

AERO

VOL. 6. No. 63.
FEBRUARY 1941
NINEPENCE

MODELLER



George C. Miller

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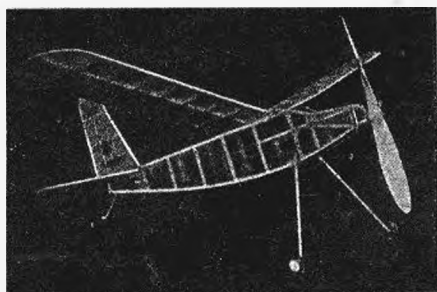
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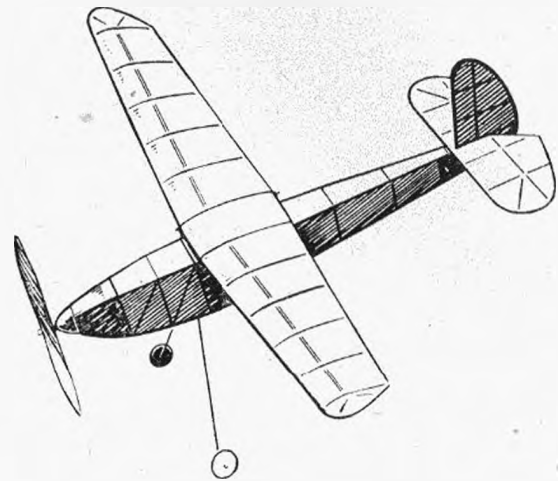
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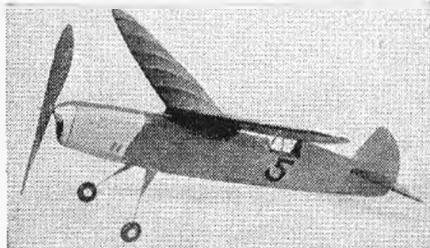
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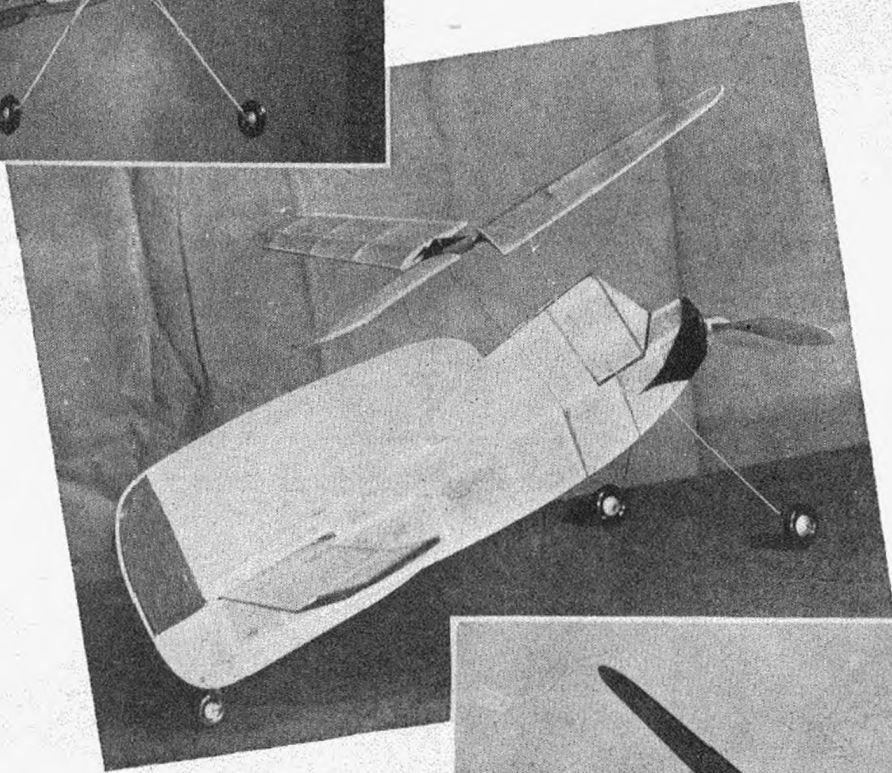
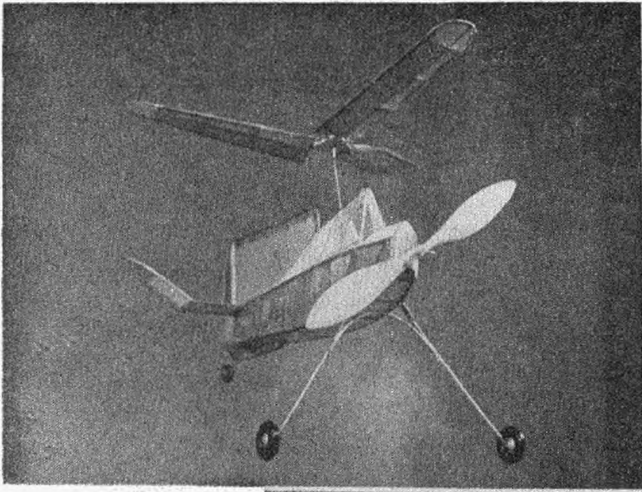
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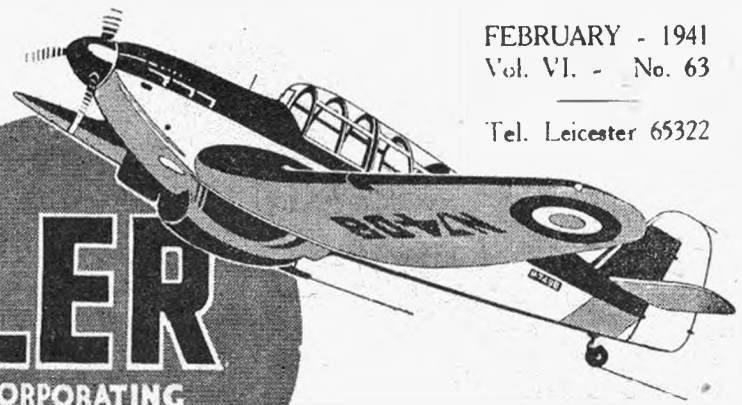


In the centre is the prize-winning photograph, taken by Dr. H. Charles, of 68 Park Avenue, Merriou, Dublin; above is the entry of Mr. E. J. Cottell, of Courtland Road, Wellington, Somerset; whilst the bottom photo was sent in by Mr. R. Colman, of Cambridge Road, Evesham.

The AERO MODELLER

FEBRUARY - 1941
Vol. VI. - No. 63

Tel. Leicester 65322



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Editorial



THE N.G.A. now enters its third year of operation as the means of providing third party insurance to all regular readers of THE AERO-MODELLER.

Whilst some thousands of readers of this journal are insured, we know that, for a fact, a considerable number as yet have not taken out any third party insurance.

Fortunately, accidents due to flying a model aircraft have been extremely few.

Nevertheless, that is no excuse for aero-modellists not being insured, particularly when they can obtain it for such a nominal figure as is offered under the N.G.A. scheme.

Owing to the present Air Ministry ban on the flying of petrol 'planes, that part of the insurance is, of course, in abeyance; but, as is commonly known, the large majority of aero-modellists fly rubber-driven models and/or gliders, and for them, whilst complying with the present Air Ministry regulations of flying models of a span not more than 7 ft., the N.G.A. insurance is still available.

At the end of this journal a copy of the terms of the policy, which is underwritten by members of Lloyd's, is printed, whilst on the back inside cover page are printed the membership forms for 1941.

Form No. 1 should be completed and sent with a postal order of appropriate value to The Secretary, N.G.A., Allen House, Newark Street, Leicester; whilst Form No. 2 should be completed and handed to the reader's local newsagent or bookseller, if he has not already placed an order for the regular delivery of THE AERO-MODELLER.

Since its inception, under the honorary chairmanship of Colonel C. E. Bowden, the N.G.A. has received a number of claims, all of which have been promptly settled by the underwriters.

For new readers, we would explain that the meaning of the words on the badge is, "Fly with Care," and that all members undertake to fly their 'planes with due regard to persons and property in the neighbourhood.

We reproduce herewith a picture of the membership card, which is issued to every member, on which is shown a replica of the gilt metal lapel badges, size 7/8 in. in diameter, which are available for 1s. each; and two reproductions of the black and gold transfers which are available for members to affix to their aircraft, each shown in the actual size, are on the next page.

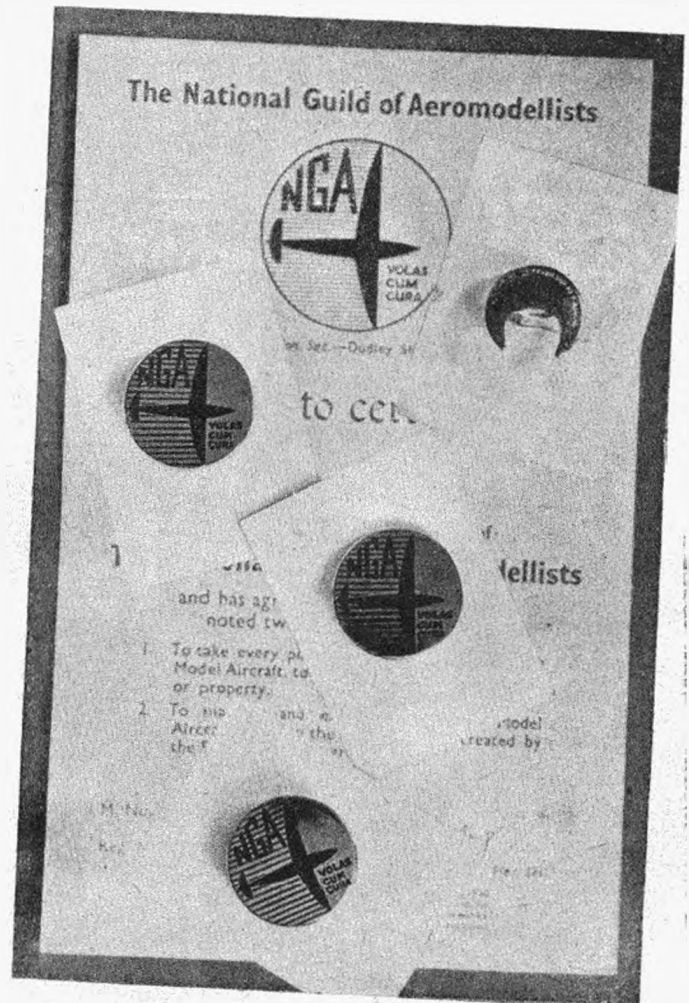
We trust that all existing members will renew their subscriptions for 1941, and that, in addition, we shall receive many thousands of new members.

Rotator IV.

We publish this month, on the opposite page, three photographs of models of Mr. Mawby's Rotator IV, the centre one of which was submitted by Dr. H. Charles, who is awarded our prize of half-a-guinea for the best model built to the plans published in the October,

1939, issue of this journal.

The senders of the other two photographs have been awarded a consolation prize of books.



All three contributors are to be congratulated upon the way in which they have built their models, and we must admit there is little to choose between their entries.

The top photograph reveals one error in that the top curve of the fin is concave where it should be convex, and the entrant of the lowest photograph loses a point, as he has got the triangular wire pylon supporting the rotor the wrong way round.

Now on *this* page we publish three more photographs from entrants. We have not published them to make fun of them, and we are not going to give their names and addresses, and to each of them we have sent a book with our compliments. However, we thought they would make good examples to emphasise one point we have before drawn attention to in regard to photographing models.

These competitions, which we organise for photographs of readers' models, are very popular, as is indicated by the large number of entries we receive, and it is disheartening for us to have so many photographs sent in that we have to disregard on account of their being such poor ones, and thus we cannot make prints from them, whilst realising that possibly the models may be very good.

We know that all aero-modellers cannot be good photographers, but with modern, inexpensive cameras, it is so easy to get good photographs that we do feel that better photographs should result.

Let us consider the three photographs on this page. That on the left is out of focus, and little attempt has been made to obtain a neutral background against which the model would show up well.

Actually, of course, the roof of the house in the background is more in focus than the model. Had the reader stood above his model and so used the grass as a background, and had he obtained a correct focus, a better result would have been obtained.

