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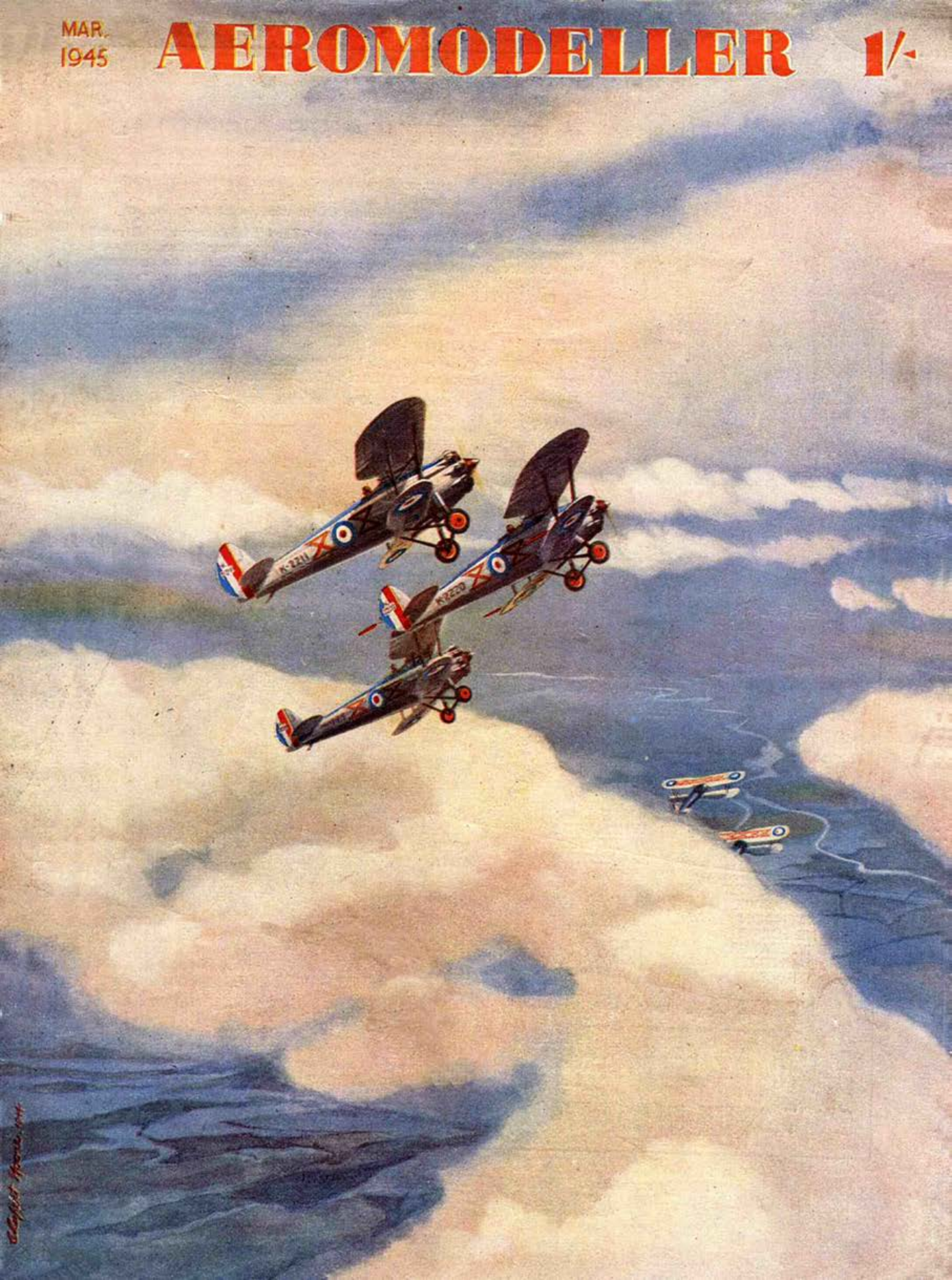

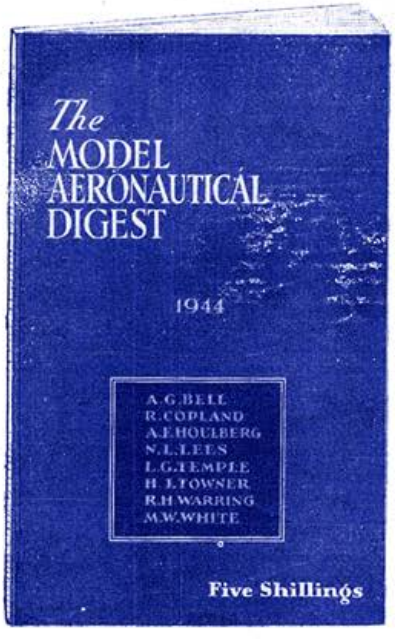

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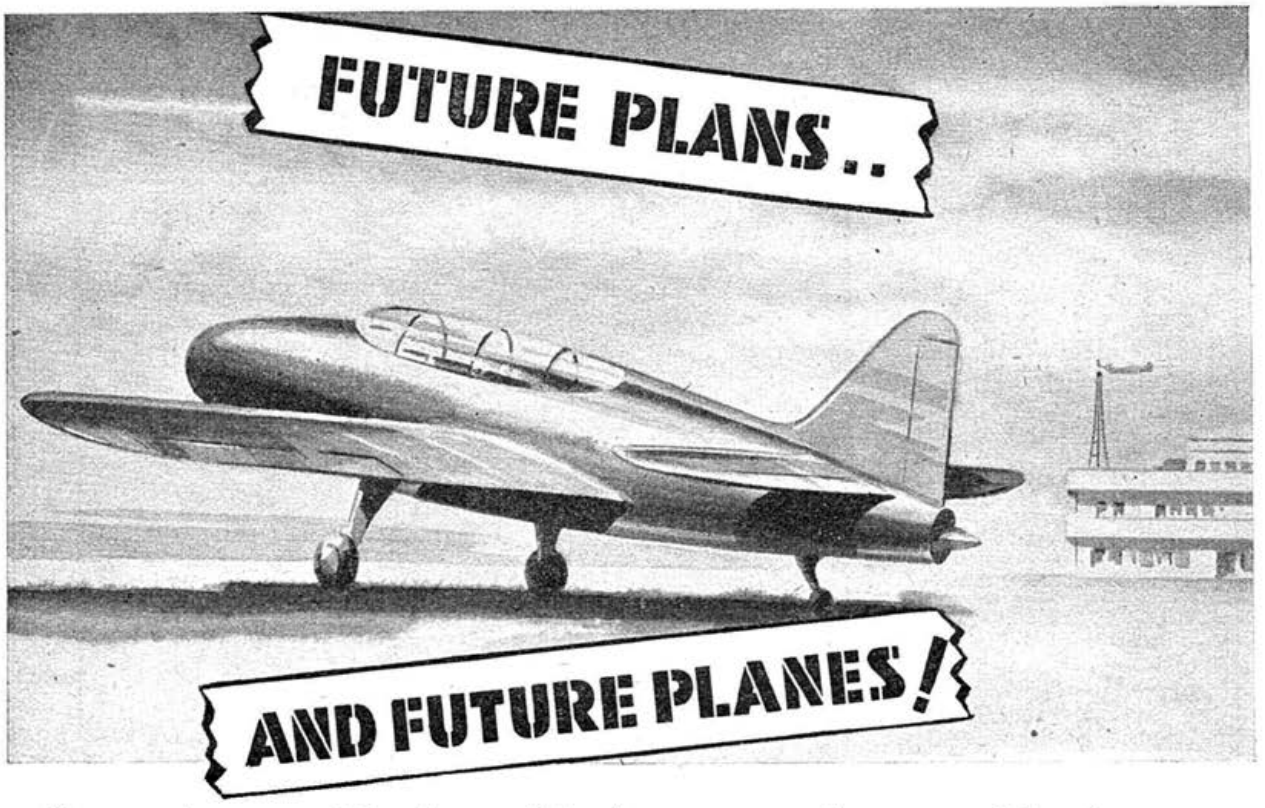

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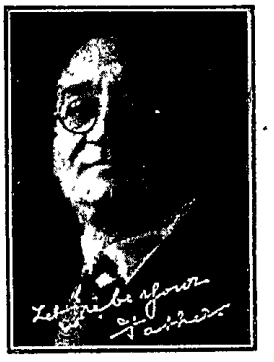

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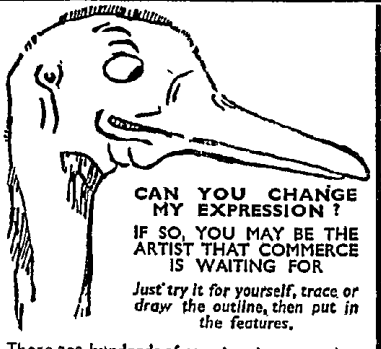

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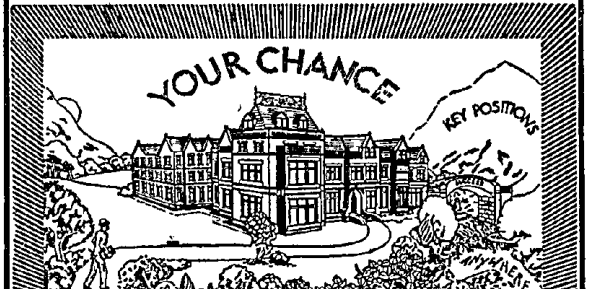

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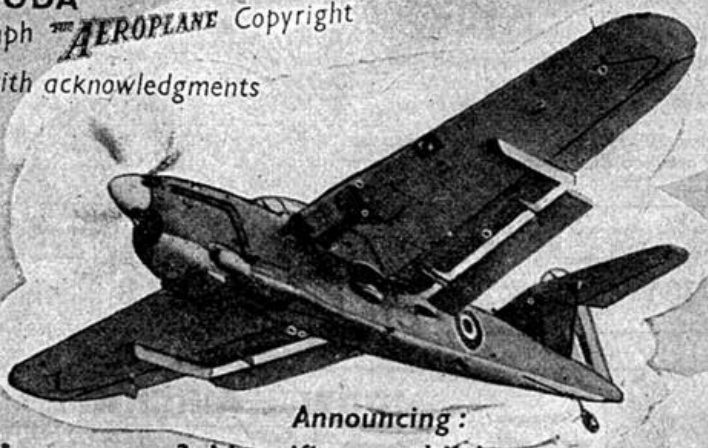

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THE "AEROMODELLER" EXHIBITION

Our report of the Aeromodeller Exhibition recently held at the Dorland Hall will be issued in two parts. The first part, published in this issue, deals with the Exhibition in a "general" way, and has been written by Mr. Lawrence H. Sparey, who recently joined the AEROMODELLER staff. In our next issue we shall publish the second part by Mr. H. E. White, B.Sc., who deals with the Exhibition in a more "particular" way, *i.e.*, with the technical aspects of the various models. Following publication of the second part, the whole report will be published in brochure form and will be available for a few pence to those aeromodellers who wish to keep in permanent form a record of the First National Model Aircraft Exhibition ever to be held in this country.

N.G.A. INSURANCE

Up to the present time, subscriptions to N.G.A. Insurances have been due as at February 1st of each year, and have been effective until January 31st of the following year. Members who joined at a date later than this, *i.e.*, during the year, obtained insurance only for that part of the "year" which was left. From now onwards, however, *subscriptions may be paid at any time throughout the year*, and the insurance will run for a full year from the date of payment of the subscription.

We feel that there has been a tendency for aeromodellers who became aware of the insurance scheme only in the middle of a year to feel that it was not "worth while" paying a full year's subscription for the few remaining months of the "flying season" which might remain, and they would therefore put off taking the insurance until the beginning of the year following. Now, as stated above, it does not matter *when* a member pays his subscription, he obtains insurance for a full year.

The latest N.G.A. membership form is printed in the bottom right-hand corner of the back inside cover of this issue, and will be reprinted in the same place each month from now onwards.

We would remind all readers that the N.G.A. insurance scheme was the first of its kind in the world. It was inaugurated before the war, especially for the benefit of British aeromodellers, to provide them with Third Party insurance whilst flying their model aircraft. For a subscription of 6d. per annum, Third Party insurance, underwritten by Lloyds, securing the payment of any individual claim up to £5,000, may be obtained in connection with the flying of rubber-driven model aircraft and gliders; whilst for 2s. 6d. per annum similar insurance may be obtained in regard to the flying of power-driven model aircraft and on model race cars. There is also the "Total Loss" insurance which may be obtained for a premium of 2s. per annum per model (a description of which *must* be forwarded to the offices of the N.G.A. at the time of the insurance) and which secures a payment up to £2 should the machine be a total loss by out-of-sight flight. Full particulars of the insurance, with full terms of the policy, may be obtained upon application to the Secretary, N.G.A., Ltd., Allen House, Newarke Street, Leicester. Third Party insurance covering the flying of rubber and power-driven model aircraft and gliders, is, of course, included in the subscription to the Association of British Aeromodellers, *i.e.*, members of this Association are automatically insured upon payment of their subscription. These subscriptions run for a full year from whatever date they are paid, and, of course, the N.G.A. insurance cover runs in the same way.

N.G.A. insurance was introduced essentially to provide aeromodellers with Third Party insurance cover for the cheapest possible sum. There is no question that, by securing more members, the proprietors of N.G.A., Ltd., secure an increasing profit. It is only because the AEROMODELLER organisation provides the clerical staff to handle forms, membership cards, issue of badges, etc., that the N.G.A. Company is able to offer this insurance at the low premium which it does.

CONTENTS OF THIS ISSUE

FOR DESIGNERS

PART I

BY P · R · PAYNE, A.M.N., nst. E

THE purpose of this article is to describe a new and more efficient layout for model aircraft. I have been developing the type for some time, but due to pressure of work, I have had to stop all my modelling activities indefinitely. It is thus with the hope that I may be able to interest other modellers who have more spare time, that I am writing this.

All model designers are aware of the inefficiency of the orthodox model layout, and I need not dwell on the point except to emphasise that two of the principal snags are sensitivity to movement of the C.G., and the parasite drag of the tailplane. There is only one layout in which the former snag is absent, although several do away with both the fuselage and the tailplane, and that layout is the Tandem. With regard to the other layouts, it is a debatable point as to whether they gain anything in performance, there being nowhere to place a long

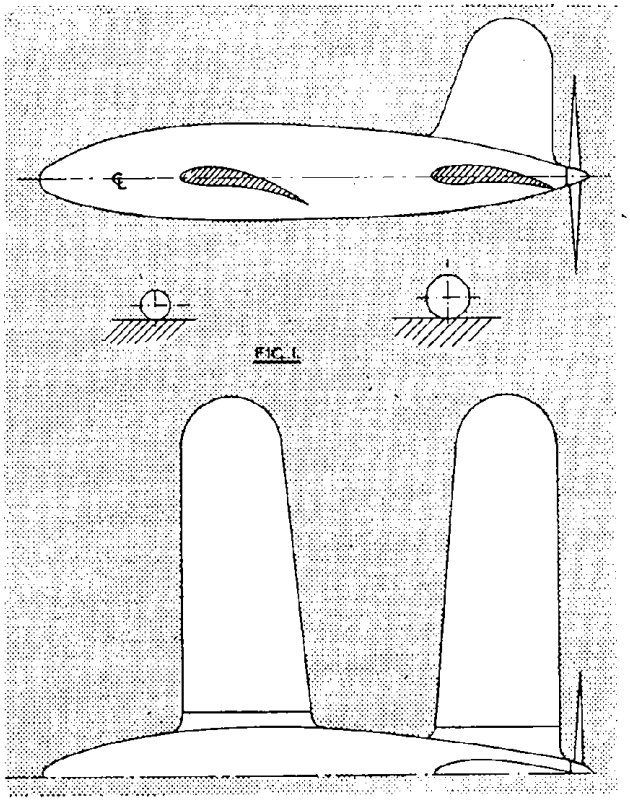

FIG. 1

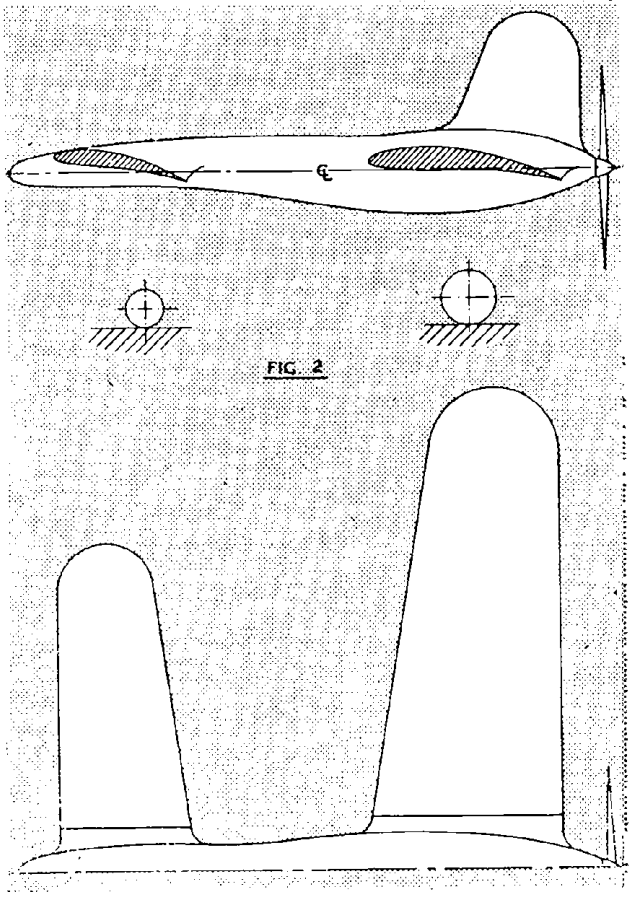

FIG. 2

rubber motor. Although we have no space for a survey of these layouts, readers will find, if they take the trouble to investigate, that none of them are suitable for a model. The tandem layout, on the other hand, appears at first sight to approach the ideal for the modeller. Some of its advantages are :—

(*a*) Parasite drag of the tailplane eliminated.

(*b*) The machine is not sensitive to movement of the C.G.

(*c*) Properly designed, the layout is very stable.

(*d*) A pusher airscrew may very easily be used, with a consequent improvement in performance. I consider this very important, for when a tractor " paddle wheel " has finished churning up the air, anything might happen behind. Certainly not what the designer expects !

The ordinary tandem layout is shown in Fig. 1 ; unfortunately, this layout has certain drawbacks. The turbulence set up by the leading wing affects the performance of the rear wing, and a large fin is needed for adequate directional stability. Also, if the leading wing is set at the angle of attack giving $\frac{Cl^{\frac{3}{2}}}{Cd_T}$ max., the rear wing must be set at an angle which gives a lower value for the power factor, and the converse. Generally speaking, the best compromise is to set the *leading* wing, at the angle corresponding to the max. power factor for the machine. Another alternative is to set both wings at angles which give the best overall result.

Now all modellers know that an aircraft is, from beginning to end, a compromise, and who knows this better than the designers ! The problem is to find the best compromise. As it stands at the moment, the tandem would not be much more efficient than the ordinary layout, although it would be superior in stability

and the problem of C.G. movement. There are, however, several modifications of the tandem, such as the Warren-Young project (see page 562 of May 18th, 1944, issue of *Flight*), but only one appears to be practicable for the aeromodeller—the "libellula" layout of Mr. George Miles (page 444 of *Flight*, April 27th, 1944), shown in Fig. 2. In passing, I should like to recommend this article to model designers, as it contains a very good summary of various aircraft layouts. On closer inspection, however, the layout is seen to have the following disadvantages for model use. They are :—

A. With the main wing set at the relatively large angle of attack associated with $\frac{Cl^{1.5}}{Cd_T}$ max., the leading wing would have to be set at some inefficient angle near its stalling point.

B. Due to this large α, the vortices from the leading wing would be very strong, especially those from the wing tips, and this would affect the performance of the rear wing. This could be defeated by placing the rear wing high up above the front one, but it would be difficult to do this without affecting the machine's performance.

C. A large fin area is needed.

It was with these drawbacks in mind that I started in quest of a better and more efficient layout. The result is shown in Fig. 3. The "Payne-type" tandem !

The leading or main wing is set at α for CL 3/2/CDT max., and the rear wing at an angle which is a few degrees less. The difference need not be great, for I have flown two sailplanes, in the course of my experimenting, which both had rear planes which were on the small side, both of which were set at angles two to four degrees less than that of the main wing. They were mounted high up, well out of the way of the strong part of the downwash.

The rear wing is assumed, in the preliminary design stage, to support 25 to 30 per cent. of the total weight of the model, and is approximately half the size of the main wing. This, incidentally, brings wing loadings down with a bump. The rear wing has a symmetrical airfoil section; such as R.A.F. 30, and must have a fairly large thickness/chord ratio, although this must not be higher than 20 per cent. The main wing has no dihedral, though in a tapered wing it would be advisable to have the taper on the bottom of the wing. The rear wing is dihedralled and, in its high position, has a very powerful effect.

So far, my survey of types has been negative, but I must now turn to the positive, as I fail to see any serious drawbacks ! The advantages of the type, as I see it, are :—

A. The main wing is at its most efficient angle, whilst the rear wing is nearly as efficient.

B. The losses due to the small loss in total efficiency due to the smaller α of the rear wing is minimised because of its small size.

C The wing mount plus the dihedral rear wing gives ample "fin" area.

D. The high position of the rear wing gives it a strong anti-spin effect. It is out of the way of the turbulence set up by the main wing.

E. The extra weight and parasite drag of a tailplane are eliminated.

F. It is not affected by small movements of the C.G., such as that caused by the rubber motor or a non-balanced retracting undercarriage.

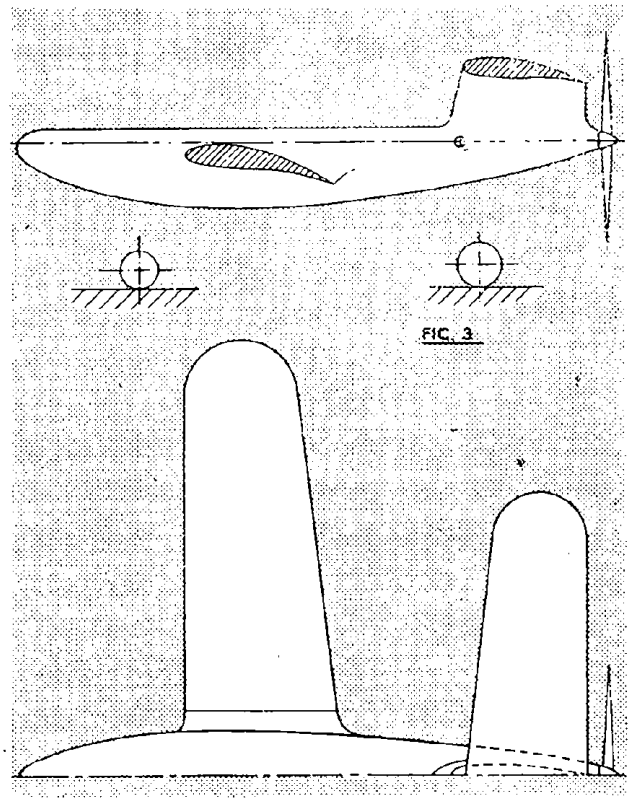

FIG. 3.

