wing of 6 ft. chord, i.e. 6 in., and fly it at one-twelfth full-scale speed, say 10 m.p.h. Now it is obvious that even if the *sections* are the same the *quantity* of air attacked is different, and we may reasonably assume that the *characteristics* will also differ. This assumption has been proved by tests.

Now, to ensure similar aerodynamic conditions the product of the velocity and the chord must be the same in each case and, if this is so, then the geometric flow patterns are the same. Thus for comparing tests we introduce the Reynolds Number which shows the *aerodynamic scale* at which these tests were carried out, and this is given simply as follows:—

*RN $= 63{,}000 \times V \times C$.
V = velocity in ft./sec.
C = chord in feet.

For further information on the Reynolds Number, see the August, 1941, issue of THE AERO-MODELLER.

A WAKEFIELD QUIZ

By D. M. H.

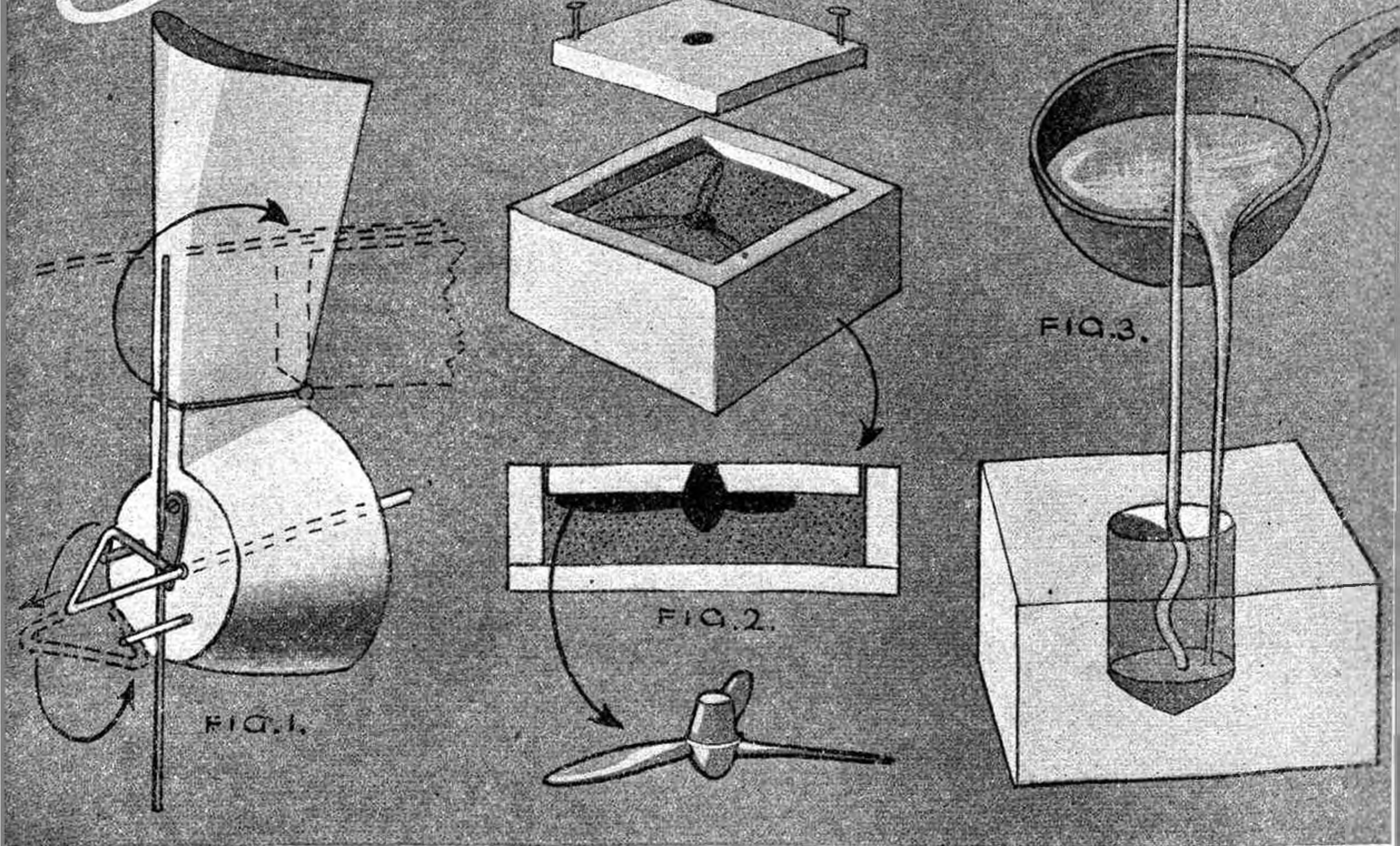
THE Wakefield Trophy Contest which has for many years been the keystone of the aero-modelling hobby in Britain, if not in the whole world, has been regretfully suspended until after the war. Yet the very name "Wakefield" conjures up memories of past contests, in which model flyers from all nations have met to pit their skill against that of their fellow modellers.

Everyone who is really interested in aero-modelling has a knowledge of the men and models which have figured in the contests held in bygone years. Just how much can be remembered may be ascertained by attempting the following questions:—

Give yourself 5 marks for each correct solution. Solutions are on page 139.

1. The first Wakefield Contest was held in—
   (*a*) 1910.
   (*b*) 1928.
   (*c*) 1924.
2. It was won by—
   (*a*) Newall.
   (*b*) Bullock.
   (*c*) Allman.
3. One of the following has won the contest twice. Who?
   (*a*) Ehrhardt.
   (*b*) Bullock.
   (*c*) Light.
4. The Trophy first left this country when it was won by America in—
   (*a*) 1930.
   (*b*) 1935.
   (*c*) 1937.
5. The first British winner to use an all-balsa model was—
   (*a*) Allman.
   (*b*) Kenworthy.
   (*c*) Bullock.
6. The Trophy returned to England because in 1932—
   (*a*) The American winner was disqualified.
   (*b*) We won it.
   (*c*) The contest was held to be null and void.
7. The 1936 contest was notable because—
   (*a*) The British team visited U.S.A.
   (*b*) The American team came to England.
   (*c*) Both went to France.
8. Who holds the Trophy at present?
   (*a*) Great Britain.
   (*b*) U.S.A.
   (*c*) France.
9. Who formulates the rules governing each individual contest?
   (*a*) The country holding the Trophy.
   (*b*) An international committee.
   (*c*) The S.M.A.E.
10. Of past British winners who has been the most consistently highly placed in the trials held since?
   (*a*) Allman.
   (*b*) Judge.
   (*c*) Bullock.

Gadget Review



THIS month's ideas run largely in pairs, several correspondents having submitted more than one. Incidentally, one of the writers throws in several jolly little brickbats by way of good measure. Ah, well! such things help to maintain one's top-knot at a size commensurate with shortness of stature. And, after all, they can be heaved back.

With the brickbats Mr. C. Dennison, of Billingham, Co. Durham, sends details of a single-blade folding airscrew which he has devised. Reference to Fig. 1 will show that the wire which carries the counterweight, instead of being attached to the boss, or to an extension of it, is carried across the boss and joined to the blade. Thus the folding of the blade results in the weight moving forward, disturbing the balance of the model.

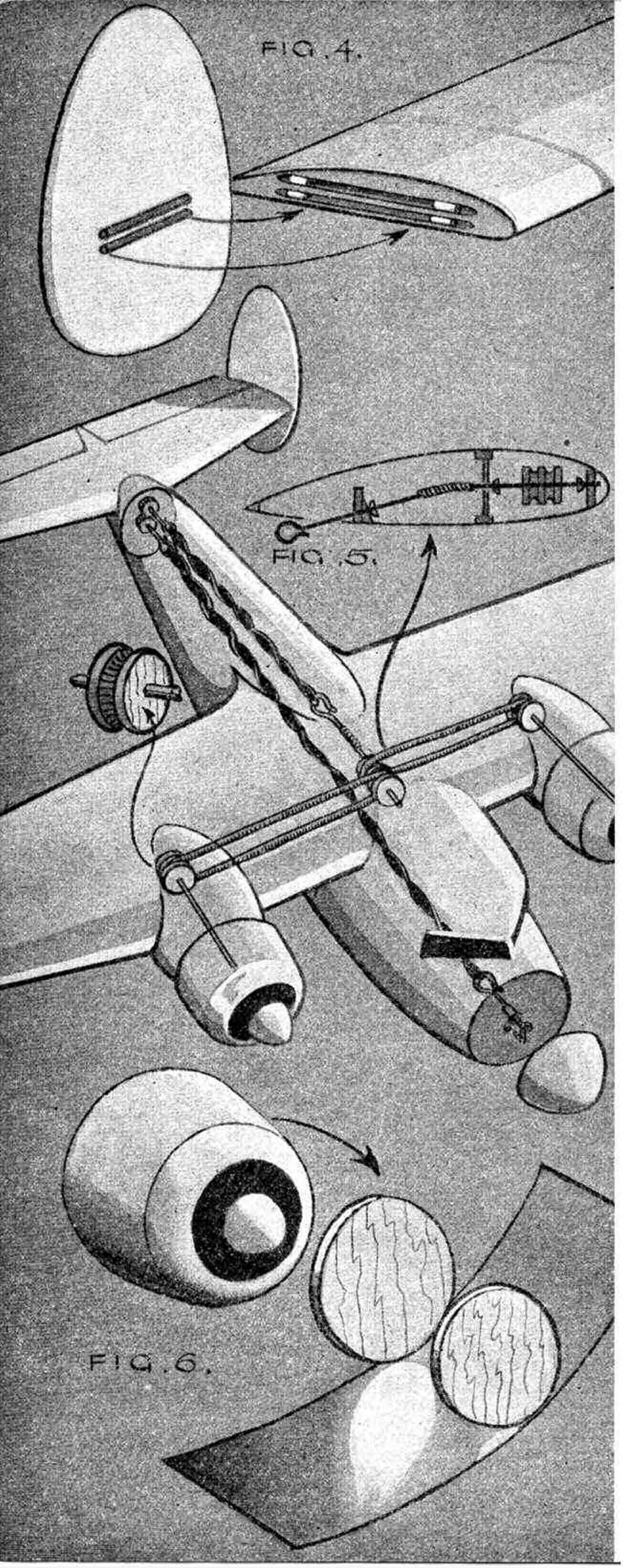
During flight the tension of the rubber motor holds the airscrew-shaft in the rearward position, the triangular winding-hook at its forward end contacting a short stop in the boss. The counterweight wire is thus held, locking blade and weight in the extended position. When only a few turns remain on the motor, a spring takes the shaft forward until it clears the short stop. It is then restrained by a larger stop, thereby releasing the counterweight wire, and allowing blade and weight to take up a horizontal position.

One is inclined to agree with the sender that the simplicity and comparative invulnerability constitute an improvement on a somewhat similar airscrew recently described. That is the justification for its inclusion in this review, and Mr. Dennison might care to note that precisely the same consideration governed the decision to publish the wing-section enlarger, the inclusion of which drew his criticism on the ground that it bore some similarity to another of the species.

The same correspondent takes exception to the suggestion recently made that a simple alternative to a "compensating" airscrew such as that just mentioned would be to trim the model for the glide with the blade folded, and slightly lower the thrust-line to counteract the nose-heaviness resulting from the extending of the blade He does not think this arrangement would work, owing to the varying power output of a rubber motor. The answer is that it does work, or one would not have suggested it. Where pilotless flight is concerned, varying power output is a factor calling for compromise in almost any aspect of line-up, but it does not constitute an insuperable difficulty.

Mr. Dennison also describes a method of moulding lead airscrews for small solid models. Use is made of a frame, about 1 × 1 in., with a stout plywood base, and a tight-fitting lid of [illegible] in. plywood, in the centre of which is a hole wider at the bottom than at the top. The frame is filled almost to the top with loam, as used by moulders, or alternatively a mixture of clay and sand, which is then smoothed.

An airscrew to serve as a pattern is made or purchased, placed on the loam, and pressed in by means of the lid. The latter is then raised by means of a nail in two of the corners, the airscrew removed, the lid replaced, and molten lead poured through the hole, any excess being scraped away before it sets. When set, the lid is removed, and the lead which filled the hole cut away from the front of the airscrew. The job is then finished with glasspaper. Successive processes are illustrated in Fig. 2.



A simple and effective means of making the counterweight for a single-blade airscrew, suggested by Mr. C. A. Daniels, of Hillingdon Heath, Middlesex, is shown in Fig. 3. A hole about 1/16 in. in diameter is drilled in a block of hardwood, the wire to carry the counterweight held vertically therein, and the hole filled with molten lead. On removal the blob of lead is smoothed with a rasp and glasspaper. A file should not be used for the purpose, as it becomes badly clogged.

The sender has experienced no trouble with the method described, but movement of the weight might occur through hitting an obstacle with turns on the motor. This could be obviated by kinking the wire embedded in the lead. Still greater security could be obtained by substituting solder for lead, in which case first dipping the wire in flux.

Twin fins, properly proportioned and mounted at the extremities of the tailplane, do tend to increase the efficiency of the latter, and minimise change of trim when the power ceases. Any means, therefore, of reducing their liability to damage, and enabling them to be removed for convenience of transport, is to be welcomed. One such idea was recently described, and here is an alternative, as used by Mr. A. C. Brown, of Sanderstead (see Fig. 4).

On the inner face of each fin are cemented two parallel strips of 16 gauge aluminium tubing, so positioned as to fit between short pieces of the same material let into grooves in the outermost rib of the tailplane. The latter should be of sturdy material, say 1/8 in. balsa sheet. Attachment of the fins is by means of "shear pins," consisting of 1/16 × 1/16 in. balsa sanded to circular section. Shallow depressions in each outer rib enable the balsa strips to be inserted in the tubes. In the event of trouble these weak links shear away, thus tending to preserve fins and tailplane from damage. Broken shear pins can be removed by means of a piece of wire.

The reviewer suggests that light reed cane in place of balsa, while serving the purpose equally well, would reduce the risk of the fins being wrenched off in flight by the "gentle breezes" that so often grace (or disgrace) our flying days.

Master J. E. Geake, of Wilmslow, Cheshire, forwards details of his flying scale D.H. Flamingo, the most interesting feature of which is the twin motor drive. This is a very creditable effort, especially for so youthful an enthusiast. Flight tests, held up while the designer swots maths, would doubtless reveal the need for some modification, and the ensuing description is included rather as a pointer for experimentation than for exact copying.

The drive, which is shown in Fig. 5, consists of a pulley on each airscrew-shaft linked by Meccano spring-cord (a kind of miniature expanding curtain-rod) to a double pulley in the centre-section, which is turned by twin rubber skeins in the fuselage through a further short section of spring-cord. Each pulley consists of a 4-ply balsa disc, with cement smeared into the groove and moulded by the cord to produce a caterpillar track effect. It is attached by cement subsequent to an application of dope to the shaft. It is surprising to learn that this method of conjunction has withstood tests with a clockwork motor geared to about twice the speed of the intended rubber motor. However, the effect of the initial burst of power from the latter has still to be manifested.

The 1-in. piece of spring-cord linking the drive with the rubber motor is forced on to the rear end of the centre pulley shaft, and to the front end of the rubber-hook shaft. A washer on the latter takes the thrust of the motor, so that no strain is borne by the pulleys. At the rear end of the fuselage is a gearbox consisting of two slices from a Meccano 1/2-in. pinion, a piece of copper plate, two pieces of cycle spoke, and two thrust washers. The hole in each gear-wheel was plugged by hammering in pieces of rod slightly larger than the hole. It was then re-drilled, the spokes forced in, and their ends burred. An inconvenient feature of the drive is the weight of the spring-cord.

Another point of interest about the Flamingo model referred to is the method of forming the motor cowlings (see Fig. 6). They are of celluloid obtained from a superannuated touring car sidescreen, and are almost indestructible. Oblong strips of the material are rolled to form tubes, cemented, and held by rubber bands until dry. Balsa nose and tail formers are added to complete the ensemble.

The idea depicted in Fig. 7 is sent by Mr. H. B. Whitby, of Fordingbridge, Hants. It represents a simple gadget enabling spinnered airscrews having no winding-loop to be wound by the usual drill-cum-hook. A piece of 18 gauge piano wire about 7 in. in length is looped at the centre, and bent as shown about $\frac{1}{2}$ in. from the loop. Each end terminates in a hook, which, as it has to grip an airscrew blade, is covered with valve tubing. The fitting thus formed is passed over the airscrew from the front, given a quarter turn to the right, and pulled forward so that the blades are gripped by the hooks.

Similar devices have, of course, been in use for years, but the one in question differs from the rest by not being attached directly to the winder. Thus the latter, carrying the customary hook, can be used indiscriminately, without alteration, for winding spinnered airscrews without winding-loops, or unspinnered airscrews with loops.

Mr. P. D. Hall, of Surbiton, has been experimenting with the fixed type of undercarriage described in the October Gadget Review, and has modified it so that it can be removed from the fuselage. His version is depicted in Fig. 8. The ends of the shock-absorber wires are bent to pass under the lower longerons, as shown, and plug into pieces of brass tube attached to the inner faces of two vertical struts. A wooden dowel corresponding in diameter to that of the shock-absorber loops, is cemented across the longerons, and the loops slip over the projecting ends. Bamboo pegs, $\frac{1}{16}$ in. in diameter, slip beneath the horizontal parts of the wire, and into small balsa blocks cemented to the longeron. This prevents the weight of the model causing the undercarriage to pivot on the dowel and slip out of the brass tubes. The removal of the pegs allows the undercarriage to be detached from the tubes.