The middle photograph, whilst in focus, is not eligible for the competition at all. Our competition was for replicas



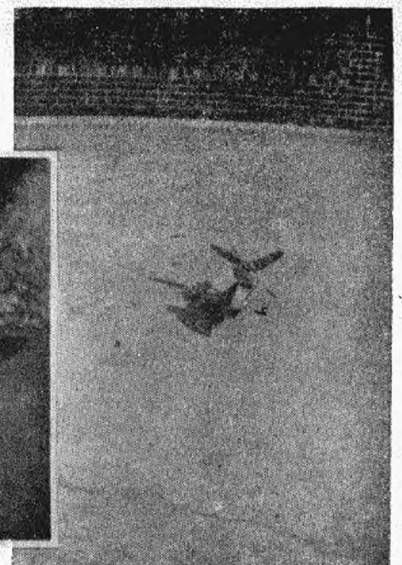
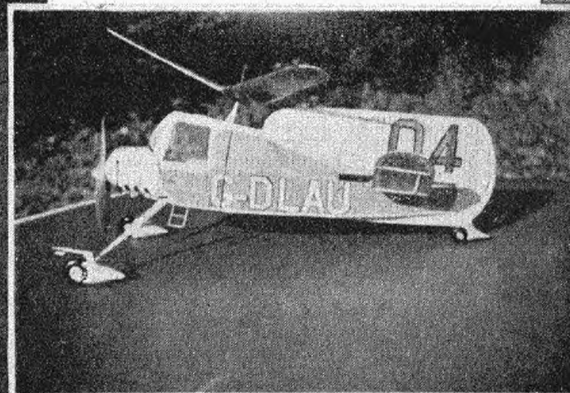
of Mawby's model built to the plans published in *THE AERO-MODELLER*.

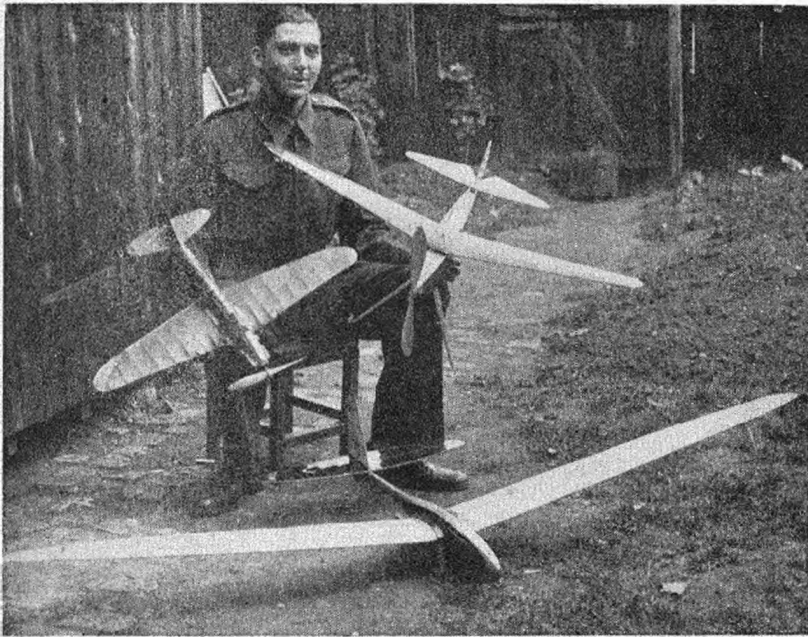
The entrant of this photograph has obviously an ingenious mind, and is a good hand with the paint brush! As will be seen, his model is equipped with exhaust pipes to the engine, spats to all three wheels, and a pitot tube on one wheel spat! Another photograph (not shown) reveals that a cabin door has been made which opens and shows a fully equipped cockpit!

Our entrant states that his age is thirteen, and on that score alone we do sincerely congratulate him on the job, but it fails in that it is not a replica of the original model, and the photograph fails in that no item of the workmanship of the rotors can be seen.

Why the third photograph is condemned should be clear, since it is hardly possible to detect what the object actually is!

Once again we emphasise that we are not trying to make fun of the entrants' photographs--least of all of those that we have used; but we have had entries for our previous competitions, in which the model was shown even smaller!





Who'll go for a soldier? Here is Sapper B. F. Lawson, R.E., with models built during several weeks convalescent leave. One of the many advantages of aero-modelling as a hobby is that it can be pursued during partial incapacity, and we know of a number of cases where the hobby has been taken up by men and boys who were temporarily laid up or out on a couch.

Elsewhere in this issue appears an article on "Photographing of Models," and we recommend all our readers to study it, particularly those who will be entering in the photographic competitions we shall organise during this year.

The S.M.A.E. Fighter Fund.

Following is the position regarding the S.M.A.E. Fighter Fund:

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Whitstable, Tankerton and D.M.A.C.	10	6	
S. Horton	10	0	
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A. D. Bradshaw	1	6	
P. J. Colbourne			9
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Thus the total now stands at £208 13s. 1d. as at January 2nd, 1941. Are aero-modellers throughout the country satisfied with this?

More than this sum has been subscribed towards sending a "Wakefield" team to America, and that was *only* to secure a cup, valuable as it may have been.

The S.M.A.E. Fighter Fund was organised for a more serious and more important (?) purpose—we say again, are aero-modellers content with this?

Suggestions have been made that collecting boxes should be on all counters of all model shops and in all club rooms.

We endorse these suggestions and, no doubt, there are

others which will be equally useful, provided they are thought out and well advertised.

There is a lot yet to be done.

Without wishing to single out any club, we note that Hinckley M.A.C. have contributed £6 6s. Hinckley is quite a small place, and the club, whilst enthusiastic, does not boast a membership running anywhere over three figures. There are some of the bigger clubs that could produce much larger sums if they were to "Go to It."

The Model Aircraft Trade Association.

At a recent meeting of the Council, which we attended, the Secretary produced a credit for several hundred pounds that he had received from a firm in South America wishing to purchase kits of British model aircraft.

We consider that this is a fine tribute to the standing of the Model Aircraft Trade Association, not only in this country, but throughout the world.

Our South American friends just sent this credit via the Bank of England and asked the Model Aircraft Trade Association to place orders with its members, sending out a range of kits representing the products of Great Britain.

We are proud to say that the sending of this order was inspired by the safe receipt in South America of copies of the Export Supplement we distributed with all over-

Miss Winifred Mason.

It is with sorrow that we record the death of Miss Winifred Mason a few weeks ago.

Miss Mason was the first of our staff to join us when the Leicester offices of THE AERO-MODELLER were opened close on four years ago.

Until the beginning of the war, and the consequent suspension of gala days and big meetings, Miss Mason was regularly present on these occasions as an enthusiastic supporter both of aero-modellers and THE AERO-MODELLER.

Her loyalty to the journal was unbounded, and she always started her trips around the country with an armful of AERO-MODELLERS, distributing them on her travels for "the good of the cause."

Although when she joined us, her knowledge of model aircraft was negligible, she showed a fine enthusiasm for the hobby, and very soon was building models; and on one occasion she created a minor sensation by appearing at Fairey's Aerodrome with a 4 ft. span duration model which she had built herself and decorated to match her frock!

To her family we extend our sincere sympathy, in which we are sure her many aero-modeller friends will wish to be associated. We pay tribute to an aero-modeller who played well for the team, and whose loss we keenly feel.

D. A. R.

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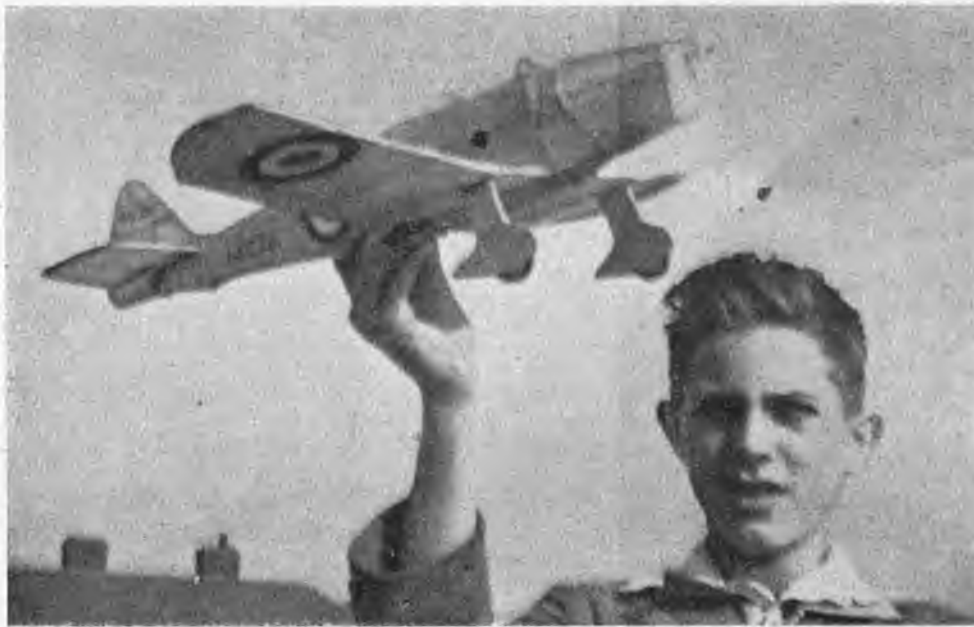


Fig. 5. Here is how the author says a model should be held, if it is desired that the owner of the model himself should be included. Note how the sun is falling on the subject's face from one side, and that the model is held in front of it.

The only attachment required for good model photography is a cable shutter release. This may be purchased for about 2s., and is almost a necessity for good snapshots.

What kind of photographs do we desire? The writer has made a practice of taking one or two posed photographs of each model, built so that a complete photographic record of his model-building activities is obtained. All photographs may be taken outdoors. If the model is covered with white tissue a dark back-sheet is necessary, and an ordinary dark blind or a thick green tablecloth will serve the purpose very well.

The front portion of this must be laid on the ground and the model placed thereon. Behind the model the other edge of the back-sheet may be raised, and held up, say, over the back of two chairs, this forming the background.

Having arranged the model in this manner, place the camera in the horizontal position on a block of wood or box about six inches high. As viewfinders are notoriously unreliable, often showing parts of the subject which never find their way to the print, one should not bother to make the image of the model fill the viewfinder. Provided it appears in the centre it may be quite small, i.e. one may be quite a good distance away from the subject.

If the day is sunny a snapshot may be taken, and here it will perhaps be as well to say something about apertures.

THE trouble with most articles on model photography is that they take it as a matter of course that the reader possesses a camera costing somewhere in the neighbourhood of fifteen guineas. Actually, the average aero-modeller who is an aero-modeller first and amateur photographer a very poor second, often has nothing more expensive to work with than the humble "Brownie Box," or perhaps a camera obtained by collecting cigarette coupons!

One of the first things to realise, however, is that it is by knowing how to use the equipment one possesses rather than by using a very good camera that good photographs are obtained.

Let us, therefore, presume that all we have is a box camera, or one of the small folding types. On examining our camera we find first of all that the lens is of the fixed focus variety, that is to say, it cannot be focussed on the object to be photographed. On some folding cameras there are, however, two points on the slides which take the lens mount marked "near objects," and "distant." For practically all model photography it should be set on "near objects."

Secondly, we find that the camera can be used upright or horizontally, and the latter position is best for our purpose. On box cameras a separate view finder is provided for use when the camera is held horizontally, while on folding cameras the view finder may be swivelled round.