Other advantages may be thought of, but that is enough to get on with. In addition, such attractive possibilities as having a petrol engine mounted inside the rear wing mount, driving a propeller, and cooled by a duct in the leading edge of the mount, rise to one's mind. Again, the project has definite advantages for use with a jet propulsion plant, due to its C.G. being fairly well back. The layout gives endless scope for the ingenuity of designers.

As far as I can see there is one snag—*torque*. This could be eliminated by the use of contra-props, but using an ordinary propeller with slightly more dihedral is usually satisfactory. If gears are used, torque ceases to be troublesome.

In conclusion, I should like to emphasize that I have had experimental models flying successfully on this principle. The first two were gliders, one a converted "Aeolus," which still holds the local club H.L. record, and the other of original design with my own airfoil sections. The former has gone to its final resting place, but I hope to fly the latter again when less strenuous days arrive. A third model, designed for the A.B.A. experimental class competitions, has two 1·5 oz. rubber motors geared up to a pusher airscrew with a gear ratio of 3 : 1. Its leading particulars are, motor run, 90 secs, Sinking speed, 1·94 ft./sec. Gliding angles, 6 degrees 48 mins. Rate of climb, 340 ft./min. Duration in still air, 6¾ mins. I have had a couple of small "mods" to do, which I hope will increase its performance, but when I shall find time to do them, goodness only knows.

Finally, I should welcome any criticisms, hoping that the design may be improved still further.

LITTLE VAGABOND

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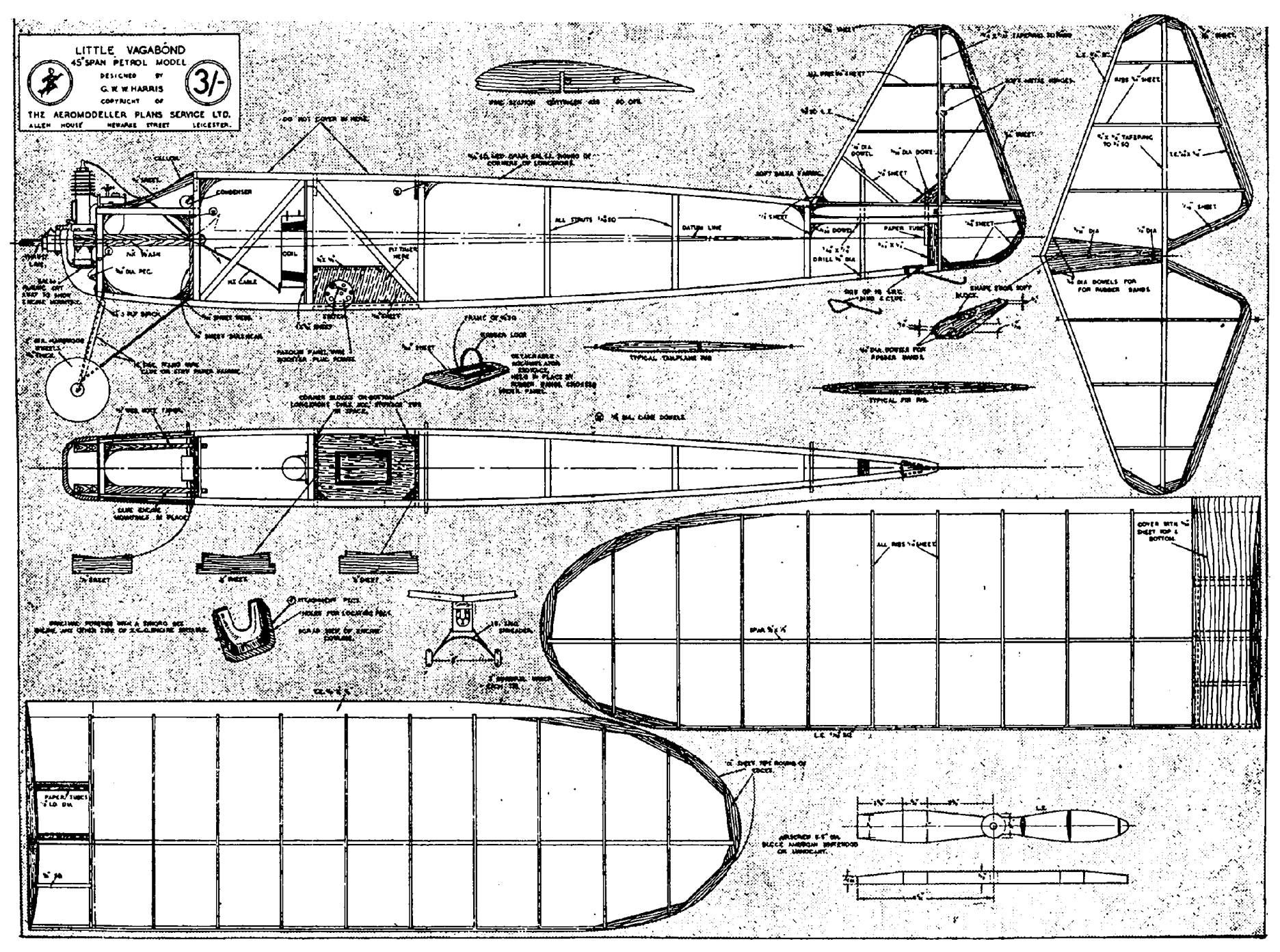

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In still air the model unsticks after a take-off run of about 20 ft.; with a breeze this distance is decreased, of course, though personally I like to see these midgets taking their time about getting off the deck and climb steadily rather than watch them leap into the air and give rocket without a stick exhibitions.

The construction is quite straightforward and it is well within the abilities of rubber-driven 'plane fans to build it.

For the benefit of those who have not yet built a petrol job but who would like to build " Little Vagabond," the following points should help.

1. Be sure you understand your engine before you fit it in the model.

2. Shellac all woodwork in immediate vicinity of the engine as a protection against petrol and oil.

3. Solder all electrical connections.

4. The original model carries a small accumulator for ignition, although booster battery connections are provided they have never been used. It is well worth having at least two accumulators for the machine, plus a large one to keep them charged.

5. Bind the undercarriage in place with thread to the cross struts and longerons, using a fish or casein glue; fit the appropriate webs last.

6. The airscrew shown may not suit all 2 c.c. engines but it can be used as a guide. Remember there is no surplus power available for badly carved props.

7. Double cover the fuselage with jap tissue and apply two coats of dope. The main planes and tail unit are covered with a single covering of jap tissue; apply one coat of dope.

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(SEE ¼-SCALE REPLICA ON OPPOSITE PAGE)

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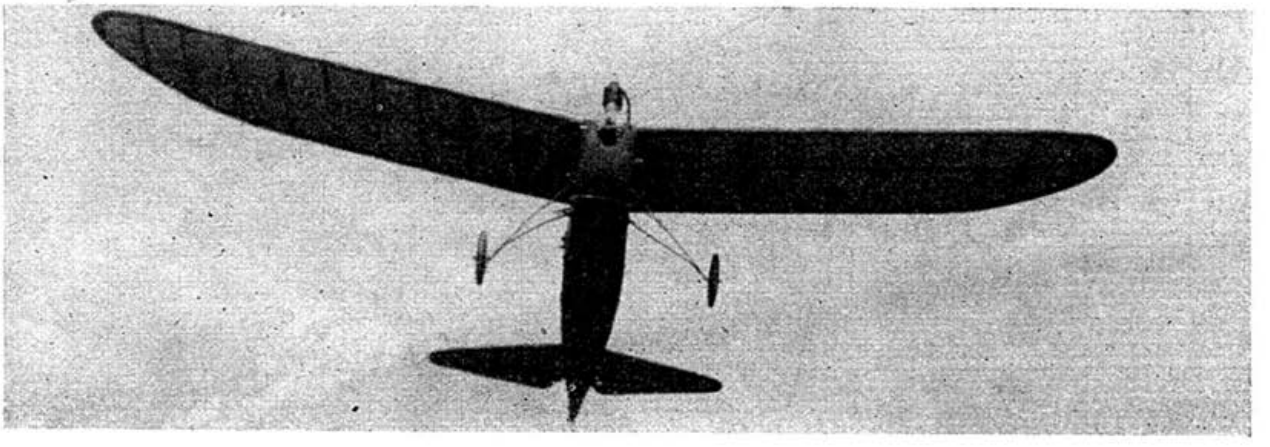


POWER OUTPUT OF RUBBER MOTORS

BY W · R · WHITMORE, 393 SQUADRON, A.T.C. AEROMODELLERS' CLUB

ONE of the principal problems that confront us in the design and consequently the flying abilities of our model planes is the propeller speed when powered by a skein of rubber. We have to find out by experiment (sometimes to the detriment of our model, especially if badly overpowered) the correct weight and type of rubber required. It we draw a set of power output curves for different arrangements of rubber, we can select the one that best suits our purpose.

The one that we require is that which will give us a long steady climb in preference to that high burst of power at the beginning of our flight and then rapidly tailing off to nothing.

Now in order to derive these power output curves we must know at what speed our propeller is turning. If we wind on, say, 800 turns and the prop revolves for, say, 40 seconds, we know that the AVERAGE speed is 20 turns per second. This, however, is not going to help us very much, as we require to know at what speed our propeller is turning at a given moment.

If we know the speed, say, every 5 seconds of our power run, we can draw a graph of speed against time and derive a Power Output Curve of our rubber motor. Fig. 1 shows a set of curves taken by a method to be outlined in this article.

For a model under construction, a motor was required that would give a propeller speed of 20 turns per second for a good steady climb. Referring to the curves in Fig. 1 (A) shows immediately that this motor was useless as this speed was obtained only for approx. 5 seconds; (B) on the other hand is obviously the one we require, as this gives between 25 and 20 revolutions per second for approx. 40 seconds, a really useful time; (C) and (*d*) are equally not the motor we require, as these show that although they give a high initial power they tail off too rapidly.

Now, as I have said, in order to get these curves we must have a means of plotting our propeller speed against time. One way of doing this (and it is a long and laborious task, not to mention the hard wear on our valuable rubber) is to wind on, say, 800 turns, stop the prop at five seconds, and then carefully count the remainder, re-wind again to 800 turns, stop at ten seconds, again counting the remainder, and so on until we have obtained the turns for every five seconds for the complete motor run. I tried this and decided that some better and less laborious method was required to give these results. A STROBOSCOPE was the answer, hence this article.

To those to whom the word stroboscope does not mean anything, this explanation will, I trust, help.

If we take a cardboard disc and draw a line from the centre to the perimeter, Fig. 2, then revolve this in the light of a Neon lamp operating on A.C. current, we can, by counting the number of lines we see, arrive at the speed the disc is turning. In order to understand this and to explain why I say the NUMBER of lines (since we have drawn only one on the disc) we must go into the Electric Theory a little.

Fig. 3 shows what is known as a Sine Wave of A.C. current or voltage. Let us assume that it is a voltage sine wave, since this will suit our purpose better. You will notice that this voltage is constantly changing, first from zero to maximum (a to b) then back to zero (b to c), again to maximum (c to d) in the opposite direction, and finally again to zero (d to e). This comprises what is known as one complete cycle of A.C. (alternating current) such as we obtain from our

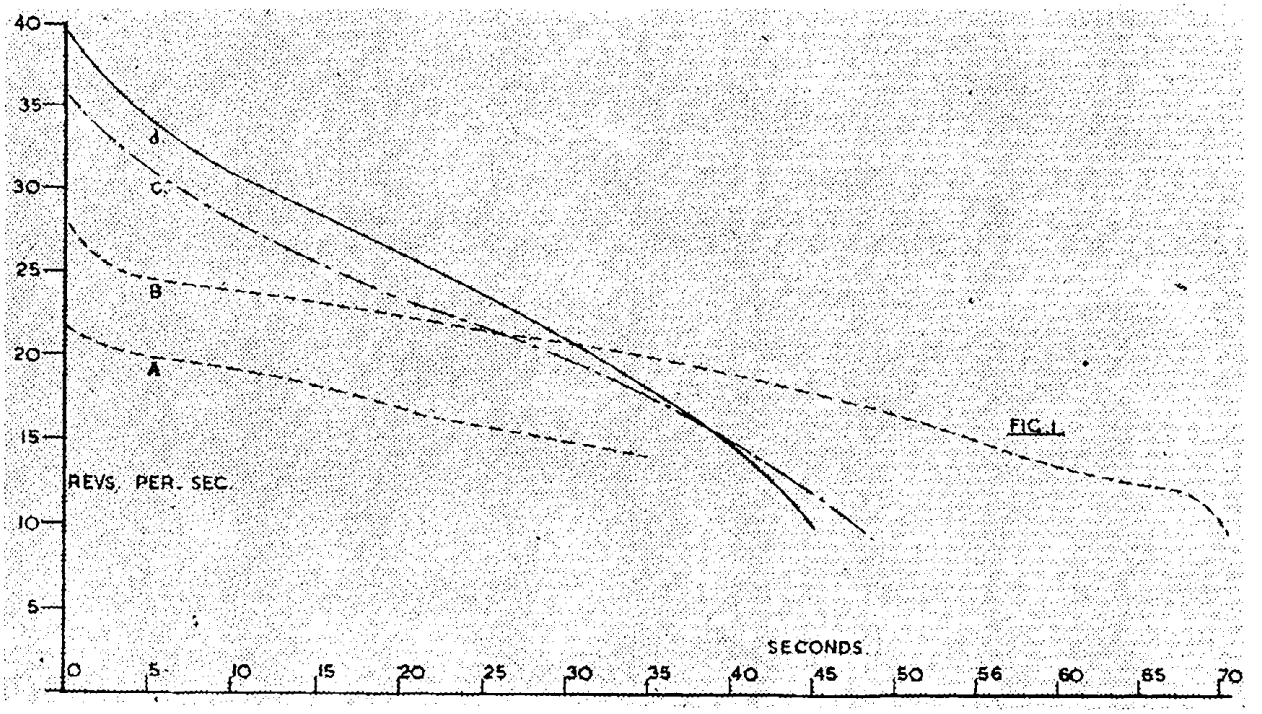


FIG. 1.

electrical supply company (assuming, of course, that the supply is A.C., which is pretty general throughout the country now). This cycle occurs every 1/50th of a second, so that in one second we get 50 such cycles, which explains why our electrical supply is called a 50 cycle supply.

Now a lamp that is connected to such a supply gives full light only when the voltage is at maximum, *i.e.*, at points b and d on the sine curve. At points a, c and e, there is no voltage applied, so theoretically, there is no light, which means that our lamp is going on and off all the time (actually at the rate of 100 times per second). So fast is this, of course, that we cannot see it happening.

Unfortunately, an ordinary lamp will not do for us as, due to the after-glow when the lamp is switched off it does not go right out, so we must use a Neon lamp, the ordinary Beehive type will do and can be obtained from almost any lamp or radio shop, costing around 3s. This Neon lamp is filled with a gas which ignites when a certain voltage is applied and is definitely out when no voltage is applied, so this just suits our purpose.

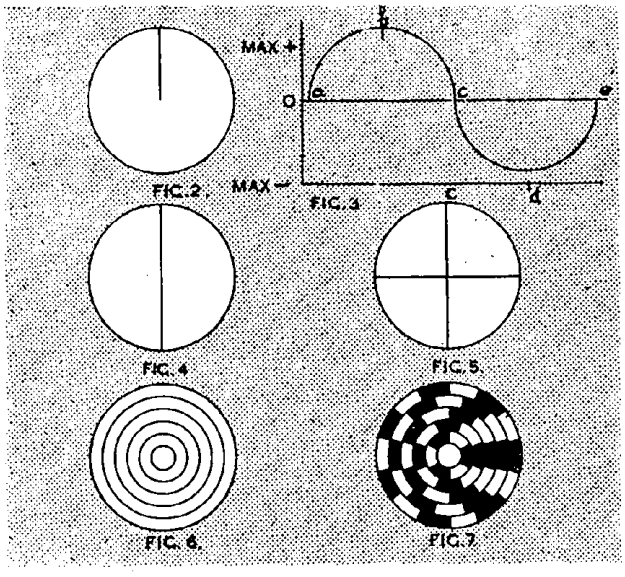
Now if we revolve our disc with the line on it at exactly 100 revolutions per second, the line that we have drawn will be in exactly the same position when the lamp is alight, so we shall be able to see it as we have drawn it (Fig. 2). If, however, we revolve our disc at 110 times per second the line will be in a different position every time the lamp is alight, and we shall be unable to see it. Now let us revolve the disc 50 times per second: remember, the lamp is lighting 100 times per second, so we shall now have the light falling on the disc twice every revolution, so we shall see our line twice, once as we have drawn it (Fig. 2) and again when it has gone half way round, so that it will appear as a line right across our disc (Fig. 4).

If halving the speed of our disc enables us to see apparently two lines (or one full line) it is obvious that halving it again (to 25 revolutions per second) will enable us to see four lines (or two full lines), as Fig. 5.

In order to see these lines perfectly steady the speed of our disc must be exactly right. If a little faster than the correct speed the lines will appear to revolve slowly to the right, if slower, to the left. The speeds that we are mainly concerned with for our propellers lie between, say, 35 and 10 r.p.s., so we require a stroboscope that will enable us to identify the speed quickly as it may be changing at a very rapid rate, too fast, in fact, for us to be able to count the lines. We therefore put on our disc the requisite number of lines for certain speeds, and when these lines appear stationary we know that our prop is revolving at these speeds.

To make up this stroboscope, draw on a piece of cardboard (a post card will do) 6 concentric circles, starting at ¼ in. diameter and increasing by ¼ in. dia. each time until you have the six circles as shown in Fig. 6. Now by means of a protractor carefully divide the first ring into three, *i.e.*, three lines 120 degrees apart. The area of our lines must equal the white area to keep our lines readily visible when the disc is revolving, so draw another line 30 degrees each side of the dividing lines, then fill in the space with indian ink. This then gives us three black and three white sections each 60 degrees apart.

The second ring we divide into four (90 degrees apart), again the area, *i.e.*, 22½ degrees, each side of the dividing lines. The third ring into five, 72 degrees apart and 18 degrees each side; fourth ring into six, 60 degrees apart and 15 degrees each side; and, finally, the fifth ring into seven, 51½ degrees and 13 each side. Our disc

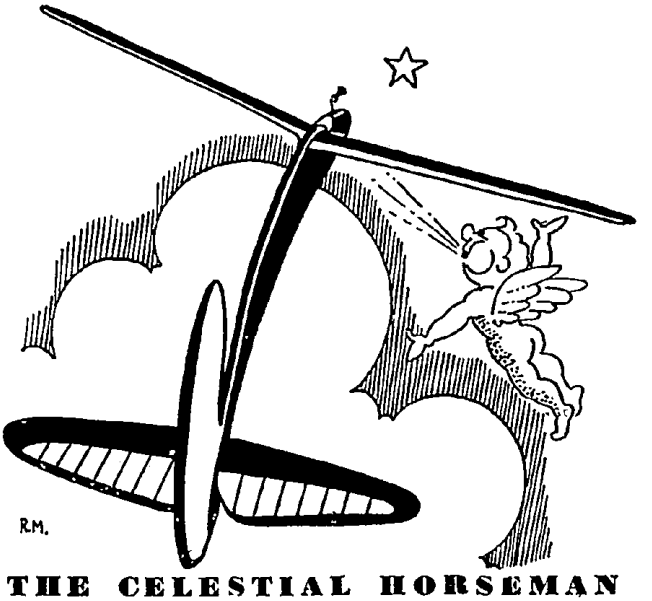


should now appear as Fig. 7. (You may like to cut this out and paste it on a card, instead of making one.)

Place this disc firmly on to the propeller shaft in front of the propeller, wind normal turns and place the Neon lamp about 3 ins. from the disc (the normal lights can be left on), get someone to hold a clock that is fitted with a second hand, let the prop go and get the clock holder to note the exact second, watch the stroboscope disc carefully. As soon as you see, say, the four-line circle STEADY sing out "four," the timekeeper notes this time; continue watching the disc carefully and you will see the four lines becoming a blur and then the five lines will gradually appear and become stationary. call "five" when this happens and again note the time; follow on with the six and seven lines in the same way.

Continued on page 189.

CARICAPLANES No. 1



THE CELESTIAL HORSEMAN

DESIGNED AND BUILT BY L · G · TEMPLE

UNDERCARRIAGE DESIGN

BY J · H · MAXWELL

IT has frequently been stated that the landing of a man-carrying aircraft differs from that of a model in that the pilot of the former pulls his machine into a nearly-stalled, nose-up attitude, and drops it on to the runway; whereas the latter "glides into the ground" However, it must be remembered that, at the moment of touching down, the forward speed of a full-size aircraft is still very considerable, and, therefore, despite its nose-up attitude, it too, in effect, "glides into the ground". There is, in fact, no fundamental difference in the landings of the two types.

This fact is mentioned in order to dispel a prevalent misconception, but it does not imply that model undercarriages should necessarily follow the lines of full scale ones. The design of model undercarriages involves its own peculiar problems, and this article is an attempt to explain these.

Explanation of Landing Shocks.

Anyone who has ever bounced a tennis ball, or broken a cup, must realise that when an object strikes the ground it experiences some sort of shock. The explanation is quite simple.

A moving object, because of its weight and motion, possesses kinetic energy, and when it is brought to a standstill this energy must be absorbed either in the object itself or in the halting medium. A model aeroplane in flight is one such moving object. If it lands on something hard and unyielding, the energy must be absorbed in the undercarriage and structure; but if the landing surface is soft, then it will absorb some of, if not all, the energy.

If the stop is sudden, the energy must be absorbed very quickly, and it produces a large force. Conversely, if the stopping process is gradual, the energy is absorbed slowly and a small force results. Therefore, in order that the landing loads on a model should be at a minimum, it is essential that the arresting process should be as protracted as possible. Or, in other words, the farther a model travels from the instant it first touches down until it finally comes to a standstill, the smaller will be the landing loads.

Landing Forces.

All the forces acting on an undercarriage in landing originate at the points of contact, that is, where the wheels meet the ground, but they may, for convenience, be divided into two categories according to whether they are due to the model's downward motion, or its forward motion. Those produced by the downward motion act vertically upwards, and are indicated by arrow A in the accompanying sketch. Those due to the forward motion, represented by arrow B, act horizontally backwards.

Vertical Forces.

The magnitude of the vertical forces depends on how quickly the model's downward motion is arrested, as previously explained.

Imagine a model descending on to a hard surface. Its sinking speed at the instant the wheels touch down is 3 ft. per second, and, obviously, it must decelerate to zero ft. per second. If the undercarriage can yield, or give, say, an inch vertically, the job of absorbing the kinetic energy is spread over this inch, and the force will be reduced to a manageable amount. If, however, the undercarriage is rigid, the energy must be absorbed instantly, and, theoretically, the force will be infinitely great.

Softer surfaces, such as grass, yield and absorb at least part of the energy, but it is not wise to depend on this, as most models land on hard surfaces occasionally.

Methods of providing for the vertical forces depend on the type of undercarriage. In cases where the legs are more or less vertical, when viewed from in front, as in some scale models, the vertical loads act up the legs; and therefore each leg should incorporate a shock absorber which will permit its compressing. More usually the legs slope outwards considerably, and the main effect of the vertical forces is to bend them farther outwards. In undercarriages of the latter type, the legs should be able to bend, or hinge outwards and upwards.