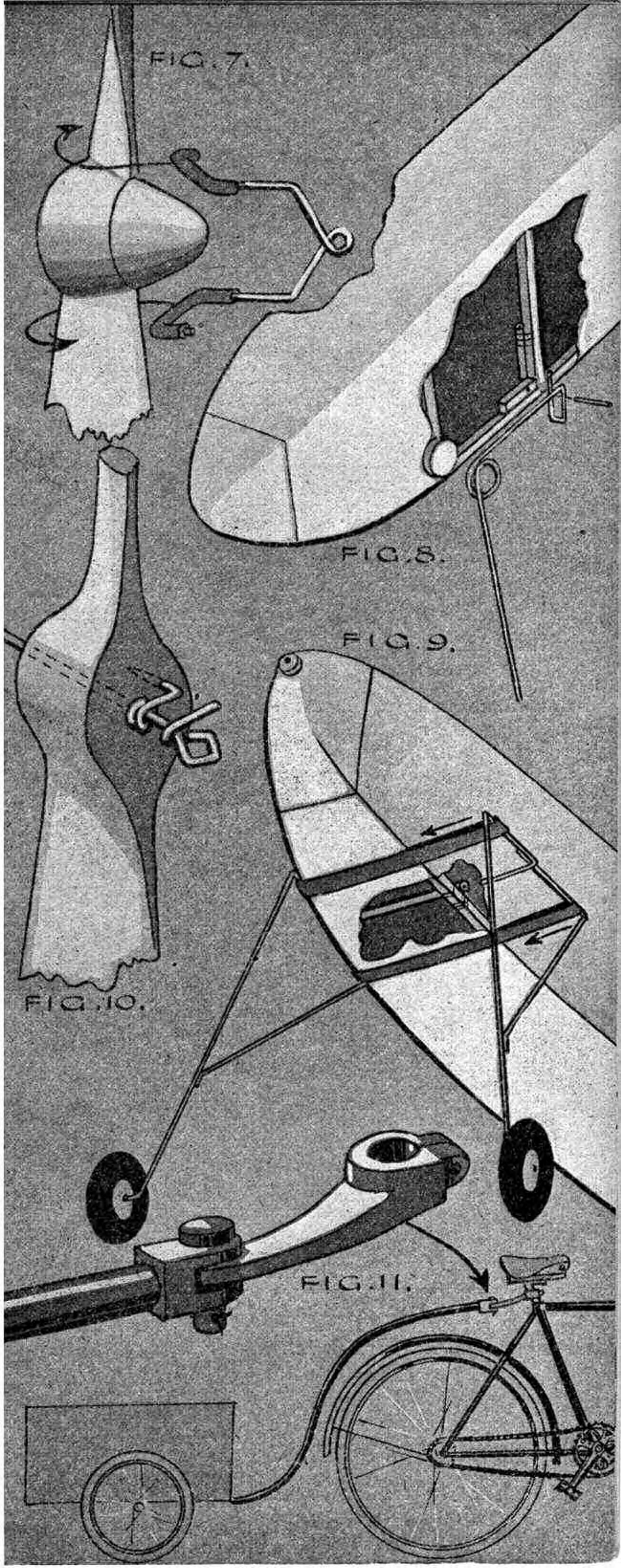
A novel form of unretracting undercarriage, devised by Mr. W. Holdstock, of New Seaham, Co. Durham, and employed with satisfaction by sundry members of the local flying club, is shown in Fig. 9. The triangulated main members are of 16 or 18 gauge piano wire, according to the weight of the model, and plug into a tube in the fuselage by means of two prongs, set at such an angle to the main members as will cause the legs to splay outwards sufficiently to form a good wheelbase. A pair of $\frac{1}{8}$ in. rubber bands, corresponding in length to the width of the fuselage, hold the undercarriage in place, and serve as shock-absorbers.

To attach the undercarriage it is held by the top horizontal members, which are 3 in. in length, the bands are stretched, and the prongs inserted in the tube. In the event of a heavy landing the undercarriage pivots in the tube, the rear band gives, and then springs the structure back into the normal position.

Mr. Holdstock is also the sender of the simple freewheel device illustrated in Fig. 10. To form the clutch, a length of 18 gauge steel wire is wound on a piece one gauge larger than is used for the airscrew-shaft, and the last turn of the coil is filed to a taper. The upper end of this fitting is forced into the airscrew-boss. Note how the latter is recessed to accommodate the coil. The forward end of the 16 or 18 gauge airscrew-shaft is bent to form a winding-loop, and terminates in an arm which, under the tension of the wound rubber skein engages with the clutch and turns the airscrew. In the glide the shaft slips forward and the arm clears the clutch, allowing the airscrew to freewheel.

The problem of conveniently conveying models, spares, and what-not to the flying field is ofttimes a thorny one. Petrol is scarce, not to mention cars in which to use it, large wooden boxes are none too popular with 'bus conductors, and in any case 'buses are few and crowded, while light cardboard cases are apt to be stove in by bulky fellow travellers, or reduced to pulp by oodles of rain. Mr. S. W. Cliff, of Castle Bromwich, proposes as a solution of the problem the use of a cycle and light trailer. The means of attaching the one to the other is illustrated in Fig. 11.

The essential fitting is a brake connection obtained from a defunct Austin-Seven at a car dealer's, with the hole enlarged to accommodate the saddle-pillar. It has full swivel movement, and when not required for towing, the locking-nut can be loosened, and the fitting turned to the front out of the way of a saddle-bag. This fitting is linked by means of a length of electric conduit, fixed by a bolt or rivet, to the trailer.



AN IMPROVED METHOD OF CALCULATING RUBBER MOTOR TURNS

By J. H. MAXWELL

In this article J. H. Maxwell advances an extremely interesting and seemingly comprehensive formula for calculating the number of turns it is possible for any rubber motor to take. Compared with the basic formula, which he develops at length, it would appear to give values considerably in excess of this for most normal motors and it is hoped that readers will compare it with their own data. Many competition fliers test a similar motor to that used for flying by winding it up until it breaks but this is expensive and, especially with the present shortage of rubber, extremely wasteful. Any formula that will do away with this and still give reliable results is invaluable but it must be borne in mind that actual weather conditions have a considerable influence on the breaking point of a motor. This the 1940 *British Wakefield Team found to their cost when at the contest many motors broke several hundred times short of the expected value predetermined by " destruction " tests.*

IS it possible to calculate, with reasonable accuracy, the number of turns a rubber motor will stand ? Many practical aero-modellers seem to think that it is not, while others consider that it is something like amateur weather forecasting—a combination of luck and " guesstimation." Nevertheless, we are convinced, after testing to destruction between 70 and 80 motors of various makes of rubber, including five American brands, that, provided a motor is treated in a systematic manner, the turns which it will stand under normal conditions can be accurately calculated. Not that our research work on rubber is complete—far from it—but it is held up meantime, and we should like to pass on our findings to date.

Let us approach the subject from a commonsense angle.

Imagine a tightly wound " Wakefield " motor made up of about 100 strands of 1/16 in. square rubber. (Of course, nobody would think of using such a motor, but it helps to clarify the reasoning.) Now picture one of the strands. It coils round and round the motor, sometimes on the outside and sometimes near the centre, but as a whole it might be imagined as spiralling round an average diameter. Thus the effect is similar to having wound the strand round a solid rod of this " average diameter."

Although the strand is in the form of a spiral, it is simply being stretched and, obviously, we can say that—

the stretched length = number of turns × length of rubber in each turn.

$\therefore$ the number of turns $= \dfrac{\text{stretched length}}{\text{length of rubber in each turn.}}$

The stretched length is also = so many times the unstretched length.

= unstretched length × a

= $L \times a$

The length of rubber in each turn = the circumference of the imaginary rod × b, a figure to allow for the rod in one turn.

Since the rod is round, or nearly round, the circumference is proportional to the square root of the cross sectional area.

i.e. the circumference = $c \times \sqrt{\text{cross sectional area.}}$

This cross sectional area = a fraction of the original cross sectional area of the unstretched motor (A).

= A/d

$\therefore$ The circumference $= c \times \sqrt{A/d}$

$$\therefore \text{The number of turns } (Nt) = \frac{L \times a}{c\sqrt{A/d} \times b} = \frac{a\sqrt{d} \times L}{bc \sqrt{A}} = K\frac{L}{\sqrt{A}}$$

The number of strands is a more convenient figure to work with than the cross sectional area, so the formula may be re-written

$$Nt = K\frac{L}{\sqrt{Ns}}$$

This is the basic formula, but we have found that, due possibly to the friction between the strands, it does not hold good for multi-strand motors. However, as a result of our tests we have evolved a more usable formula which is probably the most accurate means yet devised of calculating the number of turns a motor will stand. This formula is as follows :

$$Nt = \frac{1{\cdot}414\,K - 0{\cdot}00956\,K\,(Ns - 2)}{\sqrt{Ns}} \times L$$

Where Nt = Number of turns on motor.
Ns = Number of strands in motor.
L = Unstretched length of motor in inches.
K = Number of turns per inch on a 2-strand motor.

Unfortunately trade etiquette prohibits our giving actual values of *K* for different makes of rubber, but the enthusiast will quickly overcome this by testing small loops of rubber, using his usual running-in and winding procedure, and finding at how many turns per inch they break. If this breaking point is used as *K* the formula will give the breaking point of the motor, so the answer should be reduced to between 80 per cent. and 90 per cent. for safety. We can, however, state that for good rubber the average breaking points of two strands, in turns per inch, are 110, 90 and 70 for 1/8 in., 3/16 in. and 1/4 in. respectively, all 1/30 in. thick.

As an interesting sidelight we should like to point out that the formula

$$Nt = \frac{K \times L\sqrt{L}}{\sqrt{W}}$$

quoted by many writers, is really the same as our basic formula, and consequently suffers from the same faults. Let us prove this.

The weight (W) of a motor is proportional to its volume, i.e. proportional to the length × the cross sectional area,

or $L \times A$

$$\therefore Nt = \frac{K \times L\sqrt{L}}{\sqrt{A} \times \sqrt{L}} = K\frac{L}{\sqrt{A}} = K\frac{L}{\sqrt{Ns}}$$

We invite comment on, and criticism of our formula, and we shall be pleased to hear the opinions of those who use it.

3 TECHNICAL BOOKS

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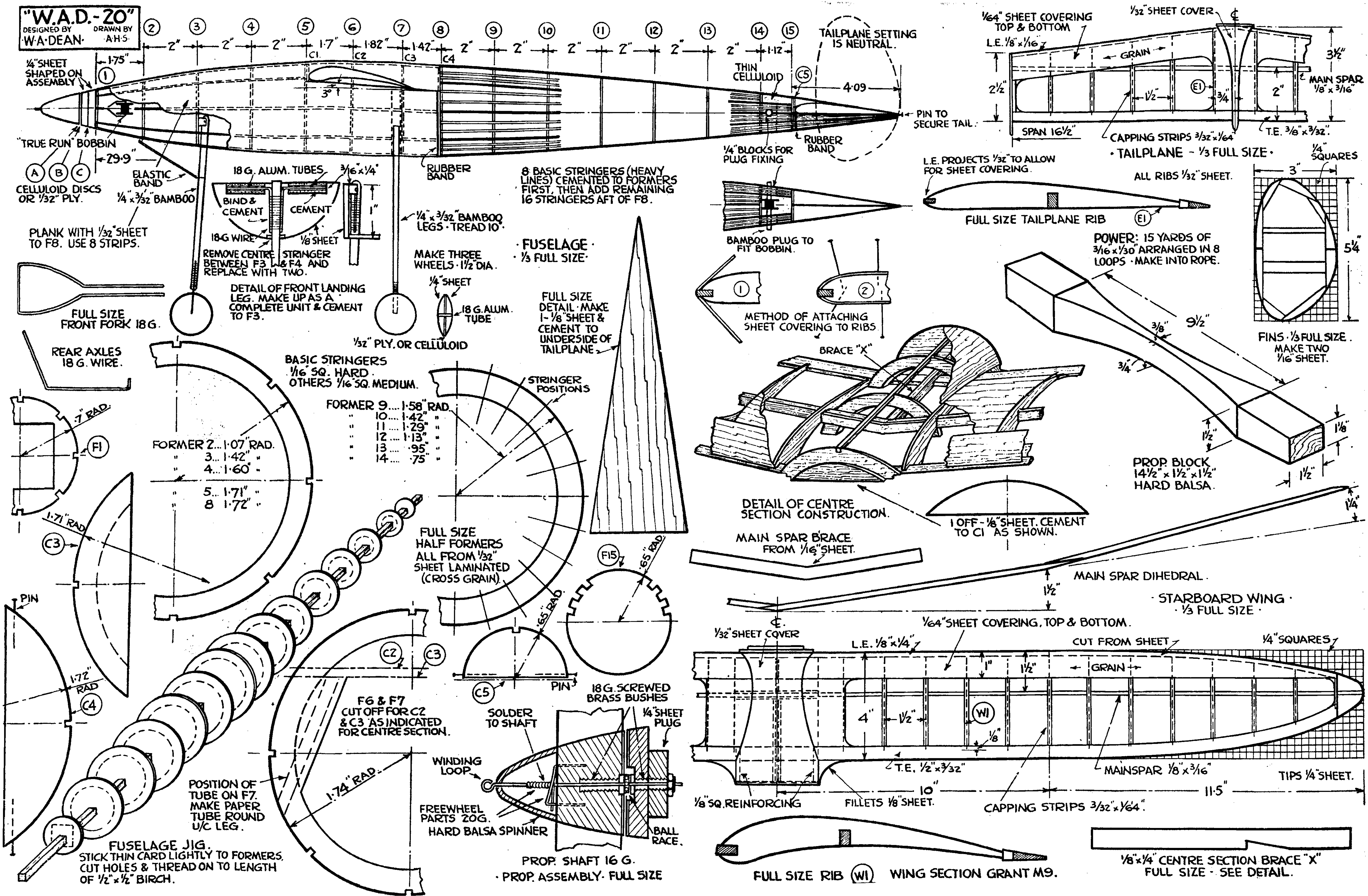

"W.A.D.-20"
DESIGNED BY W.A.DEAN
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¼" SHEET SHAPED ON ASSEMBLY
"TRUE RUN" BOBBIN
CELLULOID DISCS OR 1/32" PLY.
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PLANK WITH 1/32" SHEET TO F8. USE 8 STRIPS.
THIN CELLULOID
TAILPLANE SETTING IS NEUTRAL.
PIN TO SECURE TAIL.
RUBBER BAND
¼" BLOCKS FOR PLUG FIXING
18 G. ALUM. TUBES
BIND & CEMENT
CEMENT
18 G WIRE
1/8" SHEET
REMOVE CENTRE STRINGER BETWEEN F3 & F4 AND REPLACE WITH TWO.
DETAIL OF FRONT LANDING LEG. MAKE UP AS A COMPLETE UNIT & CEMENT TO F3.
¼" x 3/32" BAMBOO LEGS · TREAD 10".
8 BASIC STRINGERS (HEAVY LINES) CEMENTED TO FORMERS FIRST, THEN ADD REMAINING 16 STRINGERS AFT OF F8.
· FUSELAGE · 1/3 FULL SIZE ·
MAKE THREE WHEELS · 1½" DIA.
¼" SHEET
18 G. ALUM. TUBE
1/32" PLY. OR CELLULOID
FULL SIZE FRONT FORK 18 G.
REAR AXLES 18 G. WIRE.
BASIC STRINGERS 1/16" SQ. HARD OTHERS 1/16" SQ. MEDIUM.
FORMER 2... 1·07" RAD.
3... 1·42"
4... 1·60"
5... 1·71"
8 1·72"
FORMER 9.... 1·58" RAD.
10.... 1·42"
11.... 1·29"
12.... 1·13"
13.... ·95"
14.... ·75"
STRINGER POSITIONS
FULL SIZE HALF FORMERS ALL FROM 1/32" SHEET LAMINATED (CROSS GRAIN).
FULL SIZE DETAIL · MAKE 1 - 1/8" SHEET & CEMENT TO UNDERSIDE OF TAILPLANE.
·65" RAD.
PIN
F6 & F7 CUT OFF FOR C2 & C3 AS INDICATED FOR CENTRE SECTION.
1·74" RAD.
POSITION OF TUBE ON F7. MAKE PAPER TUBE ROUND U/C LEG.
FUSELAGE JIG. STICK THIN CARD LIGHTLY TO FORMERS, CUT HOLES & THREAD ON TO LENGTH OF ½" x ½" BIRCH.
SOLDER TO SHAFT
18 G. SCREWED BRASS BUSHES
¼" SHEET PLUG
WINDING LOOP
FREEWHEEL PARTS 20G.
HARD BALSA SPINNER
BALL RACE.
PROP. SHAFT 16 G.
· PROP. ASSEMBLY · FULL SIZE
1/64" SHEET COVERING TOP & BOTTOM
1/32" SHEET COVER
L.E. 1/8" x 1/16"
GRAIN
MAIN SPAR 1/8" x 3/16"
SPAN 16½"
CAPPING STRIPS 3/32" x 1/64"
T.E. 3/8" x 3/32".
· TAILPLANE - 1/3 FULL SIZE ·
L.E. PROJECTS 1/32" TO ALLOW FOR SHEET COVERING.
ALL RIBS 1/32" SHEET.
FULL SIZE TAILPLANE RIB
BAMBOO PLUG TO FIT BOBBIN.
METHOD OF ATTACHING SHEET COVERING TO RIBS
POWER: 15 YARDS OF 3/16" x 1/30" ARRANGED IN 8 LOOPS · MAKE INTO ROPE.
¼" SQUARES
FINS · 1/3 FULL SIZE. MAKE TWO 1/16" SHEET.
BRACE "X"
DETAIL OF CENTRE SECTION CONSTRUCTION.
1 OFF - 1/8" SHEET. CEMENT TO C1 AS SHOWN.
PROP. BLOCK 14½" x 1½" x 1½" HARD BALSA.
MAIN SPAR BRACE FROM 1/16" SHEET.
MAIN SPAR DIHEDRAL.
· STARBOARD WING · 1/3 FULL SIZE ·
1/64" SHEET COVERING, TOP & BOTTOM.
L.E. 1/8" x ¼"
CUT FROM SHEET
T.E. ½" x 3/32"
MAINSPAR 1/8" x 3/16"
TIPS ¼" SHEET.
1/8" SQ. REINFORCING
FILLETS 1/8" SHEET.
CAPPING STRIPS 3/32" x 1/64".
FULL SIZE RIB (W1) WING SECTION GRANT M9.
1/8" x ¼" CENTRE SECTION BRACE "X" FULL SIZE · SEE DETAIL.