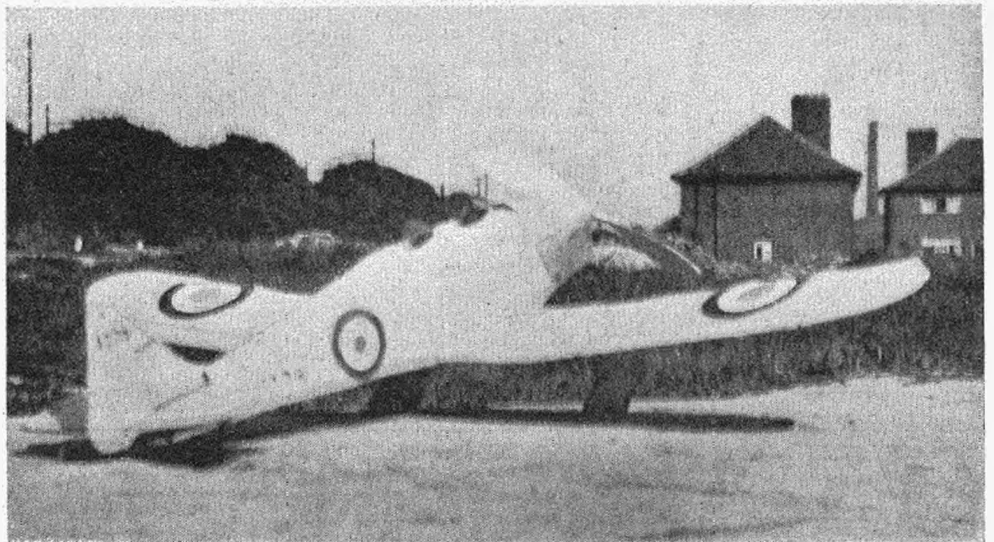


Fig. 6. How to photograph a model in a "life-like" setting. The camera is positioned practically on the ground, and the model is arranged in the background, which is sufficiently far away to emphasise the apparent largeness of the plane.

OF MODEL PHOTOGRAPHY

By D. M. H.

Fig. 3. The wrong way to hold a model for photographing it! Far more space is occupied by the person holding the 'plane, more of which is obscured by his hands than is desirable.

The aperture is the tiny hole just behind the lens. On some of even the cheapest cameras there are three aperture settings, and the centre one should be used, or, if they are marked in numbers, the one numbered f.11.

If the day is dull a brief time exposure is necessary, and this often results in a better picture than a snapshot taken on a sunny day, for there will be no harsh shadows. The camera shutter control must be set to "Brief Time," usually indicated by a letter B. The plunger of the cable must be pressed down and held for two or three seconds and then released. Fig. 1 shows a photograph taken in this manner.

A skeleton model may be photographed in exactly the same manner, but if only a part or parts of the model, say, wing and fuselage, are required to be taken, it is best to hang the back-cloth about five feet from the ground, say over a clothes line. The various components may then be lightly sewn to the cloth with a needle and white thread, this being only a few minutes' work. After that the camera can be set up level with the subject, and the picture may be taken in the ordinary way, Fig. 2.

No album is complete without a good sprinkling of photographs taken on the flying field, but a great number of modellers make the mistake of considering themselves the subject to be photographed instead of their models.

A favourite way of being photographed is holding a model preparatory to launching. Fig. 3 shows the *wrong* way to do it. The model is too far from the camera, it is held too high and also—and this is a common error—parts of



the model are obscured by the hand holding the propeller. A model held up against the sky always makes a good photograph, but only the hand which holds the model need be shown on the print, Fig. 4.

If you insist on having your face on the photograph (!) then it should be taken as shown in Fig. 5. The model must always be in the foreground.

When photographing a model on the ground there are various methods which may be employed, but the main thing to remember is that if the model is light in colour then the background should be dark, green grass being preferable to, say, a yellowish clay path. A good effect is always obtained by placing the camera on the ground so that on the finished print the model appears to be very

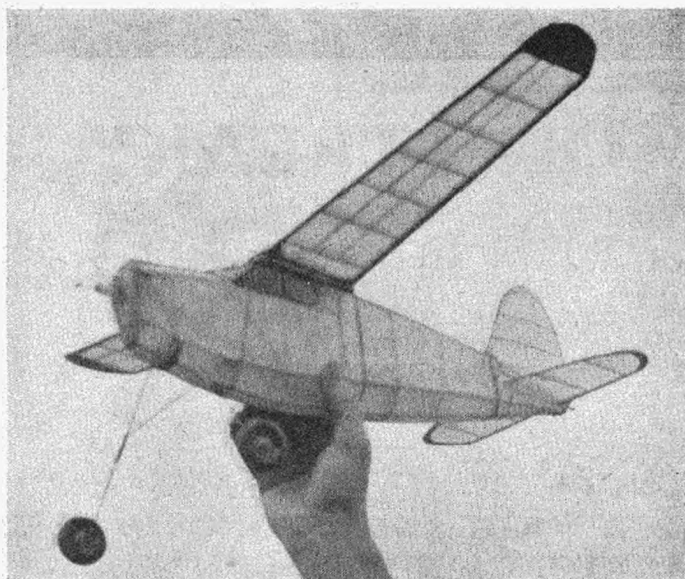
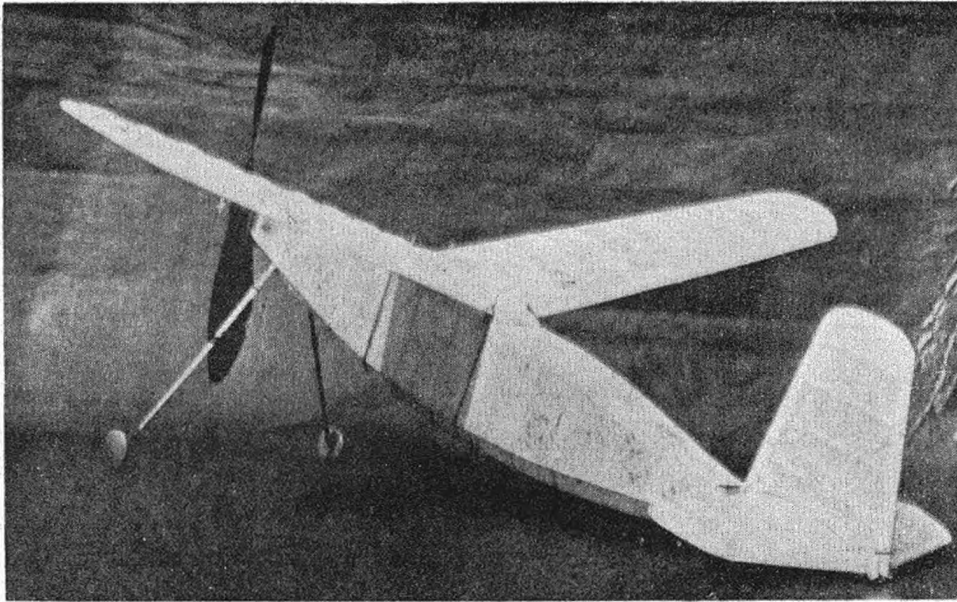


Fig. 4. The right way to hold a model when photographing it. It occupies the greater part of the available space, and the introduction of the hand serves as a guide to give some idea of the model's size.



matter to draw a pencilled rectangle around the portion in which one is interested, and ask the photographer who does one's printing to make a postcard enlargement of that particular part of the print. If he is a good photographer he will soon understand what is required, and will mask out any unnecessary detail without being specifically instructed to do so.

One should always have postcard enlargements made, for they are quite cheap, and are a great improvement on the smaller "contact" prints.

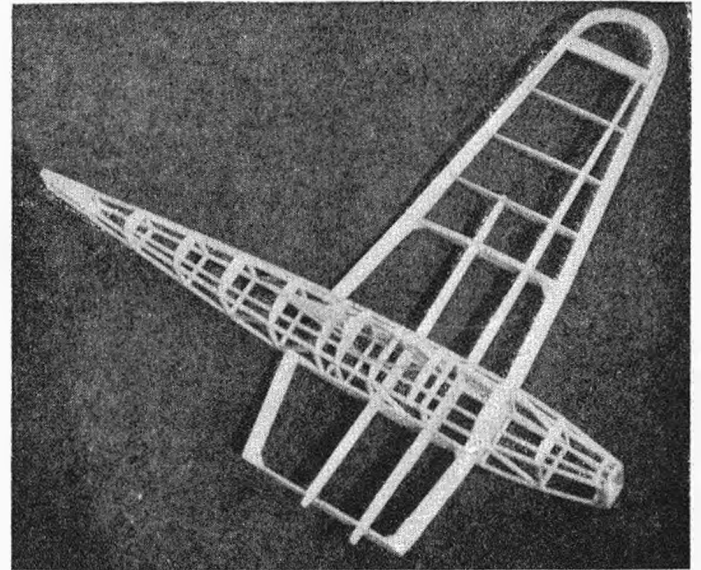
Figs. 1 and 2. Good examples of how to arrange a model, or part thereof, against a dark back-cloth, against which the whiteness of the wood or tissue covering may be plainly seen.

large. Particularly is this the case when photographing scale models.

It is a good plan to place the model at the edge of a path (as the camera is placed on a level with the model the path will not form the background), and it will then appear to be drawn up on an aerodrome. This effect is much enhanced if there are a few houses in the background, which assist the illusion and make the model look like a full size machine. Fig. 6 shows a photograph of a model Miles Magister taken in the manner described.

There are two main things to aim at in model photography—clarity and good centring of the subject. If the camera is used in a normal manner and one does not approach too close to the subject, the photographs will print quite distinctly. Absolutely clear prints can only be obtained by the use of a focusing camera, but for a private collection there should be no objection to the very slight diffusion common to all photographs taken with a fixed focus camera—indeed, this often flatters the model, for it conceals any slight blemishes in the construction or covering.

One need not worry unduly about bad centring provided that no portion of the subject is omitted. It is a simple



BUILD THE "CRIMSON STREAK"—

Designed by M. W. HAWKSBY and J. P. McNAMARA

THE "Crimson Streak" is the result of the letter by Mr. F. C. Neville, in which he describes a petrol-driven "Cable Buggy." Not owning an engine we decided to make a rubber-driven model, and this is the result. The fuselage is built on the jig system, covered with $\frac{3}{8}$ in. sheet. This is covered with tissue paper, well doped and painted. The other details are on the plan. Instead of pulleys we used plain looped wire. This worked quite well, but pulleys

would probably be better. Instead of string we used wire from the coils of a large electric bell. As this wire was in two lengths we soldered them together and smoothed the solder so as not to get a bump. The total length was about 340 feet. The wire was stretched from the bottom of my garden to an upper room. The model hurtled down the line and came up nearly as quick, when given a send off from the bottom!