Horizontal Forces.

On a smooth landing surface the only effect of the horizontal forces is to turn the wheels, and the resulting landing run allows the forward energy to be absorbed slowly. Thus, the horizontal loads in the undercarriage are very small.

At first sight, this is difficult to believe, but a little thought will show that it must be so, and anyone can prove to his own satisfaction that it is not "some more of this indoor theory", as a recent letter to the Editor put it, by simply gliding any ordinary model on to a hard smooth surface, such as a roadway. It will then be quite apparent that the legs spring, not backwards, but outwards and upwards.

The snag is that most models have to land fairly frequently on rough ground and tufts of grass, where there is little chance of a landing run, if, indeed, the wheels turn at all. Under these circumstances, a large horizontal load is placed on the undercarriage, and, although the grass may be relied upon to give a few inches in most cases, the undercarriage must be able to spring backwards as far as possible. When the wheels hit a rock, a fence, or something equally immovable, the model invariably tips forward on to its nose, so that not all the force is taken by the undercarriage. However, the exact forces produced by a rough landing are difficult to assess, and will have to be made the subject of some future practical tests.

The position as regards horizontal forces may be summed up thus. Where a reasonable landing run is assured, as in models with large wheels landing on smooth turf, the horizontal force is small, or even negligible. With smaller petrol models, and rubber-driven models in general, where the landing run is likely to be impeded, provision must be made for considerable horizontal forces, by incorporating backwards springing in the undercarriage.

Practical Applications.

The application of the above conclusions to specific models is best illustrated by means of a few examples.

Example 1.

A large radio-controlled model has a forward speed of 30 ft. per second, and a sinking speed of 4 ft. per second. Because of the radio apparatus, the maximum landing

forces must not exceed 4G. Find (*a*) the minimum permissible landing run, and (*b*) the distance the undercarriage must yield vertically.

(Landing forces are usually measured in terms of G. G is the force due to gravity, and is equal to the weight of the model. Closely related to G is small g, which is the rate of acceleration or deceleration due to gravity, and is equal to 32·2 ft. per second². An acceleration or deceleration of 1g produces a force of 1G, and so on.)

The appropriate formula is

$$s = \frac{V^2}{2a}$$

Where s = distance travelled while accelerating or decelerating, in feet.

V = speed, in feet per second.

a = acceleration or deceleration, in feet per second².

(*a*) Consider first the forward motion.

V = 30 ft. per second $\therefore V^2 = 900$

a = 4g = 4 × 32·2 = 128·8 ft. per second².

$$\therefore \quad s = \frac{900}{2 \times 128{\cdot}8}$$

$$= 3{\cdot}5 \text{ feet,}$$

i.e., the minimum permissible landing run is 3·5 ft.

(*b*) In the downward case

V = 4 ft. per second $\therefore V^2 = 16$

a, as before = 128·8 ft. per second².

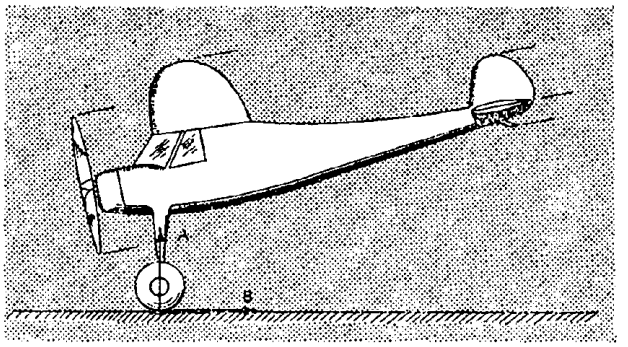
$$\therefore \quad s = \frac{16}{2 \times 128{\cdot}8}$$

$$= 0{\cdot}062 \text{ ft.} = 0{\cdot}75 \text{ ins.}$$

i.e., the undercarriage must give vertically 0·75 ins.

Example 2.

A Wakefield model, having speeds of 20 ft. per second forwards and 3 ft. per second downwards, hits a tuft of grass into which the wheels sink 3 ins. forwards and 1 in. downwards. In addition, the legs spring, allowing the wheels to move 3 ins. backwards relative to the model, but not upwards. Determine the landing forces.



The previous formula may be re-written :—

$$a = \frac{V^2}{2s}$$

In the forward case the total give is 6 ins.

$$s = 0{\cdot}5 \text{ ft.}$$

$$V^2 = 400$$

$$\therefore \quad a = \frac{400}{2 \times 0{\cdot}5} = 400 \text{ ft. per second}^2$$

$$= \frac{400}{32{\cdot}2} = 12{\cdot}4 \text{ g}$$

The horizontal backward force on the undercarriage is therefore 12·4 G, which is fairly high. If the model weighs 8 ozs. (0·5 lbs.) the force is 6·2 lbs., and the undercarriage could be tested by supporting the fuselage vertically (nose up) and hanging 3·1 lbs. on each wheel.

In the vertical case only the grass gives, and s = 1 in. = 0·083 ft.

$$\therefore \quad a = \frac{9}{2 \times 0{\cdot}083}$$

$$= 56 \text{ ft. per second}^2 = 1{\cdot}75 \text{ g.}$$

i.e., the vertical force is 1·75 G.

The design of the constructional details of undercarriages to suit specific models is outside the scope of this article, but it is hoped that what has been written here will promote a better understanding of the functions of undercarriages in general.

POWER OUTPUT OF RUBBER MOTORS. *Continued from page* 187.

If you wish to continue beyond this go back to the four line circle and you will see this appear as eight lines, the five as ten, and so on.

Now for the speeds :—

3 lines when appearing stationary				= 33·1/3 r.p.s.	
4	,,	,,	,,	= 25	,,
5	,,	,,	,,	= 20	,,
6	,,	,,	,,	= 17	,, (apx.)
7	,,	,,	,,	= 14·3	,, ,,
8	,, (on the 4)	,,	,,	= 12½	,,
10	,, (,, 5)	,,	,,	= 10	,,

and so on.

If we plot the speeds called out against the times noted we obtain the power output of our motor; with one winding instead of the several required in the previous method outlined. For actual flying speeds allow 10 per cent. increase on these figures (this increase is due to the fact that the prop has less drag when free to move forward through the air).

Try different number of turns or other arrangements of strip until you get the curve giving the results you require.

Note that THE MAINS SUPPLY MUST BE A.C.; if D.C. the scheme is useless.

Footnote.

If your mains supply is other than 50 cycles per second, the formula for the speed for a given number of lines drawn on the stroboscope disc is

$$S = \frac{2f}{N}$$

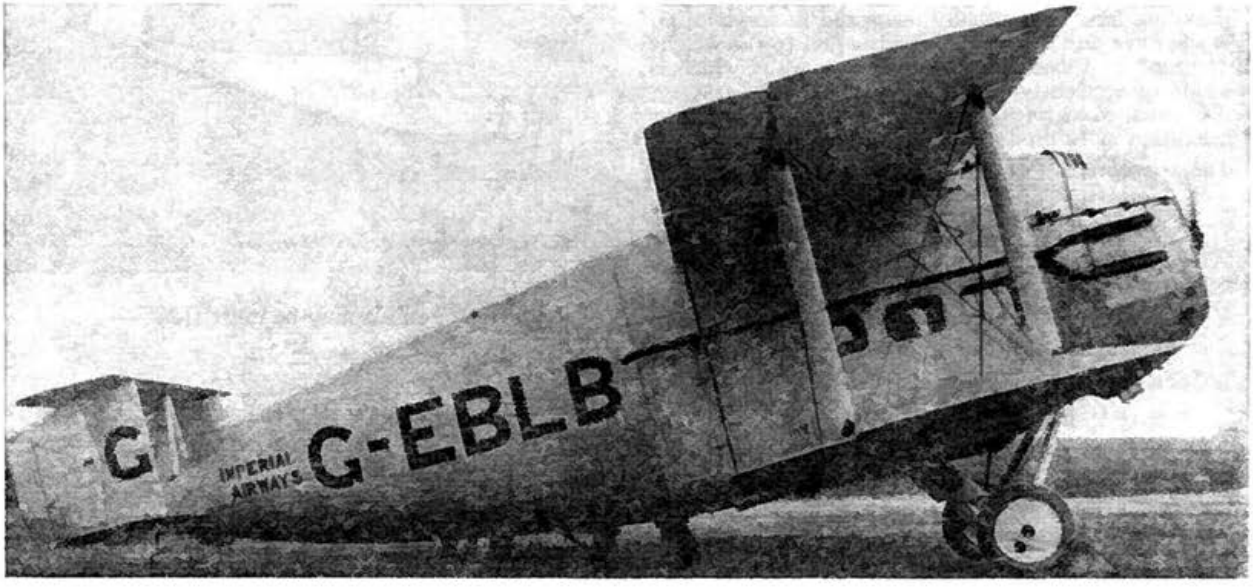
Where S = disc speed in revolutions per second.
f = frequency of the mains in cycles per second.
N = number of lines drawn on the disc.

As an example; suppose you have drawn three lines on the disc and the mains supply is rated at 60 cycles per second, the speed of your disc when the three lines appear stationary would be

$$S = \frac{2 \times 60}{3} = \frac{120}{3} = 40 \text{ r.p.s.}$$

THE VICKERS "VULCAN"

BY E · J · RIDING



IN 1922, Vickers (Aviation), Ltd., of Weybridge, Surrey, produced a design which, although intended specifically for carrying passengers, was, in accordance with the need for economy in those days, powered by one wartime Rolls-Royce "Eagle VIII," 12-cylinder, water-cooled engine, of which the Aircraft Disposal Board held large stocks.

The machine was known as the Vulcan, and by no means could it be called a pretty aeroplane—in fact its ungainly aspect earned it the nickname "Flying Pig." From the very first, the machine was grossly underpowered and although it embodied several novel and interesting features, it proved too slow in comparison with contemporary designs working on the same routes. The aim of the designers seems to have been to produce an aeroplane capable of carrying eight passengers on an engine of 360 h.p. which, if successful, would have meant that the operating company would have been able to pay its way without the aid of a Government subsidy.

The constructors showed their faith in the design by laying down an initial batch of eight machines without waiting for orders—an unusual policy for those days in view of the fact that it was an untried machine.

The prototype was delivered to the Instone Air Line in the Summer of 1922 and was employed on their Croydon-Brussels service. Two other machines, G-EBDH and G-EBEA, followed shortly afterwards, but their low speed coupled with an unfortunate accident to G-EBDH at Oxted in the Autumn of the same year, caused the withdrawal from service of all three aircraft shortly afterwards. 'BL seems to have had a slightly longer life and made flights to Cologne and Prague on one or two occasions before being relegated to the scrap heap in 1923.

The next two Vulcans, G-EBES and G-EBET, were bought by the Australian Airline Q.A.N.T.A.S., and it was rumoured that when the machines got out there they were unable to rise above the house tops!

Vulcans were flown in the King's Cup Races of 1922 and 1923. G-EBEM finished 7th in the 1922 race, and G-EBFC fitted with the more powerful Napier "Lion" engine of 450 h.p. was forced to retire during the first leg of the 1923 course.

The next machine to be built, G-EBEK, was allotted to the Air Ministry, who very seldom used it. Visitors to the 1925 Wembley Exhibition were treated to the spectacle of 'EK disguised as an "Imperial Airways Freighter," in spite of the fact that the machine was never owned by Imperial Airways and had never been flown as a freighter. It, too, was broken up shortly afterwards.

The eighth Vulcan, G-EBFC, was bought by the newly formed Imperial Airways in May, 1924, and flew regularly on their services to the Continent until it was dismantled and subsequently burned a year later.

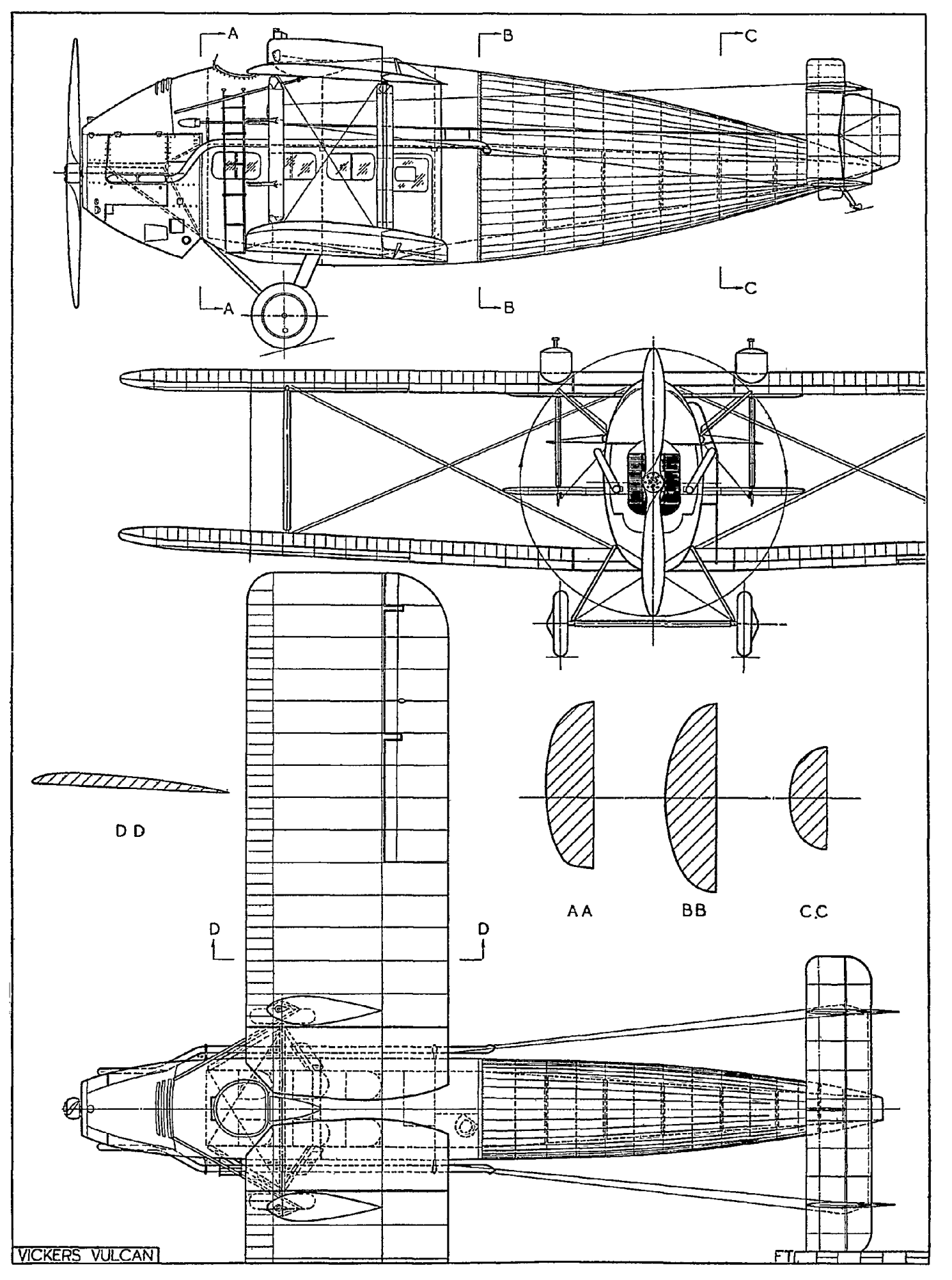
G-EBEM was flown for a short while by a private hire company owned by the late Mr. Leslie Hamilton, until it forced landed in the sea off the coast of Italy early in 1926.

The ninth, and last Vulcan, registered G-EBLB, was delivered to Imperial Airways, Ltd., in May, 1925. It was fitted with the 450 h.p. Napier Lion engine and must have done more flying than all the other Vulcans together. On July 13th, 1928, it crashed and burst into flames at Purley during a test flight, involving the death of several employees of Imperial Airways.

The colouring of these machines was as follows:—Instone Air Line: Royal blue fuselage, white letters, silver wings and tail surfaces with black letters. Imperial Airways, Ltd.: Silver all over with black letters.

The Vulcan was of all wooden construction, the front portion of the fuselage being of elliptical monocoque section covered with plywood, the rear half being built up from hollow spruce longerons with stringers to preserve the streamline shape. The wings were of a thick airscrew section employing spruce box spars and lattice type ribs.

Specification: Span, 49 ft.; length, 37 ft. 6 in.; height, 14 ft. 3 in.; tare weight, 3,775 lb.; loaded weight, 6,150 lb.; max. speed, 105 m.p.h.; cruising speed, 90 m.p.h.; landing speed, 40 m.p.h.; time to 6,000 ft., 14 mins.

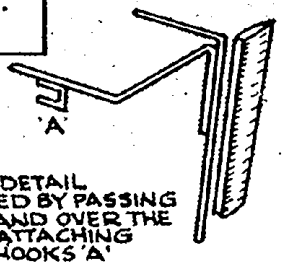


VICKERS VULCAN

FT

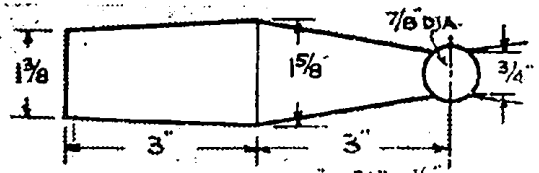
"ARIEL-4."

DESIGNED BY J. LOCKEY.



UNDERCART DETAIL
U/C. IS SECURED BY PASSING A RUBBER BAND OVER THE FUSELAGE & ATTACHING THE ENDS TO HOOKS 'A'

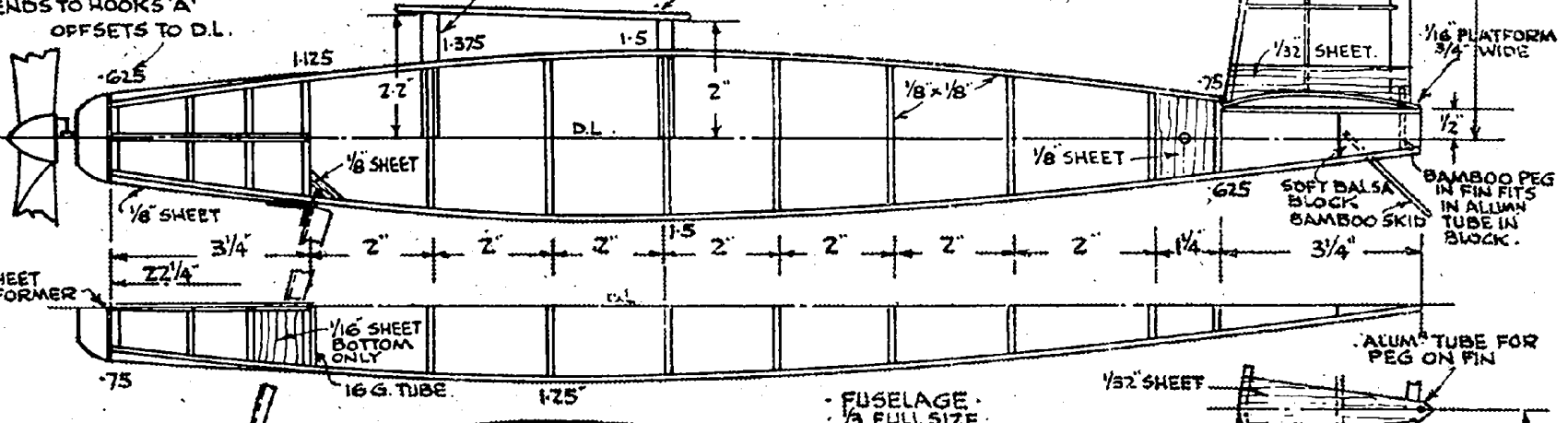
POWER :- 10-12 STRANDS 1/4" x 1/30"



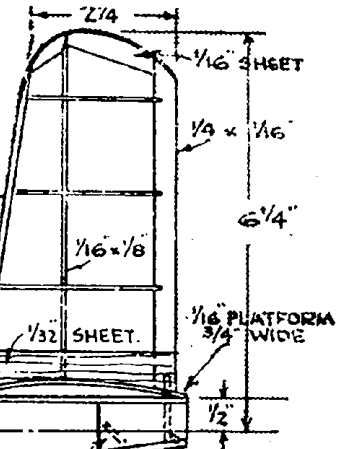
PROP. BLOCK 12" x 1 5/8" x 1 1/8"

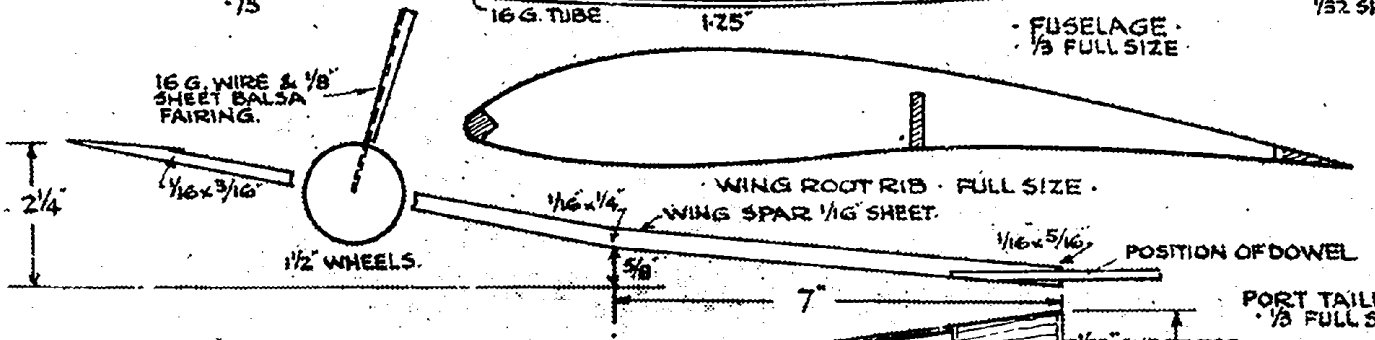
WING MOUNT SUPPORTS 1/8" x 3/16" HARD BALSA CEMENTED TO SPACERS & STREAMLINED AT TOP.