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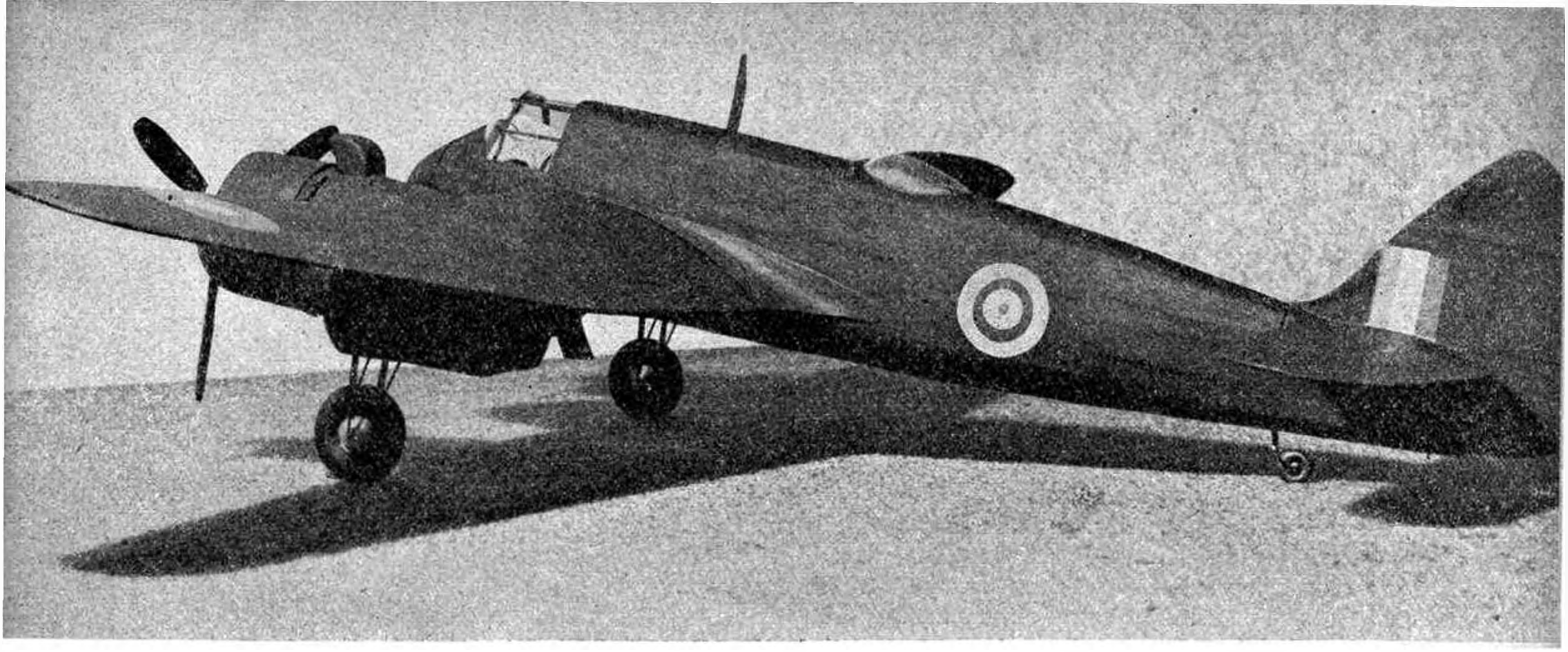


BRISTOL "BEAUFIGHTER" I

By W. R. JONES

HEREWITH are the plans for building Britain's latest night fighter. Several original constructional features have been embodied in the design, resulting in a very robust model which will stand quite a lot of "man-handling." No "super-duration" can be expected of the "Beaufighter"—in fact, the longest flight to date has been one of 26½ seconds. The model is very tricky to trim and fly, but if the instructions are followed "to the letter" reasonable results can be expected; it will also give hours of building enjoyment, and will enable the builder to conduct various experiments in the "twin engine scale model" world.

Fuselage Construction.

This is the most difficult operation and very great care must be taken to ensure accuracy. Cut out formers, keels, etc. Insert keels (top and bottom) into the notches on the formers, and glue in position. Next mark the former positions on the 3/32 in. square longerons and glue into notches on formers (top longerons are fitted first). Steam the top and bottom longerons to take up the curves forward of No. 3 former. Glue all 1/16 in. square stringers (birch if possible) in the former notches.

NOTE :—Fuselage must be trued up from time to time in these operations. The fuselage is now covered with 1/32 in. soft sheet balsa "planked" (i.e. using 1 in. × 1/32 in. strips of wood).

NOTE :—Planking is commenced *after* the windscreen and cockpit covers have been glued in position. The part of fuselage extending from former No. 3 to former No. 5 must be covered last, and when this is done the bottom longeron must be cut at these two formers (see notes on plan) so that it falls away.

The *centre-section spars* are now fitted on to formers 3A and 4A and the ribs are glued into place. This operation may be a little trying, so take care with the building. Cover the *underside* of the centre plane with 1/32 in. wood before the *nacelles* are glued in place. (Drawings show all details of nacelle construction.) Cut away the underside of centre section covering to take the nacelles and then fit the *top rear portion* of the nacelle keel. The top rear nacelle covering is now glued in position (Drawings give all details.)

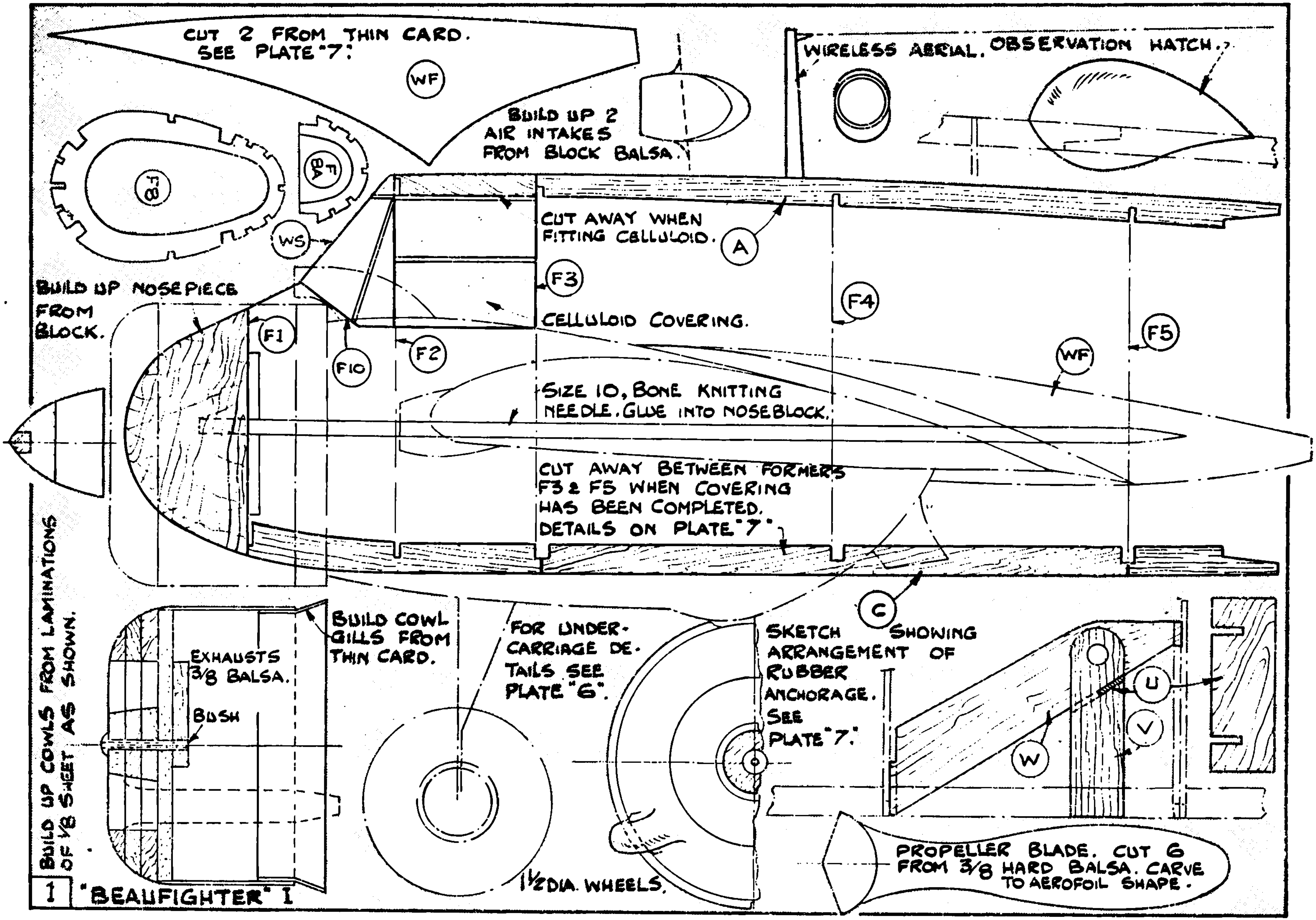
The *wings*, *tailplane* and *rudder* need no explanation here as the construction is quite straightforward. Plans give all information needed.

The "*undercarriage*" is built up as shown on the drawings.

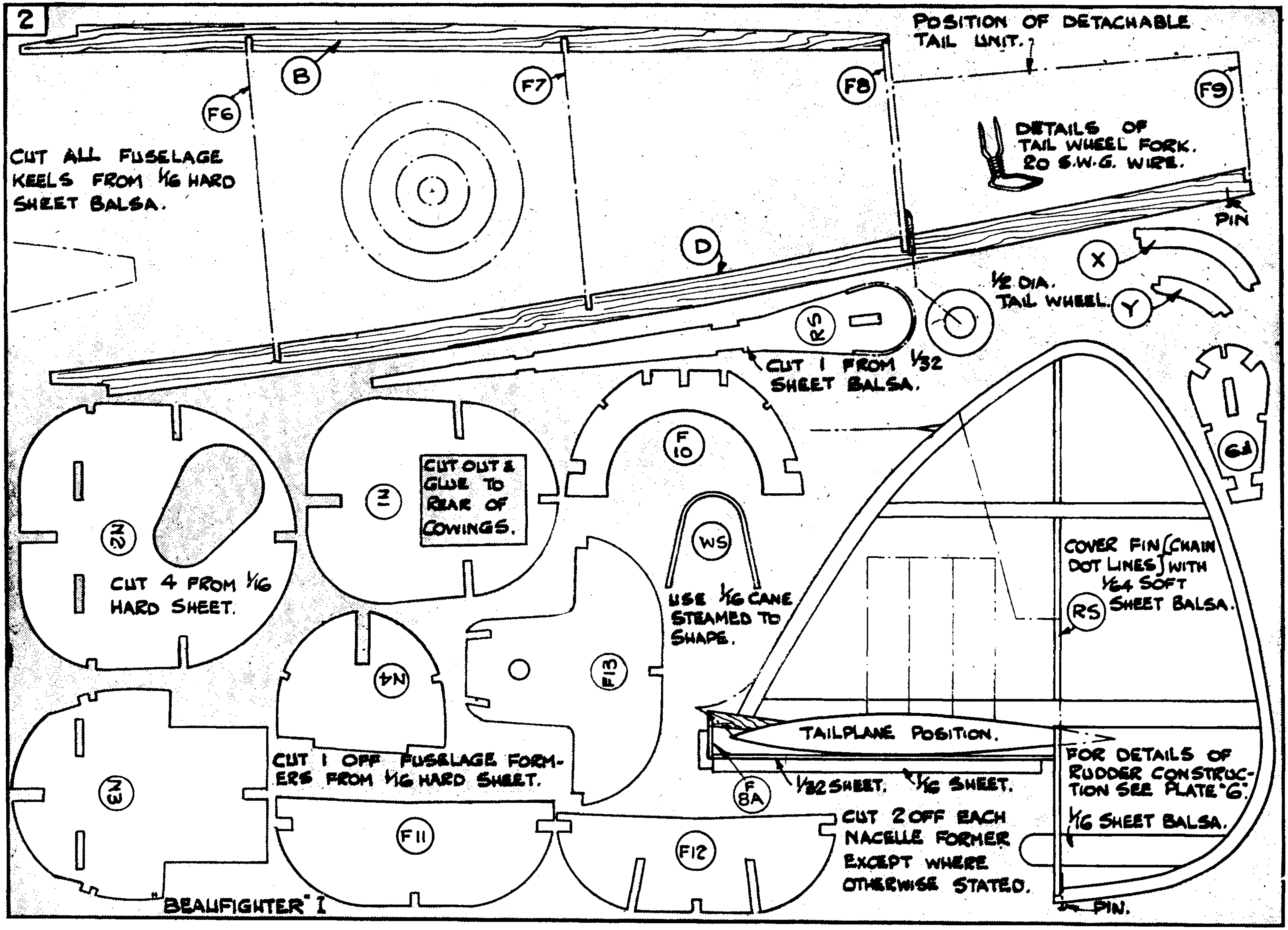
The *observation hatch* is moulded from celluloid, a "tricky business," but it *can* be done (see photographs). The two formers (inside and outside) are made from wood. Insert celluloid between formers (after putting into boiling water) and push the outer former up into the inner one. Several "boiling water" insertions may be required before the hatch emerges to your satisfaction—that was my experience, anyway!

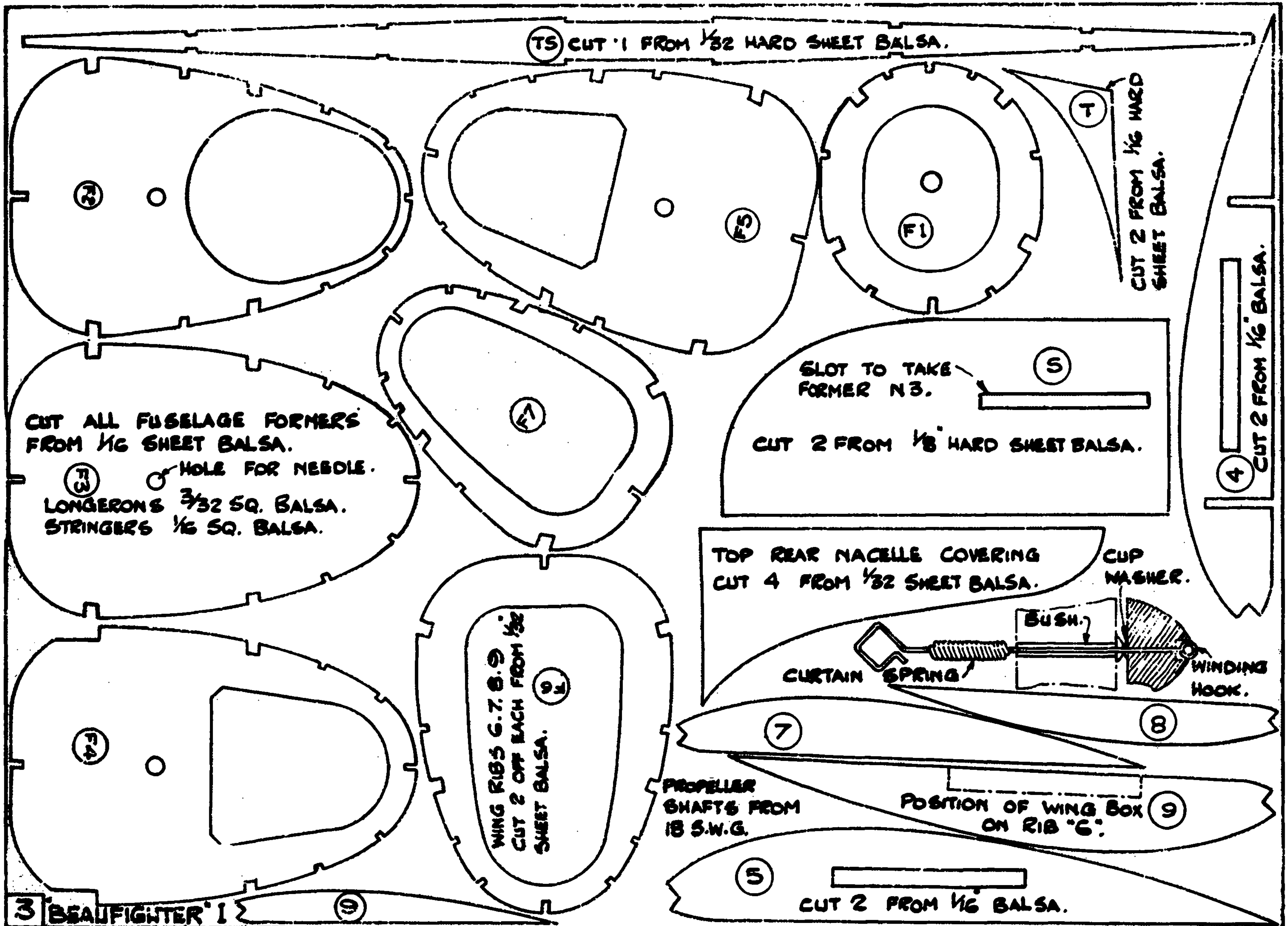
Tissue covering is applied over the entire framework (including fuselage) and two thin coats of clear dope and one of banana oil are applied. Take care to avoid wrinkles when covering.