A SET OF FULL-SIZE PLANS IS ON THE NEXT TWO PAGES

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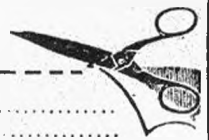
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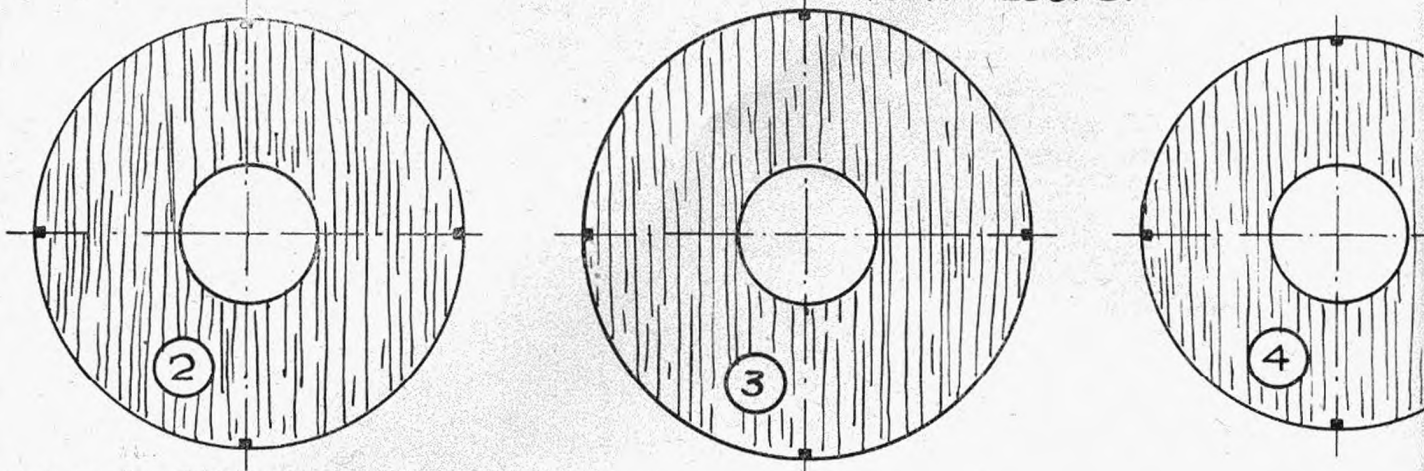
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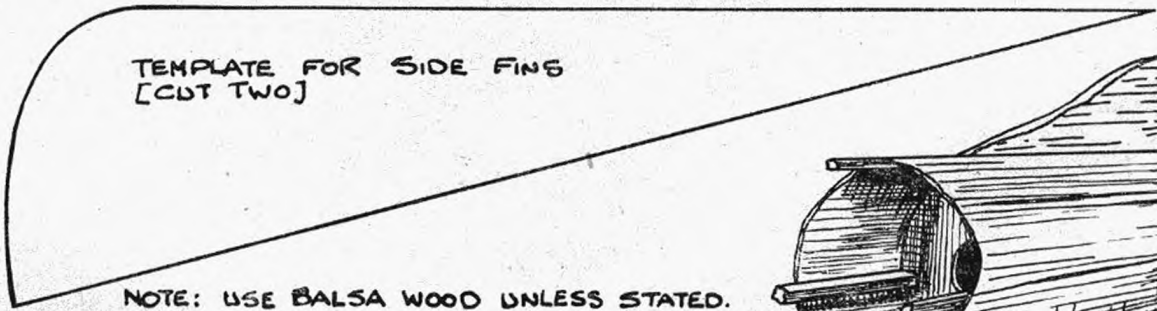
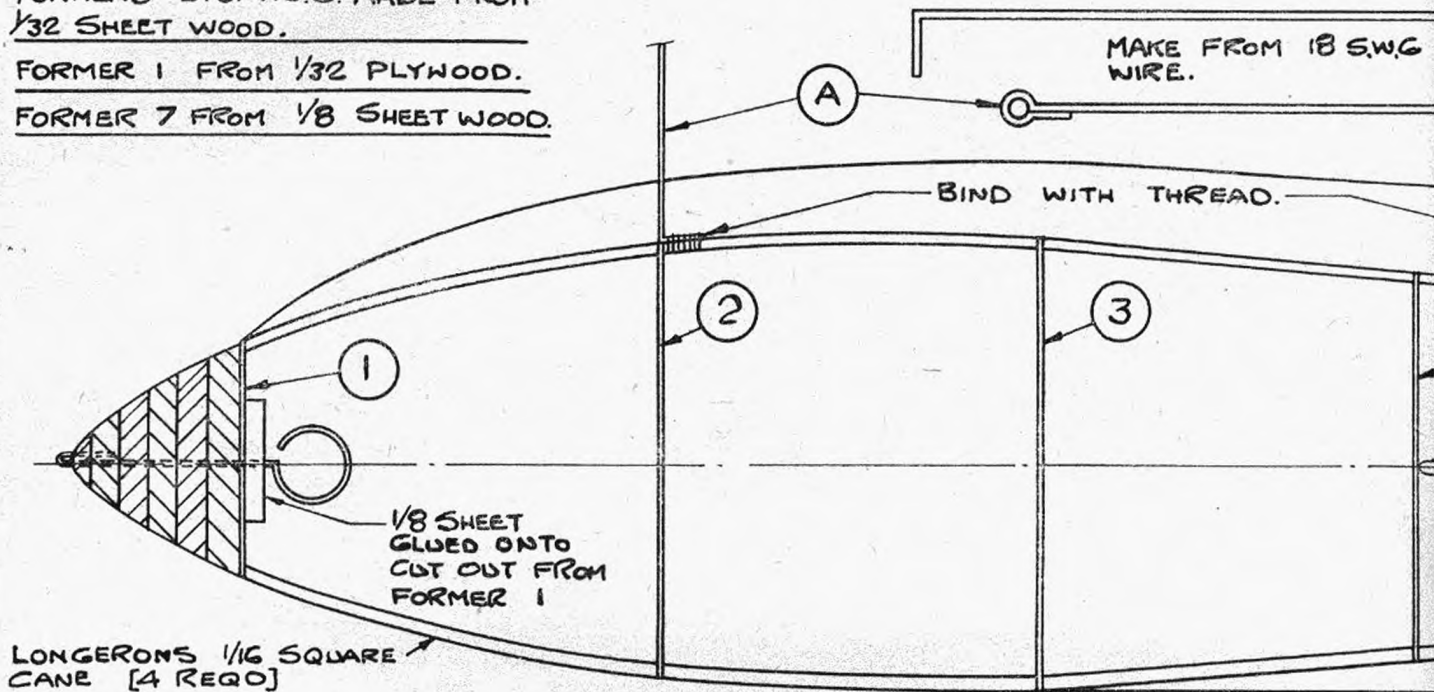
MODEL IS POWERED BY 1/8 OF 1/8 FLAT RUBBER ARRANGED IN FOUR LOOPS.



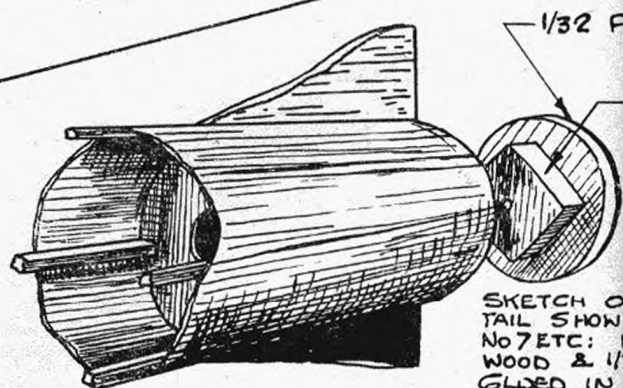
FORMERS 2, 3, 4, 5, 6 MADE FROM 1/32 SHEET WOOD.

FORMER 1 FROM 1/32 PLYWOOD.

FORMER 7 FROM 1/8 SHEET WOOD.



NOTE: USE Balsa WOOD UNLESS STATED.



- THE CRIMSON STREAK -

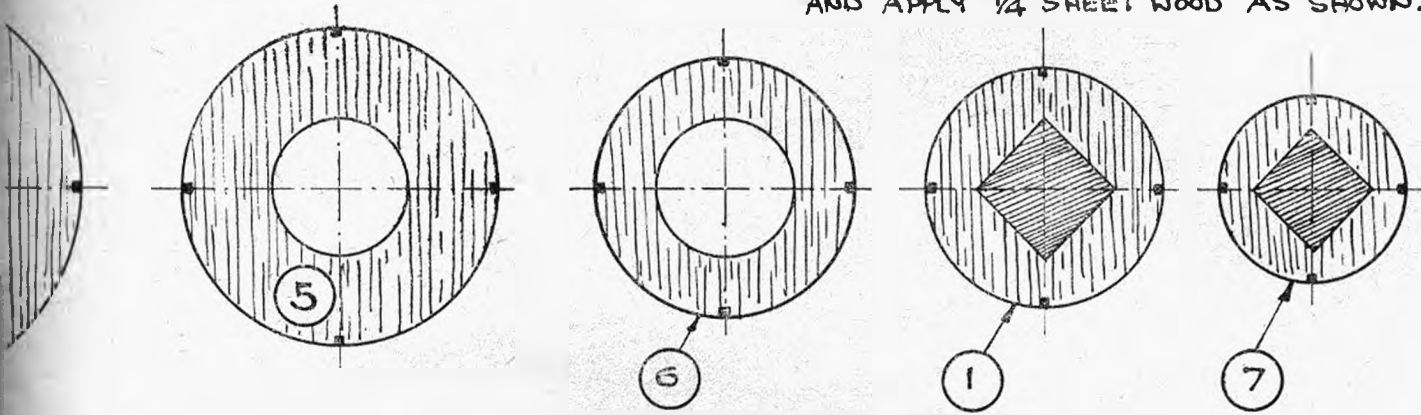
- DESIGNED BY -

M.W. HAWKSBY & J.P. McNAMARA

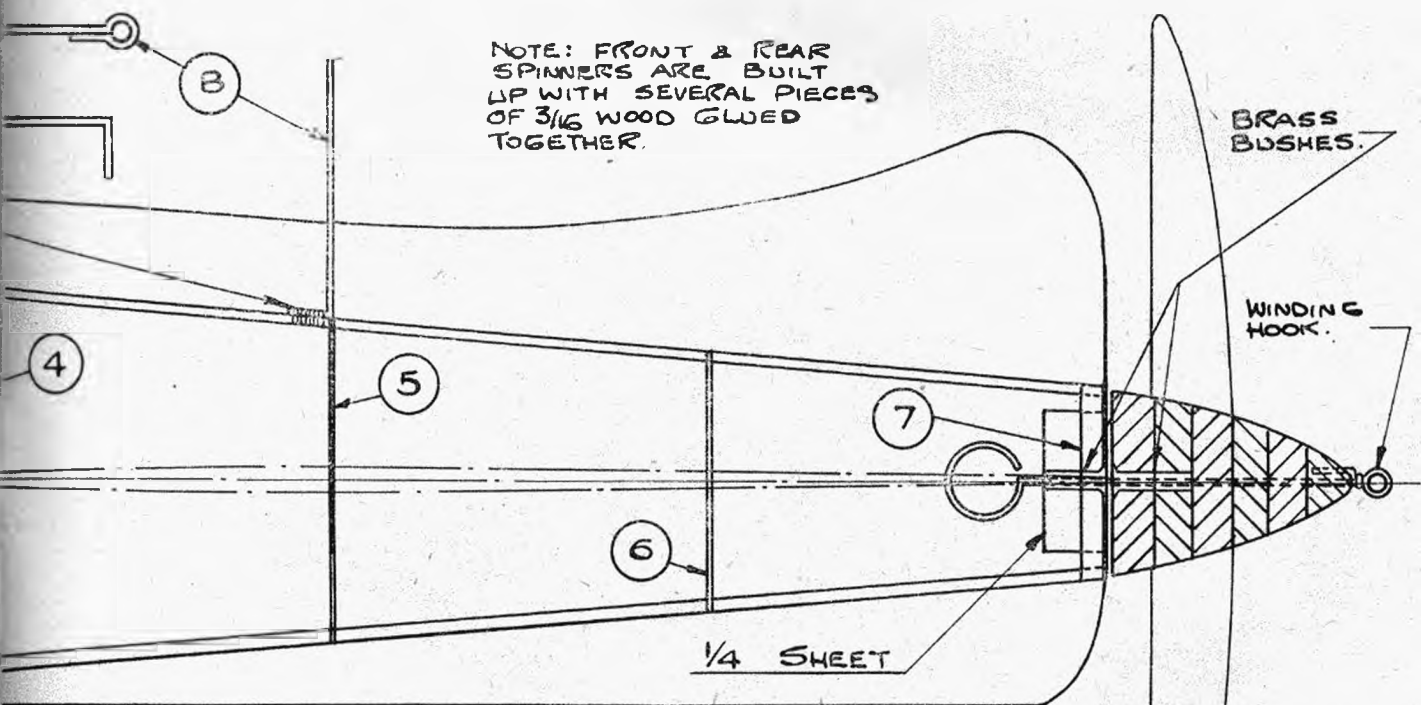
FEET
3 IN

PROPELLER SHAFT AND
FORWARD HOOK MADE
FROM 18 S.W.G WIRE.

NOTE: SHADED PORTIONS ON FORMERS
1 & 7 ARE CUT OUT. GLUE CUT OUT
FROM FORMER 1 ONTO FORWARD SPINNER. GLUE
CUT OUT FROM FORMER 7 ONTO 1/32 PLY
AND APPLY 1/4 SHEET WOOD AS SHOWN.



NOTE: FRONT & REAR
SPINNERS ARE BUILT
UP WITH SEVERAL PIECES
OF 3/16 WOOD GLUED
TOGETHER.

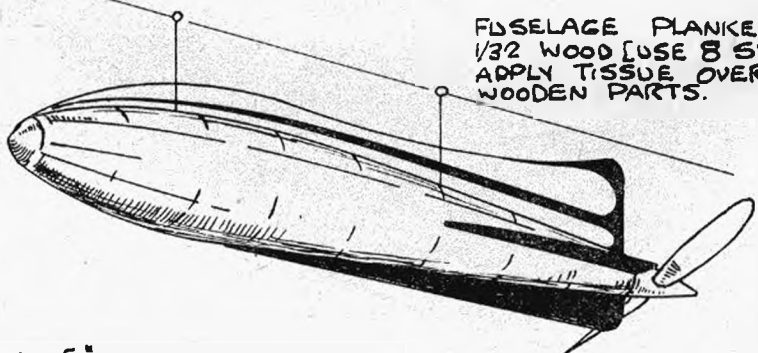


NOTE: TOP BOTTOM & SIDE FINS
ARE CUT FROM 1/8 SHEET WOOD.