BAMBOO RAILS

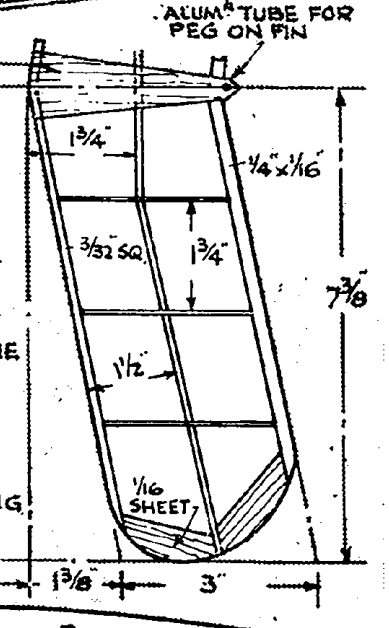


· FUSELAGE · 1/3 FULL SIZE



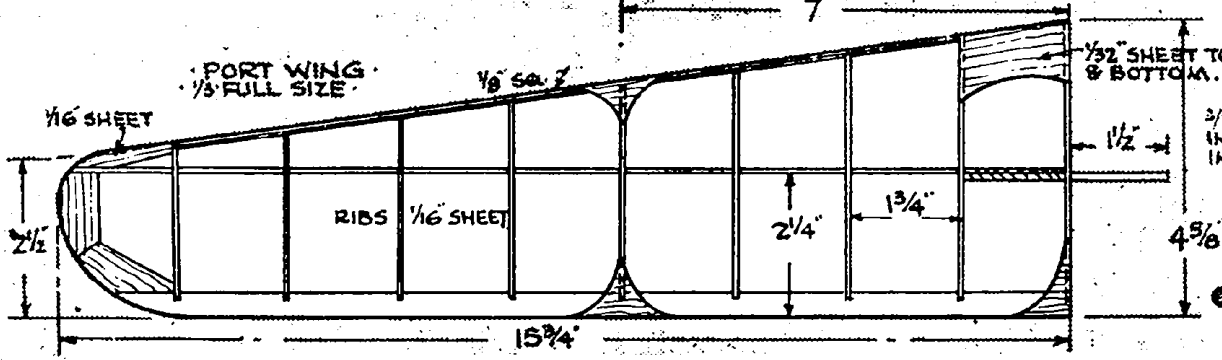


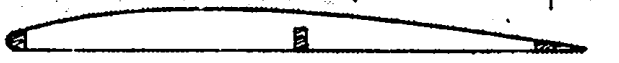
· WING ROOT RIB · FULL SIZE ·



· PORT TAILPLANE · 1/3 FULL SIZE ·

· PORT WING · 1/3 FULL SIZE ·





TAIL RIB · 1/16" SHEET · FULL SIZE

Against a most appropriate background hangs Mr. D. G. Procter's model, First Prize Winner in the Duration Class.

IN the year 1868, the first Aeroplane Exhibition in the world was held at the Crystal Palace, London, by the newly-formed Aeronautical Society of Great Britain. It was true that none of the machines shown was capable of flight—except, perhaps, that of the great John Stringfellow—yet the Exhibition did a service to aeronautics of inestimable value. Hitherto, aeronautics had been generally considered to be the fantastic dream of a few impractical visionaries, and the Exhibition forcibly convinced the general public that, far from being a mirage, the problem of flight was well on the way to solution, and was being tackled by some of the best brains in the world.

In a similar manner, in 1945, the first National Exhibition of Model Aircraft, held at The Dorland Hall, Lower Regent Street, London, has achieved a similar end, in so far as it has brought forcibly to the public notice the importance of model aeronautics in this country. Both the general public and "the powers that be" cannot fail to have been impressed by the importance and value to the community of model aeronautics, or have failed to perceive that some of the finest brains in the country are occupied in the solution of its problems.

The Exhibition would have been an outstanding achievement in times of peace; in times of war it is in fact little short of miraculous; and speaks well not only of the quality of the organisation, but of the strength of the Model Aeroplane Movement in general.

In the presence of many distinguished visitors, the Exhibition was opened on January the 5th, by The Lord Brabazon of Tara, who was introduced by Mr. D. A. Russell, Managing Editor of the AEROMODELLER, and organiser of the Exhibition. Those present included :— Lord Londonderry; Sir Robert Bird, Bart., M.P. (President of the A.B.A.) and Lady Bird; Vice-Admiral D. W. Boyd, C.B., C.B.E., D.S.C., Fifth Sea Lord; Air Vice-Marshal Sir Leslie Gossage, K.C.B., C.V.O., D.S.O., M.C., Director-General, A.T.C.; Air Commodore Sir Adrian Chamier, C.B., C.M.G., D.S.O., O.B.E.; Major H. J. G. Collis, Army Cadets; Major John Henderson, Boy Scouts; Air Commodore O. R. Gayford, C.B.E., D.F.C. (Vice-President, A.B.A.); Air Commodore A. W. Glenny, D.F.C., M.C.; Commander H. E. Perrin, C.B.E., Secretary, Royal Aero Club; Wing Commander F. C. Gillman; E. L. Baddeley, Esq., Press Officer, Ministry of Aircraft Production; C. A. Rippon, Esq., Chairman, A.B.A.; C. M. Poulson, Esq., Editor of "Flight"; The Editor, "The Aeroplane"; E. Colston Shepherd, Esq., B.A., B. Litt., Oxon., Air Correspondent, B.B.C.; F. J. Camm, Esq., Editor of "Practical Mechanics"; F. H. Berry, Esq.; P. G. Masefield, Esq., Air Adviser to Lord Beaverbrook; J. N. Maskelyne, Esq., Editor, "Model Engineer"; A. R. Peers, Esq., Editor, "English Mechanics"; Leonard Halls, Esq., Editor, "Boys' Own Paper"; Editor of "The Scouter"; J. R. Tildsley, Esq., Director, and R. T. Deller, Esq., General Manager, Messrs. Horace Marshall & Son, Ltd.; Squadron Leader Peter Hunt and Mrs. Hunt; Mr. and Mrs. Robert North; Ian Anderson, Esq.; C. G. Corder, Esq., Messrs. Kodak, Ltd.; C. D. Stevens, Esq., Director, Chingford Model Aerodrome, Ltd.; H. W. Paterson, Esq., Director, British Model Aircraft Mfg. Co.; A. E. Jones, Esq., Director, Messrs.

Planet News Photo.

Lord Brabazon of Tara in a characteristic attitude.

Gee & Watson, Ltd.; J. W. Jacques, Esq., Messrs. Peal, Ashdown & Hart; C. E. Dooley, Esq., L. F. Hunt, Esq., Kennerley Press; The News Editors of "The Daily Sketch," "Daily Express," "Westminster Press," "Manchester Guardian," "Daily Worker," "Daily Mail," "Provincial Newspapers," "Glasgow Bulletin."

In a short, opening speech, Mr. Russell aptly summed up Lord Brabazon's position in the aeronautical world by saying that he (Mr. Russell) in considering whether he should invite Britain's No. 1 Pilot; or a Minister of Aircraft Production; or an Air Minister; or a man, who had at heart "The Cause" of British Aviation to open the Exhibition, he had suddenly realised that, in Lord Brabazon, there was the one man who combined all these qualities!

In reply, Lord Brabazon said that while it gave him great pleasure to open the Exhibition, it was with something more than pleasure—it was with *great enthusiasm* for the art of modelling, as he himself had made many models. He addressed himself first to the ignorant. To these he would say most emphatically that *models were not toys*! He had, at one time, built a most elaborate model railway, and almost everybody who saw it remarked, "How nice for the children." He hastened to point out that no child was ever allowed within one hundred feet of this model!

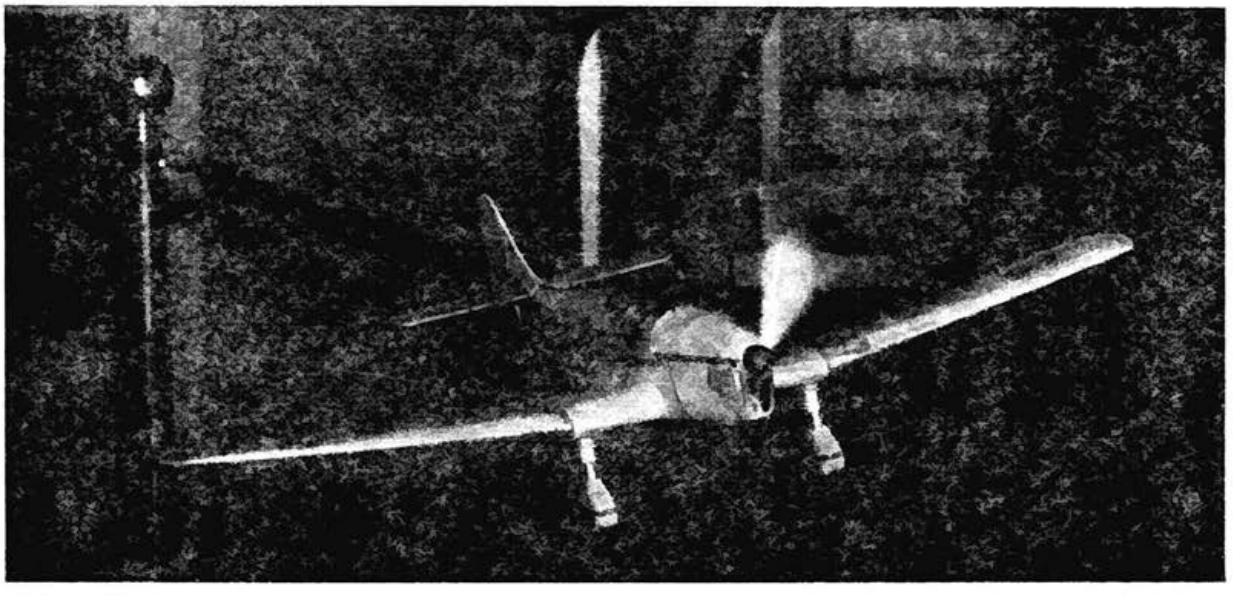
As early as 1902 he and Charles Rolls had made model gliders, and had flown them in the Albert Hall. How they had managed to get into the hall for this purpose must remain his secret! He pointed out that they had made the usual beginner's mistake of constructing to too large a scale.

In continuing, Lord Brabazon said that there were three approaches to aeromodelling; True Scale, Semi-scale, and Flying Models designed without any regard to resemblance to full-sized machines.

The first were always true works of art, and a joy to the eye. He had, at the present moment, a beautifully made model ship in his office, at which he was never tired of gazing.

The second type presented great difficulties to the modeller, but these had, apparently, been overcome with a great measure of success.

The third (to him) was the most interesting type. In this field the inventions are developed, and discoveries made which lead to progress. "But we must be very careful in framing the rules for our competitions, to ensure that they make for genuine progress and better aircraft." Already great progress had been shown, particularly in small power units, and, he understood,



Vice Admiral Boyd, First Sea Lord operates the electrically-driven Miles Magister shown in the photograph bottom left.

even small jet propulsion units had made an appearance.

Lord Brabazon then quoted the saying that "Aviation was still in the air!" The field for experiment was almost limitless. Should we pull or push our aircraft? Should we fly nose or tail first? Should the craft be all-wing or all-fuselage? He particularly desired to see advances in autogyro and helicopter development, and the strange properties of the boomerang studied. He pointed out that the boomerang presented all the problems of flight: helicopter, autogyro, gyroscopic effects, lift and drag. He was an expert boomerang thrower himself, and he was prepared to offer a cup for the encouragement of the art.

"Flight," he said, "was not born in the laboratory, but arose out of the work of the hands and brains of skilled mechanics and craftsmen, like the Wright brothers. We aeromodellers may continue to make important discoveries by our practical work."

In conclusion, Lord Brabazon pointed out that, above all, it was necessary to make British youth air-minded. "We must become a race of airmen as well as seamen, if the future peace of the world is to be assured."

Mr. Russell then introduced Sir Henry Tizzard, who, he said, was undoubtedly the greatest living authority on aeronautics in the world to-day, and had kindly consented to support, and thank, Lord Brabazon.

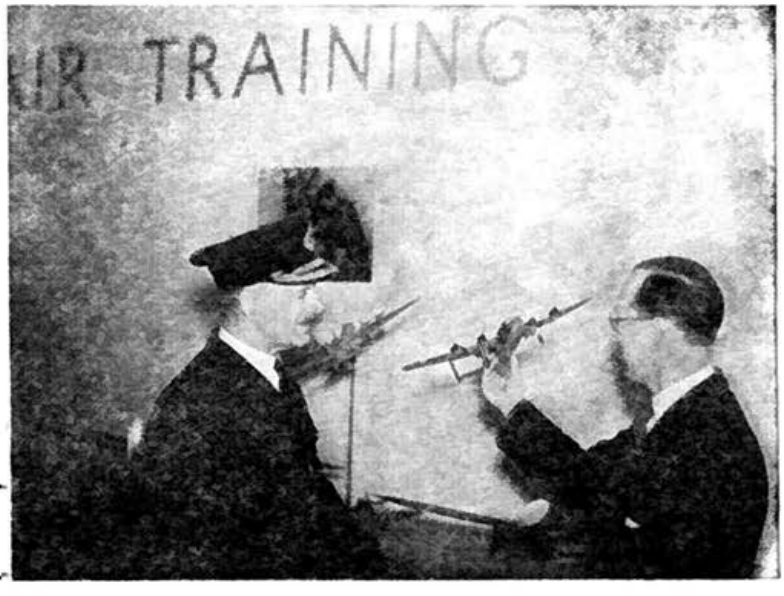
Sir Henry Tizzard, in opening his speech referred, humorously, to some differences in opinion between himself and Lord Brabazon, but said that he would leave their settlement to another time! The present Exhibition was, he said, a fine example of skill, intelligence and progress. To him, its principal feature was *the spirit of adventure*—which must be kept alive if youth is to conquer.

A short well-turned speech by Mr. D. A. Russell terminated the Official Opening. He said that in setting up the stands, and in arranging all the exhibits—over seven hundred of them—during the last two days, the stand contractors and his staff had "worked like slaves." He desired to thank them, and also the Press, who had helped considerably by the publicity afforded the Exhibition.

After this impressive opening, Lord Brabazon and the principal guests were conducted around the Exhibition, and it was then that some of the remarkable and varied nature of the exhibits was revealed. It is obviously impossible to describe all these marvels in detail, ranging as they did from large gliders of 10 ft. span to tiny solid models hardly a $\frac{1}{2}$ in. in breadth! Between these two extremes lay a varied range of machines and apparatus. Large petrol-driven aeroplanes, scale and semi-scale flying models, exquisite solid models of all types, flying bombs, rockets, model petrol engines, and, yes, a wind tunnel!

On directly entering the Hall, one was struck by a representative display of machines of all types hung overhead in the entrance. Prominent among these could be seen the work of Mr. C. Rupert Moore, whose fine scale and semi-scale work is well known. Striking an unusual note was a beautifully made outdoor stick model by Mr. J. H. Maxwell of Bristol. It is surprising what an amount of ingenuity and good work can be packed into such an apparently simple machine as this.

Proceeding, one was immediately aware of the large petrol-driven aeroplanes which were suspended above



Air Vice Marshal Sir Leslie Gossage, discussing points on the A.T.C. stand with Mr. Lodge, Secretary of the A.B.A.

(Above.) Commander H. E. Perrin, Secretary of the Royal Aero Club, and Mr. D. A. Russell examining a partly finished fuselage of a built-up, scale "Hawker Hurricane."

the main aisle, alternating with some large gliders. First, Mr. Russell's well known gas job "Vulcan," showing no visible signs of its long and vigorous career. Next, Mr. Temple's huge glider—"The Celestial Horseman"—surely one of the most beautiful machines ever constructed. Then, characteristically finished in white

(Below.) The judges at their difficult task. From left to right, Air Commodore Sir Adrian Chamier, Air Commodore Glenny and Mr. C. A. Rippon, Chairman of the A.B.A. With his back to the camera Mr. H. G. Hundleby, Assistant Editor of the "Aeromodeller" deputises for Mr. D. A. Russell.

COMPETITION

Competition No. 1A.

1st Prize Winner:	D. H. Middleton, 12, Beverley Gardens, Golders Green, N.W.11.	"De Havilland Albatross."
2nd Prize Winner:	D. Jackson, 203A, Dunstans Road, East Dulwich, S.E.22.	"Lancaster I."
3rd Prize Winner:	D. S. Larner, 184, Hampton Road, Twickenham, Middx.	"Sopwith Camel."

Competition No. 1B.

1st Prize Winner:	F. Hardon, 23, St. Phillips Road, Surbiton, Surrey.	"1/24th Scale Typhoon."
2nd Prize Winner:	L. Temple, East Mersea, Colchester, Essex.	"1/24th Scale Heston Napier Racer."
3rd Prize Winner:	D. H. Elmes, 13, Quebeck Road, Ilford, Essex.	"1/48th Scale D.H. Dragonfly."

Competition No. 2.

1st Prize Winner:	D. F. Proctor, 63, Copse Avenue, West Wickham, Kent.	"Wakefield Model."
2nd Prize Winner:	J. H. Maxwell, 1, Kenilworth Road, Redland, Bristol, 6.	"Outdoor Stick Model."
3rd Prize Winner:	G. A. Cull, 7, Grimshaw Close, North Road, Highgate, N.6.	"Air Cadet."

Competition No. 3.

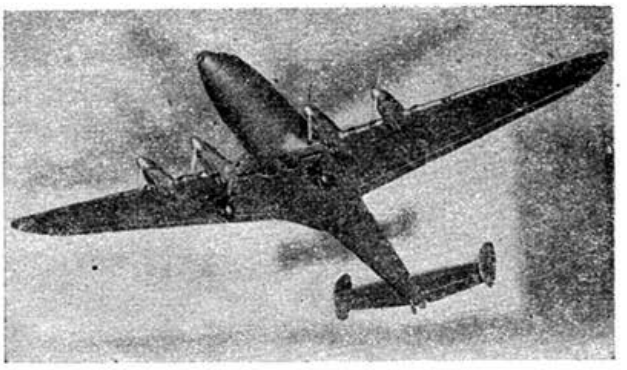
1st Prize Winner:	F. F. Dare, 21, Rydal Drive, Bexleyheath, Kent.	"Kingfisher."
2nd Prize Winner:	H. C. Baines, 55, Gellatley Road, S.E.14.	"Heston Phœnix."
3rd Prize Winner:	R. W. Morris, 68, Ryland Road, Erdington, Birmingham, 24.	"Austor IV."

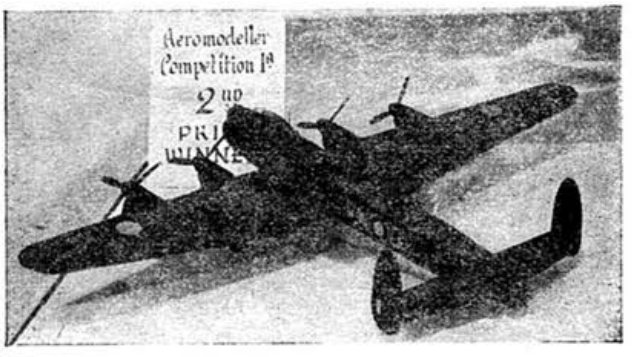
Competition No. 4.

1st Prize Winner:	L. G. Temple, East Mersea, Colchester, Essex.	"Celestial Horseman."
2nd Prize Winner:	N. Gregory, 64, Wellington Road, Hatch End, Middx.	"Argestes."

RESULTS

3rd Prize Winner:	B. A. Germany, 39, Stretton Road, Leicester.	"Xiphoid."
Competition No. 5.		
1st Prize Winner:	J. S. Balfour, 9, Stone Road, Bromley, Kent.	"5½ ft. Span Petrol Model."
2nd Prize Winner:	K. Tansley, 61A, Green Lanes, Palmers Green, London, N.13.	"Petrol Model."
3rd Prize Winner:	A. E. W. Simes, 52A, Lytton Road, New Barnet, Herts.	"Petrol Model."
Competition No. 6.		
1st Prize Winner:	H. E. White, 60, The Woodlands, N.14.	"Rubber-driven Flying Boat."
2nd Prize Winner:	G. F. Webb, 40, Clive Road, Rochester, Kent.	"40 in. Semi-scale Flying Boat."
Competition No. 7.		
1st Prize Winner:	N. K. Walker, Leahurst, Jenner Road, Guildford.	"Low Turbulence Wind Tunnel"
(The Judges wish to give special mention to the above excellent exhibit, one of the finest in the Exhibition.)		
2nd Prize Winner:	L. H. Sparey, 14, Naylor Road, N.20.	"7·5 c.c. Experimental 2-stroke Rotary Valve Engine."
3rd Prize Winner:	J. Rhodes, 31, Hood Avenue, Uplands, Nr. Purfleet, Essex.	"Electrical Model Spitfire and Flying Bomb in Brass."
Competition No. 8A.		
Winner:	L. Temple (Member of Blackheath M.F.C.), East Mersea, Colchester, Essex.	"Sailplane Celestial Horseman."
Competition No. 8B.		
Winner:	R. G. Wigley (Air Scouts Spotters Club 438), 8, Oxley Road, Winshill, Burton-on-Trent, Staffs	"1/72nd Scale Typhoon."





Top photograph shows Mr. D. H. Middleton's 1/72nd scale Albatross, First Prize Winner in the "Solids" class. This model has a superb finish and fully detailed interior, including electric lighting.

Centre, is Mr. D. G. Jackson's 1/72nd scale "Lancaster" I, a remarkable effort for a modeller of 16 years.

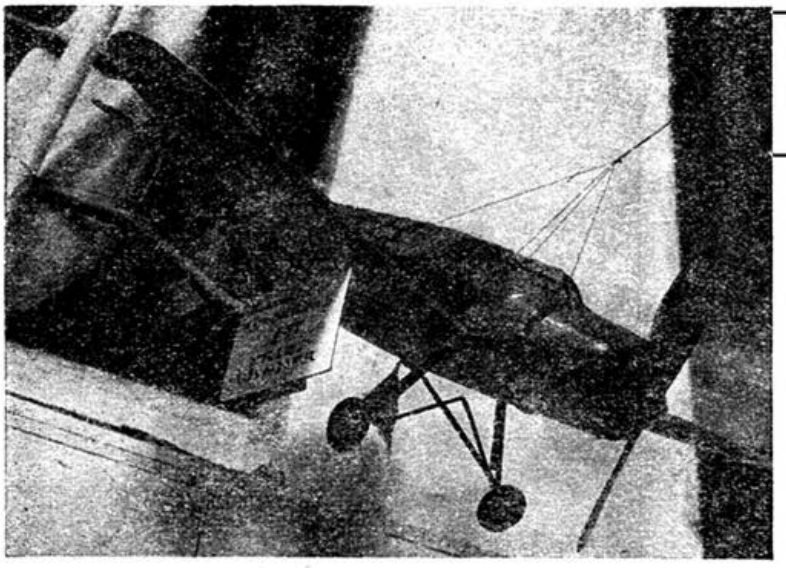
Bottom photograph demonstrates Mr. D. H. Elmes' beautifully detailed mode of a "D. H. Dragonfly" to 1/48th scale. This model also incorporates detailed cockpit fittings and interior electric lighting.

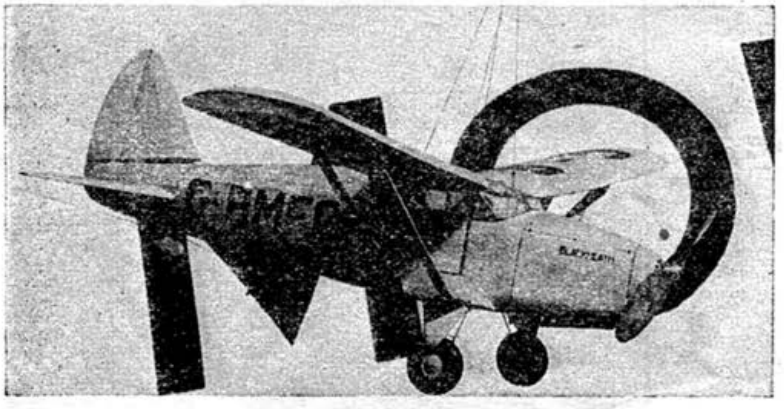
enamel, Col. Bowden's "Kangette" biplane, housing its 4 c.c. engine in an airframe of extremely small proportions. Then another beautiful glider, and so on, until, at the end of the line, Mr. D. A. Russell's 1/5th scale petrol-driven model "Lysander," surely the king of all model aeroplanes.