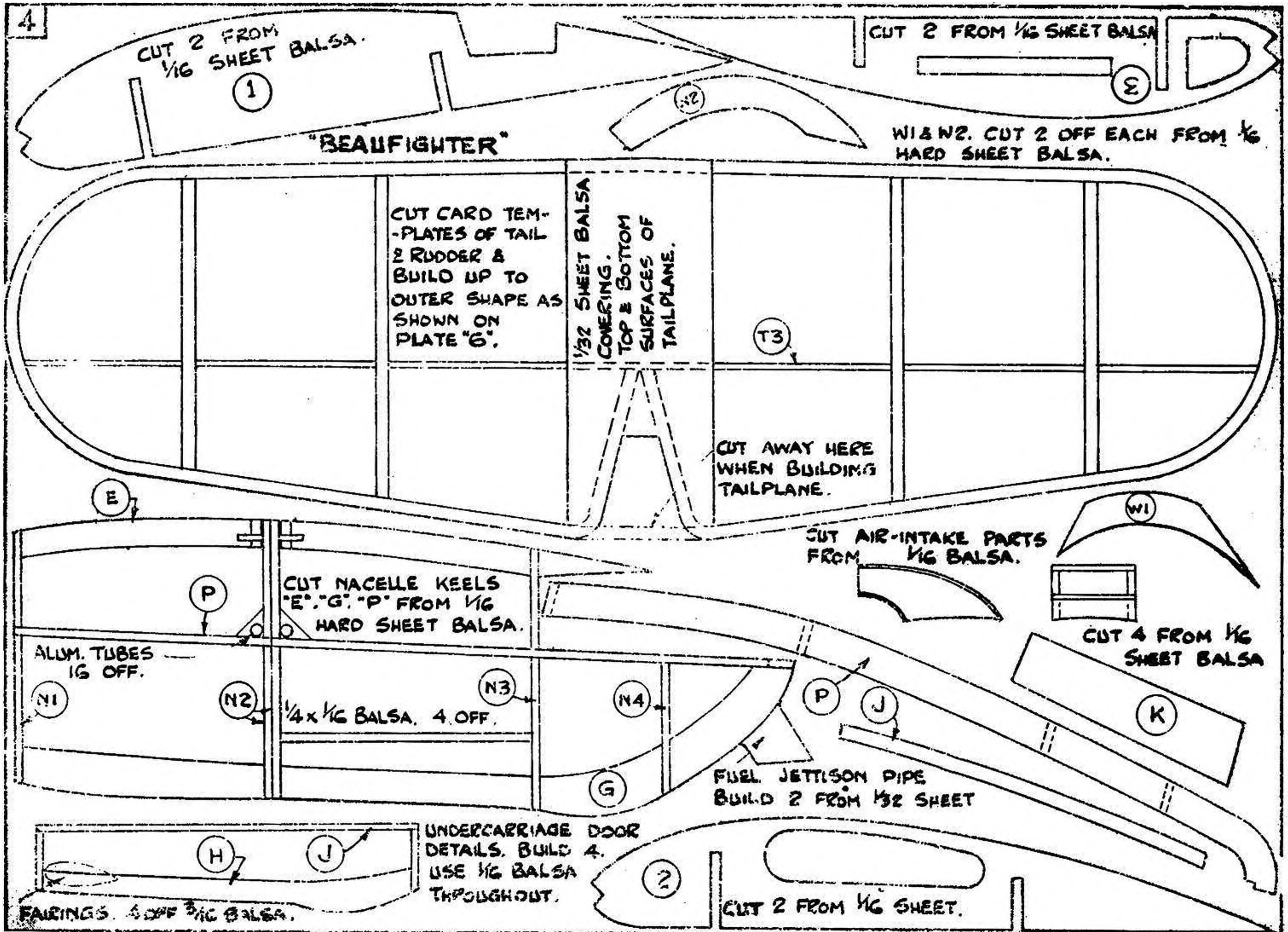
Little can be said about *Flying*, but use three loops of 3/16 in. × 1/30 in. brown rubber, well lubricated, and start with 100 turns on each motor (when gliding tests have been successfully concluded). As stated at the beginning of this article, the "Beaufighter" opens up new and very interesting fields and I shall be pleased to hear (through the Editor) of any interesting times, etc. This applies also to any difficulties encountered in the building. Before I leave you I should mention that the original model is painted "night flying black," but it may also be camouflaged for "daylight" operations.

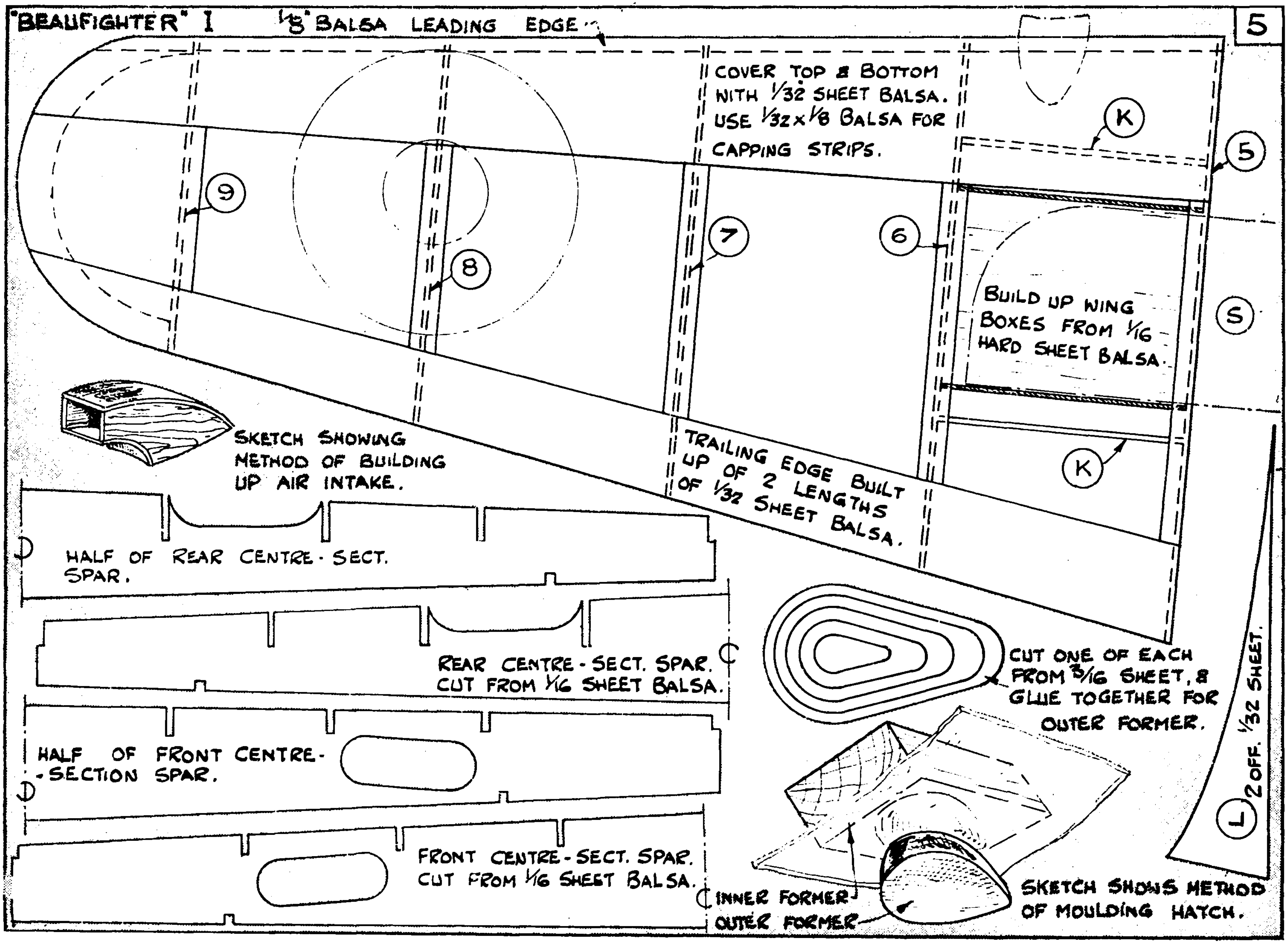


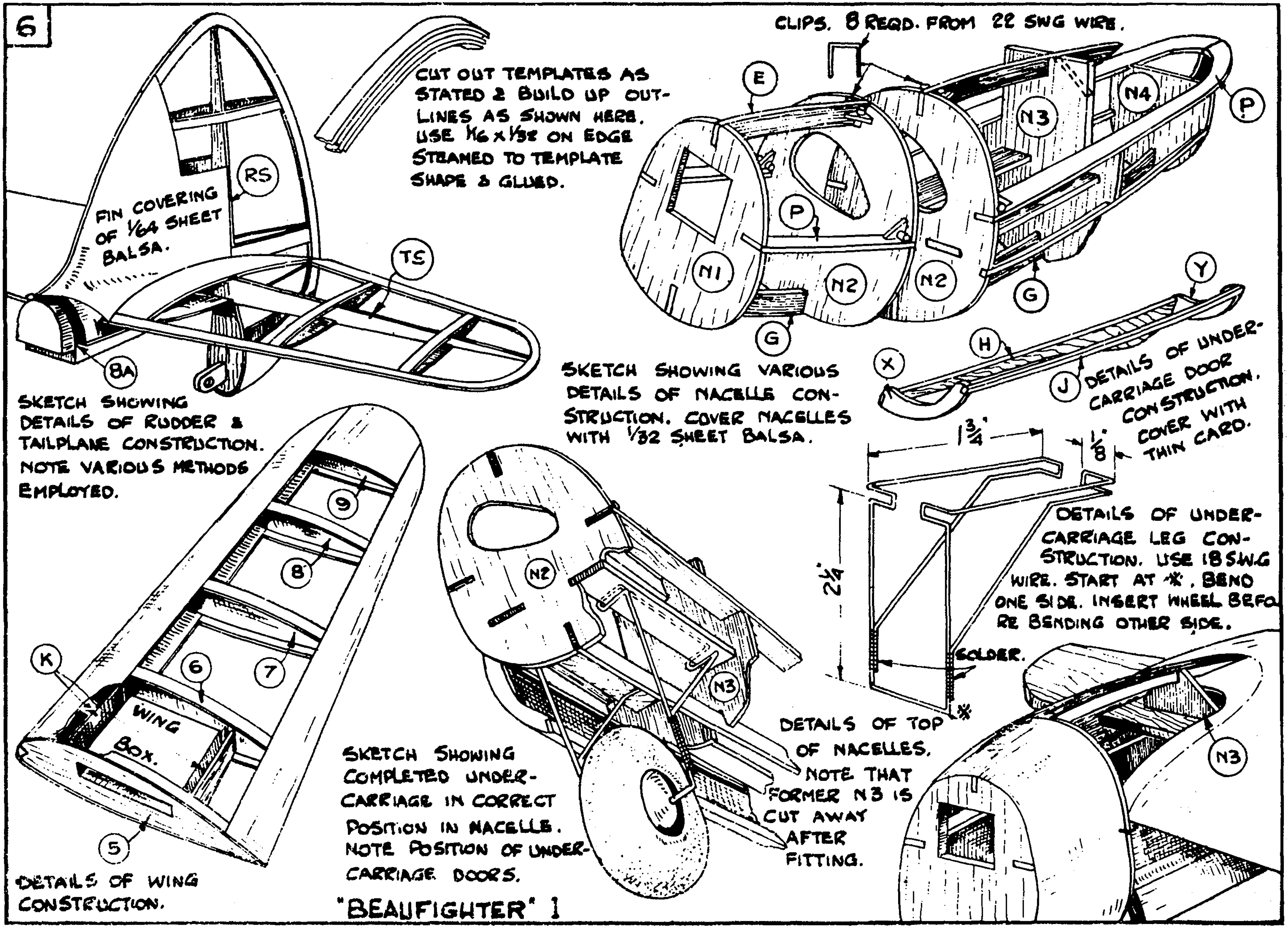
CUT 2 FROM THIN CARD. SEE PLATE "7".
WF
BUILD UP 2 AIR INTAKES FROM BLOCK BALSA.
WIRELESS AERIAL.
OBSERVATION HATCH.
F8
F8A
WS
CUT AWAY WHEN FITTING CELLULOID.
A
F3
CELLULOID COVERING.
F4
F5
BUILD UP NOSEPIECE FROM BLOCK.
F1
F10
F2
WF
SIZE 10, BONE KNITTING NEEDLE. GLUE INTO NOSEBLOCK.
CUT AWAY BETWEEN FORMERS F3 & F5 WHEN COVERING HAS BEEN COMPLETED. DETAILS ON PLATE "7".
C
BUILD UP COWLS FROM LAMINATIONS OF 1/8 SHEET AS SHOWN.
EXHAUSTS 3/8 BALSA.
BUSH
BUILD COWL GILLS FROM THIN CARD.
FOR UNDERCARRIAGE DETAILS SEE PLATE "6".
SKETCH SHOWING ARRANGEMENT OF RUBBER ANCHORAGE. SEE PLATE "7".
U
V
W
1 1/2 DIA. WHEELS.
PROPELLER BLADE. CUT 6 FROM 3/8 HARD BALSA. CARVE TO AEROFOIL SHAPE.
1
"BEAUFIGHTER" I

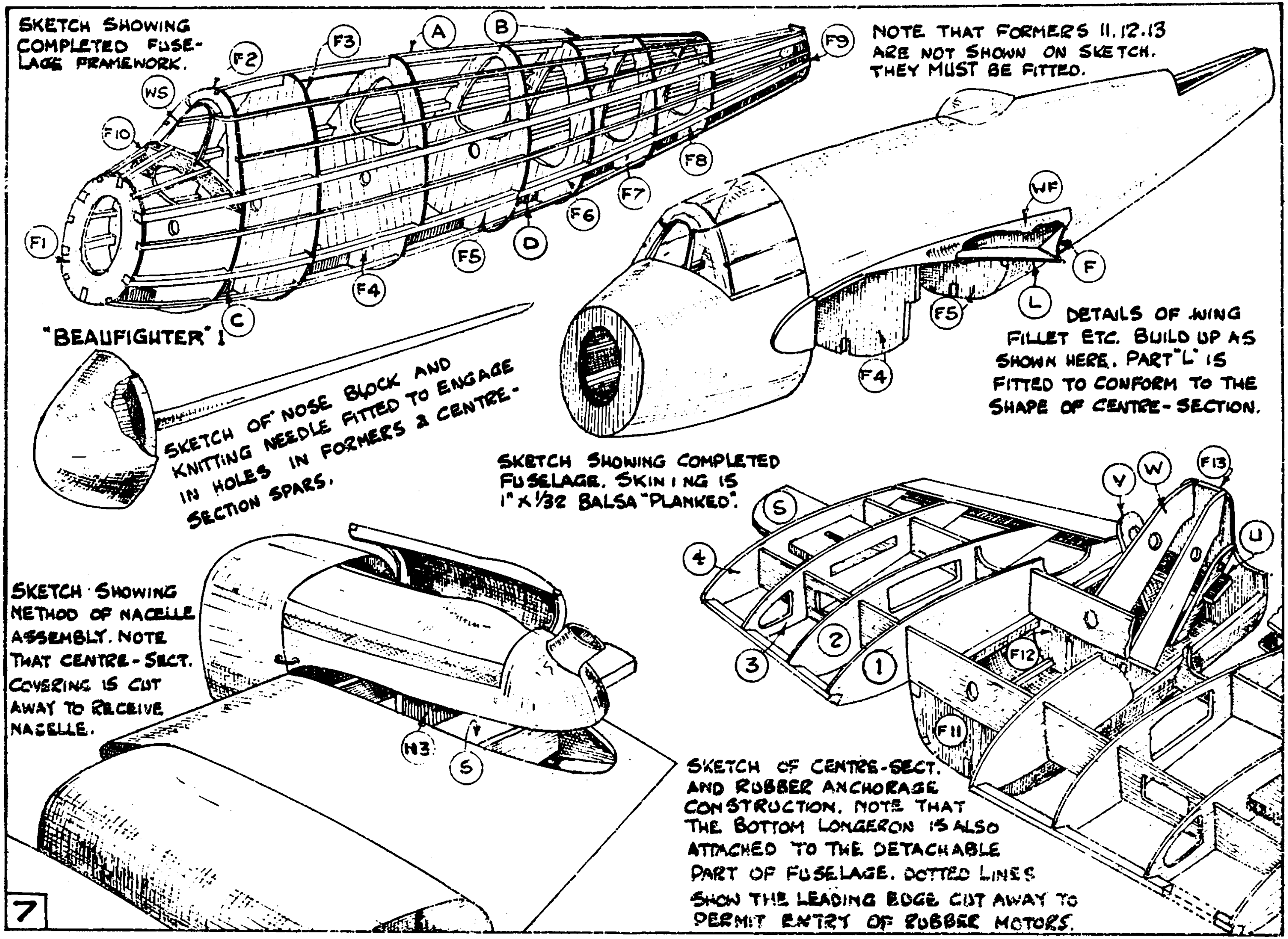

2
POSITION OF DETACHABLE TAIL UNIT.
B
F6
F7
F8
F9
D
CUT ALL FUSELAGE KEELS FROM 1/16 HARD SHEET BALSA.
DETAILS OF TAIL WHEEL FORK. 20 S.W.G. WIRE.
PIN
X
Y
1/2 DIA. TAIL WHEEL.
RS
CUT 1 FROM 1/32 SHEET BALSA.
F 10
N2
CUT 4 FROM 1/16 HARD SHEET.
N1
CUT OUT & GLUE TO REAR OF COWINGS.
WS
USE 1/16 CANE STEAMED TO SHAPE.
N4
F13
N3
CUT 1 OFF FUSELAGE FORMERS FROM 1/16 HARD SHEET.
F11
F12
F 8A
1/32 SHEET.
1/16 SHEET.
TAILPLANE POSITION.
COVER FIN (CHAIN DOT LINES) WITH 1/64 SOFT SHEET BALSA.
FOR DETAILS OF RUDDER CONSTRUCTION SEE PLATE "G".
1/16 SHEET BALSA.
CUT 2 OFF EACH NACELLE FORMER EXCEPT WHERE OTHERWISE STATED.
PIN.
"BEAUFIGHTER" I


TS CUT 1 FROM 1/32 HARD SHEET BALSA.
F2
F5
F1
T
CUT 2 FROM 1/16 HARD SHEET BALSA.
CUT 2 FROM 1/16" BALSA.
4
5
SLOT TO TAKE FORMER N3.
CUT 2 FROM 1/8" HARD SHEET BALSA.
CUT ALL FUSELAGE FORMERS FROM 1/16 SHEET BALSA.
F3
HOLE FOR NEEDLE.
LONGERONS 3/32 SQ. BALSA.
STRINGERS 1/16 SQ. BALSA.
F7
TOP REAR NACELLE COVERING CUT 4 FROM 1/32 SHEET BALSA.
CUP WASHER.
BUSH.
CURTAIN SPRING
WINDING HOOK.
7
8
F4
WING RIBS 6.7.8.9. CUT 2 OFF EACH FROM 1/32 SHEET BALSA.
F6
PROPELLER SHAFTS FROM 18 S.W.G.
POSITION OF WING BOX ON RIB "6".
9
5
CUT 2 FROM 1/16 BALSA.
3 BEAUFIGHTER I
9


4
CUT 2 FROM 1/16 SHEET BALSA.
1
"BEAUFIGHTER"
CUT 2 FROM 1/16 SHEET BALSA
W2
W1 & W2. CUT 2 OFF EACH FROM 1/16 HARD SHEET BALSA.
CUT CARD TEM-PLATES OF TAIL & RUDDER & BUILD UP TO OUTER SHAPE AS SHOWN ON PLATE "6".
1/32 SHEET BALSA COVERING. TOP & BOTTOM SURFACES OF TAILPLANE.
T3
CUT AWAY HERE WHEN BUILDING TAILPLANE.
E
W1
CUT AIR-INTAKE PARTS FROM 1/16 BALSA.
CUT NACELLE KEELS "E". "G". "P" FROM 1/16 HARD SHEET BALSA.
P
CUT 4 FROM 1/16 SHEET BALSA
ALUM. TUBES 16 OFF.
N1
N2
1/4 x 1/16 BALSA. 4 OFF.
N3
N4
P
J
K
G
FUEL JETTISON PIPE BUILD 2 FROM 1/32 SHEET
H
J
UNDERCARRIAGE DOOR DETAILS. BUILD 4. USE 1/16 BALSA THROUGHOUT.
2
FAIRINGS. 4 OFF 3/16 BALSA.
CUT 2 FROM 1/16 SHEET.