WOOD
1/4 SHEET WOOD

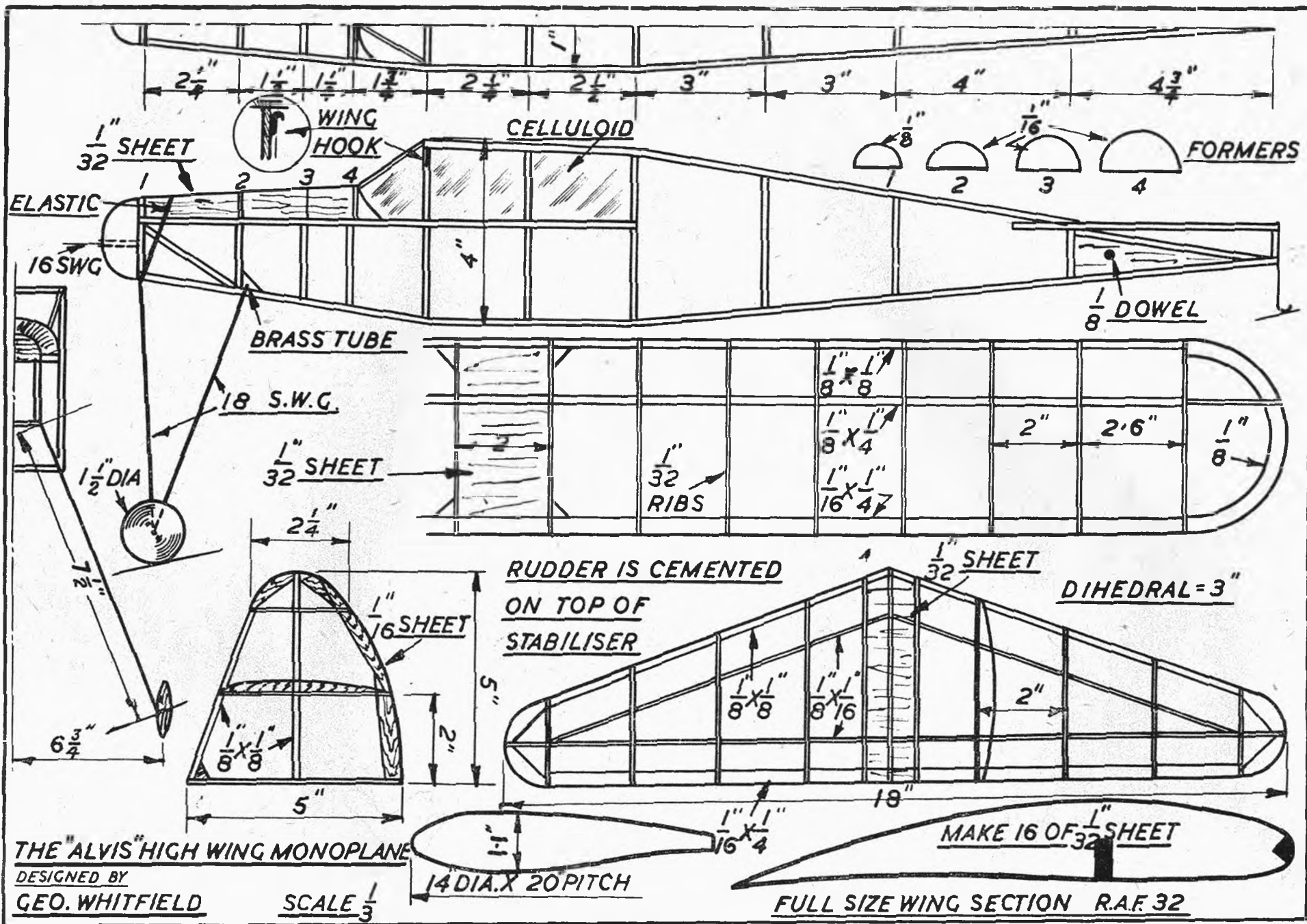
FUSELAGE PLANKED WITH
1/32 WOOD [USE 8 STRIPS]
APPLY TISSUE OVER ALL
WOODEN PARTS.

FUSELAGE
IS FORMER
ONTE 1/4
2 PLYWOOD
POSITION.



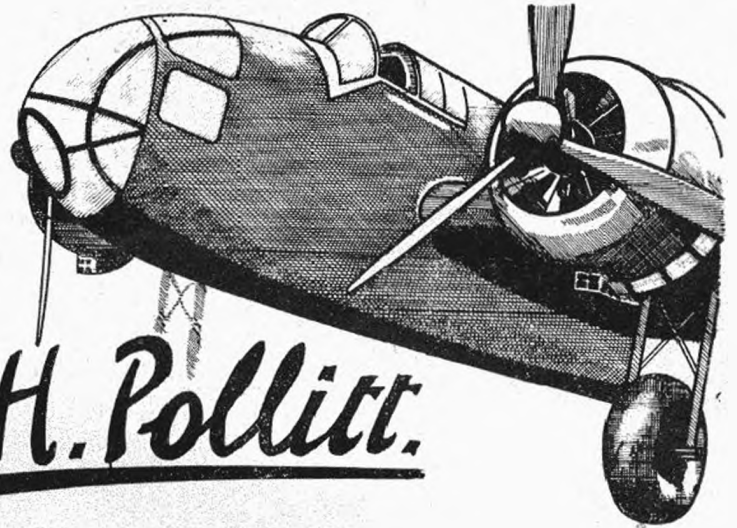
FINISHED MODEL IS
GIVEN 3 COATS OF
DOPE AND 1 COAT
OF BANANA OIL.
APPLY COLOURED
TISSUE AS SHOWN
IN SMALL SKETCH

USE A 5" DIAM PROPELLER.



Gadget Review

by C. A. H. Pollitt.



THOSE of you who have read D. A. Russell's book, "The Design and Construction of Flying Model Aircraft," will no doubt remember the description of the small scale wind tunnel built by the author. Many of you will probably have felt disposed to have a shot at constructing a similar one yourselves, though limitations of space may have precluded the possibility of your going ahead with the project.

I have this month only narrowly missed being able to introduce a design for a simple-to-make wind tunnel of modest proportions, and requiring a minimum financial outlay. Unfortunately, the projected wind tunnel was of such small proportions as to be incapable of eliminating what is technically known as "interference," and it was therefore aerodynamically useless.

Now here was an idea which just fell short of being practicable, and, like others that I have received, I was perforce unable to publish it. But, apart from these gadgets, which for some sound reason or other I am not able to deal with, there is a whole host of material accumulating month after month, and all of which, circumstances permitting, I intend to deal with in the future. I make this observation because I know that many of my contributors have been wondering what can have happened to ideas they may have sent in quite a long time ago.

Patience is not a lasting virtue with all of us, yet I am sure you will all bear with me when I explain that I am

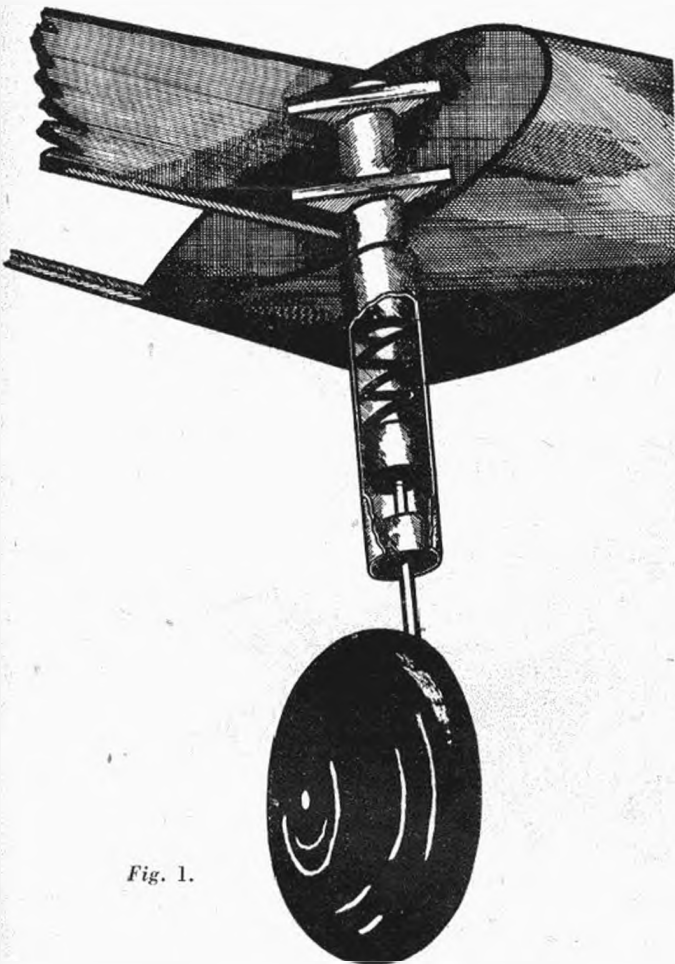


Fig. 1.

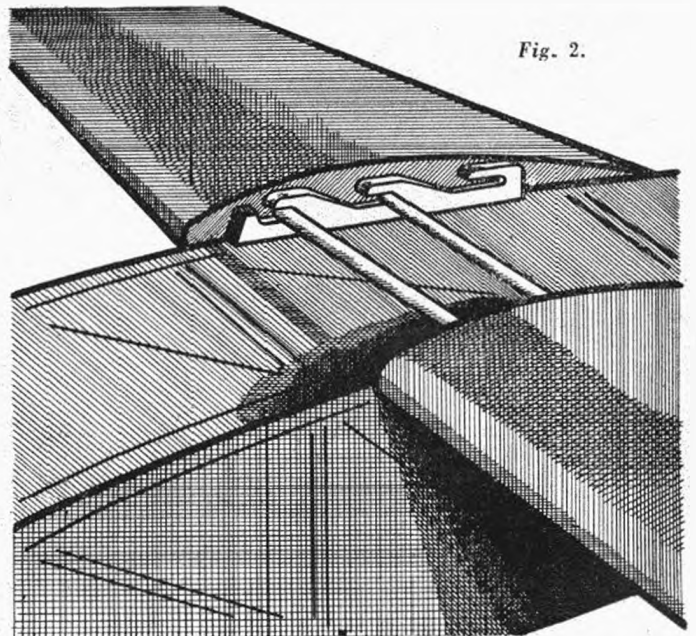


Fig. 2.

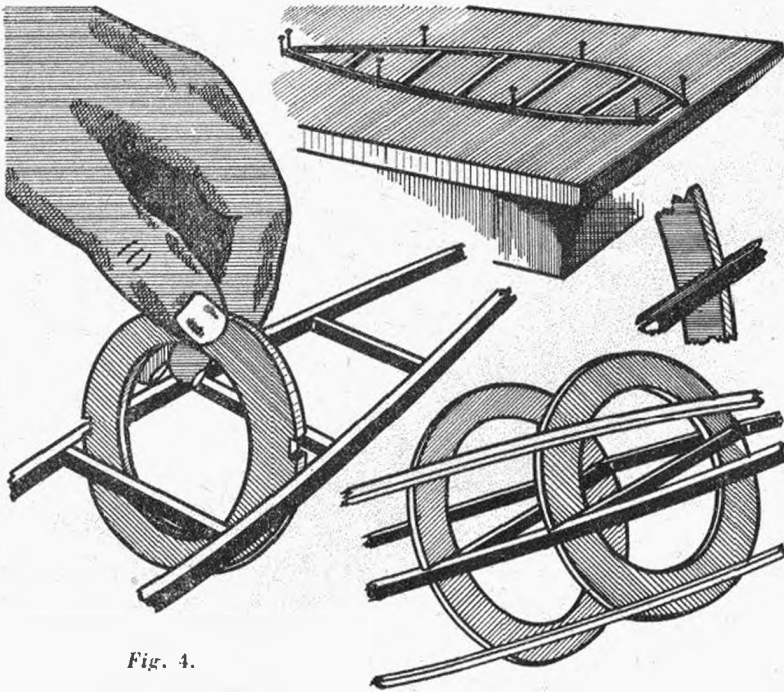


Fig. 4.

getting through as many of your suggestions at a time as I can, and that your turn will no doubt come along by and by.