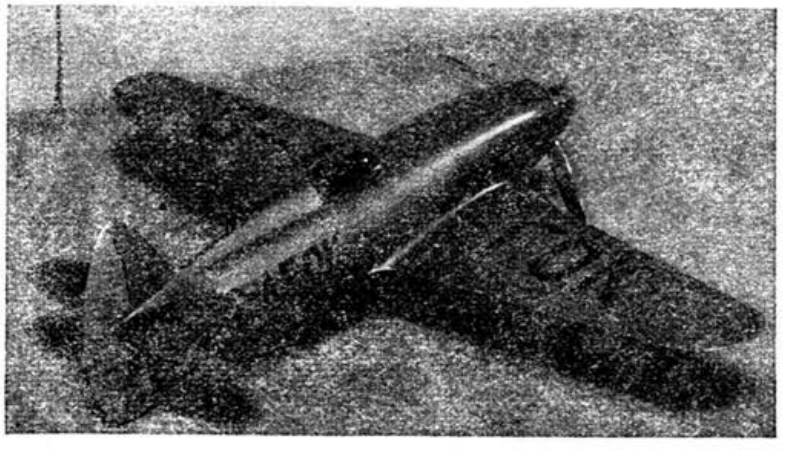
Meanwhile, the eye has been distracted by the brilliant stand of the AEROMODELLER Plans Service. Suspended above the stand was an array of many of the aeroplanes for which plans are supplied, offering an unique opportunity for selection by the would-be constructor. As a foil to this highly practical display, the opposite side of the aisle was flanked by a long stand of exhibition models, all exquisite examples of the modellers' art. Here was displayed a most topical work of art—a "Spitfire" chasing a "doodle bug," all most beautifully made in solid brass by Mr. J. Rhodes of Uplands, Essex. Entitled "Battle of Britain, 1944," this model has its tiny propeller driven by an electric motor in the base, and, to its credit, it ran continuously for the whole of the Exhibition period.

Large, glass showcases in the centre of the aisle held a selection of some of the very finest solid scale models to be seen in the world to-day. Description is impossible, as the wealth of working detail and skilled finish has to be seen to be believed. As a pointer in this direction it may be said that one small model, Fairey "Firefly," was insured for £300! And it was worth it, too! A valuation along these lines leads one to a speculation as to the total value of the machines on view, and it is an awe-inspiring thought that the figure, taking all in all, cannot have been much less than £10,000.

Then followed the stand of the Harborough Publishing Company, well known for its publications on model and full-size aircraft. Were one to read all the books shown on this stand, one could claim to have a most liberal







(Left.) Mr. D. Dares' flying scale "Kingfisher". (Centre.) Mr. H. C. Baines' flying scale "Heston Phoenix", Second Prize Winner in its class. Lower photograph shows our old friend George Temple's 1/24th scale "Heston Napier Racer".

the imposing solid scale models, almost 4 ft. in span, of the "Miles Master II," loaned by Miles Aircraft, Ltd.

At the end of the Hall was situated one of the most spectacular exhibits, namely, an electrically-driven, round-the-pole, flying-scale Miles Magister. By donating to the Royal Air Force Benevolent Fund, members of the public were allowed to operate this exciting little model. A fuller description of this model will be given next month so details need not be given here. Suffice to say that this machine *flew over* 1,000 *miles* round-the-pole during the period of the Exhibition and collected £35 ! !

Close to this exhibit was a kiosk, at which throughout the Exhibition a patient aeromodeller was demonstrating the building of a solid-scale Hawker "Hurricane IIc"; and a semi-scale "Jackdaw." If these machines continue to be made with the same painstaking care, I should like to see them when completed. This kiosk seemed to be a mecca for all the schoolboys in the Exhibition !

Adjoining this kiosk was an outstanding exhibit which, on the contrary, attracted most of the adult visitors, especially Air Force personnel (of which there was a great number). This was the wind tunnel, enthusiastically operated by Messrs. Annenberg and Walker. It need only be said here that enveloped in fumes smelling strongly of ammonia, there struggled a dense crowd of enthusiasts. Judging from the exclamations of wonder and surprise that were to be continually heard, some wonderful contributions to the theory of flight are to be expected ! ! Seriously, though, this wind tunnel was, in many respects, the outstanding exhibit of the Exhibition.

The stand of the A.B.A., presided over by Mr. Lodge, the Secretary, was in reality a small edition of the whole Exhibition; in so far, as the Association members had contributed models of every kind. Here were duration machines, petrol machines, gliders, scale and semi-scale models, solids and flying, petrol engines, and, in fact, almost every type of aeromodelling interest. Here, at least, was a practical demonstration that The Association of British Aeromodellers, did, in truth, represent all classes of enthusiasts. The fine display of cups and trophies, valued at some hundreds of pounds, might serve to whet the interest of the competition men. Mr. Lodge reports that the membership of the Association has increased considerably due to the direct influence of the Exhibition.

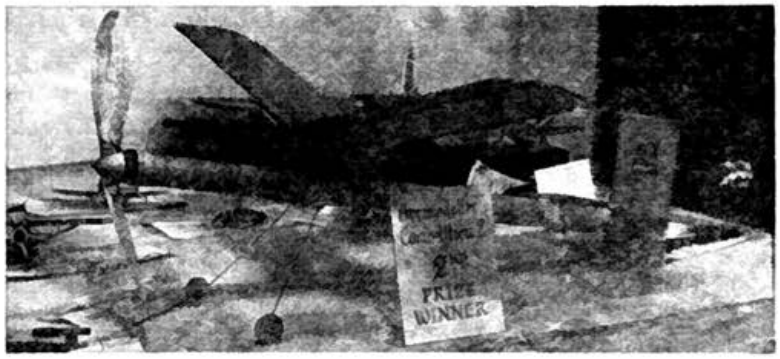
education in a variety of subjects from humour (McGillicuddie Annual) to art (selected paintings of Rupert Moore). The stand was further enlivened by some fine solid scale models lent by Messrs. Westland Aircraft, Ltd. On the opposite side of the aisle were several solid models loaned by The Fairey Aviation, Ltd.; the "Barracuda," "Albacore" and "Firefly." While on the subject of trade models one must mention

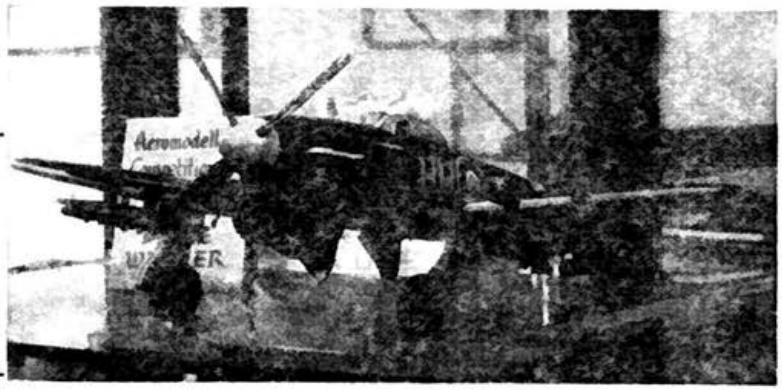
Opposite to the A.B.A. stand was that of the L.C.C. Men's Evening Institutes, a body which is affiliated to the A.B.A. Here again, variety and good workmanship were the keynotes. On this stand, incidentally, was shown the only compressed-air power plant in the Show. This was constructed by Mr. H. E. White, who also had two well-designed and well finished flying-boats on view.

The balcony now claims our attention, and here were shown some of the most popular exhibits of the Show. These were the model race cars and air-sea rescue launches displayed on the stand of the Drysdale Press, Ltd., who run a series of publications on this most interesting of allied pastimes. Perhaps the primary interest was the model race cars, and this is hardly to be wondered at when one considers that such well known models as Mr. Buck's racer, Mr. Curwen's "Special," and Mr. Cruickshank's "M.G." were on view. In addition, an American car was displayed. Outstanding from the point of view of appearance and realism was Mr. Russell's 1/5th scale "S.S.100" whose realistic appearance was enhanced by the use of proper scale-type tyres and spoked wheels. Great interest was displayed in the mechanisms of these wonderful little cars, especially in the centrifugal clutches, and ingenious springing systems.

No less interesting were the model air-sea rescue launches, plans of which are also issued by this firm. Several models were on show, and not the least important feature was the alternative sources of power by which the models were driven. The would-be builder has the choice of petrol engine, electric motor, clockwork spring motor, or geared rubber skein. The latter drive is an ingenious extension of model aircraft practice to the sphere of model boats, and I was, indeed, struck by the similarity in the whole of the construction of the model to that of the model aeroplane. Certainly no extensive range of tools and equipment would be required to build any of these intriguing models, in fact, the usual model aeroplane constructor's outfit, plus a corner of the kitchen table, would suffice.

As was to be expected, the engaging stand of the Air Training Corps was mostly devoted to solid scale models of operational machines. In these, fidelity of outline and detail was more noticeable than extremely high finish, probably due to the fact that a very close study of the

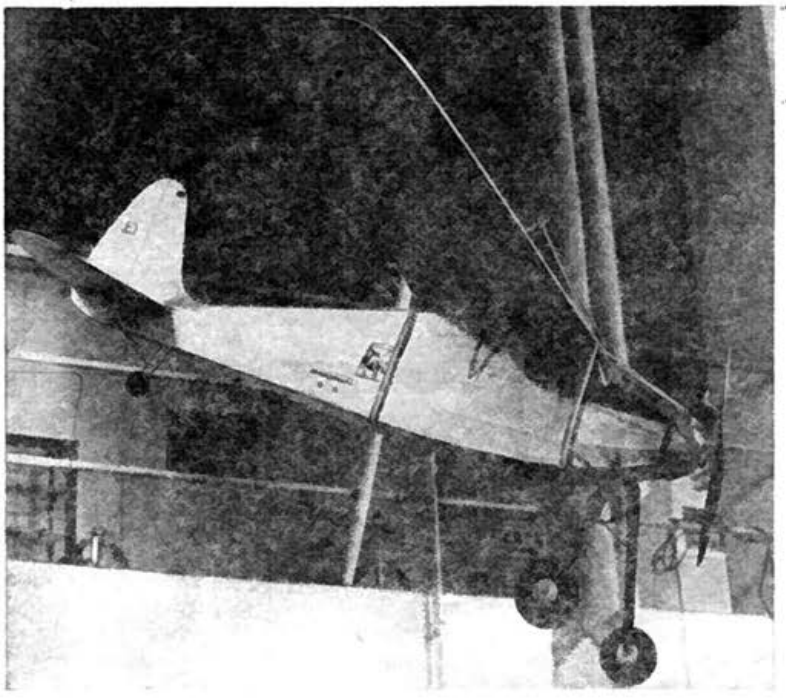




Completely spanning the centre aisle was the "Celestial Horseman" shown above. Too well known to need a description and a well deserved winner of two First Prizes.

Top right we have Mr. J. H. Maxwell's outdoor stick model the "Lavelock," a unique model of superb construction.

On the right is shown Mr. F. Harden's 1/24th scale Typhoon, complete with movable controls and many other details too numerous to mention. Another well deserved First Prize Winner.



(Left.) Mr. J. S. Balfour's 5½ ft. span petrol model. A clean design of excellent construction that well earned him First Prize.

originals had been made. Another feature, due, undoubtedly, to the A.T.C. training, was the absence of models of old time aeroplanes; all efforts, apparently, being directed towards the very modern Service types.

Of the many other exhibits of outstanding interest, space will not permit of even a mention, and a detailed description of individual machines is neither fair nor possible. As one walked around with one's mind filled with the beauties of some little machine just seen, the interest would be suddenly stolen away by a glimpse of another equally perfect example of the modellers' art. One thing I know for certain, the Exhibition has considerably modified my own ideas of my powers as a model maker! It would no doubt be possible to enter into a long eulogy of praise which might vie with the outpourings of a film publicity man, yet I feel that no repetition of the words "stupendous," "colossal" or "epoch-making" would do half so well as a very homely expression which I heard used by a very homely sightseer at the Exhibition. After gazing at one particularly beautiful solid scale model, he said: "Blimey, it don't look as if 'ands touched it!"

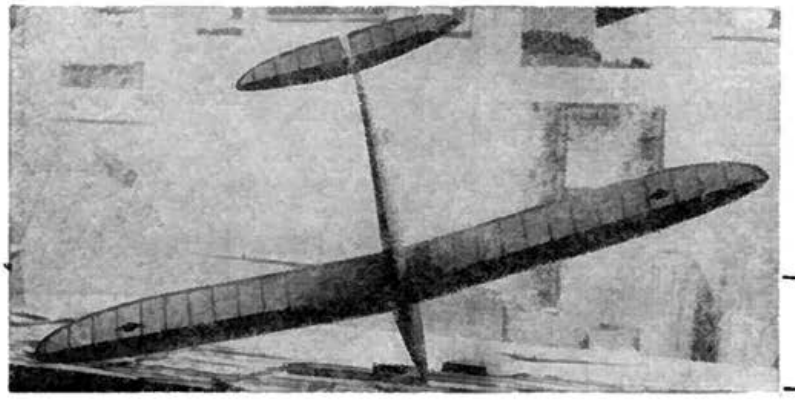
As a crowning interest, there was a cinema show running for the whole period of the Exhibition. Here might be seen a unique film of model aeroplanes in flight, model race cars in action, and model boats speeding across the water. Such a film could not be seen anywhere else in the world so far as I am aware, and formed a thrilling and instructive spectacle for modellers of all ages. Many a modeller, I vow, left the cinema burning as I did, with the desire to build a little race car or a speed boat before many days were over. The interest was greatly heightened by the fact that all the models that charmed us so delightfully on the screen were on view in the Exhibition, and one gazed with renewed awe upon the little aeroplanes, boats and cars as they reposed so modestly upon the stands. One is led to the reflection that the cinema industry has neglected an astounding source of interest. What a scenario could be written for all boys between seven and seventy!

Another kiosk, on which the making of solid models was being demonstrated, was an object lesson in this painstaking art. I was a visitor here for several days, and I noticed the gradual progress of a "show finish" on one of the models being made. My observations lead me to believe that the art of obtaining a *real* finish is to put twelve coats of paint on and rub eleven off!

Upon leaving the Exhibition the predominant feeling was one of amazement. This was shared, I think, by all visitors, especially the very large numbers of American soldiers and airmen who were present. I talked to a large number of these (one of the fascinating things about these fellows is that one may always breezily approach them and engage in conversation) and every one was amazed that this "little old island" could produce such a show of models. One American flying officer quite genuinely told me that he had never before seen such a display, here or in his home country.

It is difficult to estimate the value of this Exhibition to the model movement in general. Here, in Lower Regent Street, London, in the heart of our Empire, the world has been shown that aeromodellers are a force to be reckoned with in the re-shaping of this weary old planet. Apart from any benefits which the skill and knowledge of the aeromodeller may give, surely the spirit of co-operation and goodwill which is evident throughout the Movement has a place in our future destiny?

Part 2 of this Exhibition Report by Mr. H. E. White will be continued in the April issue.



(Left.) Mr. N. Gregory's sailplane "Argestes" Second Prize Winner in its class. With a monocoque fuselage this graceful-looking model fully demonstrated the art of Aeromodelling.

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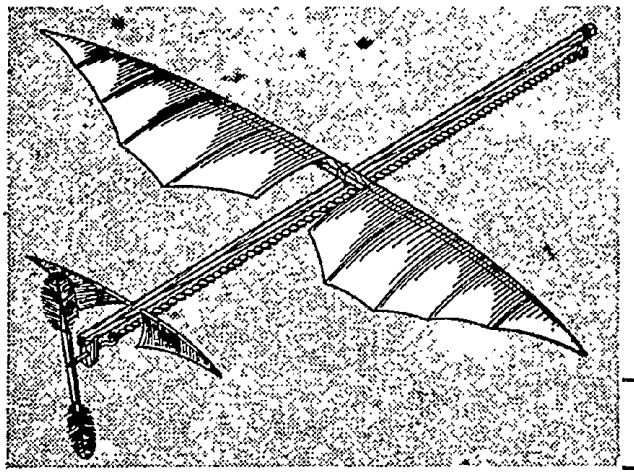


AEROMODELLING IN THE EIGHTIES

BY M · F · ALLWARD

Fig. 1. Shows the "Aerophane" invented (!) by M. Penaud. Aeromodelling in those days must have been very hard on our feathered friends ! !

MOST aeromodellers will be familiar with the early attempts by man to fly, but I wonder how many know there were model enthusiasts some 25 years before the Wright brothers' historic flight at Kitty Hawk on December 17th, 1903.

The other day, while glancing through an old book, I was intrigued by a chapter titled "New Locomotive Appliances," and sub-headed "The Aerophane" (it really was "Aerophane" and is not a misprint), which mentioned several early models.

Two models of particular interest were described, one of them, as might be expected, being a mechanical bird, but the second was a monoplane with a pusher propeller.

Many terms in common use to-day were evidently unknown then, and in order to retain the original character of the book I will quote much of it *verbatim*.

The "Aerophane."

The first type described was "invented" by M Penaud and called the "Aerophane," and is illustrated in Fig. 1. It is essentially a stick model, with a two-bladed propeller at the rear made from a feather. No rudder is shown in the original drawings, so it is difficult to understand how directional control was achieved. The wings bear a marked resemblance to those of a bird and consisted of a wire framework covered with silk. The unusual length of stick in front of the mainplane is accounted for by the fact the propeller is at the rear. The tailplane appears to be simply two feathers.

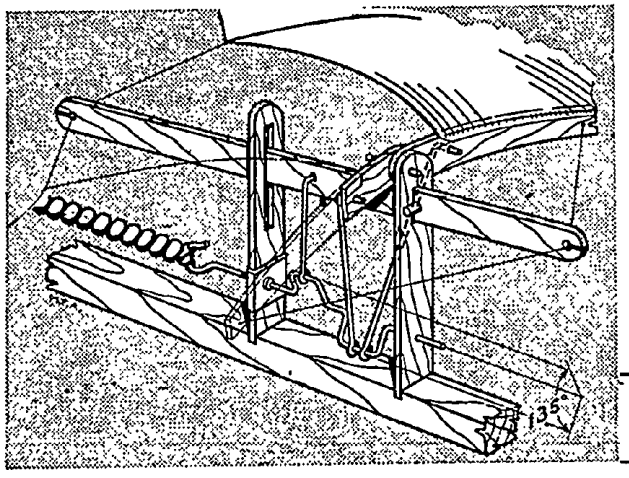


Fig. 2. The ingenious mechanism of the "Bird". Apart from the flapping of the wing, the incidence was variable and automatically changed as the wing moved up or down.

Referring to the "Aerophane," the book says:

"This has a screw at the back, so fixed that it receives no shock from striking against any obstacle. After having twisted the india rubber and loosened hold of the apparatus in a horizontal position, it will first descend for an instant, then, acquiring increased speed, it rises seven or eight feet from the ground, and describes a regular movement in the air for a distance of about fifty yards.

"The 'Aerophane' remains for seconds in the air, as lightly poised as a bird, and without any connection with the ground. During the whole time the rudder (tailplane ?) restrains with perfect exactitude the ascending and descending movements as they occur; and we can plainly observe the various oscillations like those of Sparrows, or more especially Woodpeckers. At last, when the movements are coming to an end, the apparatus falls lightly to the ground in a slanting line."

What made the wings oscillate "like those of Sparrows, or more especially Woodpeckers" is not easy to say. The "Aerophane" was not the flapping wing model. It is possible the construction was of such a flimsy nature that they flapped automatically, aided, perhaps, by an unbalanced propeller.

The "Bird."

The second type described is Tatin's "Bird," and this is illustrated in Fig. 3. Mr. Tatin is another "scientist," and directed his efforts towards the construction of a mechanical bird, by means of "more or less complicated arrangements."

In connection with his "Bird," Mr. Tatin conducted several experiments on the shape and construction of suitable wings. "He has endeavoured to discover in the small appliances made with (*powered by*) india rubber what were the best shapes in which to reproduce the wings, in order to adapt them to a large apparatus acting by compressed air." After several experiments "he decided upon the employment of long, narrow wings." This was contrary to the results of experiments carried out by a Mr. Wenham, who "had previously proved that a wing may be equally effectual whether it be narrow or wide."

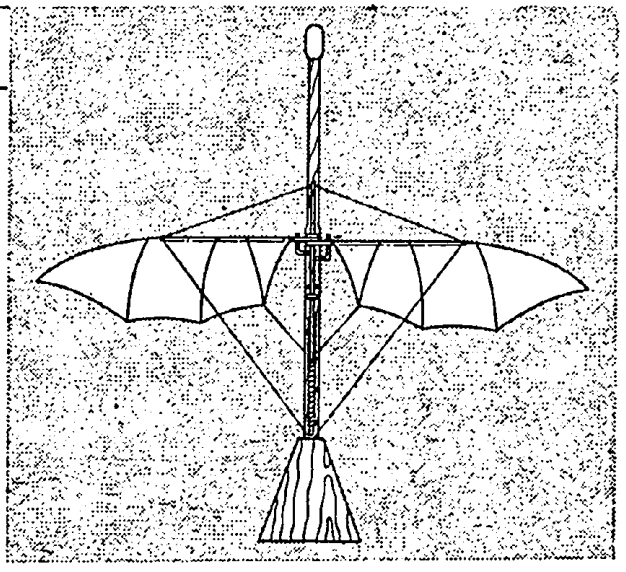


Fig. 3. Plan view of Mr. Tatin's ornithopter the "Bird".

This decision to use "long, narrow wings," that is, wings of high aspect ratio, was a real advance in aeronautical design. The results of such early pioneer experiments are reflected in the fine models of to-day, and on efficient wings of aeroplanes such as the "Liberator" and the "Super-Fortress."

"By means of these long, narrow wings Mr. Tatin has reduced the time during which the wing reaches a suitable position for acting on the air when it first descends.

"Granted the fact, so long established, that a bird flies more easily if it rests its wing against a great volume of air, it will be understood that the maximum speed of movement will also be the most advantageous as regards the reduction of expended force. The inventor, finding that he could not prevent his mechanical birds from losing force in proportion as they attained considerable speed, remedied this defect by *placing the centre of gravity in front.* In consequence of this, the bird in full flight preserves the same equilibrium as the real bird hovering in the air, and its speed is, to a certain extent, passive, the mass of air pressing of its own accord against the wings, all expenditure of force therefore being utilised for suspension. Thus has Mr. Tatin been enabled to increase the weight of his appliances, without increasing the motive power, and yet obtains double the course."

This part is not over clear, but it is interesting to note the word "appliance" used instead of "model," and at the end the word "course" for "duration."

The description of the "Bird" is most interesting: "The apparatus, looked at sideways or from behind, is composed of a light wooden frame, on which are two small supports crossed by an Axletree so as to form two cranks. This axle receives a circular movement from an india rubber spring. The crank on the foremost plane causes the rising and falling of the wings, which move around (pivot about) a common axis, and pass the dead points as the cranks of a locomotive do—so the action is maintained."

The ingenious wing flapping mechanism is shown in Fig. 2. As the cranks revolved, the wings were not only given their oscillating movement, but the angle of incidence changed throughout the cycle, and was at its maximum as the wings approached their highest position on the up stroke.