"BEAUFIGHTER" I
1/8" BALSA LEADING EDGE
5
COVER TOP & BOTTOM WITH 1/32 SHEET BALSA. USE 1/32 x 1/8 BALSA FOR CAPPING STRIPS.
K
5
9
8
7
6
BUILD UP WING BOXES FROM 1/16 HARD SHEET BALSA.
S
K
SKETCH SHOWING METHOD OF BUILDING UP AIR INTAKE.
TRAILING EDGE BUILT UP OF 2 LENGTHS OF 1/32 SHEET BALSA.
HALF OF REAR CENTRE-SECT. SPAR.
REAR CENTRE-SECT. SPAR. CUT FROM 1/16 SHEET BALSA.
CUT ONE OF EACH FROM 3/16 SHEET, & GLUE TOGETHER FOR OUTER FORMER.
2 OFF. 1/32 SHEET.
L
HALF OF FRONT CENTRE-SECTION SPAR.
FRONT CENTRE-SECT. SPAR. CUT FROM 1/16 SHEET BALSA.
INNER FORMER
OUTER FORMER
SKETCH SHOWS METHOD OF MOULDING HATCH.


6
FIN COVERING OF 1/64 SHEET BALSA.
RS
TS
8A
SKETCH SHOWING DETAILS OF RUDDER & TAILPLANE CONSTRUCTION. NOTE VARIOUS METHODS EMPLOYED.
CUT OUT TEMPLATES AS STATED & BUILD UP OUT-LINES AS SHOWN HERE. USE 1/16 x 1/32 ON EDGE STEAMED TO TEMPLATE SHAPE & GLUED.
CLIPS. 8 REQD. FROM 22 SWG WIRE.
E
P
N1
N2
N2
N3
N4
P
G
G
SKETCH SHOWING VARIOUS DETAILS OF NACELLE CON-STRUCTION. COVER NACELLES WITH 1/32 SHEET BALSA.
X
H
J
Y
DETAILS OF UNDER-CARRIAGE DOOR CONSTRUCTION. COVER WITH THIN CARD.
1 3/4"
1/8"
2 1/4"
DETAILS OF UNDER-CARRIAGE LEG CON-STRUCTION. USE 18 S.W.G WIRE. START AT *, BEND ONE SIDE. INSERT WHEEL BEFO-RE BENDING OTHER SIDE.
SOLDER.
*
9
8
7
6
K
WING BOX.
5
DETAILS OF WING CONSTRUCTION.
N2
N3
SKETCH SHOWING COMPLETED UNDER-CARRIAGE IN CORRECT POSITION IN NACELLE. NOTE POSITION OF UNDER-CARRIAGE DOORS.
DETAILS OF TOP OF NACELLES. NOTE THAT FORMER N3 IS CUT AWAY AFTER FITTING.
N3
"BEAUFIGHTER" 1


SKETCH SHOWING COMPLETED FUSELAGE FRAMEWORK.
F1
F10
WS
F2
F3
A
B
F9
C
F4
F5
D
F6
F7
F8
NOTE THAT FORMERS 11.12.13 ARE NOT SHOWN ON SKETCH. THEY MUST BE FITTED.
WF
F
L
F5
F4
DETAILS OF WING FILLET ETC. BUILD UP AS SHOWN HERE. PART "L" IS FITTED TO CONFORM TO THE SHAPE OF CENTRE-SECTION.
"BEAUFIGHTER" I
SKETCH OF NOSE BLOCK AND KNITTING NEEDLE FITTED TO ENGAGE IN HOLES IN FORMERS & CENTRE-SECTION SPARS.
SKETCH SHOWING COMPLETED FUSELAGE. SKINNING IS 1" x 1/32 BALSA "PLANKED".
SKETCH SHOWING METHOD OF NACELLE ASSEMBLY. NOTE THAT CENTRE-SECT. COVERING IS CUT AWAY TO RECEIVE NACELLE.
N3
S
S
4
3
2
1
V
W
F13
U
F12
F11
SKETCH OF CENTRE-SECT. AND RUBBER ANCHORAGE CONSTRUCTION. NOTE THAT THE BOTTOM LONGERON IS ALSO ATTACHED TO THE DETACHABLE PART OF FUSELAGE. DOTTED LINES SHOW THE LEADING EDGE CUT AWAY TO PERMIT ENTRY OF RUBBER MOTORS.
7

"LAZYBONES"

An easy-to-build yet contest winning microfilm model for the beginner and expert alike.

By JOEL SENBER

Materials.

(All wood is soft, except where noted.)
1 sheet, 1/64 in. × 2 in. × 12 in., for boom.
1 sheet, 1/32 in. × 2 in. × 24 in. (quarter-grained), for motor stick, ribs.
1 sheet, 1/16 in. × 1 in. × 24 in., for wing spars and struts.
6 strips, 1/32 in. × 1/32 in. × 24 in., for outlines.
1 block, 13 x x x (quarter-grained), for propeller.
Wire, washers, ½ oz. glue, 1 oz. "mike" solution, bearing.

Mike Solution.

6 pts. banana oil.
3 pts. amyl acetate.
1 pt. castor oil.
For best results, shake well and leave to stand for a few days before using.

PLANS on PAGES 128-9-30

The Stick.

The blank for the stick should be cut from 1/32 in. quarter-grained sheet and sanded slightly with very fine sandpaper. It should be allowed to soak in hot water, together with the tail-boom, which is cut from 1/64 in. straight-grained stock.

They are then bent around their respective formers, taped with strips of gauze or cloth and put aside. When dry, the seams are cemented, always keeping in mind that glue is used very sparingly to save weight. Next the caps, bearing, hooks, etc., are cemented in place. Incidentally, the stick is always used with its seam on top or nearest the wing.

Tail Assembly.

A strip of 1/32 in. square is soaked in hot water and then slowly, and with uniform pressure, bent around the rudder template and pinned in place. When dry the braces are cemented in.

The stabiliser is constructed in somewhat the same manner. 1/32 in. square is bent around its template and then the whole is pinned to a board. While it is drying the ribs are cut. Notice they are all cut to the same length and are fitted by cutting one-third off the leading edge and two-thirds off the trailing edge, thus maintaining the proper airfoil shape.

The Wing.

The first step is to cut, taper and sand the spars. They are cut from 1/16 in. sheet, tapering from 3/32 in. in the centre to 1/32 in. at the tips, and are sanded to size as shown in the plans. Using the wing template, the spars are pinned to a board and the ribs glued in. Next the tips are bent in exactly the same way as the rudder, and are glued on to complete the wing structure.

The Propeller.

Cut the block for the propeller and shape, and drill the hole for the shaft. (A needle is ideal for this.) Now, with a very sharp knife, start carving, taking off long, thin shavings. The underside or concave of both blades is carved first and completely finished by sanding first with 6–0 paper and then with 10–0.

Now for the top or convex side. (Note the airfoil section of the propeller.) With the knife again shape both blades to a thickness of 3/32 in. Then, holding the propeller very carefully, commence sanding the convex side with long, even strokes, in one direction only. Holding the propeller over a lighted jar while sanding will facilitate this operation.

The blades should be matched for pitch, flexibility and weight. Remember, a well-balanced and smooth-running propeller is the secret of success in an indoor job. Every extra hour spent on the propeller will be well rewarded by longer, smoother flight.

Covering.

All parts should be weighed before covering is attempted, and checked against the table of weights given on the plan. The fact that your model may be a trifle heavy (and we're taking that for granted) does not necessarily mean that the flying qualities of "Lazybones" will be impaired, providing the weights of the parts are in proportion, *i.e.* the rudder should not weigh more than the wing or stick, etc.

It would be a good idea to make the "mike" before covering, too, so let's up and at it.

First step and a sometimes exasperating one, is to persuade all members of the family (including the cat) to sort of—ah—evacuate the premises, so to speak, 'cause no one but a model-builder can appreciate the sweet, exalting smell (to put it mildly) and the gooey mess which characterises the preparation of "mike."

Then plug up the telephone, door-bell, etc., stride briskly into the bathroom with a conquering air (also a bottle of "mike" solution, a spoon, hoops, etc.) and a prayer on your lips. Loosen up your braces, bend over the tub and proceed.

Plug up all miscellaneous apertures, fix the leaky tap, and allow about two to five inches of water in the tub. The water should be soap-free and lukewarm—about 70° F.—and very still.

Holding a spoonful of the solution about 2 in. from the surface of the water, pour it slowly on to the water and draw the spoon lengthwise across the tub.

After a very short while the edges on the sheet of microfilm will start to wrinkle, and it is now time to attempt a "pick-up" from the water.

Carefully place a hoop on top of the "mike" and gather up the surplus film to the edge of the hoop, folding it over the wire. Now, using one side of the hoop as a sort of pivot to remain on the surface of the water, you gradually lift the other side out. When the hoop is tilted about 45°, the whole thing is lifted clear, and, presto !—there's your sheet of "mike."

Make a few sheets of "mike" and hang them up (out of danger) so as to allow the water on them to evaporate.

The actual covering job is extremely simple. Wet the framework, either with a fine brush dipped in plain water or by using your tongue to spread saliva over it. Drop the framework lightly on to a sheet of microfilm, pressing gently to make it stick.

The parts are now trimmed, either with a brush dipped in acetone or a hot wire. Loose film is tightened by holding it above a very low gas flame.

The wing is covered in one piece, broken at the centre, dihedral put in, and the loose film tightened by heat.

Assembly and Flying.

Glue the rudder and stabiliser to the tail-boom, and the boom to the stick. Block up the wing and cement the struts in place. Put two well-oiled washers on the propeller shaft and slip it through the bearing.

Attach the wing so that the clips are firm, but do not crush the stick.

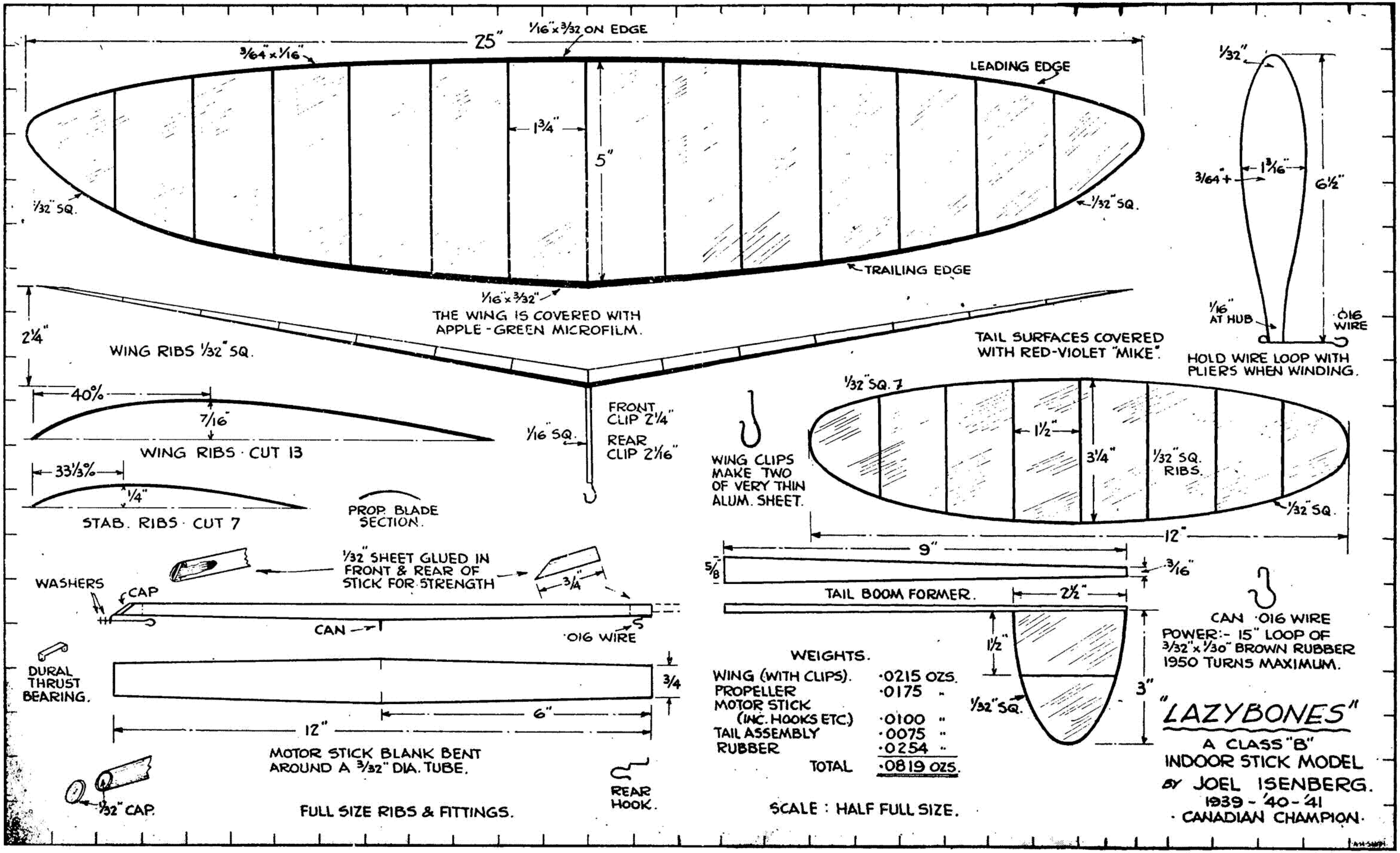
A well-lubricated loop of 3/32 in. brown rubber is put on the hooks, the whole model balanced, and "Lazybones" is now ready for its first test glides.

Again using your power of persuasion, get rid of that family. They are a menace to model-building. From our experience with families, they just love to stress-analyse a model with their hands, which is not any too healthy for the model.

Launch the model, nose down, with a very gentle push, and, observing the reactions, correct for stall or dive by moving the wing backwards or forwards as necessary.

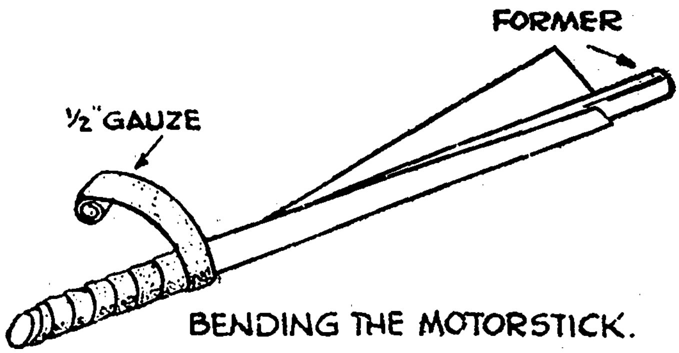
The first power flight should be made with only a few hundred turns in, gradually adding a hundred turns on each successive flight, as the model is adjusted for turn and climb.

When flying under a very low ceiling, try a long loop of 5/64 in. This will serve to keep the model low.



25"
1/16" x 3/32 ON EDGE
3/64" x 1/16"
LEADING EDGE
1 3/4"
5"
1/32" SQ.
1/32" SQ.
TRAILING EDGE
1/16" x 3/32"
THE WING IS COVERED WITH APPLE-GREEN MICROFILM.
2 1/4"
WING RIBS 1/32" SQ.
40%
7/16"
WING RIBS · CUT 13
33 1/3%
1/4"
STAB. RIBS · CUT 7
PROP. BLADE SECTION.
1/16 SQ.
FRONT CLIP 2 1/4"
REAR CLIP 2 1/16"
WING CLIPS MAKE TWO OF VERY THIN ALUM. SHEET.
1/32"
3/64"
1 3/16"
6 1/2"
1/16" AT HUB
.016 WIRE
HOLD WIRE LOOP WITH PLIERS WHEN WINDING.
TAIL SURFACES COVERED WITH RED-VIOLET "MIKE".
1/32" SQ.
1 1/2"
3 1/4"
1/32" SQ. RIBS.
1/32" SQ.
12"
1/32" SHEET GLUED IN FRONT & REAR OF STICK FOR STRENGTH
WASHERS
CAP
3/4"
CAN
.016 WIRE
DURAL THRUST BEARING.
3/4
6"
12"
MOTOR STICK BLANK BENT AROUND A 3/32" DIA. TUBE.
1/32" CAP.
FULL SIZE RIBS & FITTINGS.
REAR HOOK.
9"
5/8
3/16"
TAIL BOOM FORMER.
2 1/2"
1 1/2"
3"
1/32" SQ.
CAN .016 WIRE
POWER:- 15" LOOP OF 3/32" x 1/30" BROWN RUBBER 1950 TURNS MAXIMUM.
WEIGHTS.
WING (WITH CLIPS). .0215 OZS.
PROPELLER .0175 "
MOTOR STICK (INC. HOOKS ETC.) .0100 "
TAIL ASSEMBLY .0075 "
RUBBER .0254 "
TOTAL .0819 OZS.
SCALE : HALF FULL SIZE.
"LAZYBONES"
A CLASS "B" INDOOR STICK MODEL
BY JOEL ISENBERG.
1939 - '40 - '41 CANADIAN CHAMPION.