One of the devices I have not yet seen adapted to model aircraft are oleo-pneumatic undercarriages; ambitious as that may be, Mr. Neville J. Jackson, of County Durham, has produced a shock absorber undercarriage leg which in external appearances at least closely resembles an oleo leg. A piston fitted to the top of the undercarriage strut is accommodated in a cylinder, in which there is also a short coil spring for eliminating landing shocks. The only shortcoming of this gadget is that no means are provided for keeping the wheel in its correct fore and aft alignment, though there are a num-

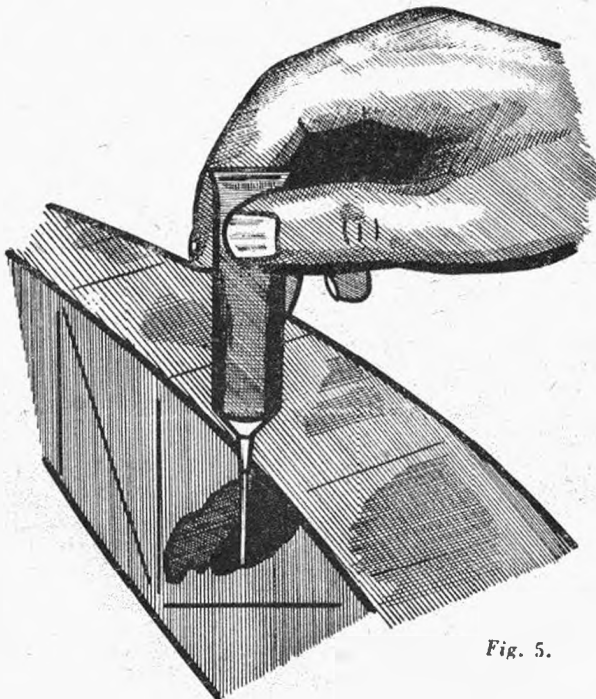


Fig. 5.

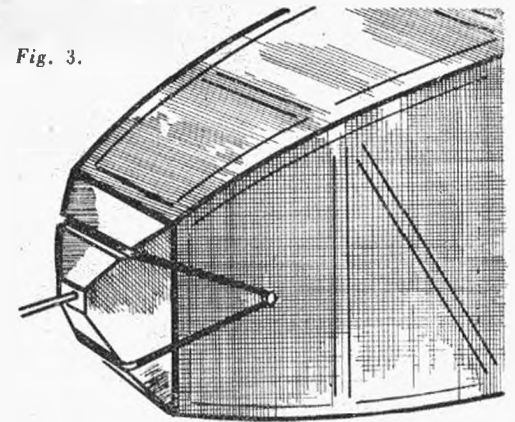


Fig. 3.

ber of ways of remedying this. Fig. 1 illustrates the idea.

From Gentleshaw, in Staffordshire, Mr. R. Leyland sends an idea for a wing fixing which will allow of the wing position being varied. The port and starboard wings are braced together by two hardwood dowels, which fit into slots in two brackets on top of the fuselage. Two elastic bands, stretching from the trailing edge to the fuselage, could be used to secure the dowels in the slots, and so prevent the wings sliding forward. I have omitted to show the elastic bands in Fig. 2.

Fig. 3 shows a method of additionally securing a nose block, with the aid of an elastic band. Grooves are cut across the front of the block, to locate the elastic, which is then passed over two pins, one on either side of the fuselage. Mr. P. Brannon, of Harrow, whose suggestion this is, points out that the fore part of the fuselage is balsa covered, to receive the pins.

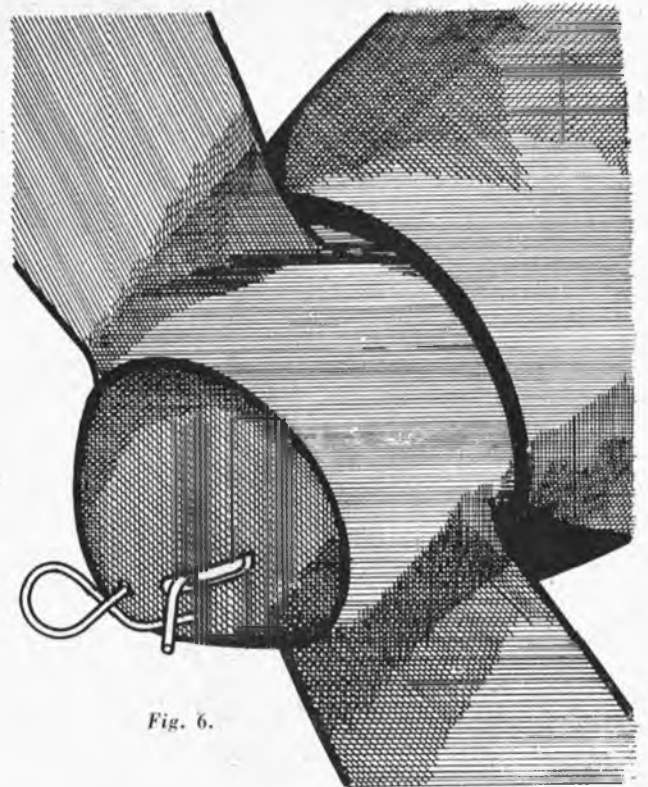


Fig. 6.

The use of jigs or fixtures for constructing fuselages is usually avoided, on the grounds that once the fuselage is completed the jig is discarded and is of no further use. Mr. E. Elliott, of Homerton, London, has very cleverly overcome this point by incorporating a small frame, similar in plan view to the fuselage shape, as an integral part of the fuselage structure. I think that Fig. 4 shows clearly how the frame is made, on a flat surface, and with the aid of a few household pins. In the bottom right-hand corner of the sketch I have contrived to show how the stringers sit on top of the formers, while the building frame is notched into them, for which purpose the formers are made something like $\frac{3}{16}$ in. smaller than is really necessary, all the way round.

I wonder how many of you have cursed the general cussedness of things when carrying out hasty repairs on the field, and by some inexplicable means or other you manage to get cement all over the fuselage, but never in the right place! Mr. H. Russell-Holland, of New Southgate, London, offers quite a sound—and simple—remedy, by attaching a length of aluminium tubing to the spout of the cement tube, as shown in Fig. 5.

Fig. 6 is an ordinary free-wheel device used in conjunction with a spinner. Of particular interest is the fact that this idea comes from the other side of the world. Brisbane, Queensland, Australia. Mr. Russell Watson-Will, the sender of this idea, wishes us every success, as he says, despite the war, and I am sure that all our readers will join me in reciprocating his good wishes. Observe how the striking peg is fitted in a short length of tube recessed into the spinner.

Finally comes a gadget for the solid aero-modellists. The two lower figures in Fig. 7 are horizontal and vertical, fore and aft fuselage profiles. Slots extending halfway along each of these templates allows of their being interlocked in their

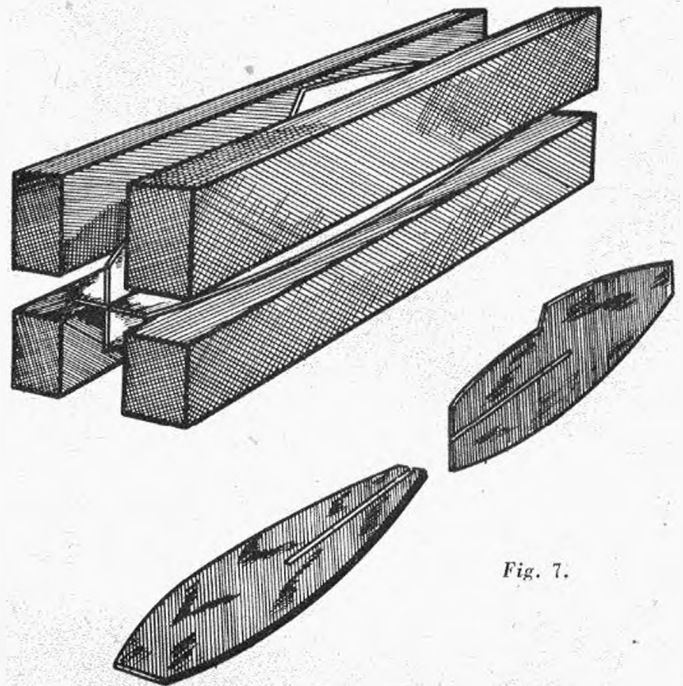


Fig. 7.

normal respective positions. I think the sketch gives some idea of how four blocks of timber fitted round the templates can be carved to the necessary shape. I am indebted to Mr. T. Whittaker, of Sittingbourne, Kent, for this last idea.

Before signing off I need hardly mention that the already existing rates will continue to be paid for all ideas published. So until next month, cheerio.

MAKING USE OF NATURE'S LIFT By T. A. BROWN

ALTHOUGH I am quite aware that it is impossible for most clubs to pick and choose in regard to their flying grounds—in fact, it is very difficult to get one of any kind—all enthusiasts should know how to make full use of various characteristics which might be present on their own ground or on some other on which they might be compelled to make competition flights. We have seen with what disastrous effects, for the British team, Dick Korda made use of a thermal in the Wakefield Cup for America. And I am told that it is quite a common practice amongst the Americans to design their Wakefields so that they climb to extreme heights in the hope they will pick up a thermal. This is not such a hit and miss method as it might appear on first sight, since one can train oneself to recognise thermal conditions, as any first-class sailplane pilot will tell you.

If we study the formation of a thermal we can see where they will be most likely to be found. The sun's rays do not heat the air through which they pass to any great extent, but transmit heat to the earth's surface. Part of this is in turn transmitted below the surface, and part is radiated into the atmosphere. This latter causes "bubbles" of hot air to accumulate, which expand as they grow hotter, until they at length break away and rise rapidly until they reach a height where the density of the surrounding air is the same as that in the "bubble," which then ceases to exist as such. The lowering of the density of the air in the "bubble" being caused by the heat, these rising "bubbles" can be distinctly

felt by a pilot in a sailplane soaring in a thermal. So we can now arrive at the conclusion that a thermal is most likely to be found over ground which throws back the heat of the sun rather than absorbs it, as is the case with shady woods and cool water. Thermals may be found over bare ground, such as ploughed fields or over ripened corn fields, a sandy waste where the grass is short or scarce, or over a town, and have even been known over a black tar covered road, since that colour attracts the heat, or, as we said before, any surface that will tend to grow hot and throw back the heat into the atmosphere.

Should there be a cool surface a short distance away from the hot one the thermal is likely to be fiercer, since a circulation tends to set up in the air, down over the cool surface and up over the hot one. Absorbers or cool surfaces are marshlands, meadows with long cooling grass, water and shady woods, although fir trees in a wood often denote light sandy soil, with the result that thermals can actually be produced by woods of this kind.

Thermals or other rising currents of air can often be recognised by the little cumulus clouds which sit on top of them. Any number of these are usually to be seen on a hot summer day, and owe their formation to the condensation of the moisture present in the hot air on reaching higher and relatively colder regions. These clouds may not, strictly speaking, be signs of actual thermals, but they certainly represent a rising current of hot air, which is what most flyers are

looking for. They may be caused by air being deflected upwards by a hill, and it will be noticed that clouds often form along the coast or ranges of hills, and accurately reproduce their shape, but they are still formed by hot air rising into relatively colder air. Flying in such currents is known as hill or contour soaring. Many examples of this can be seen, especially if one watches seagulls, for I have personally seen them soar for hours over obstacles no larger than a common hedge, but if one has a hill running up to the edge of the flying ground, over which these currents can be found, so much the better.

I have known certain formations of hills which gave a very concentrated jet of air, such as a small valley with a wide open end towards the wind, the width becoming progressively smaller, whilst the other end runs smoothly up to meet the sides at their highest point, thus forming a huge scoop, but I am afraid these are comparatively scarce.