The ratio of incidence to "angle of flap" was governed by the relative angle of the two cranks. This appears to be about 135 degrees and must have played a great part in the success of the mechanism.

The description of the mechanism continues: "But the wing does not only move as a whole; every part of it, particularly as it rises, shows a tendency to inclination, which is most marked towards the extremity; the part the the body alone preserves an invariable obliquity."

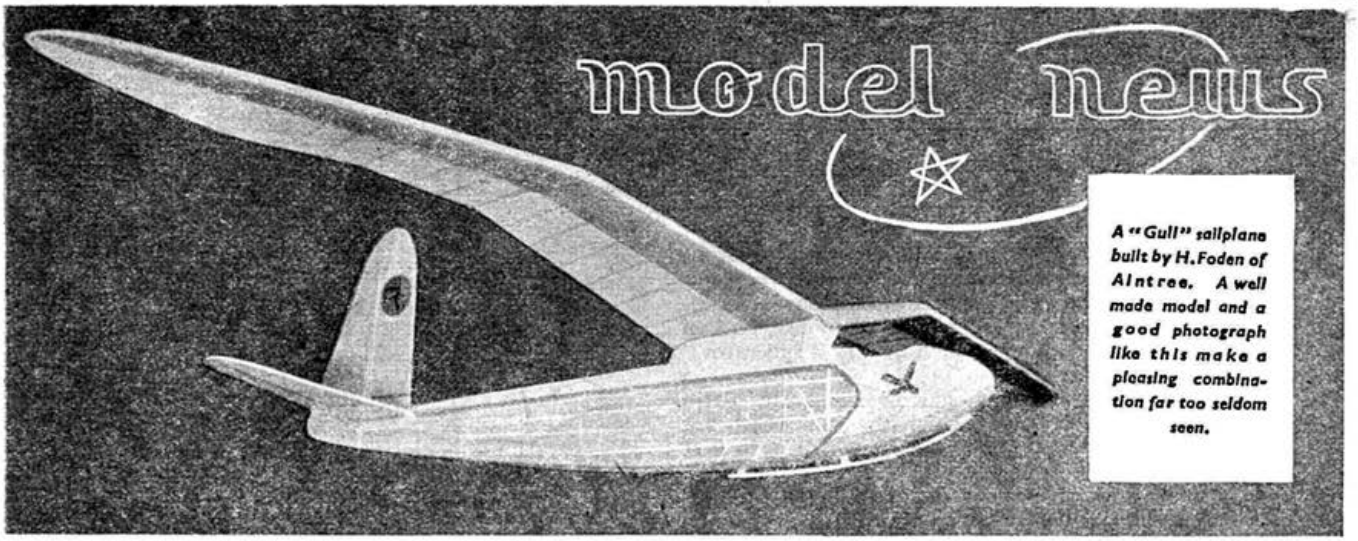
Little mention is made of the construction of either model, but the wings were evidently silk covered, as is mentioned in the next extract. The first paragraph of this is rather mystifying, and the "screw" mentioned must refer to the propeller.

"Tatin was of the opinion that it is with the screw it is necessary to direct the twisting movement; and to obtain it with all its transitions, he has substituted for silk wings, which fold up, some wings composed entirely of strong feathers, arranged in such a manner that they slipped one over the other when in motion. The arrangement was perfect, but still not suitable for adaptation to the large bird. The inventor therefore returned again to the use of silk wings which he appears to have definitely adopted. By means of certain modifications which he has certainly introduced in his large apparatus —viz., a change in the shape of the wings, variation of the amplitude of flapping, etc., M. Tatin has been enabled to make great progress. The bird, acting by means of compressed air, at first could only raise three-quarters of its own weight, but finally lifted itself entirely. And we must take into consideration that the apparatus has to struggle against the weight of the steering apparatus, which nullifying the vertical and horizontal reactions of the bird during flight, constantly fulfils the office of regulator."

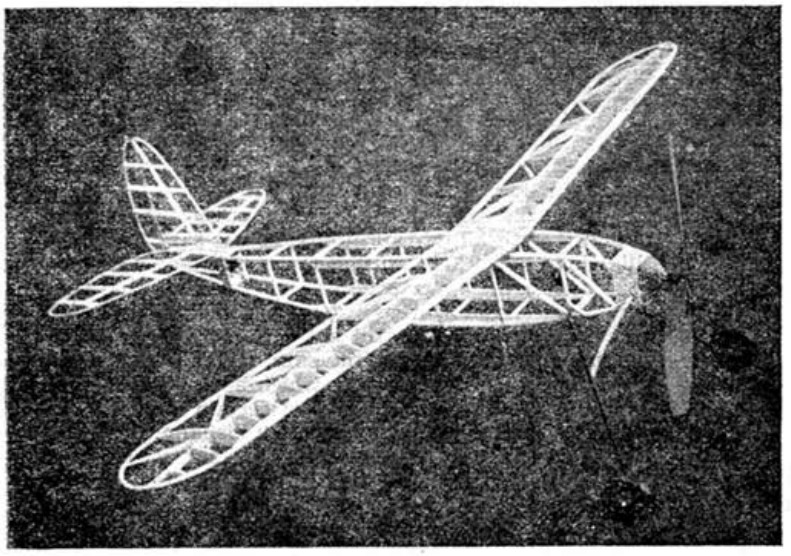
No indication is given of the size of the models, apart from the fact they were launched by hand, which is rather a pity. Both of them appeared to fly, and one of them, probably the "Aerophane," covered 210 feet. The "Bird" is said to "continue flying for several seconds when it is set in motion." That it should fly at all is a remarkable achievement for those early days. I know, for I have built a similar bird myself which was most unsuccessful. When launched, the wings of this maze of struts and cranks had a strong inclination to remain still, while the fuselage jerked up and down so violently that after a very short while the whole thing was shaken to pieces.

Looking through the current issue of the AEROMODELLER it is evident that the design of models has improved in comparison with the striking advance of design apparent in the real aircraft of to-day.

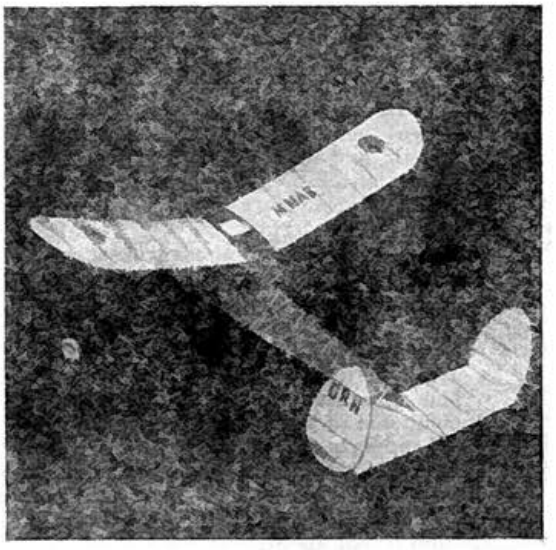
model news



A "Gull" sailplane built by H. Foden of Altrec. A well made model and a good photograph like this make a pleasing combination far too seldom seen.

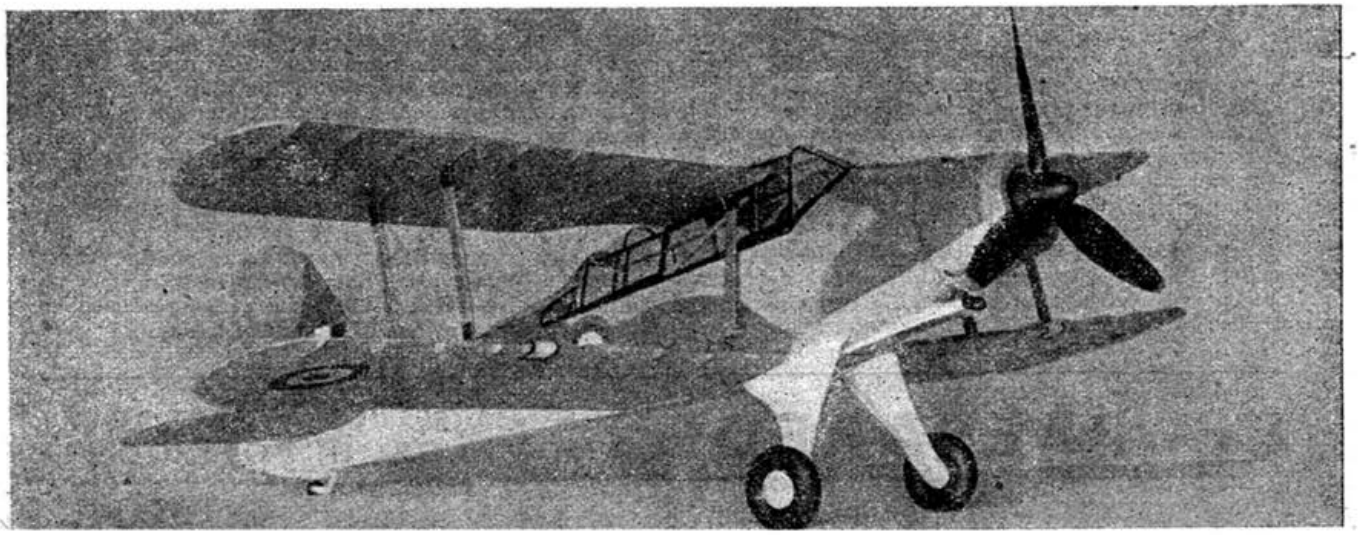


OLD FAITHFUL—Well over 800 'Air Cadet' duration models built from "Aeromodeller" plans have been flown with great success all over the country. Here is one of them, a particularly well made specimen, by P. Genner of Kinner.



MERSEYDOATS—D. R. Hughes of the Mersey M.A.S. sent this photo of his new light-weight duration model. A snappy-looking model with an even snappier name.

APPLECORE—The fine finish of this flying scale Albacore rounding off a very nice bit of construction wins high commendation for the builder, C. J. Inman of Isleworth. The photo shows the great advantages a spray gun possesses for painting when compared with a brush.



(Right.) FIRM FAVOURITE—of flying scale fans is the Miles Kestrel trainer. This model, with the promising name of "Red Flash", was built by P. Cannell and photographed by G. Hall, both from Kettering.

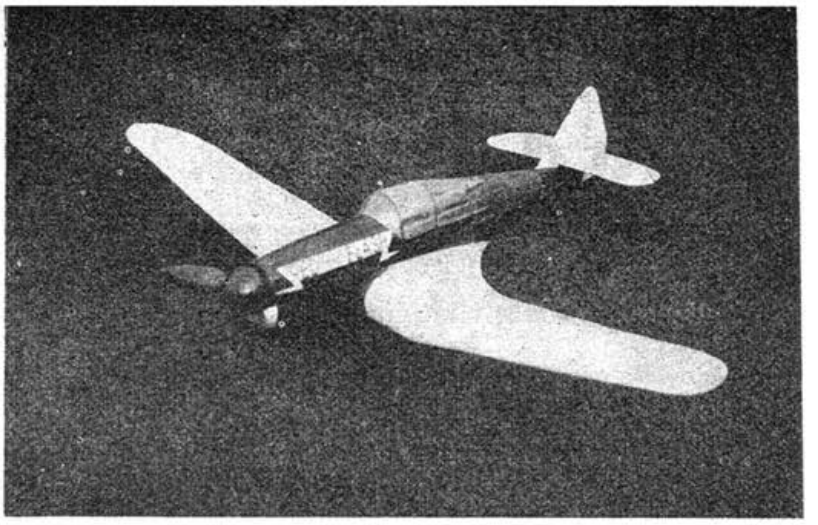
(Below.) CHAPERONED—by a Mosquito, this model Stirling looks as formidable as the real thing. Both models were built by D. C. Bishop-Culpeper of Saffron Walden, who photographed them against a background of snow.

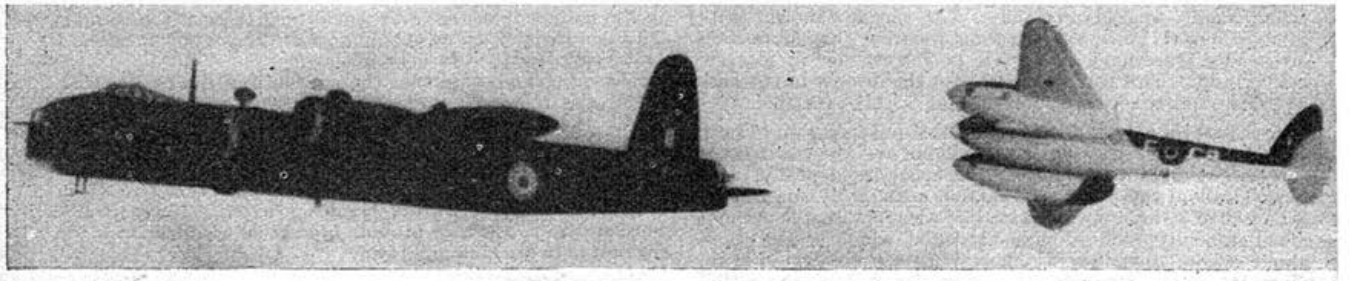
(Centre, left.) OLD-TIMER—from 1917. Another model, this time a 'Camel', from the stable, or should we say—hangars, of M. Crisp of Sidcup. This modeller builds his models to 1/24th scale, and they all feature built-up construction, with movable control surfaces.

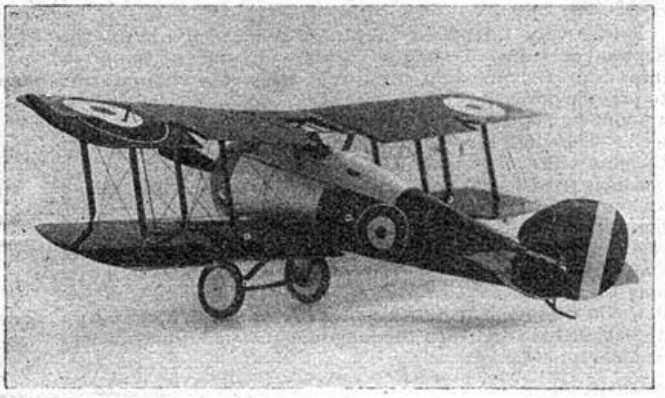
(Centre, right.) INNARDS—of a neat and novel little doodlebug built by A. France of Hendon. The cut-away sides show the arrangement of the various compartments.

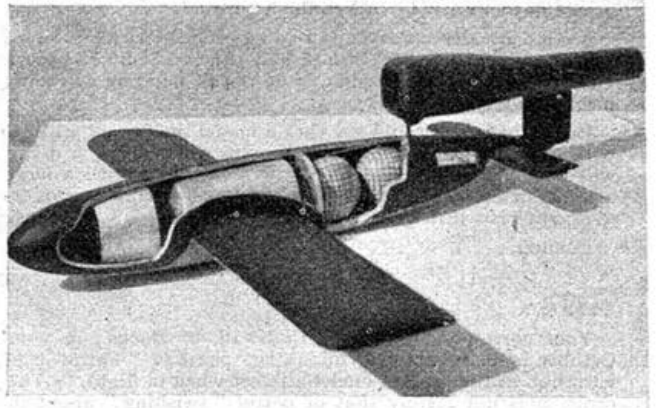
(Bottom left.) WIZARD WIREWORK—by Mr. E. V. Pullen, who found ordinary solid models too easy, so developed the technique of constructing models as uncovered air frames. Built entirely from yards of brass wire, this 1/48th scale "Avro Tutor" possesses over 900 soldered joints.

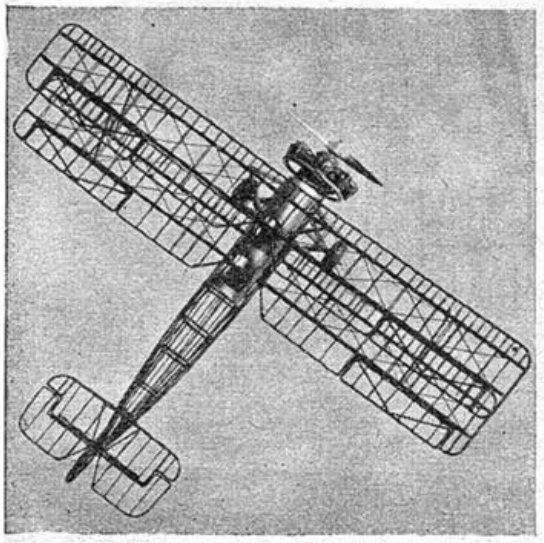
(Bottom right.) GRACE—Exemplified by this 81 in. span sailplane by L. G. Morrison of Slough. It is built entirely of hardwoods, and a photo of the model in its uncovered state appeared in the January Model News

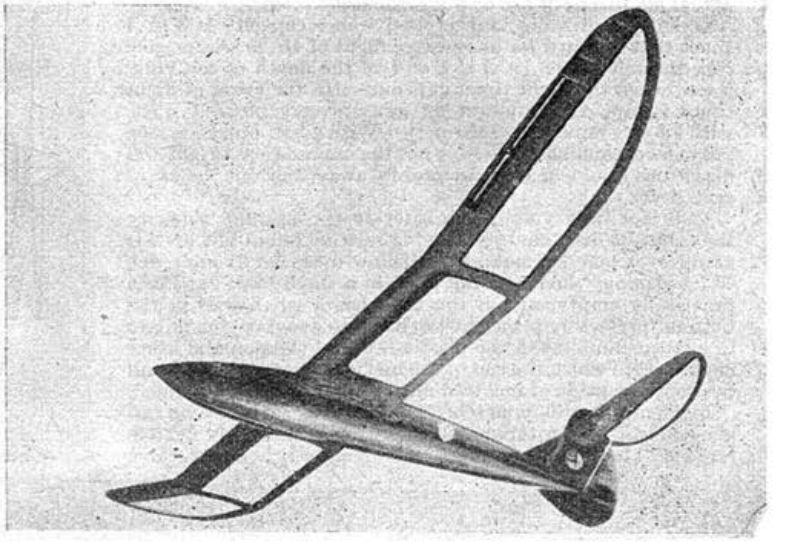












Readers' ..... Letters

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

1/72ND SCALE NON-FLYING MODEL AIRCRAFT

DEAR SIR,

After reading your Editorial in the November issue of the AEROMODELLER, I do feel that some answer in favour of retaining the 1/72nd scale is necessary.

The 1/72nd scale has now been standard for non-flying scale models for many years, and it cannot be denied that very great progress in finish and detail has been achieved. The points which the 1/72nd scale scores, as I see them, are as follows :—

1. The equipment necessary to make a 1/72nd scale model is very small—one can do wonders with very few tools. With a larger model, however, it is soon apparent that more tools are needed if sections, etc., are to be correct and an accurate model built. This consideration is of the utmost importance at the present time when tools are not readily available.

2. Detail on a 1/72nd scale model is quite easy to obtain, provided *accurate* drawings are available and the constructor possesses a certain amount of patience. Incidentally, your remarks about the size of radio aerials are slightly mis-chosen. An aerial of 36 or 38 s.w.g. enamelled wire (obtainable without much difficulty) will provide an aerial which scales up to about ·43 in. diameter, which is a far cry from your 2 in. diameter cable. To scale up to your size of 2 in., the cotton aerial would be about five times as thick as the wire I am accustomed to using—rather thick cotton !

3. One usually constructs a range of models of different types, and personally I would find the problem of space a very serious one after some time spent building anything larger than 1/72nd scale.

In conclusion, I would say that a model really well finished with all sections accurately made, and without much detail will look far better than an indifferent model with a large amount of detail. Correct painting and lettering cannot be over emphasised in this respect.

London. J. R. VANDELURK.

DEAR SIR,

Your correspondent, B. F. Cornwall, of Bucks., in your October issue, completely misses the point of " Petrol level variation in the tank of model aircraft when in flight." The problem is not merely that of petrol " swishing " about in varying attitudes, but also, and perhaps more important, the actual *fall in level of fuel as it is consumed.*

Obviously, if a big tank is used whose capacity is 3 or 4 times that required for an average flight of 45–60 secs. engine run, the fall in fuel level is ⅓ or ¼ of the depth of the tank, if and when the flight timer cuts out. (In the event of flight timer failure, the resultant fly away is very possibly o.o.s. with a 3 or 4 minute engine run !) With a half-pint tank, the fall in level would be negligible but the unnecessary weight and disastrous results of an accidental fly away, rule out the use of such hefty tanks.

It is not only very much safer to use a small capacity tank, but its disadvantage of a big relative fall in fuel level is easily overcome by making it shallow overall. Trouble due to " swishing " fuel does not arise in a small tank until it is practically empty, and if the tank has a small well in the bottom (preferably placed at the back, to avoid engine failure in a steep climb) as in the plastic tanks of Ohlsson and other engines, into which the end of the fuel pipe descends, there will be no interruption of fuel feed until the last drop is consumed.

Incidentally, will your correspondent tell us where he can get *synthetic* rubber tubing anywhere near sufficiently flexible for his " fuel hunting pipe " to operate ? Cycle valve tubing seems the thickest permissible, and I have yet to meet this in synthetic rubber. There is no finer " gummer-up " of needle valves than dissolved natural rubber in one's fuel !

Somerset. J. F. P. FORSTER.

DEAR SIR,

I have examined Mr. Edmund's design for a contact breaker in the October, 1944, issue and it appears to me, with great respect, to have all possible mechanical faults.

The first one is that the motion of the cam is at right-angles to that of the contact breaker, with the result that there is a strain on the hinge and furthermore the approach of the cam to the underside of the lever would tend to wear the corners. This is a fault which exists on most of the contact breakers I have seen described in your magazine.

The other faults are that the approach of the two contact surfaces is oblique ; the spring is far too short and would break from fatigue in the course of comparatively few revolutions.

I venture to suggest that all designers of these contact breakers should examine a magneto contact breaker, which has been designed as the result of extensive experience. Special care is taken to provide fibre blocks to deal with the friction between cam and lever.

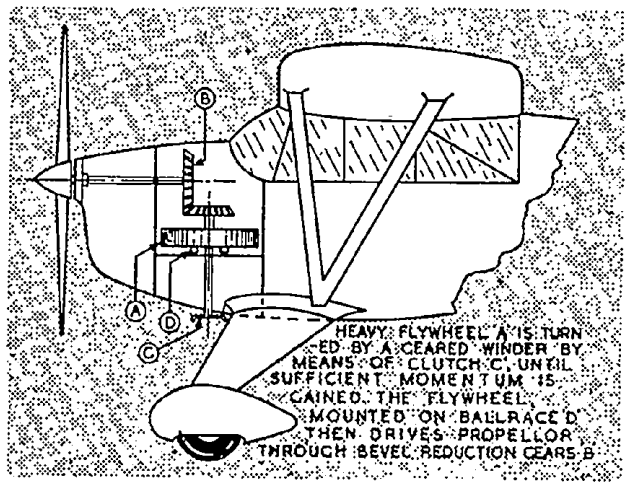
Walthamstow. E. N. BRAY.

DEAR SIR,

I was very interested in Mr. Gwynne's article in the September issue. I suppose I am only one of many to inform Mr. Gwynne that his idea of using rotary momentum to provide power for turning propellers is old. It was used on a commercially produced submarine model and worked very well. Therefore his warning to dealers is unfounded, in fact the idea is already patented.