MODES OF CONSTRUCTION
FOR INDOOR MODELS.

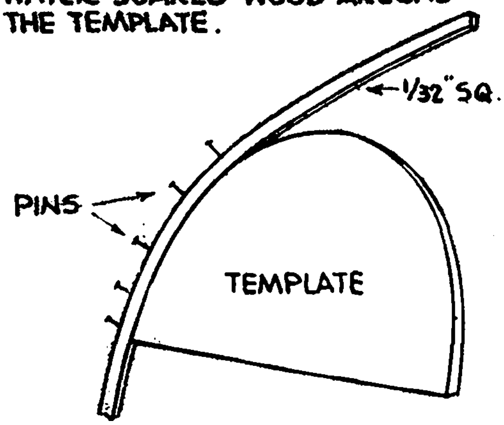


BENDING THE MOTORSTICK.

START WITH ONE END OF THE BLANK AND GRADUALLY BEND IT AROUND THE FORMER, INCH BY INCH, TAPING AS YOU GO ALONG.

FIG. 1.

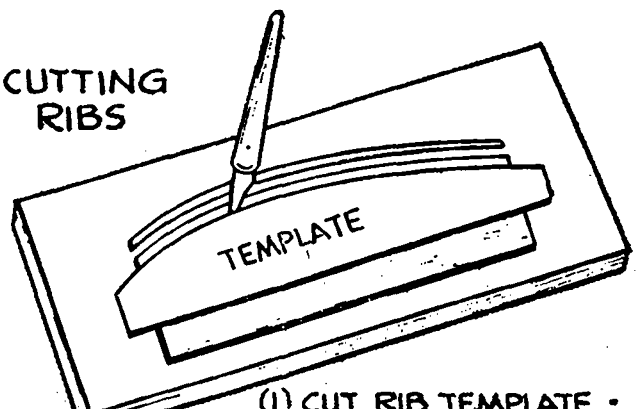
APPLY EQUAL PRESSURE WHEN BENDING WATER-SOAKED WOOD AROUND THE TEMPLATE.



BENDING RUDDER OUTLINE.

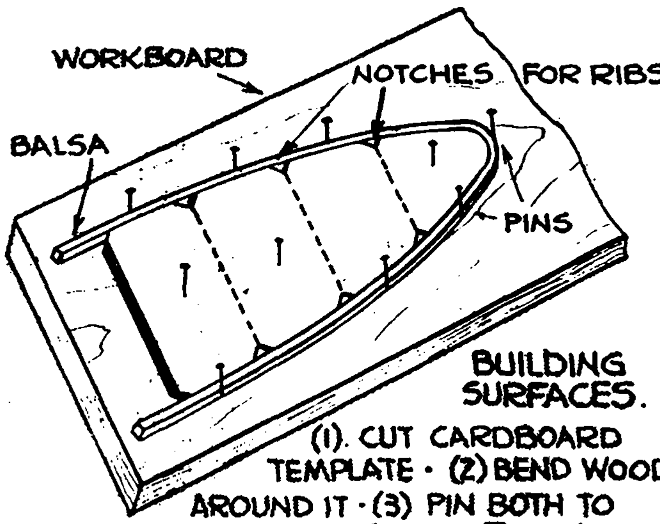
FIG. 2.

CUTTING RIBS



(1) CUT RIB TEMPLATE ·
(2) PLACE IT ON 1/32" SHEET & CUT ·
(3) MOVE TEMPLATE DOWN 1/32" & CUT AGAIN
REPEAT FOR REQUIRED RIBS.

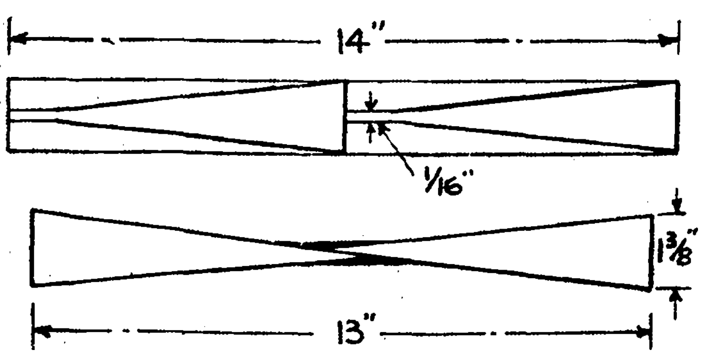
FIG. 3.



BUILDING SURFACES.

(1). CUT CARDBOARD TEMPLATE · (2) BEND WOOD AROUND IT · (3) PIN BOTH TO BOARD TO DRY.

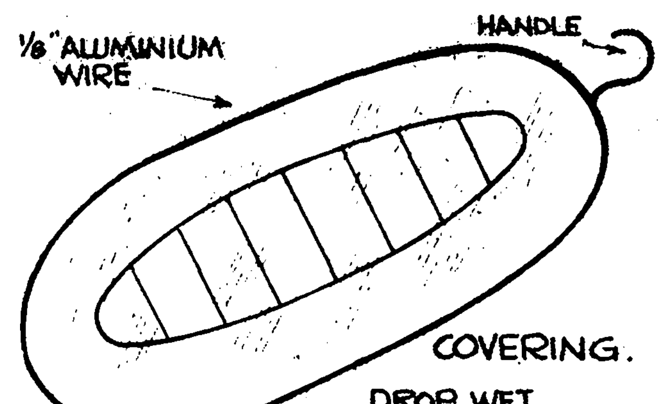
FIG. 4.



PROPELLER.

METHOD OF QUARTER-GRAINING BLADES

FIG. 5.



COVERING.

DROP WET FRAMEWORK ON TO HOOP OF MICROFILM & PRESS GENTLY TRIM WITH HOT WIRE.

FIG. 6.

MONTHLY MEMORANDA—

—ON COLOUR MARKINGS OF THE WORLD'S AIRCRAFT.

By O. G. THETFORD

(CO-COMPILOR, WITH H. J. COOPER, OF "AIRCRAFT OF THE FIGHTING POWERS".)

A 10 in. span Solid Model, with hinged rudder and retractable undercarriage, built by Mr. L. W. Stonell.

This new feature which will appear monthly has been introduced with the object of providing for readers an up-to-the-minute news service on military aircraft and the world's air forces but will also, on occasion, pay some attention to civil aircraft and those "veteran" pre-War Service aeroplanes and prototypes still to be seen about the country.

Current developments in camouflage schemes and international insignias are to be the subject of particular attention since, apart from the obvious needs of the solid modeller for such information, the correspondence received at these offices is indicative of a widespread interest in the topic.

Service Aircraft Markings "Ready Reference."

Camouflage schemes on Royal Air Force and Fleet Air Arm aeroplanes are changed with such remarkable frequency nowadays that any effort to summarize them is somewhat hazardous. However, the information which follows may be taken as accurate for all machines in use at the present time (February), and is the most complete guide which may be published compatible with the existing censorship regulations. Future changes will be announced in this series month by month.

Fighter Command aeroplanes may now be broadly divided into two categories; day fighters and night fighters. Single-motor and twin-motor day fighters based in this country (Hurricane I and II, Spitfire II and V, Tornado I, Typhoon I, Mohawk III and IV, Tomahawk II, Airacobra I, Kittihawk, Mustang, Whirlwind I and Beaufighter I) have the upper surfaces painted dark slate grey and dark sea grey and the undersides a light sea grey. An eighteen-inch duck-egg blue band is painted round the fuselage ahead of the tail assembly and the spinner is also duck-egg blue. A yellow strip six inches wide is painted along the leading edge of the wing from the tips half-way to the roots. Red and blue cockades appear above each wingtip and red, white, blue and yellow on the fuselage. Fin stripes are on the fin and red, white and blue cockades beneath each wingtip. Night fighters in all theatres of war (Defiant I, Hurricane I and II, Havoc I and II, Blenheim IV and Beaufighter I) are jet black all over. National markings are confined to red and blue cockades above the wings, red, white, blue and yellow on the fuselage and fin stripes.

Medium day bombers (Blenheim IVF and Boston III) and heavy day bombers (Halifax I and Stirling I) have dark earth and dark green upper surfaces and pale duck-egg blue undersides. Red and blue cockades are painted above the wings and red, white, blue and yellow on the fuselage in addition to the fin stripes.

High-altitude day bombers (Fortress I) have dark earth and dark green upper surfaces and azure blue undersides. National markings same as medium bomber.

Heavy night bombers (Stirling I, Halifax I, Manchester I, Whitley V, Wellington Ic, II and III and Hampden I) have dark earth and dark green upper surfaces and jet black undersides. The black paint is applied to the sides of the fuselage to a point level with the leading edge of the wing forward to the nose and between the trailing edge of the wing and the leading edge of the tailplane aft. The fin and rudder are also black. National markings are same as medium day bomber.

Coastal Command aircraft (Hudson III, IV and V, Beaufort I and II, Blenheim IVF, Sunderland I and II, Lerwick I, Catalina I, Liberator I and any other type normally used by Fighter or Bomber Command which may be temporarily transferred) are painted dark sea grey and dark slate grey on the upper surfaces and pale duck-egg blue beneath. National markings are same as day bombers.

Army Co-operation, Bomber-Transport and Transport aeroplanes (Lysander I and II, Vigilant, Bombay I, Whitley III and Harrow I and II) are dark earth and dark green on the upper surfaces and pale duck-egg blue beneath, but the undersurfaces may occasionally be black to suit special needs.

Training and Ferry Command aircraft (Tiger Moth, Magister I, Master I, II and III, Harvard I and II, Battle (T), Anson (T), Oxford I and II, Botha I, Dominie I, Hertfordshire I, Crane I and all civil aircraft both British and American now used by the Royal Air Force) are painted dark earth and dark green on the upper surfaces and training yellow beneath. In addition to the normal cockades on the upper surfaces, red, white and blue roundels are painted beneath each wingtip. Until recently the serial number was also painted beneath the wings of trainers but this is no longer seen. The usual fin marking is carried. Operational trainers (Hurricane I, Spitfire I, Blenheim I, Wellington I and other replaced types) normally retain their operational markings but are sometimes yellow underneath.

Target-towing aeroplanes (Battle I and Henley III) are dark earth and dark green on the upper surfaces and yellow beneath with diagonal bands of black. The underside of the tailplane is completely black and the elevators completely yellow. National markings as for other trainers.

All Naval aeroplanes, both shore-based and carrier-borne (Martlet I, II, III and IV, Fulmar I and II, Skua I, Roc I, Chesapeake I, Swordfish I, Albacore I and Walrus I) are painted sea grey and slate grey on the upper surfaces and pale duck-egg blue beneath. National markings are same as medium day bombers in the case of the reconnaissance and bomber types while the fighters carry duck-egg bands and spinners as land fighters. All machines have the words "Royal Navy" on the rear fuselage.

Buffaloes in the Far East.

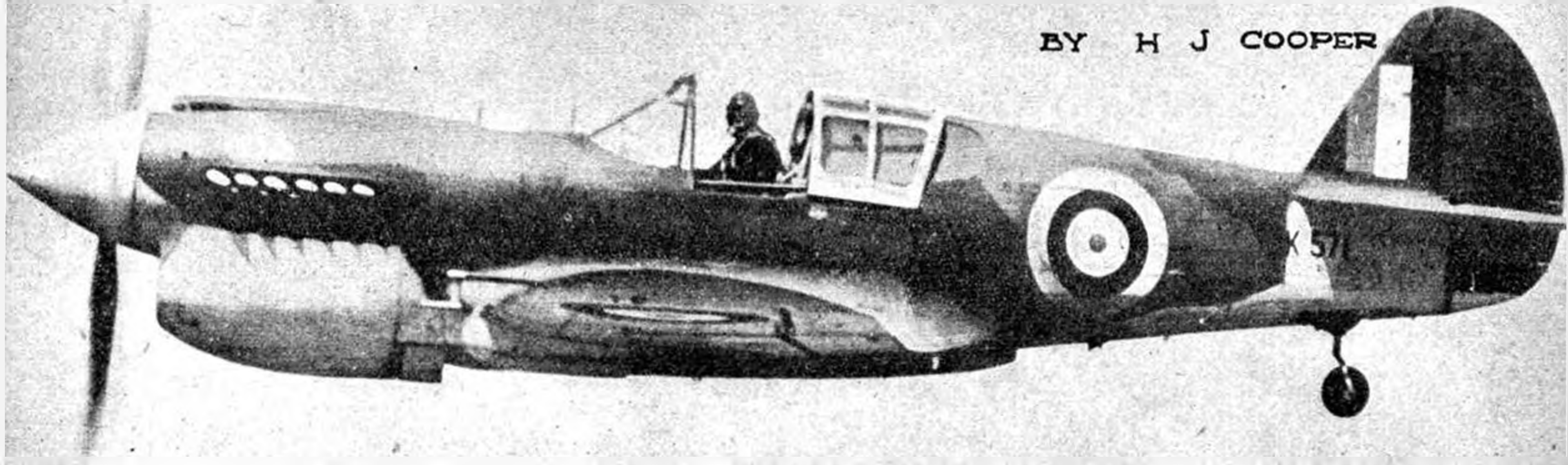
The fighter strength of both the Royal Air Force and the Netherlands East Indies Air Force is composed almost entirely of Brewster Buffalo single-seat fighters and they have proved formidable in action against the Japanese bombers.

Two R.A.F. squadrons defending Singapore equipped with Buffaloes carry the code identification letters "GA" and "TD" which are painted on the fuselage aft of the cockade on both sides. These machines are painted dark earth and dark green above and duck-egg blue and black beneath. The port wing, which is black, carries a red, white, blue and yellow roundel beneath the tip. They have the usual duck-egg spinner and fuselage band.

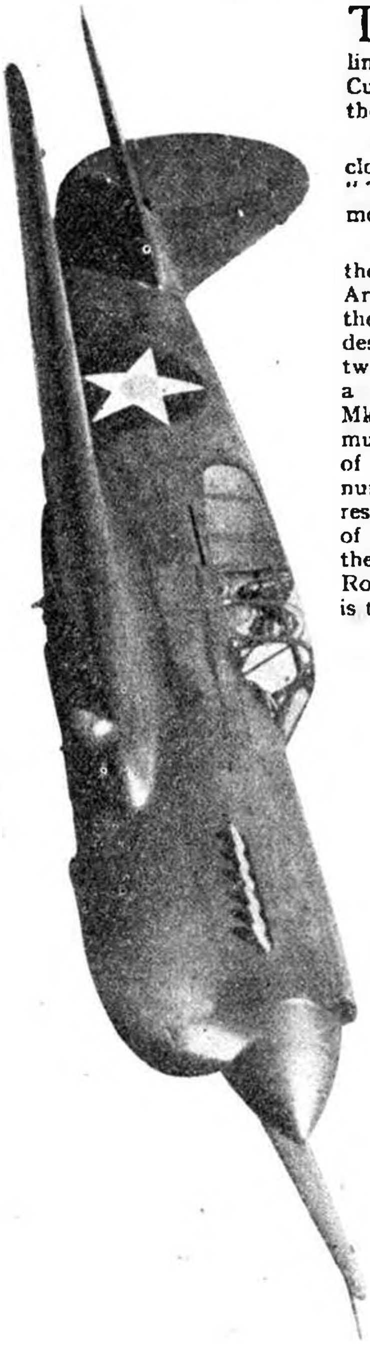
Netherlands East Indies Buffaloes are camouflaged in delicate shades of purplish blue and grey-green on the upper surfaces and silver beneath. The national insignia, an orange triangle with a black outline, is painted on the fuselage and wings. The serial number of the machine (one being B 396) is painted in white on the fuselage sides aft of the national markings and on the leading edge of each wing.

FIGHTING AIRCRAFT OF THE PRESENT WAR—XIV

BY H J COOPER



THE CURTISS KITTYHAWK



THE Kittyhawk is one of the latest aeroplanes in that long line of fighters developed from the Curtiss Hawk 75, from which came the Mohawk and Tomahawk.

In appearance the Kittyhawk closely resembles the well-known "Tommy," and differs only in a modified nose and cockpit cover.

Actually there are two "Kitties": the Mk. I, in service with the U.S. Army Air Force as the P–40D, and the Mk. II, which the Americans designate the P–40E. Outwardly the two are identical, the installation of a slightly improved motor in the Mk. II resulting in a higher maximum speed, being the only difference of note. The Curtiss Company's numbers are H–87A–2 and H–87A–3 respectively. Only a small number of the former have been built, and the version now in service with the Royal Air Force in the Middle East is the Mk. II. A later development, known as the P–40F, is powered by a Merlin motor built under licence by Packard, and has a maximum speed of about 375 m.p.h. This version is in quantity production for both the U.S. Army and Royal Air Forces, and with the latter will probably be named the Goshawk.

In construction the Tomahawk and Kittyhawk are identical. They are both of all-metal construction with stressed-skin covering, except for the fabric-covered control surfaces. Metal-covered split flaps are fitted to the trailing-edge.