At a risk of complete loss or ruination of a model, exceptional flights can be accomplished in front of a thunderstorm. Rain during a thunderstorm falling through the air tends to cool it down to a certain extent. This cool wedge of air is carried along with the storm, and becomes cooler as it goes along, drawing upwards masses of hot air in its path. The intensity of these rising currents can be estimated if one looks at the hailstones and realises that they have been supported in the rising air until they grew to that size, when they became too heavy and fell to earth. It must be realised, how-

ever, that the currents pass along in front of the storm, so that as soon as rain begins to fall there is no chance of catching them. Also the model must be very strong and stable to ride the strong winds which almost invariably accompany a thunderstorm, otherwise this type of flight will only be successful in the less turbulent type of storm.

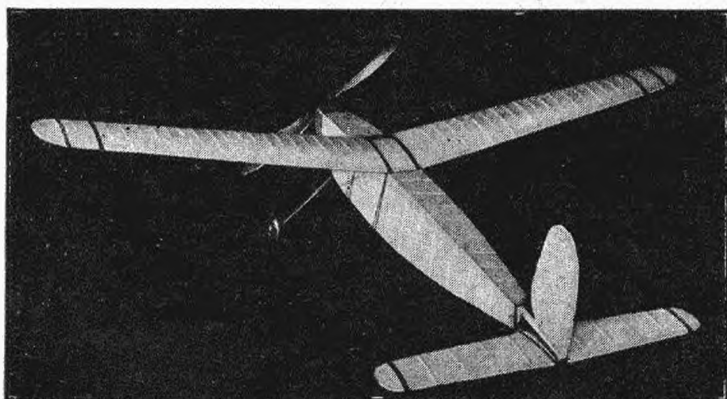
I will now bring forward a theory which will, I hope, lead a few of our more inventive aero-modellers into new fields of thought. This deals with the possibility of soaring in a gusty breeze, obtaining our energy merely from the gusts. To explain this theory suppose we take a case in which we have a wind which fluctuates, blowing gustily at regular intervals. Suppose we start the cycle with our machine flying in a lull and facing an oncoming gust, which supplies an increase of lift on arrival; as the machine rises it turns until it is flying down wind at a great speed over the ground. After the turn is completed the wind lulls again, but this actually gives the machine an increase of air speed, since it is flying down wind, and thus supplies more and more lift as the gust continues to lull; when the wind reaches a predetermined low speed the machine turns again to meet the oncoming gust, and so we gain more lift and close the cycle. Thus duration depends only on the duration of the gusty wind. I am quite aware that this theory savours of perpetual motion, but I am unable to find any snags in it myself; so now all we have to do is to arrange the model so that it will turn at the correct time in relation to the gust.

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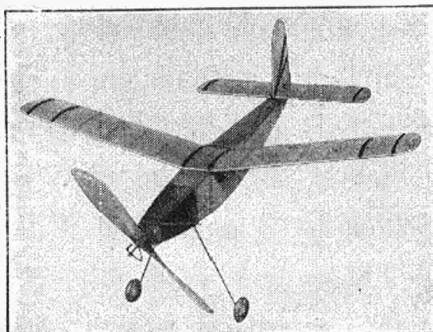
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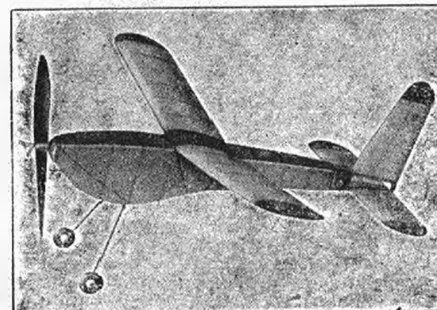


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"THE COPYIST"

or

Following in Father's Footsteps

MOST of us have at some time or another experienced the kind of "help" given by youngsters. I am no exception to the rule. I am sorely tried by the antics of my own nipper, aged six, and his "gang," as he calls them . . . as if I haven't enough on my plate trying to conquer the vagaries of low wings!

Funnily enough, David, unlike his father, has shown little aptitude up to press for dissecting things to see how they work, and has not been as handy with his fingers as he is at dodging the issue.

All that is left of my first Hurricane is a perfect pair of wings. These together with the stub wings, have been waiting for a new fuselage, but as I have been otherwise engaged during the past few weeks, that little job has been shelved.

On Sunday, as I was struggling to fit a bunch of stringers, "his lordship" came up, and this is how it went:

"Daddy!"

"What do you want now" (not too cheerfully).

"I have nothing to do" (very bored like).

"Oh, play with your farm!" (a bit less cheerfully).

"I have played with it" (very indignant).

"All right, then, play with your Meccano" (getting very short now).

"I have made everything with wheels on that I can push."

"Oh, have you? Then perhaps you'd better design a slab-sided fuselage for those old Hurricane wings—"

Imagine my surprise when the blighter took me at my word. He went looting into a cupboard, came out with two sheets of squared paper, which he proceeded to gum together (yes, he's evidently seen the old man at work) and got down to it.

Half an hour or so later.

"Daddy!"

"Yes?"

"Can I have some $\frac{3}{16}$ in. square and some cement and your balsa knife?"

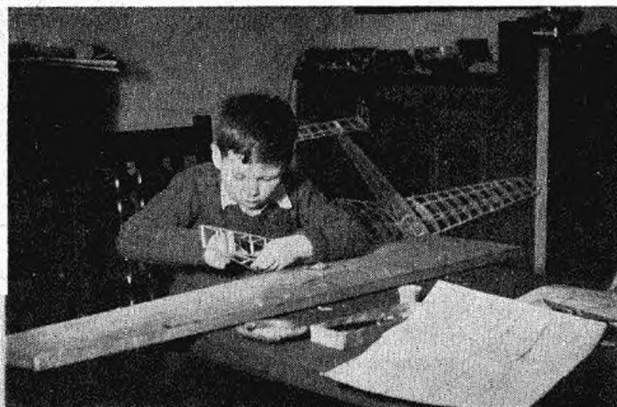
I woke up with a bump.

"What do you want that for?"

"To make this fuselage," was the reply.

I looked at his drawing, and, hoping to defer operations, said: "Don't you think that you should cut down the height of the sternpost a little?"

"No, it won't do like that, it has to be like this."



By

H. C. JENKINSON

And so I gave up all hope of peace and capitulated. I put my job away, got out a bundle of $\frac{3}{16}$ in. square and the rest of the things and let him get on with it.

"That blue crayon is where the pieces of wood go," says he, laying his plan out.

"O.K., carry on, then."

"I want some pins."

"They are in that box."

"How do you fasten them on? I can't."

"Oh, knock them in with those pliers."

Using the lines on his paper and a length of wood, the boy set up his first row of pins, and then the others. Not a scrap of help would he accept. "I can do it myself," was his cry, and so I took a back seat and looked on quietly.

Some time after lunch I was called in to help. By this time David had completed his side members and fixed them together at the sternpost and was trying to glue in the cross pieces.

"What's the matter now?" said I.

"These bits of balsa come unstuck when I put this rubber band on," was the reply.

So father helped glue in the first four cross pieces, and after that beat a hasty retreat.

My wife would not believe that the lad had made the article when shown the completed job. Neither would I if I had not seen it made.

"I'm going to make this into a biplane; those Hurricane wings look all wrong with this body."

Once again I was called in to help. This time I drew a wing section, and the lad set to work to cut out a pair of ribs. This time the balsa knife came off best. Those ribs were anything but a pair, so I made him some sections and cut out the slots for the spars, but that was all I could do.

There has been some argument about those wings. The boy wants them smaller, as, poor kid, he can't see such big ones looking right. They seem all wrong to him, so we have compromised. He will make them to my plan, but will cut them down when they are finished if he thinks they are still too large.

My wife says that I shall be surprised if the laddie's efforts beat mine. Well, who wouldn't? But so far his work has been really excellent. The slab-sided fuselage has parallel top and bottom longerons, and so I reckon that it is now up to father to see that he isn't disappointed. I have been told that the thing has to fly and not to be just another glider.

Well, well, we do see life, don't we! But by making the wings come-off-able, some help, if I am allowed to give any, when the dihedral and wing stagger are set, perhaps the bus might fly. If ever a 'plane was designed downside up, this one was!

UPS AND DOWNS By ERIC J. OWEN

I WRITE this article with the intention of telling the aero-modelling world of my trials and tragedies, tribulations and triumphs.

The whole thing started with my being given an old copy of THE AERO-MODELLER. It interested me very greatly, and I would have liked to have been able to make a model 'plane, but never having seen a good one I did not know how to set about the job.

In June, 1939, I saw some 'planes being flown near my home, so naturally I went to "have a look." I stayed, only to make up my mind to try my hand at the game. The die was cast—I have been firmly attached to aero-modelling ever since, through thick and thin.

My first effort was a 30-inch span glider. It flew quite well, but soon broke up, and was left to rot on the field. Nothing daunted I decided upon something stronger, and built a 28-inch span all-balsa glider from AERO-MODELLER plans. This was a success, making many good flights, one being O.O.S., but it was, I am glad to relate, recovered. Its subsequent demise was due to my having placed it across an armchair in a hurry, and the dog jumped on it—that was the end of number two.

During the first three months of the present conflict I was in the country, and I made a 22-inch span Stinson from a two shilling kit for amusement. It was a very shapely job, but was not meant to fly, so it stayed on top of the gramophone as an ornament.

I next constructed a 20-inch span Hurricane for a relation. This was my first taste of streamlining, and I liked it so much that I have built myself a 40-inch Hurricane, of which more anon.

Round-the-pole models claimed me in the winter, so I built several. All flew fairly well in the restricted space at my disposal. The best time was 64 seconds on a 2 ft. 3 in. line, which I consider is quite good, having never seen a proper R.T.P. model, and being unable to join a club.

The approach of spring saw me trying to design a Wakefield model. On the first day out it easily averaged 60—80 seconds on a few turns, and I was very pleased with it, but on the next try-out it refused to climb above 10 feet, in spite of all adjustments and the addition of six more strands of rubber. Three propellers were broken in another try out. That did it—I modified the Wakefield as a glider, and got

The lesson will benefit father, the cause of all the trouble, and who, by the way, has infected the village with model aeroplane-itis, and who is being looked upon, mistakenly, as an expert. It's a good job none of the youths saw my first Hurricane giving its famous impersonation of a corkscrew, or they would soon alter their minds. Still, I do my best, and try and curb their ambitions by telling them to take it easy and that model Hurricanes and Spitfires are good fund when you've got them "taped," but that otherwise they are not exactly the right stuff for a beginner to start off his model-making career.

Don't I know it!

many fine glides of two to three minutes off a 300 ft. line without thermals, but one windy day put paid to it; the wings folded up at 100 feet, and the fuselage wrecked itself on an anti-Nazi chalk heap, but why it should wreck a British 'plane I still don't know.

One would think that the series of mishaps would have damped my ardour for modelling. But no! I built a 30-inch span general purpose model, and got many nice flights of about a minute in all kinds of good and bad weather. The end of this 'plane came in rather a funny way. I wanted to have one more flight before going home, so naturally I put on a few more turns than usual. The 'plane climbed well and started to glide down wind at about 15 m.p.h. Then to my disgust it hit a telegraph pole head on and flew to pieces.

I have just finished (constructionally) a 36-inch span all-weather model. It boasts an 8-inch radius built-up single blade folding propeller, which appears to do its job well, as far as I can see. I have not had a chance to try it out properly yet, but I am confident of a good performance. After reading Mr. B. Renaut's article in the Christmas number of THE AERO-MODELLER, I am going to fit this model with 16 strands of $\frac{3}{8}$ in. wide rubber instead of 10 strands, as I originally intended. The climb should be very steep, as the 'plane weighs only 4½ oz. all up.

I possess a Korda 1939 Wakefield, and can say that Mr. Renaut is correct except on the question of power, as I consider the motor specified is on the weak side. The propeller appears very large for the power of the motor, and I cannot see how Korda got a terrific climb, as my model will not climb steeply unless I give it more power, although it is built strictly to specification.

A "Wasp" made from AERO-MODELLER plans flew so well on 200 turns that it landed near the top of a 20 ft. hawthorn tree, and defied all efforts to dislodge it.

My 40-inch span Hurricane mentioned above is almost ready for testing, and with a 40-second motor run times of a minute should be common.

No doubt my experiences will make many clever and more successful modellers hold up their heads a shade higher, and provoke laughter from some. On the other hand, I hope they will hearten the discouraged. I have enjoyed my successes, and have learnt a lot from my failures, even when they have resulted in another model "going west."