I have tried the idea and come to the conclusion (practically and not mathematically), that it is useless for duration 'planes, but may be ideal for scale jobs. A small flywheel driving a small fine pitch airscrew through bevels is the most practical way of using the power. I have drawn a small sketch you may think of interest to readers. Fitted to a small scale job it would be sufficient to lift the model from the ground to a decent altitude and then the long idle and smoothness would be ideal for scale jobs.

Leeds. B. B. CROCKER.



MONTHLY MEMORANDA

BY O · G · THETFORD

Mosquito XVI

Photo by courtesy DeHavilland Aircraft Co.

Mosquito Sixteen.

The latest Mosquito about which details have been released to date is the Mk. XVI and, in its dual function as light day or night bomber or photographic reconnaissance aeroplane, it is now one of the most widely-used types of Mosquito. As a bomber, the Mosquito XVI is capable of carrying a 4,000 lb. " block buster " in the enlarged and bulged bomb bay. The most important feature of the Mk. XVI is the pressurised cabin, the Rotol cabin supercharger being driven by a Merlin 73 port motor. The starboard motor is a Merlin 72. Both motors develop over 1,650 h.p. Spotters will note the new cowling shape resulting from the intercooler intake just behind the spinner; the " butter-pat " airscrews; bulged bomb bay and tanks beneath the wings (optional). The bomber version has a range of over 1,500 miles and the photographic reconnaissance version a range in excess of 2,000 miles. Both models have a top speed of more than 400 m.p.h. and a service ceiling above 36,000 ft.

Mk. XVI bombers are camouflaged in dark green and dark sea grey on the supper surfaces and medium sea grey on the under surfaces. It is to be noted that the upper surface camouflage meets the lower surface halfway down the fuselage, and on the motor cowlings the upper and lower camouflage is joined level with the leading edge of the wing. Two batches of Mosquito XVI bombers are numbered MM 199, MM 200, MM 201, etc., and ML 963, ML 964, ML 965, etc.

Photographic reconnaissance versions of the Mk. XVI are painted P.R.U. blue on all surfaces.

15,000th and last P-40.

The 15,000th and last Curtiss P-40 fighter monoplane, a P-40N for the U.S.A.A.F., has left the Buffalo Factory of the Curtiss-Wright Corporation. This historic P-40N was left aluminium all over and carried the U.S. Army serial number " 447773 " in black across the fin and rudder. An olive drab anti-dazzle panel was painted along the top of the motor cowling back to the pilot's cockpit. The usual star insignia appeared on the fuselage sides, above the port wing and beneath both wings.

Damon Runyon Havocs.

Many of our readers will probably be familiar with the works of the American humorist, Damon Runyon. Mr. Runyon is noted for his amusing underworld characters and many of his picturesque names have become almost household words in the U.S.A. It is now revealed that a squadron of Douglas A-20 Havocs of the U.S. Fifth Air Force operating in New Guinea has named all its aircraft after Damon Runyon characters, the name being chosen, as far as possible, to coincide with the physical characteristics of the pilot of each machine. The Havocs of this squadron are camouflaged in drab green on the upper surfaces and the names are painted in yellow block letters about nine inches or one foot high on the fuselage sides, just below the pilot's cockpit. Nineteen A-20s are named as follows:— *" Little Isadore," " Waldo Winchester III," " Paddy the Link," " Big Nig III," " Milk-Ear Willy," " Spanish John," " The Brain," " Judge Goldfobber," " Jo Jo," " Joe the Joker," " Liverlips III," " Slugsy Sachs," " Izzy Cheesecake," " Big Butch," " Jew Louie," " Good Time Charlie," " Sorrowful," " Educated Edmund "* and *" Tobias the Terrible."*

French Marauders.

Among the types of American aeroplanes operated by the Fighting French Air Force in Italy is the Glenn Martin B-26B3 Marauder. These French Marauders are left aluminium all over and carry the French red, white and pale blue roundels (the red outermost) above and below the wings, well aft on the fuselage sides (just beneath the tailplane leading edge), and red, white and pale blue rectangle across the fin and rudder, the red being aft.

Brevities.

Co-belligerent squadrons of the Italian Air Force in Italy are equipped with the Spitfire L.F. VB. These machines carry the Italian red, white and green roundels on the wings and fuselage and normal fighter camouflage (midstone and light earth, Mediterranean blue underneath).

Albacore biplanes of the Fleet Air Arm operating from shore bases in Belgium have black under surfaces, fuselage sides and vertical tail surfaces. One squadron of night-flying Albacores carries the code letters " NH " on its aircraft, forward of the roundel.

R.A.F. Flashback—4.

This month's reminiscence is a Bristol Bulldog fighter (500 h.p. Bristol Jupiter) bearing the blue and white checkerboard markings of No. 19 (F) squadron. The particular machine illustrated, K 2159, has the squadron leader's insignia on the rudder, and the checkered fin and *elevators* also indicate the leader's machine. Bulldogs were standard fighters from the early thirties until 1937 and were flown by Nos. 3, 17, 23, 29, 32, 41, 56 and 111 squadrons in addition to No. 19. Bulldogs of No. 29 Squadron appear on this month's cover. No. 3 Squadron's Bulldogs carried a green band; No. 17's double black zigzag; No. 23's red and blue squares; No. 32's a blue band with diagonal intersections; No. 41's a red band; No. 56's red and white checks; and No. 111's a black band.

Photonews

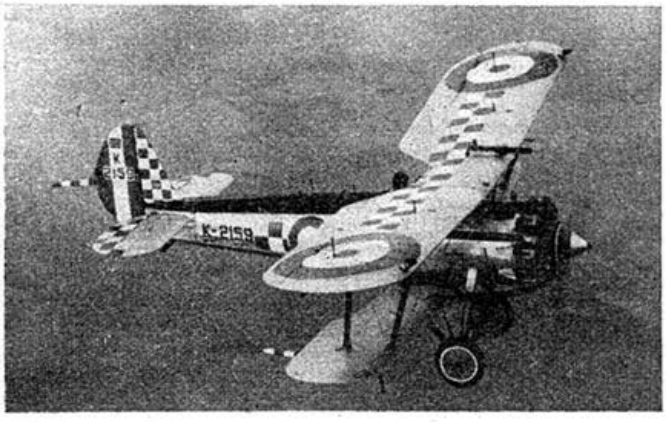
(Top right.) "G-AGLF" :—First Avro Lancastrian for B.O.A.C.'s England-Australia run. This machine is aluminium all over. (*A.T.P. Photo.*)

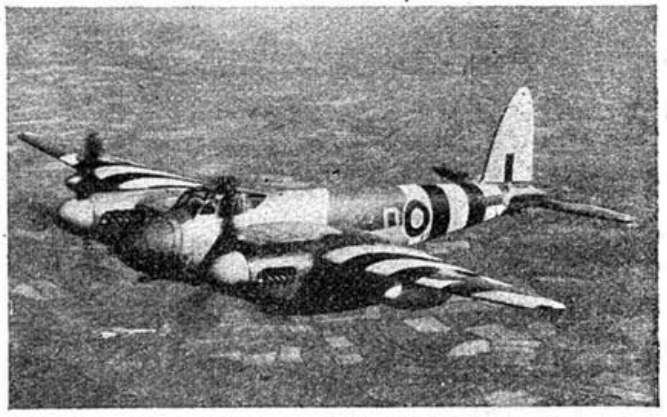
(Middle right.) BIG GUN MOSSIE :—A Mosquito XVIII (six pounder cannon) of the R.C.A.F. wearing invasion stripes. (*British Official Photo.*)

(Bottom right.) BIG GUN MITCHELL :—A picture of the B-25H Mitchell with the 75 m.m. cannon. (*Associated Press Photo.*)

(Top left.) CHECKERBOARD :—A Bristol Bulldog fighter formerly of No. 19 (Fighter) Squadron. ("*Flight*" *Photo.*)

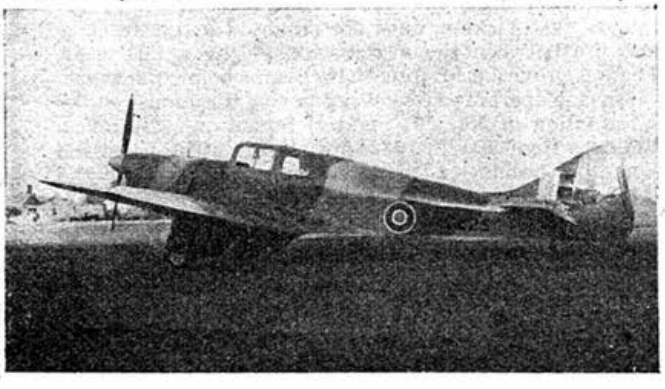
(Bottom left.) PURSUIT-TRAINER :—Built for Siam as the N.A. 50 fighter by North American and taken over in 1941 as the P-64 combat trainer for the U.S.A.A.F., this machine is alleged to have inspired the Australian Boomerang. (*Wm. Larkins Photo.*)

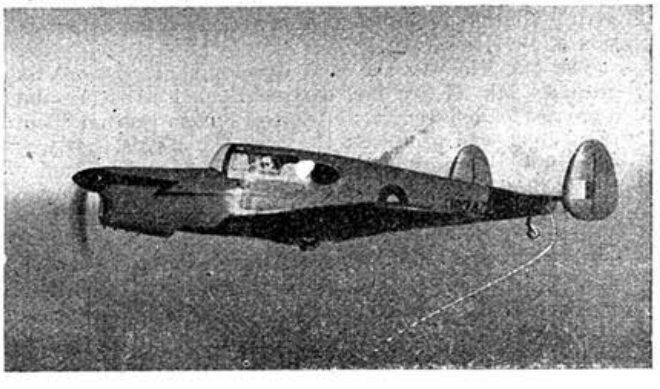




(Below.) NIGHTHAWK TAXI :—Miles' own communications Nighthawk, U-0225. First developed as a wireless trainer for the Air Ministry, and closely related to the Falcon Six King's Cup winner of 1936, the Nighthawk is now nine years old. (*A.T.P. Photo.*)

(Below.) BLUE MERCURY :—This particular Miles Mercury (M.28, Mk. II), U-0243, is painted P.R.U. Blue. The Mercury is the first of a series of Miles types for the post-war market. Meanwhile they are doing a splendid wartime job. (*A.T.P. Photo.*)





AEROPLANES DESCRIBED XXV

The BRISTOL BULLDOG

BY H · J · COOPER

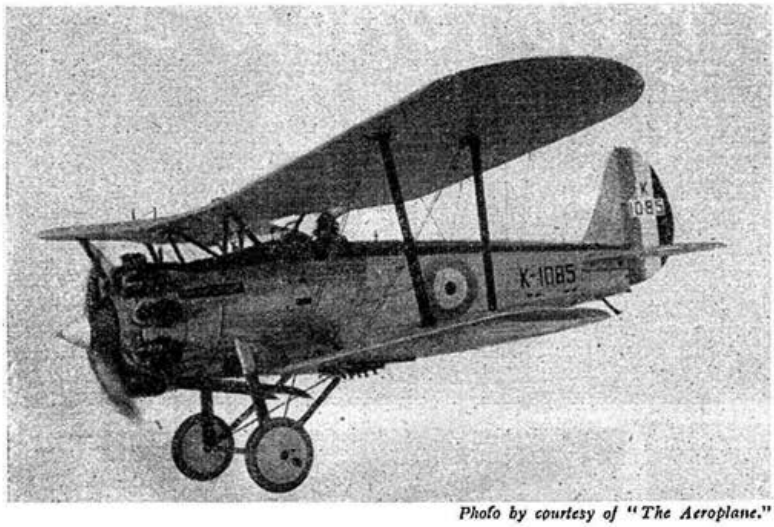


Photo by courtesy of "The Aeroplane."

NEXT MONTH :

The Northrop P-61 Black Widow

AFTER seven years' first-line service with the Royal Air Force, the Bristol Bulldog was withdrawn from squadron service at the end of 1936, and is another example of a high-performance aircraft debarred the opportunity of proving itself in action.

The Bulldog was a popular aircraft with pilots, and its snub-nosed and aggressive appearance suggesting the tenacity of its canine namesake made it a popular type with spotters also. Now that its progeny the Beaufighter is the order of the day one is apt to overlook the splendid appearance of these old biplanes on windy and sunny days.

The prototype Bulldog, called vaguely the " Bristol Single-seat Fighter," appeared first in the New Types Park at the R.A.F. Pageant at Hendon in 1928. It was equipped with a 490 h.p. Jupiter VI air-cooled radial motor and had a maximum speed of 170 m.p.h. at 10,000 ft. No other service aircraft of that period, with the exception of the Westland Wizard (see the AEROMODELLER, May, 1944) could equal this performance.

In October, 1928, this prototype was adopted by the Royal Air Force and became known as the Bulldog I. The first aircraft was numbered J 9480.

In the following summer the first production models were completed and issued to No. 3 (Fighter) Squadron, which was then flying Gloster Gamecocks. This production Bulldog was known as the Mk. II, and is the type drawn on the opposite page. It had a Jupiter VII or VIIF motor. The prototype was registered G–AATR.

The Bulldog II was first publicly shown at the 1929 Hendon Air Display, when No. 3 Squadron gave a ground attack demonstration with the Fairey Foxes of No. 12 (Bomber) Squadron. The first batch of Bulldog IIs was numbered J 9567 to J 9591, and a later batch with a slightly modified form of rear fuselage construction K 1079 to K 1101.

The Mk. IIa was the next development. It was an ordinary Mk. II but had a strengthened structure and a greater loaded weight, and the oil system was modified.

In 1932 was produced the Mk. III. This also was essentially the same as earlier versions, but had a Mercury IVF.2 motor in a Townend Ring. The prototype bore the civilian registration G–ABZW, and did not go into production.

In 1933 came the Bulldog IV, a number of which were built for Finland. This version had a cowled Mercury IVS.2 motor and a fin of slightly larger area. The prototype was lettered G–ACJN. A Bulldog II formerly operated by the Bristol Company for exhibition purposes also had this larger fin and was registered G–ABBB. The larger fin was also fitted to some of the later versions supplied to the R.A.F.

After their squadron service was over (they had their final fling in the Air Exercises of 1936) Bulldogs were used for training purposes, and in 1933 a special two-seat version for dual instruction was produced. It was known as the Bulldog T.M. and in general was similar to the Mk. II, except for the extra cockpit.

The Bulldog is an all-metal structure, with fabric covering. The fuselage is built up of steel tube, and steel strip formers and stringers fair it to an oval section with a vee-shaped bottom. The lower wing is suspended from centre-section struts as on the old F.2B Fighter, but on the Bulldog are faired in. The rear portion of the fuselage is fabric-covered and the motor cowling and fuselage as far as the cockpit are covered with polished sheet aluminium.

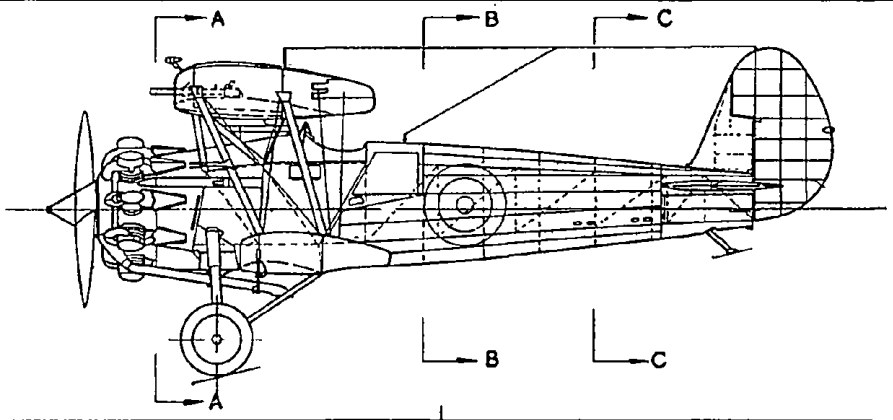
The wings and tail-unit are all-metal structures covered with fabric. Frise ailerons are fitted.

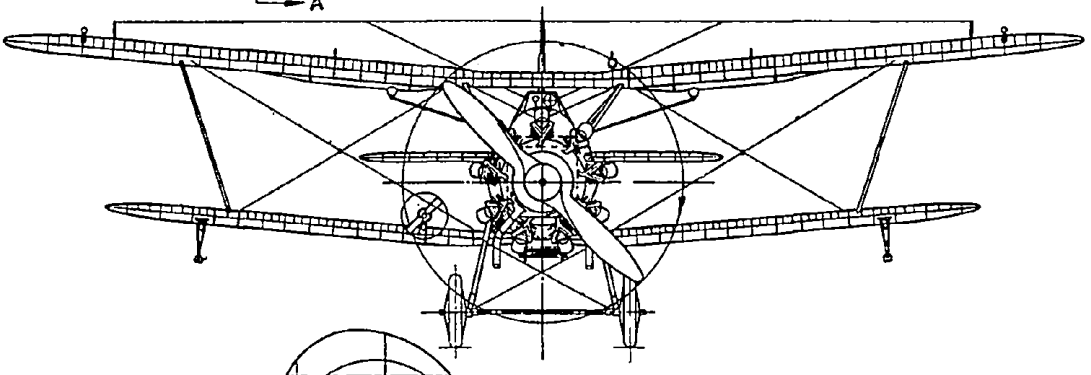
Main dimensions of the Bulldog II are : Span (upper), 33 ft. 10 ins. ; (lower), 27 ft. 6 ins. ; chord (upper), 6 ft. 4 ins. ; (lower), 4 ft. 9 ins. ; length (tail up), 24 ft. 9 ins. ; gap, 5 ft. 0 ins. ; stagger, 2 ft. 0½ in. ; tailplane span, 11 ft. 4 ins. ; tailplane chord (including 1 ft. 8 ins. elevator), 3 ft. 11 ins. ; track, 5 ft. 5 ins. ; airscrew diameter, 8 ft. 10½ ins. ; incidence, 3 degrees ; dihedral, 5 degrees ; total wing area, 306·5 sq. ft. ; tare weight, 2,281 lb. ; weight loaded, 3,390 lb.

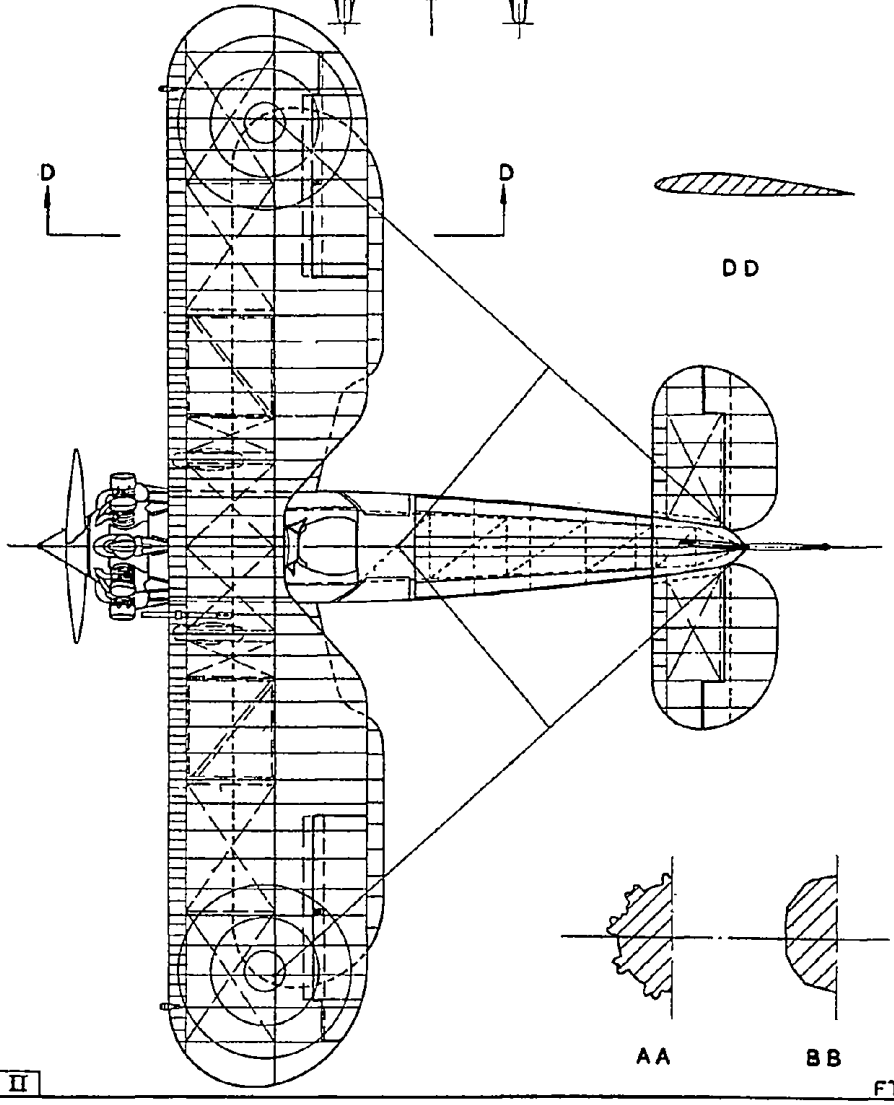
With the Jupiter VII motor the maximum speed was 174 m.p.h. at 10,000 ft., and the range 350 miles at 15,000 ft. at full throttle. The service ceiling was 27,000 ft.

Two ·303 Vickers guns are mounted in the fuselage and fire between the airscrew blades by a C.C. gear. There is provision for four 20 lb. bombs below the wings.

Mr. C. Rupert Moore's cover painting this month shows a formation of No. 29 (Fighter) Squadron, which flew Bulldogs from March, 1932, until April, 1935, when the squadron became a two-seat unit and received the Hawker Demon. Bulldogs were flown by Nos. 3, 17, 19, 23, 29, 32, 41, 54 and 56 (Fighter) Squadrons, and details of their squadron markings are given in this month's " Monthly Memoranda." Bulldogs were also supplied to the following countries : Australia, Denmark, Finland, Sweden, Latvia, Estonia, Siam and the U.S.A.







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BRISTOL BULLDOG II

FT.

CLUB NEWS

BY CLUBMAN

WHITHER the R.T.P. model? I am moved to ask this question owing to a current tendency to tether more or less orthodox free-flying microfilm models to the pole and claim records in the tethered flying class. I contend that no useful purpose can be served by setting microfilm type models in competition with the usual tissue-covered machine—if this is done a discrimination should then be made between the types by creating separate classes of competition and records.

The accepted type of R.T.P. model can be well used as a "test bench" for the outdoor machine, and in this respect I should like to see more attention given to the flying scale model. I had some good fun before the war flying a tiny scale "Rearwin Speedster," embodying a geared-up nosepiece, and learnt a number of useful tips that helped considerably with my outdoor scale models—a type I have always been keen on. I note that speed models are receiving a fair amount of attention nowadays, but I contend that the scale and duration types have nowhere reached their peak yet, and much more work can be devoted to these types with beneficial results when applied to the outdoor model.