The motor of the P–40E Kittyhawk is the twelve-cylinder inline Allison V–1710–F3R with a normal rating of 1,150 h.p. and a maximum output of 1,325 h.p. for take-off. The radiator duct is rather deeper and further forward than on the Tomahawk, and the thrust line has been raised about a foot.

The undercarriage of the two types is similar, with a slight bulge in the leading-edge wing roots, the legs turning through 90 degrees as they retract backwards and lie flat in the wings. The tail-wheel appears to be fixed on the Kittyhawks and retractable on the American versions.

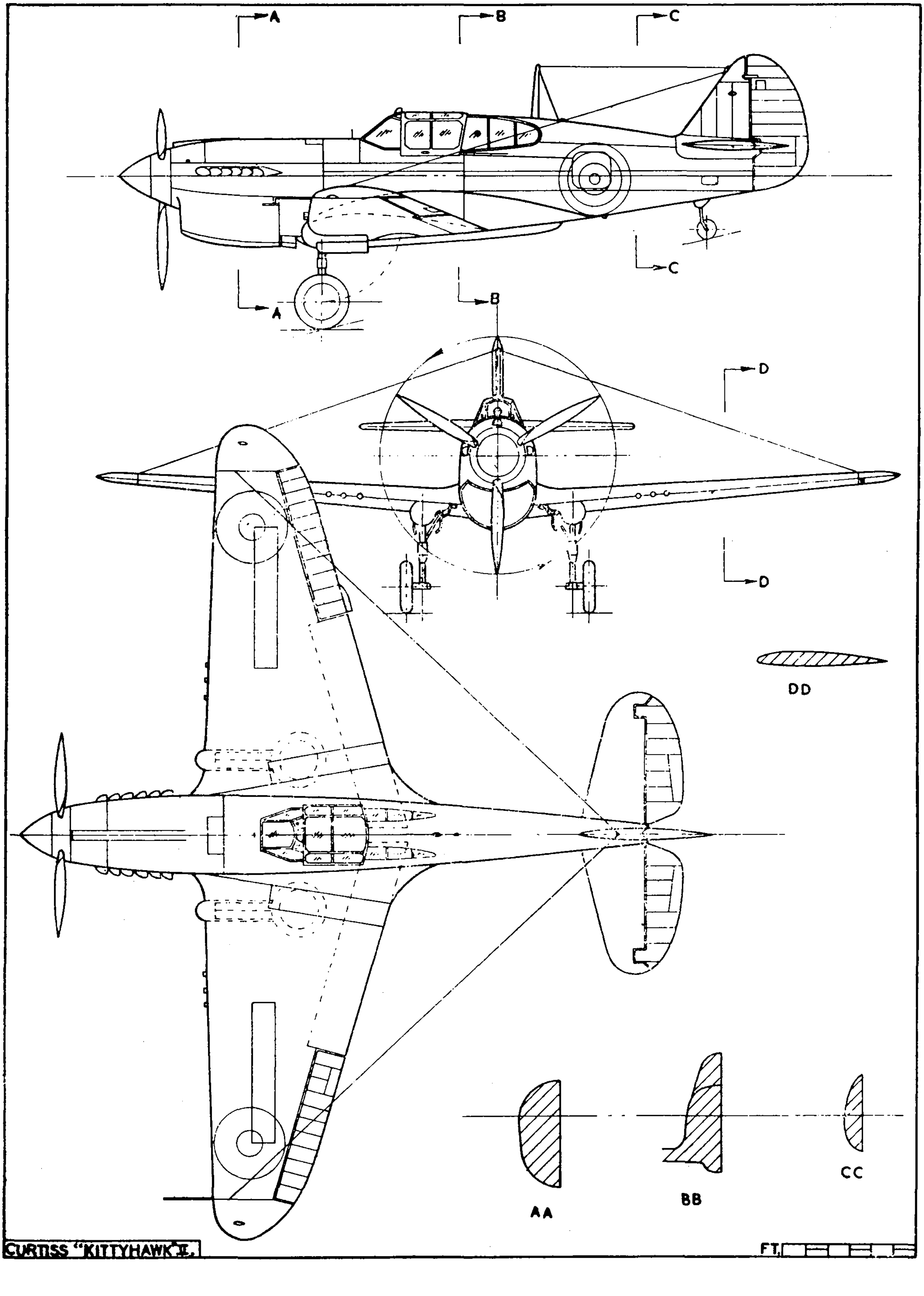
The British and American models differ in armament, and in the fitting of a radio mast on the Kittyhawk. The wireless antennæ run from the fin to the masts and to each wing-tip. The American versions do not carry the reflector gun-sight above the windscreen, which is now a major detail on all British fighters.

The armament of the Kittyhawk has not been officially disclosed, but it is stated by the manufacturers to be greater than that of the Tomahawk, which is six machine-guns, two in the fuselage and two in each wing. Presumably the Kittyhawk has eight machine-guns. Photographs at present available show only three guns in each wing, but two further guns are believed to be carried in the leading-edge wing root, firing through the airscrew disc. Even with this heavier fire-power the "Kitty" has a speed increase of 35–40 m.p.h. over its predecessor.

Conforming to latest colouring regulations, Kittyhawks in this country are camouflaged on sides and upper surfaces with dark slate grey and extra dark sea grey. The latter colour is really a grey-green; the descriptions quoted are official. The undersurfaces are light grey. The spinner is duck-egg blue, as are the squadron letters and the band round the fuselage ahead of the fin. Roundels above the wings are red and blue; below they are red, white and blue, and on the fuselage are red, white and blue with the usual yellow surround. The fin bears vertical red, white and blue stripes in the form of a rectangle two feet wide by about two feet six inches high. These markings are standard on all British aircraft at present. Kittyhawks in the Middle East are camouflaged green and brown, with light grey undersides. Some retain the black and light grey under markings formerly seen on R.A.F. home-based fighters.

The P–40D and P–40E pursuit ships of the U.S. Army Air Force are coloured entirely drab khaki from spinner to trailing-edge of rudder, both upper and lower surfaces. The words U.S. ARMY are painted in black below the wings with their tops to the leading-edge. The U.S. is on the starboard wing. The national star marking is carried at each wing-tip and on the fuselage. The rudder markings have been abandoned.

Main dimensions of the Kittyhawk are: span, 37 ft. 3½ in.; length, 31 ft. 8¾ in.; height (tail up), 12 ft. 6 in.



CURTISS "KITTYHAWK" II.

NICE drop of weather we're having, aren't we . . . at any rate, that remark holds good at the time I write this month's chatter. Snow, frost, fast thaws and slow buses—in fact all the merry items that go to make winter such an enjoyable season! I bet a clothes coupon to a couple of "tins" points that very few stalwarts have put their noses outside the clubroom door, and it is no surprise to note the predominance of indoor activities reported at the moment.

R.T.P. flying has caught on well and truly, and is proving blessing to harassed club officials who have always had a tough time keeping the boys together during the "off" season. Microfilm flying has been indulged in also, but here, of course, facilities are not available to everyone, and it is only in odd spots that good efforts can be made. In spite of that, however, I am of the opinion that more family baths are now decorated by a bright band of rainbow-tinted cellulose at high-water mark than ever before. (Incidentally, anyone know a quick and easy method of removing said tell-tale mark? I must get our tin tub looking a bit cleaner before the family returns!)

There is much of interest to note in the current S.M.A.E. report (that for the meeting held on January 4th). First item is that the Society has received permission to hold indoor flying meetings at the Albert Hall, though, of course, certain conditions encumbent on black-out requirements have to be met. Owing to this, and the fact that the hall is not available at week-ends, it becomes necessary to hold the matter over until lighter nights are with us, and meetings can be staged during the week. Of course, this facility is only of service to a very few who have easy access to the Hall, but no one will grudge them all the space available. It will be interesting to see just how the times improve when flying under warm conditions. (I have memories of sitting in the middle of that great space, shivering with cold, and expecting my own poor effort at "microfilmies" to perform decently with the mercury knocking the bottom out of the thermometer.) I await with eagerness the first occasion that the Hall is available, and must try and get more than 20 seconds from my "Fairy Windbag."

Arising from a discussion on the subject of a proposed Postal Ballot for the election of officers (finally rejected), an interesting sidelight is the resolution opinion that the Council suggest the holding of the Annual General Meeting at a Midlands venue—when the present emergency is over. That concession will be welcomed in a number of quarters, as it has been a sore point for years among clubs outside the Metropolis that more consideration was not given them regarding the matter of travelling, etc. May I go a step further on this subject and ask the Council to keep in mind the possibility of holding some of the National meetings at a more central venue than hitherto. This, I venture to state, will do a great deal towards bringing about a better co-operation among the "central" groups and clubs in outer districts.

The contest dates are well spaced, and I note a leaning towards glider encouragement this year. This is wise, and very welcome, as I am sure that the current shortage of lighter woods (also rubber!) will bring about a falling off in popularity of the usual duration model. Gliders can be built to stand so much more knocking about, no busted motors are encountered and a high wind need not bring about the usual cancellation of a meeting. You know my opinion of the state of British model gliding before the War, and I hope that the present restrictive conditions will bring about a greater concentration on this very instructive phase of the hobby.

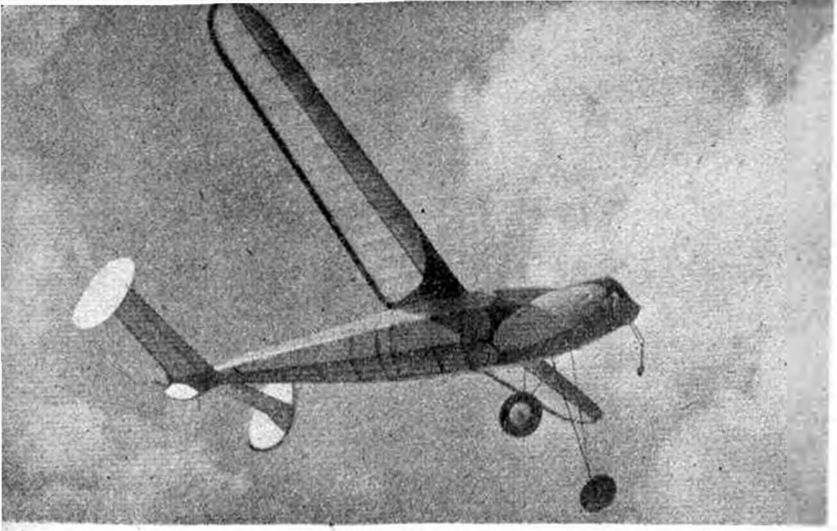
I am intensely interested in Mr. Temple's articles, as he has tackled the problems entailed in first-class soaring from all angles, and we have the results of his methodical testing at our disposal. Don't run away with the idea that I am slavishly following his methods or designs, but it is always a welcome assistance to have had someone else work out most of the bugs at no expense to our dear selves!

I cannot quite grasp the method to be employed for allocating Plugge Cup points, but this will become apparent as the contests proceed. The immense popularity of the Gamage Cup event has always been a sore point with certain people, but I still maintain that the winner of an event attracting a large entry is worth more points than the winner of a competition with fewer competitors. However, no one can say I don't give anything a fair trial, and I await with interest the outcome of the new method of scoring.

On scanning through the reports recently, one fact has been very apparent, and I am minded to ask—*What has become of some of the larger and famous clubs?* News from some of these stalwarts has dropped off considerably, and makes one wonder if all is well in certain quarters. So—what about it you big groups? Don't tell me you are going to let the younger and smaller clubs take all the limelight.

Well, I wonder how our American friends are faring now they are under war conditions. I have not yet received my usual magazines subsequent to America's entry into the dog-fight, but I foresee a falling off in the campaign to secure better supplies for the model industry. Many modellers over here have been itching to get their hands on petrol engines, but did not realise that the home of these small engines was experiencing a great shortage of supplies also, and I cannot see it improving. (Incidentally, I must warn my readers that, in reply to my offer to pass on possible sales, etc., I have had

A well-built Hawker "Osprey" constructed by R. E. Poulton of Swindon. (The heading shows a fine "Coplands Wakefield" by our old friend A. E. Galeota.)



Nice model—plus nice photography—makes this shot of N. Shalford's "Maygo" of unusual appeal.

over fifty "wants," but not one "disposal." It seems that they who have are holding tight, and I can't say I blame them. Supplies will not become immediately available when this darn-fool fight is over, and he-that-has is going to feel mighty pleased with himself !)

Well, let's cut the cackle and get on with the reports for this month.

First news is from the MILLOM & D. M.A.C., who recruited a number of new members from a recent exhibition. R.T.P. flying was a great attraction, and Sgt. McGeorge (R.A.F.) won a flying scale event with a "Defiant." Sort of busman's holiday—what !

The weather has restricted activities with the MOUNTAIN ASH M.A.C. solely to R.T.P. work, and a number of competitions have been held. T. Horseman averaged 48 sec. to win the event for "special" models, D. Fidler clocked 34 sec. when winning the "outdoor model" section, while H. Baker averaged 22 sec. for the scale class. Rather poor times compared with earlier performances.

Latest stunt with the RIPON M.F.C. is target towing. A model is sent up towing a 12-in. square of red silk—and the stability of the plane is improved enormously ! What about it you "drag minimisers" ? Gliders are on the go with this group, and I hear that C. F. Elliott made a duration flight of 3:45 on half turns . . . *in 7° of frost !* What was it—a thermal ? I wonder.

The COLERAINE & D. M.A.C. have been luckier than most and report a spot of decent weather recently. AERO-MODELLER Plans are welcomed, and the models resulting have proved very efficient—two "Gutteridge" types taking first and second places at a recent competition. A library has been started, each member contributing a book which entitles him to borrow any other in the list—providing he gets there first !

I am pleased to welcome some new clubs this month, the first being the FROME & D. M.A.C. (secretary, Mr. P. F. Fearn, of "Abbotsmoor," West Woodlands, nr. Frome, Somerset). He seems to have caught "secretary's lament" and hopes that mention in these columns will stimulate membership and bring some of the blokes who are not pulling their weight into line. Senior members will be welcomed, as the club is somewhat lacking in this respect.

The other new group is the POOLE M.A.C., now affiliated to the S.M.A.E. Started last October, the membership has steadily risen to the thirty mark, and is greatly helped by such old-timers as Mr. J. W. Kenworthy and J. E. Leadbetter. Unfortunately, the Press Secretary omitted to give the name and address of the club secretary, but perhaps this will be forthcoming with their next report. The indoor record here is held by B. A. Wilson, whose "Gwennie" clocked 1:14, while A. Hallett has the scale record with a "Leopard Moth" that flew for 28 sec. R.T.P.

Main news from the HALSTEAD (Essex) & D. M.F.C. is the contest for the "Holderness Spotting Prize" organised by the club.

Four teams entered—Halstead A.T.C., Witham A.T.C., Witham Aero-modellers and the Halstead & D. M.F.C. Silhouettes of aircraft were shown through an epidiascope for identification, 10 sec. being allowed for each.

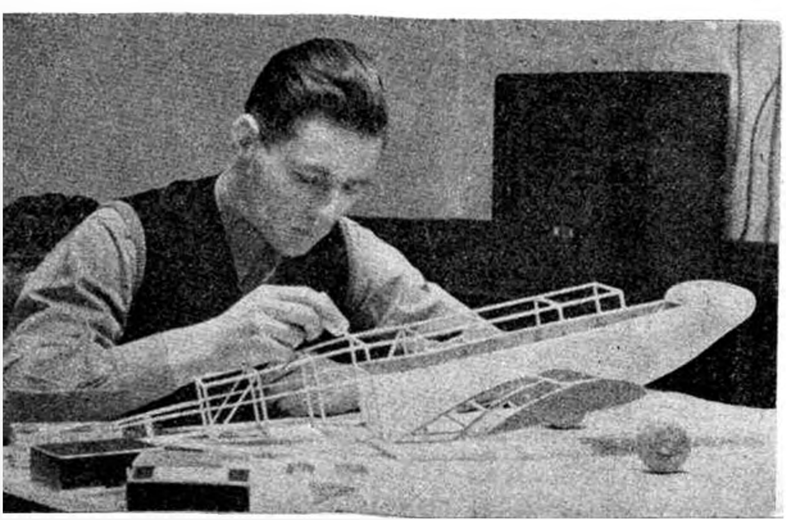
The Halstead & D. M.F.C. succeeded in winning the cup with a final average of 99 per cent. The Halstead A.T.C. second with 95 per cent., and Witham Aero-modellers third, 84 per cent. Witham A.T.C., unfortunately, had to withdraw from the contest as they were unable to raise the required four on the day of the contest.

Lectures on modelling have been given by some members to a nearby Youth Club, and were very well received.

Flying display was arranged for the pupils of one of the local schools, but owing to the weather this was found to be impossible. However, to avoid disappointment to these young enthusiasts a spruce model (30-in. span !) was tried flying R.T.L.B. (Round the lamp bracket !) A flight of 25 sec. was obtained before the model "gave up the ghost," much to the delight of the children, but considerably less to the delight of the owners of model (and of classroom !).

The STIRLING BOYS' M.A.C. staged a very well supported exhibition when over 150 models were on show. This club has been in existence for two years, and the work produced in that period reflects credit on all concerned. A fine "write up" in the local paper indicates that the "unwilling parents who had been dragged along by the eager youngsters, seemed to enjoy it as much as the boys themselves !" Well-staged tableaux were a feature of the exhibition.

Will all readers keep a look-out for a stolen model. Belonging to the 301 A.T.C. M.A.C., this model—of chromium-plated brass and span of 6 in.—was a replica of a "Hudson," and was stolen from a shop window, where the section was staging



Above is another grand effort from our "solids" expert, G. W. Rose of the N. Coventry M.A.C. Model is of course the "Boston."

Left : Tal Davies of Swansea gets busy on his Airspeed "Envoy," built from A.M. Plans.

a show of models. The thief must have thought it of some value, as he broke a ⅜-in. plate glass window to get at it. Any news is welcomed, and should be forwarded c/o the Editor.