I am pleased to note that the newly-formed Flying Council of the S.M.A.E. are recommending recognition of development work on such unorthodox types as autogiros, ornithopters, jet-propulsion, etc., etc., also suggesting contests for control line petrol models and a National R.T.P. contest on knock-out lines. All this, combined with what is surely the most ambitious outdoor competition programme ever conceived by the S.M.A.E., should keep things lively in 1945—though how and where all these events are to be fitted in will make interesting reading! (Incidentally, the formation of the Flying Council is meeting with a certain amount of criticism owing to its purely "local" personnel. When will the S.M.A.E. realise that there is a growing demand for a wider conception of the requirements of a national body, and that the selection of special committees demands a consideration of claims from districts other than the London area?)

David Miller, of Flat No. 4, Hassanally Hall, McLeod Road, Karachi, India, tells me of a club in that part of the world that unfortunately failed mainly due to lack of materials, though now a company is putting up kits of excellent quality—the first Indian kits I have heard of. He goes on to say: *"I am far out of reach of any club, and as our attempt here proved a failure, I would appreciate any move by club or individual to communicate with me regularly. I would mention that I am not quite* 14 *years of age, but have been very keen from a very early age. Please communicate by means of letter cards."*

Cpl. Derek Wilson, of the R.A.F., who has been overseas since July, 1941, writes from India: *"I have met an old member of the Blackpool club, so we have had a good chin-wag, and have also found time to build two gliders. We used sheets of foolscap, bamboo, odds and ends of cardboard and wood. How's that for jungle ingenuity? They both flew well, and when the monsoons let up a bit we hope to do a spot of real flying!"*

I am indebted to Mr. J. G. Portsmouth for a letter on the subject of many of our old modelling friends in France. He writes: *"You will be interested to know that I have received a letter from Monsieur F. Catier, president of 'Model Air Club de France.' He wishes to be remembered to all our aeromodellists. He recently met a good number of aeromodellists in Paris, mentioning Guillemond, Ducrot and Varache. Desnoes has been a prisoner for four years. All are eagerly looking forward to a Wakefield either in London or Paris."*

F./Sgt. Calverley, member of the Middle East Model Flying Club with the "Skyrocket." We intend publishing a full description of the above Club in a future issue.

Supporting the above, a letter has just been received at our offices from M. Maurice Bayet, director of Publications M.R.A. (publishers of the French model paper *Le Modèle Réduit d'Avion*), who states:

"We have pleasure to inform you that, in spite of the present events, and after several months of proceedings, we obtained the authorisation for the Parisian modellers to experiment their models and to prepare competitions. In that case it was possible to organise our following traditional meetings. The Winter M.R.A. Cup (*models of minimum spread* 0m. 80—*rubber motor max. weight* 15 *grammes*). *Under severe conditions good performances were realised, as the winners kept the air more than three minutes, and this during a temperature of minus* 5° *C. with sleet.*

The Spring and Autumn R.M.A. Cups *for gliders, also the* Perfect Modeller Cup *joined together on the start line more than two hundred competitors.*

The Flying Model Cup, *where the only tolerance allowed in the reproduction of the true aeroplane is a difference of plus* 10 *per cent. for the propeller diameter, and the* Mermoz Cup, *established by us in* 1937 *in the purpose to find, in developing our models, new formulæ for the benefit of great aviation.*

All these competitions have been successful, this in spite of the lackness of materials and circumstances, every of them the more defavorable. We hope that very soon English and French modellers will meet again in the great competitions."

A sentiment I am sure all my readers will endorse.

The S.M.A.E. Northern Area seems to be well organised and getting down to things with true North Country straightforwardness. Staunch supporter Goaling has a

few pertinent remarks to make in the current "News," in which he asks that all clubs ensure that contests are run correctly—this meaning a proper study of the rules. No doubt some contravention of rules is always taking place, mainly through ignorance, and for this reason alone those formulating rules should do their utmost to see that they are absolutely waterproof. It is suggested that the Northern Rally (organised in pre-war days by the Lancashire M.A.S.) be revived, also possibly a Northern Sailplane meeting. Goaling further states: *"While on this subject, I would like to warn clubs against the urge for each to have their own Rally. Apart from the clashing of dates, it means there are too many minor events, instead of a few big, well-organised affairs. By all means let a few clubs who are relatively close together arrange to have, say, an inter-club event. This is quite a different proposition, especially if run in conjunction with a S.M.A.E. decentralised event, and I feel this should be encouraged. On the other hand, Rallies should be well prepared and approved by the Northern Area Council."*

AYLESTONE M.F.C. held an inter-club indoor competition with the Leicester M.A.C. last December, the results showing that Leicester had the best free-flyers, and Aylestone the best r.t.p. models. Results:—

R.T.P. (agg. of 3 flights)	H. Spikings	(Aylestone)	4 : 43·5
Free flying ,,	J. Marsh	(Leicester)	3 : 15·5.
Nomination	J. Bones	(Aylestone)	7·2 error.

Aylestone team totalled 398·8 to beat the Leicester team by 7·5 secs. The members are now all out on new free-flying designs, and the microfilm record now stands at 55 secs., by junior J. Bones. H. Spikings has also raised the r.t.p. record to 2 : 35·6.

Following the disbandment of the Messenger Service in Oxford, a club was started, and as many of the members were interested in aeromodelling, a model section has been formed under the secretaryship of Mr. P. Duffy, 29, Napier Road, Cowley, Oxford. Membership is confined to Civil Defence personnel and ex-members of the Messenger Service. A big flying meeting is being arranged to take place within the next few months, open to anyone interested. Further particulars can be obtained from the Secretary.

The CHINGFORD M.F.C. is still suffering from the handicap of not possessing a permanent clubroom, the one available hall permitting only Class "A" r.t.p. flying. In spite of this, enthusiasm is great and good sport is obtained. The January r.t.p. contest was again won by the consistency shown by A. Hand, while the solids event was won by F. Hendry with a splendid replica of a "Mustang."

The EAST BIRMINGHAM M.A.C. indoor season is now well under way, and a comprehensive programme of competitions, talks and discussions has been planned for the rest of the winter. It is also hoped to hold an exhibition of all types of models in the near future. Solids contests have been arranged for each month of the winter season, a particularly large entry being forthcoming for the January event. J. Sawyer took first and second places with a well-detailed "Hurricane" and a "Flying Bomb," third place going to R. Lidstone with a well-finished Ju. 88. The club put up a good show in the Midland Indoor Rally, winning two of the five contests. K. Thomas won the unorthodox event with his tandem monoplane, his aggregate being 1 : 36'2. J. Sawyer has created a new r.t.p. biplane record with a time of 35 secs., while the microfilm figure has been pushed up to 1 : 30 by P. H. Winter flying a baby r.o.g. machine of American design.

The MONTROSE M.A.C. flying field is just on the coast, and W. Hamlin had the bad luck to lose his model glider "Aegeus" in the drink when raising the club record to 2 : 30. The r.o.g. duration stands at 0 : 54, while the h.l. record is at present 1 : 04.

WALLASEY M.A.C. having completed a reasonably successful first season, look forward with confidence to the future. Now affiliated to a local Youth Club, they have the use twice a week of a fine room, and intending members should call at the Co-operative Youth Club any Monday or Thursday evening between 7 and 9 p.m., when they will be warmly welcomed. Outstanding performances of 1944 were:

Gliders.	Class C.	A. Molyneux	12 : 29 tow launch.
	Class C.	J. Mackenzie	6 : 33 H.L.
	Class B.	D. Hill	5 : 11 H.L.
	Class A.	L. Woodward	1 : 31 H.L.

The main interest of the NORTHERN HEIGHTS M.F.C. meetings is r.t.p. flying, both duration and speed models having an enthusiastic following. Bob Copland has broken the British record no fewer than eight times to date, his best time being 4 : 15. The second round of the London area R.T.P. Contest resulted in a win for N.H. over their opponents the Edgware M.F.C. after a very pleasant evening's flying; and now in the semi-final round they are drawn against Streatham Aeromodellers. A. C. Turner and K. Tansley are both flying very promising speed models, and a large number of solids, duration and petrol models have been judged for the "best model of the month" contest, which is run each month throughout the year.

Early in the war the SHEFFIELD SOCIETY OF AEROMODELLERS suspended activities until happier times. However, in view of the fact that a new generation of aeromodellers had grown up, it was decided to revive the old club, and an enthusiastic meeting of 70 was addressed by Councillor H. Slack, President of the Society. Arrangements are being made to hold a competition and exhibition at Easter, and I trust this venture will go right ahead and prove that every city *must* have its aeromodelling club.

F. Gearing of the DONCASTER & D.M.F.C. has been getting consistent flights of 35 secs. from his "Westland Widgeon," while M. Hetherington started things off with a bang at the new clubroom by coming within two seconds of the club r.t.p. record with a time of 88·2. This club would like to arrange an inter-club scale contest, and those interested should contact the Secretary, F. Gearing, at South View, Cadeby Road, Sprotborough, Doncaster.

The BLACKPOOL & FYLDE M.A.S. announce the amalgamation with them of the Agricola Club from St. Annes—a sound move, in my opinion. J. Pennington performed a "double" with his 1/72 scale "Hurricane" at a recent exhibition, carrying off the prize for the best scale model, also the prize for the best model in the whole show.

Mr. F. A. Lowe, of 11, Wallett Avenue, Beeston, Nottingham, having recently been discharged from the R.A.F., would like to get in touch with any past or prospective members of the Nottingham Model Aero Club with the idea of recommencing "combined operations."

Most of the members of the EDINBURGH M.F.C. seem to hibernate in the winter. However, it was most gratifying to see practically 100 per cent. attendance at the A.G.M., showing at least some interest in club affairs. Although the treasurer's report showed a healthy balance, the meeting ratified the committee's proposal to increase

subscriptions to allow for future expansion. The secretary's resignation, owing to ill-health, was regretfully accepted, Mr. H. A. Wardell being elected to the office. The sole winter activity so far has been the construction of a " Vulcan " as a joint club effort. It is hoped to fit radio control some time in the future.

At the close of the ULSTER M.A.C. outdoor competition flying season an informal programme for indoor r.t.p. flying was arranged, and for the past few months a series of interesting meetings have been held.

By this time the general performances of last year have been improved upon, and in the "A" class, duration times of 2–2½ min. r.o.g. are regularly put up, whilst one stick model has been timed for 2 min. 20 secs., hand launched.

Two conclusions have been reached regarding indoor r.t.p. flying. Firstly, models specially designed and built for this work will invariably score over machines built for outdoors and altered to suit indoor conditions.

And secondly, they feel that indoor flying is valuable in maintaining interest amongst the club members during the dismal winter months, and there is no doubt that the designing and building of the lightweight models teaches everyone a great deal of the finer points of aeromodelling. Even to be able to " thumb one's nose " at the " Clerk of the weather " is really worth while!

At the end of December a number of members made the trip across the border to Dublin, where three of them competed in an indoor r.t.p. contest, run in conjunction with the first Aeronautical Exhibition to be held in Eire, and organised by the Irish Aviation Club.

The large crowd which attended the exhibition was keenly interested in the flying events and in the numerous exhibits loaned by the Army, Air Force, Aer Lingus Teoranta, and a number of English and American firms.

The large hall in the Mansion House was ideally suited for all purposes, and, the Ulster members thoroughly enjoyed the thrill of having plenty of space, and were highly appreciative of all the good work carried out by the organising body of the I.A.C.

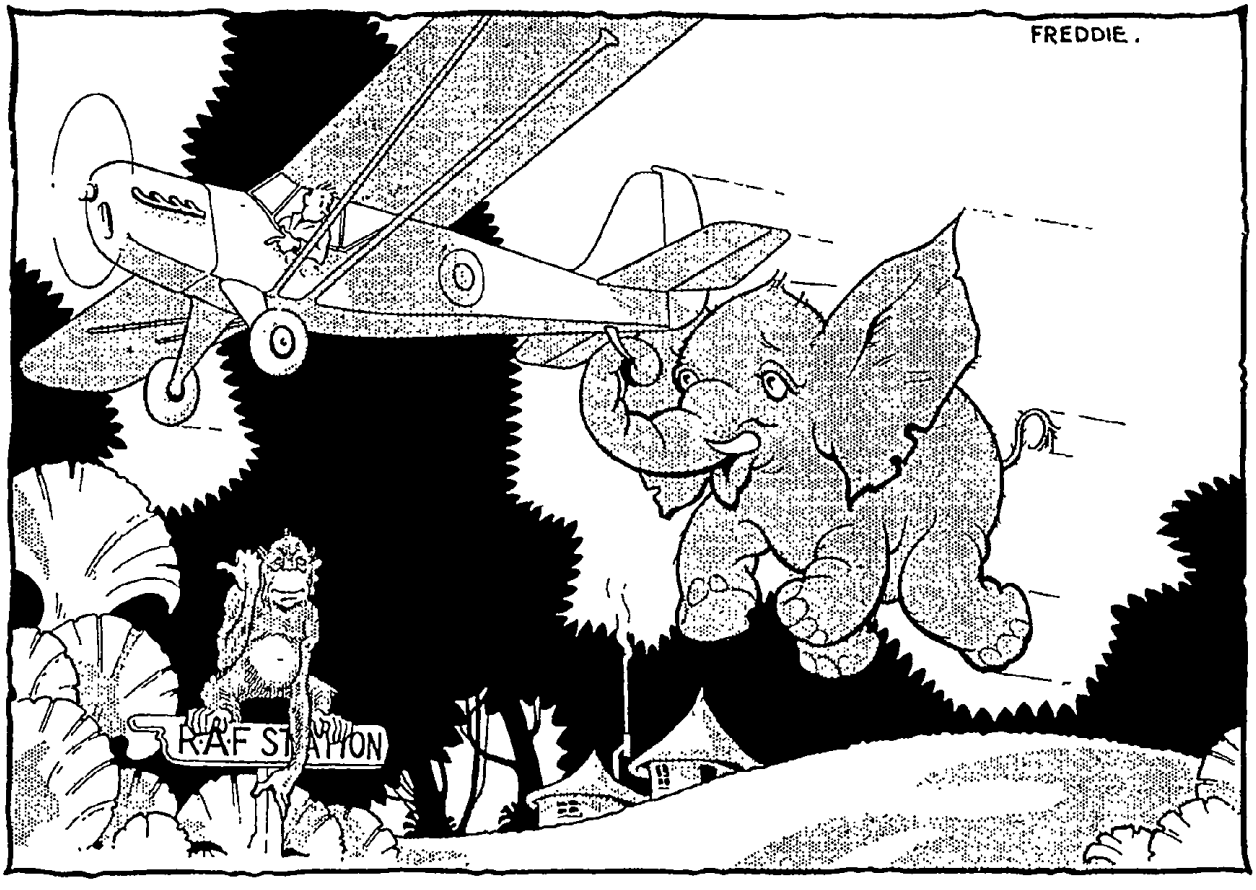
Two events were arranged, and N. Osbourn of the Ulster Club carried off the two trophies, after achieving ten faultless contest flights, and thus adding to his fine feat, made during the outdoor flying season, of gaining practically all club annual records.

The committee have just completed arrangements for renting two fine large rooms in the centre of Belfast, so with a floor space of nearly 900 sq. ft., it is hoped to encourage all types of model activities.

Four enthusiastic modellers are anxious to get clubs started in their districts, and interested readers should contact them at the addresses given:—A. W. Mollison, 27, Meeching Road, Newhaven, Sussex; J. E. Gater, 69, Alma Street, Fenton, Stoke-on-Trant; W. N. Dryburgh, Marchmont, Greenlow, Berwickshire; A. Luto, 53, Westmoreland Avenue, Welling, Kent.

Well, apart from listing new clubs and various secretarial changes, etc., that's the lot for this month, chaps, so I'll sign off till the April issue, and trust you have all the thermals in existence plus no rubber breakages!

THE CLUBMAN.



THE AFRICAN "SNITCH" HIKER.

NEW CLUBS.

SHEFFIELD SOCIETY OF AEROMODELLERS.
C. Atkinson, 91, Mona Road, Sheffield, 10.

STRETFORD (Manchester) M.F.C.
D. S. Springthorpe, 18, Wilson Street, Stretford, Manchester.

BIRMINGHAM CENTRAL GRAMMAR SCHOOL M.A.C.
B. Harrison, 92, Burnay Lane, Ward End, Birmingham.

GRAVESEND AEROMODELLING CLUB.
C. C. Pinder, 22, Darnley Street, Gravesend, Kent.

PRESTON & D. SPOTTERS' CLUB.
J. Hartley, 48, Raikes Road, Preston, Lancs.

SECRETARIAL CHANGES, ETC.

MONTROSE M.A.C. W. T. Cuthill, 21, North Street, Montrose, Angus. EDINBURGH M.F.C. E. A. Wardell, 18, Parkhead Terrace, Edinburgh, 11. BRISTOL & WEST M.A.C. M. Garnett, 33, Wellington Walk, Henleaze, Bristol, 9. MERSEYSIDE M.A.S. E. G. Bibby, 59, Arrow Road, Greasby, Wirrall, Ches. SPELDHURST (Kent) M.A.C. D. S. Saunders, 37, Baker Street, Rochester, Kent. HARROW M.A.C. W. J. Weight, 101, Leamington Crescent, South Harrow, M'sex.

S. O. S.

In the "Wants and Disposals" columns in the January issue we printed a "Disposal" for L. Bird. This reader is very anxious to get in touch with the writer of a reply enclosing a P.O. for 6s. 6d. which he received from the Mansfield district. Unfortunately he has mislaid the address. Would the writer of this reply please get in touch with Mr. Bird, whose address is now :—

14873753 Pte. Bird, L., 4 Ptn., E Coy., 13, I.T.C., Invicta Lines, Maidstone, Kent.

In view of the ever-increasing number of petrol engine "Wants" we are unable to publish any more "Wants" from readers requiring petrol engines. It is almost certain that all the engines available appear in our "Disposals" columns, so all readers need to do is to write to the person advertising. Publishing great numbers of these engine "Wants" is only a waste of space as the demand far exceeds the supply. The person who has advertised his engine for sale has no need to write to prospective customers; he is sure to be flooded out with offers, which means that the other fellow will not get a reply, and has wasted his time and ours in advertising for an engine.

A.B.A. NEWS.

In pursuing its policy of affiliating aeromodelling organisations throughout the country, the Association of British Aeromodellers announces the affiliation of the Boys' Own Paper Flying League, which numbers some 20,000 members.

Recent Club affiliations include The North London Society of Model Engineers (Aero Section); The Middlesbrough and District Model Aero Club; The Gremlins, Darlington; and the West Coventry Model Aeroplane Club. The Loughton Gremlin Club is one of the first "A.B.A." Clubs to be affiliated, in which all its members belong to the parent Association.

The A.B.A., having already affiliated the Air Training Corps and the London County Council Men's Evening Institutes, is obviously well on the way to carrying out the welding of the aeromodelling movement in Great Britain into one homogeneous whole.

A new enterprise of the A.B.A. is the inauguration of "Brains Trust Meetings." The meetings will be held on the second Tuesday of each month and the first is arranged for Tuesday, March 13th, at 7.30 p.m. at the Association's Offices, at 28, Hanover Street, London, W.1. The first session of the Brains Trust will be "staffed" by Mr. C. A. Rippon; Mr. D. A. Russell, M.I.Mech.E., Squadron Leader P. Hunt, Mr. Eric St. John, A.F.R.Ae.S., and Mr. J. S. Balfour, B.A., M.Inst.C.E. The Question Master will be Mr. Arthur Lodge, Secretary of the Association.

Anyone who cares to put forward an interesting "aeromodelling" question is invited to address same on a postcard to Mr. Lodge, and all interested, either members or non-members of the A.B.A., are invited to attend. It is intended to conduct these "Brains Trusts" on strictly B.B.C. lines for the first 40/50 minutes of the meeting; that is, the Question Master reading out questions which have been sent in by post; and then to carry on dealing with questions asked by the visitors to the meeting.

It would seem that there should be a good deal of "fun and games" arising from this series of Brains Trust Meetings, as well as instructive information, and we trust that there will be a good attendance.

N.G.A. MEMBERSHIP

To the Hon. Secretary, The National Guild of Aeromodellists, Allen House, Newarke Street, Leicester.

Please commence my N.G.A. Insurance requirements as listed hereunder

from (DATE)..... SIGNATURE.....

Place X in 1st column against item required and fill in price (where required) in second column.

(a) Rubber-driven models and sailplanes		6d.
(b) Petrol planes and petrol-driven race cars ..		2/6
(c) N.G.A. Lapel Badge		1/3
(d) Transfers : Large, 1d. each quantity..... Small, 2 a 1d. each quantity.....		
(e) Models insured for O.O.S. Number of models.....at 2/- per model. The following details to be given on separate sheet :— Type ; span ; length ; rubber-driven or glider ; colour ; and any special feature.		

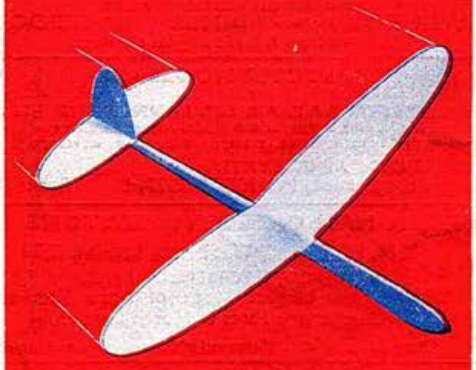
I enclose P.O./cheque No. ..... to cover the above items for _____

NAME (BLOCK CAPITALS).....

ADDRESS (BLOCK CAPITALS).....

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

'ELITE' MODELS



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Kit contains :—
PLAN, RIBS AND SHEET, CEMENT, etc.
2/6 *post free.*

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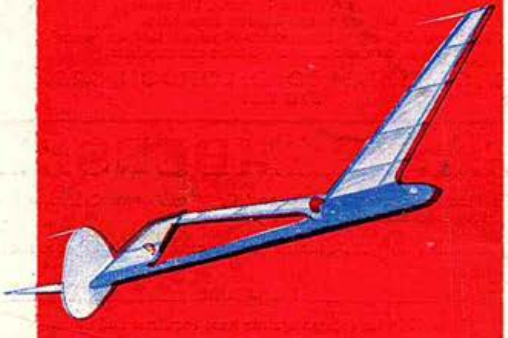
42 inch span. **11/1**



ELITE INTERMEDIATE GLIDER

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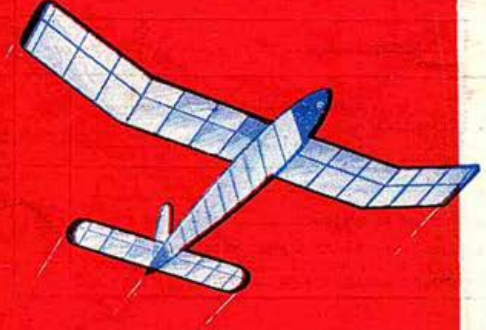
Complete KIT **3/6** *post free.*

Contains :—
CUT-OUT RIBS, CEMENT, TISSUE, etc.

GLIDER No. 3

45 inch span.
FULL SIZE PLAN AND CUT-OUT RIBS ONLY **5/6** *post free.*



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30 inch span.

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Contents of Kit :—
CUT-OUT RIBS, CEMENT, TISSUE STRIP, etc. and FULL SIZE PLAN

GLIDER No. 2

36 inch span.

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Spitfire	4d.	Mitchell	1/10
Fortress	2/4	Marauder	2/-
Lancaster	2/4	JU. 87	7½d.
Mustang	6d.	JU. 88.	10d.
Typhoon	6d.	Halifax	2/3
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