Indoor meetings have been the main activities of the LEICESTER M.A.C. during the past month. The main feature at these meetings seems to be in the way of Indoor Microfilm jobs. Many members have been making good flights with these little 12-in. to 15-in. span models, considering the size of the room, but the main obstruction is the lights.

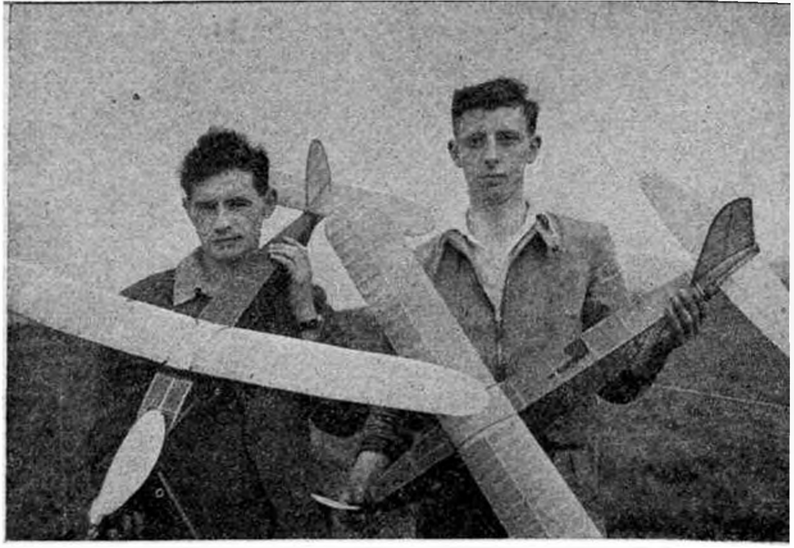
G. E. Dunmore has been trying out a tail-less "Mike" job, similar in design to the German tail-less gliders.

They have recently instituted a "Brains Trust"; the most experienced members of the club being on this committee, and questions are asked by the less experienced members. This idea seems to work well and is strongly recommended.

Another club who would welcome some adult support is the BURY & D. M.A.C., the younger element feeling the need for more experienced heads now and then. I trust someone will take the hint and give these youngsters a hand, as I am sure it would be welcomed. D. Winterburn won a recent contest with a time of 3·10—not bad for this time of the year.

There has been little activity in the ILKLEY M.A.C. owing to bad weather. K. Anning and J. Watson are building their own 6 c.c. petrol motors, with a view to post-war flying. K. Anning has built an American design, the "Powerhouse," 6-ft. span, weighing 2 lb. without engine. This model is beautifully built and finished, the scheme of decoration being very striking and entirely original.

J. Townsend has designed a model to fit his engine to, span being 6 ft., weight, with engine, 2 lb. 2 oz. The airwheels on these two models are home made, one pair from soft sponges, the other from hollow rubber balls.

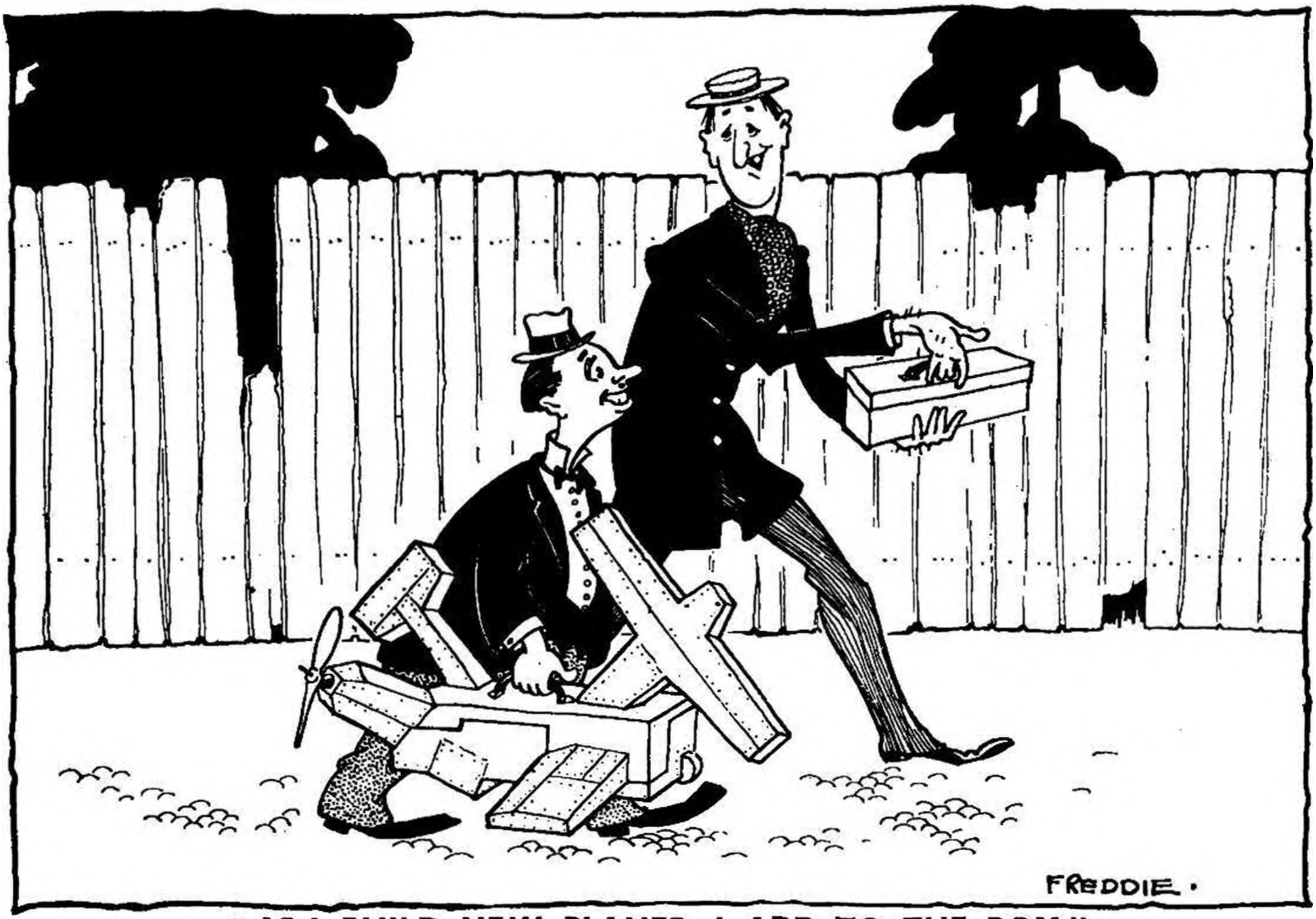


No—they are not the originals of "Freddie's" cartoon this month! B. Crawford and J. Parker were the winners of the Ulster Club "open" competition.

There has been very little activity in the BLACKPOOL & FYLDE M.A.S. during the past twelve months and, unfortunately, unless hostilities cease, there appears to be little prospect of any improvement.

This state of affairs has been brought about mainly by the fact that most members have either been called up, or are otherwise engaged in war work and have very little time to devote to the club, and also by the difficulty in obtaining supplies of balsa and other materials.

In order to keep the club going, and having regard to the above remarks, it has been decided to renew the present membership for the coming year, which commences on February 1st next, without the payment of any subscriptions. (This does not, of course, apply to any new members who



"AS I BUILD NEW PLANES, I ADD TO THE BOX" may care to join the club.)

It is intended, however, to organise one or two small contests during the summer months, and these will be restricted to "open" and "Flight Cup" type machines.

It is hoped also to call a meeting at some not too far away date, where members' views can be aired.

F. Ayres and J. Wells, of Heath Road, Harpenden, are anxious to start a club in their district, and would welcome the co-operation of other enthusiasts. Please get in touch at 11, Heath Road, Harpenden.

The BIRMINGHAM M.A.C. is staging an indoor meeting on February 28th, commencing at 2 p.m. at the Friends' Institute, 220, Moseley Road, Highgate, Birmingham. Two contests will be held, for R.T.P. and microfilm models, and prizes, in addition to two trophies, will be awarded. Though it is not stated, I presume the details are sent for the interest of any who care to attend.

News of a very interesting model is to hand from the WHITSTABLE TANKERTON & D. M.A.C. D. MacKenzie is building a fourteen foot span (Yes—I said *fourteen foot*) model of the Bristol "Blenheim." It is to be powered by two large capacity petrol engines (after the war, I presume!), and is constructed entirely of hardwood, with ⅛-in. three-ply formers and ⅛-in. square P.S.S. stringers. The fuselage is built in three sections—nose, centre and tail piece. His brother is experimenting with a means of radio-control and we look forward to more news of this ambitious project. Other scale models under construction are a 54-in. "Whitley IV" by A. Souch, with rubber power transmitted to the prop via flexible drive, and a 40-in. "Hurricane" by R. Hunt. Not frightened of tackling something worth while, these fellows. Let's have some photos of them, will you.

The ROMFORD M.A.C. has been in existence for some months and now presents its initial report. An exhibition raised a good sum for a local charity, and some fine models were on show. Meetings are held at 7 p.m. on Tuesdays at Garwood's Model Shop, Mawneys Road.

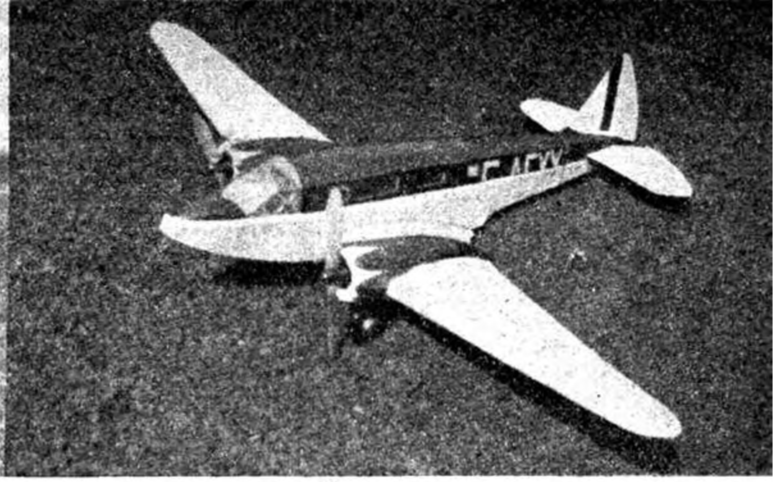
Plans, taken from the book "Scale Plans of Military Aircraft," which was bought specially for the purpose, have been loaned out to members of the BLACKHEATH M.F.C. to help entrants to build 1/72 scales for a forthcoming exhibition. Owing to shortage of materials, sharp bidding took place when a member produced at a recent club meeting a 5-ft. petrol plane wing, which the bidders wanted for proposed gliders. Hardy members who flew during the recent freeze-up reported, owing to fog, O.O.S. flights when their machines were only fifty feet above the ground, adding that they were afterwards forced down, iced up? A certain member, noted for luck, was recently riding to a flying meeting when a passing motorist obligingly released from his car a sheet of 1/16 celluloid, which is now the envy of the whole club.

As the "Comforts Fund" started to aid ailing members now rivals the club contributions, certain members develop imaginary aches regularly at club meets, but the Treasurer, well fitted for the task, will not budge!

Yet another new club, the HEALEY & D. M.A.C., sends in its first report. The club record stands at 3 : 8, held at present by D. Walker with a Wakefield machine of his own design. Second on the list comes D. Day with 2 : 48·3. Sailplane record is held by C. Westerby with a "Planer," time being 55·5 sec. Application is to be made for affiliation to the S.M.A.E. in the near future.

Will all persons interested in joining the club get in touch with the secretary, C. Westerby, 4, Colbeck Terrace, West Park Road, Healey, Batley, Yorks.

The EDGWARE M.A.C. has devoted many of its recent meetings to pole-flying, competitions being held about once every three weeks. Unfortunately the arranged competition with the De Havilland M.A.C. could not be held, the D.H., club failing to raise a team. Instead, the Edgware chairman, popular Mr. Tom Jackson, offered a prize to the member with the best R.T.P. duration. This was won by P. Hibberd, who clocked 1 min. 46 sec. R.O.G.



A promising looking scale " D.H. Moth," built by E. Brown of the Ashton & D.M.A.C. And a well-finished " Envoy " from J. G. Williams of Bristol.

In about six meetings the club will be building replicas of Mr. H. Walker's " Valkirie," which holds the club record. This has been arranged to encourage junior members with little past experience.

Well, that's that for another month, fellows, and I hope to have some interesting news next time we come around to our little chit-chat. I've got a few things up my sleeve besides arm—and dirt!—but they will keep for another month. So, till then, may your rubber never rot and your balsa never bust. (If you can find any, of course.) Cheerio, and keep 'em flying. The CLUBMAN.

CORRECTION

The reader shown on page 90 of the February issue is T. G. Phillips of Tenby, and not D. J. Smith as indicated. Our sincere apologies are tendered.

Solution to "Wakefield Quiz" on page 110.

1 *b.*	4 *a.*	7 *a.*	10 *c.*
2 *a.*	5 *b.*	8 *b.*	
3 *a.*	6 *c.*	9 *c.*	

ANALYSIS.

40—50 excellent.
30—40 good.
Below 30—subscribe regularly to the THE AERO-MODELLER.

Secretarial Changes.

WHITSTABLE, TANKERTON & D. M.A.C.
D. B. Rice, 114, Cromwell Road South, Whitstable, Kent.
DUBLIN M.F.C.
R. Dobbyn, 37, Thomas Court, Dublin
HULL & D. M.A.C.
K. Littlewood, 178, Beverley Road, Hessle, Hull.
WALTHAMSTOW M.A.S.
R. L Walker, 8, Cambridge Park, Wanstead, E.11
WALTON & D. M.F.C.
A. F. R. Love, "Highlands," Terrace Road, Walton-on-Thames

New Clubs.

FROME & DISTRICT M.A.C.
P. F. Fearn, "Abbotsmoor," West Woodlands, nr. Frome.
HEALEY & DISTRICT M.A.C.
C. Westerby, 4, Colbeck Terrace, West Park Road, Healey, Batley.
ROMFORD M.A.C.
M. G. Freeman, 139, Balgores Lane, Squirrels Heath, Romford.
AIGBURGH M.A.C.
D. L. Beveridge, 19, Horringford Road, Aigburgh, Liverpool, 19
COWES M.F.C.
R. Hurst, 72, High Street, Cowes, Isle of Wight
MOBBERLEY M.A.C.
D. E. Parmenter, 3, Oldfield Cottages, Town Lane, Mobberley
PERTH (A.T.C.) M.A.C.
T. D. A. Lunan, Old Academy, Rose Terr., Perth.

SOCIETY OF MODEL AERONAUTICAL ENGINEERS

The Minutes of the Council Meeting of January 4th, held at The Royal Aero Club, Piccadilly, W.1.

Present: Messrs. A. F. Houlberg, A. C. Bell, L. J. Hawkins, J. C. Smith, C. A. Rippon, H. P. Costenbarder, F. H. Briggs and H. W. Hills.

In the Chair:—Mr. A. F. Houlberg.

The Chairman opened the meeting by calling upon the Hon. Sec. to read the minutes of the last Council Meeting. The resolution for " adoption as read " was moved by Mr. C. A. Rippon and seconded by Mr. J. C. Smith.

One item arising from the minutes was the proposed dates for Indoor Flying at the Royal Albert Hall. The Competition Sec., Mr. J. C. Smith, had received permission for the Society to hold meetings at this venue during daylight only, no evening meeting being possible because the hall was not blacked out. Again, on Saturdays and Sundays no flying could take place, the hall already being booked for weekends. Therefore we were left with the use of the place during daylight from Monday to Friday. The Council will certainly make use of this offer when the longer periods of daylight are with us.

Correspondence.

A letter received from Mr. D A. Russell of THE AERO-MODELLER, who kindly provides the Society's Journal at no charge to the Society, was read. We have been receiving 500 copies monthly, and Mr. Russell would now increase the number of copies of the Journal to 1,000, again at no charge. The Council here record their appreciation for so generous an offer, which is gladly accepted.

Another item of correspondence expressed a desire that the Council go into the question of a Postal Ballot of officers this year. Many viewpoints were put forward that did not favour the suggestion that any method, other than the one now in use, i.e. election at an Annual General Meeting, could be adopted with advantage. This debate resulted in the following resolution, moved by Mr. H P. Costenbarder and seconded by A. G. Bell:—" The Council having discussed the possibility of a Postal Vote on nominations for the Council, consider it is impracticable at this juncture to alter the present method of election at the A.G.M., bearing in mind the financial aspect and attendant difficulties. The Council are further of the opinion that when the present state of emergency is ended Annual General Meetings should be held at a Midland venue, to enable a wider selection of clubs to be represented." This was carried.

The 1942 S.M.A.E. Contest Programme.

The Council decided that the Contests and dates for next season would be as follows:—

- * 1. Gamage Cup, Sunday, May 17th.
- 2. National Cup, Sunday, June 7th.
- * 3. Weston Cup, Sunday, June 21st.
- * 4. Pilcher Cup, Sunday, July 5th (gliders this year).
- * 5. Flight Cup, Sunday, July 12th.
- 6. Gutteridge Trophy Sunday, July 26th.
- 7. Model Engineer Cup, Sunday, August 9th (a team glider event this year).
- * 8. K. & M.A.A. (Biplane), Sunday, August 23rd.
- 9. Women's Challenge Cup, Sunday, September 6th.
- *10. Thurston Glider Cup, Sunday, September 20th.

* Denotes Plugge points contest.

The Dr. A. P. Thurston Cup (Individual Championship), the Caton Trophy, and the Captain L. Plugge Cup remain.

Special attention is drawn to the following recommendation of the Council:—In calculating the Plugge Cup points, the following method will be adopted: The Gamage Cup is to be taken as representing a 100 per cent. entry. Later competitions will have Plugge points added to those earned on the basis of percentage of entries short of the Gamage Cup numbers."

This was originally a resolution moved by Mr. J. C. Smith, seconded by A. G. Bell, and carried.

This completed the business of the meeting, which came to an end at 1.25 p.m.

A. G. BELL.

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