AIR CADETS! HAVE YOU SEEN THE NOTICE ABOUT THE "SOLID" MODEL COMPETITION ON PAGE 103?

PETROL TOPICS

By Dr. J. F. P. FORSTER

THERE appears to be some devilry afoot, and I am forced to one of the following conclusions. Either—

- (a) You are "fed up" with "Topics";
- (b) You are letting "that man" get you down; or
- (c) You are determined to make me write "Topics" myself, without any assistance from your good selves.

I am quite prepared to believe the first myself, but I suspect that it is more than mere politeness on the part of the Editor that makes him disagree—witness the continued and increasing circulation of THE AERO-MODELLER—whether *in spite of*, or partly *because of*, the inclusion of this feature, however, is quite another story!

I am very reluctant to accept the second of the above conclusions, and that leaves me with (c). This may be all very well from my remaining (one or is it two?) readers' point of view, but what am I to write about except my own small doings, which, owing to pressure of work, consist largely of wishful thinking these days?

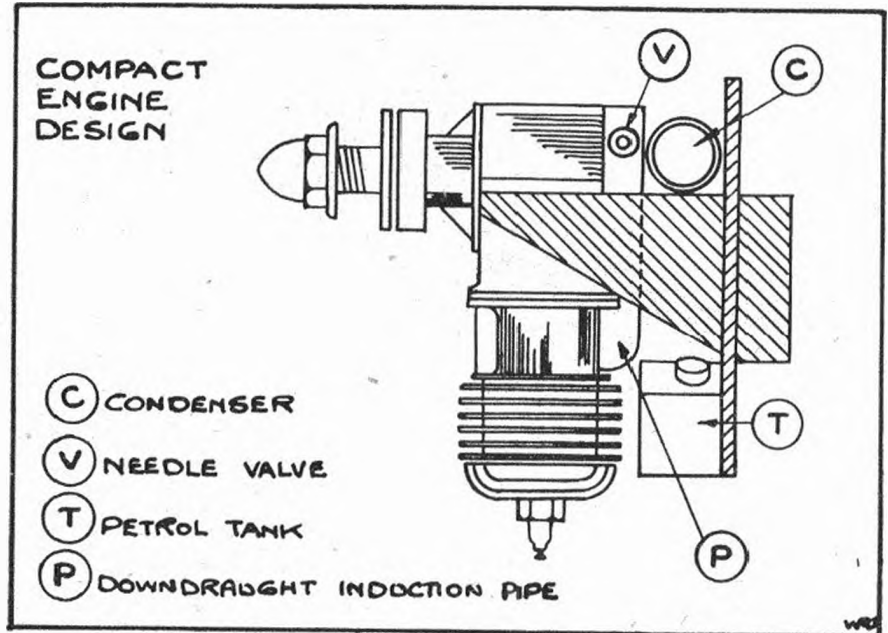
Wishful thinking has brought me to the modern tendency in engine design, which has been exercising my mind (and self-restraint!) for some time past. I refer to the "direct induction port," with the tank suspended from a long induction pipe behind the engine. This is a most cumbersome arrangement, having at least two serious objections for all users, and three for those of us who run our engines inverted.

First.—The weight of the tank is taken by the induction pipe, which in many cases, e.g. Ohlsson 23 and Cloud (to take random examples of U.S.A. and British engines) are screwed into a projection on the cylinder wall. In the course of time this vibrates loose, and the whole assembly, tank and needle valve jitter about in a most alarming manner.

Second.—The engine has to be mounted on inordinately long bearer arms to allow room not merely for the tank and unnecessarily long induction-pipe, but also for the thickness of one's finger, which is required for choking the end thereof for sucking up fuel for starting.

Third. With the engine inverted, the tank hangs down behind the cylinder, and the needle valve, tank filler-cap and induction-pipe are all inaccessible, somewhere beneath and between the bearer arms, and incidentally make cowling quite impracticable, as even with extensions to the first two there's nothing like a finger for choking purposes. Any attempt to place the tank higher results in gravity feed, which is *always* unsatisfactory for steady running in all attitudes.

If only once and for all manufacturers and modellers alike would face up to the fact that their engines *should be* run inverted, there would be no need to sell them mounted upright, with only *optional* (and sometimes non-existent) facili-



ties for inversion. Surely by now we, as users, are satisfied that this is the way we want them.

From all points of view, including looks, ease of cowling and streamlining, realism (*vide* Rolls, Gypsy, Cirrus and Allison) low C.G., high thrust-line with consequent correct aerodynamic line-up, good ground clearance for propeller permitting shorter undercarriage; the ease of emptying an accidentally flooded cylinder, and good cylinder-head lubrication—inversion is the answer to all these requisites. Furthermore, the coil being placed low in the fuselage nose for a low C.G., a short, inconspicuous and efficient H.T. wire results.

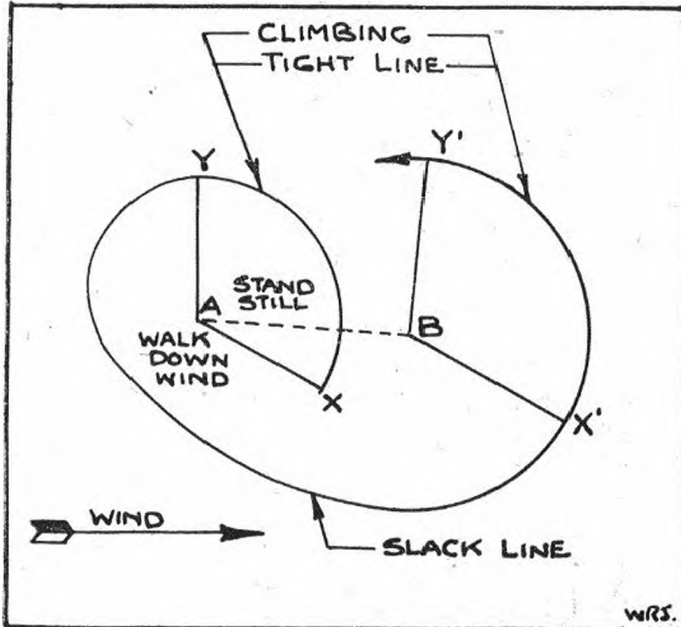
If, as I believe and hope, British manufacturers are going to get in on the home market (a golden opportunity awaits them in the post-war boom in "petroleering" that is certain to occur) then it is up to us, as practical users and potential customers, to bring all our influence to bear upon them to produce what *we* want, and not what they think we ought to have! We want *aero* engines designed for the purpose and not modified boat engines.

If they are finally convinced that the direct induction port is more efficient than the rotary valve port, as used on several popular and powerful engines, British and American (including notably Cyclone, Spitfire and Wasp), then we will abide by their findings; but if so, then they must get rid of these long overhanging and "dangling" tanks. (Incidentally, I did not mention how prone to damage is this arrangement in bad head-on crashes—usually the induction-pipe cracks off or wrecks the cylinder wall).

Perhaps some of my readers will become correspondents again and make some better suggestions than my own, but for what it is worth I append herewith a sketch of an imaginary engine with suggested induction-pipe running close up the back of the crankcase (and preferably cast integral with the cylinder and crankcase, with a faced joint). The needle-valve in this case is placed horizontally across the pipe, but I see no objection to its being arranged vertically in the end of the pipe, with side air-inlet holes and petrol feed. A

flexible feed-pipe leads up from a suction-feed tank attached to a standard detachable electron mount. Photos of this petrol-feed arrangement were published on page 544 in September "Topics."

While toying with the idea of R.T.P. flying one fairly windy day. I determined to get the feel of a lightly loaded engineless model on the end of a fly-rod and line, as it had occurred to me as probable that, once launched, a gliding model might be kept in the air in circles with an occasional pull on the line while the model was coming into the up-wind side of the circle.



The whole thing works on the kite principle, and in a fair breeze of about 15 m.p.h. I found, with an engineless petrol model, with good wide track undercart, it was quite easy to get the model into the air up wind without any pushing or hand launching by an assistant. Proper gliding trim is, of course, first obtained by substituting a suitable weight for the engine.

By running around a bit, on a cold winter's day, and giving judicious pulls on the line whenever she comes round into the wind, height is soon gained—a great deal more than is lost down wind—and it seems to me this is not at all a bad method of launching gliders set to fly in circles for thermal catching. It has also proved the feasibility of flying models under power out of doors provided the "pole" is not fixed. The flexible rod provides excellent shock-absorption to the line, and so avoids its taking up too suddenly after becoming slack while flying across wind on the windward side of the circle.

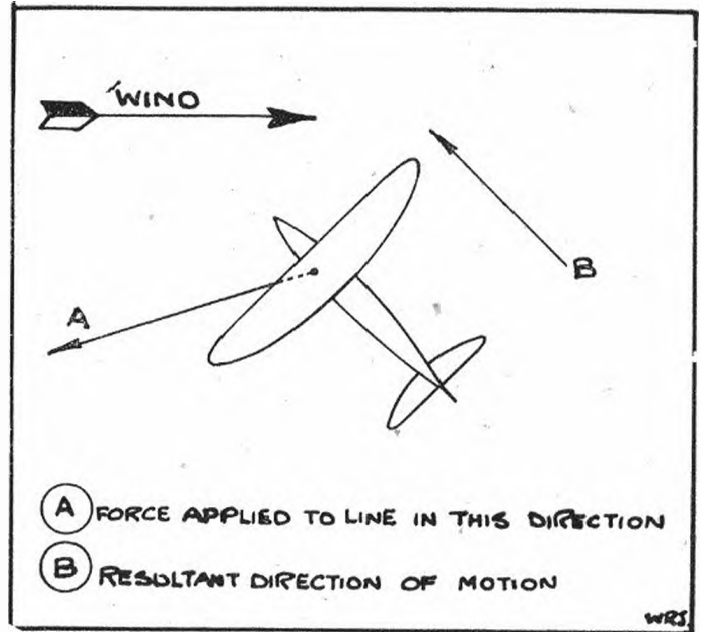
To prevent this happening, all that is necessary is to walk slowly down wind from A to B in the accompanying sketch, *except when the model is coming up-wind*, when the mere act of standing still provides the necessary counterforce to the wind to give the model a sharp life through the arc X—Y.

By the time the machine reaches point X¹, the operator should have moved to point B, where he stops, while the machine once more gains height on a tight-line, through the arc X¹—Y¹. The operator then moves further down wind and the process is repeated.

One of the chief difficulties at first was to get the model down again! This is done by walking or running towards

the model or letting out more line while it is flying through the arc X—Y, so avoiding any further gain of height, and in a few circles with an almost slack line, she finally touches down. With judicious bursts of "power" at the right moment this can be "arranged" to take place into wind, and it is remarkable how soon one acquires control.

The model in question was 6 ft. span, fitted with slots, and I found this a most useful and instructive method of observing their behaviour. Once the model was up, good control and steady soaring and gliding could be maintained with as much as 40 yards of line out, but one has to be pre-



pared to sprint pretty hard down-wind to avoid the too sudden taking up of slack line, on occasions! This danger point is at X¹ in the sketch.

I'm afraid the experiment doesn't sound very useful on paper, but I can assure any petroler who is tired of seeing his "old faithful" grounded for so long, a very amusing, instructive, and even thrilling afternoon's recreation by trying this out in practice. The only equipment required is his old 'plane (complete with engine, and minus its propeller, if it is too much trouble to substitute a weight); any light and flexible "rod, pole or perch" (the ideal is a fly-fishing rod) and a stout line of string about 25—30 yards long.

The best point of attachment for safety, is *not at the wing-tip*, as in the event of a slack line suddenly taking up while the model is flying slightly away from the operator, the sudden backward pull on a wing tip slews the whole machine round too sharply, and a spin is very liable to ensue. I found the best point was the top of the fuselage, *under the wing*, at a point about 25 per cent of the chord from the leading edge. This is high enough above the C.G. to maintain a banking angle, and so reduces the centrifugal force. To avoid too slack a line at certain points of the circle, the 'plane is trimmed to glide straight or slightly outwards.

If instead of standing still, one runs hard up-wind alongside the model, keeping a tight line, one can gain a lot of height, and at the same time avoid getting gradually too near the hedge or boundary of the field. My advice to those who say, "What has this to do with petrol modelling?" is *try it and see!*

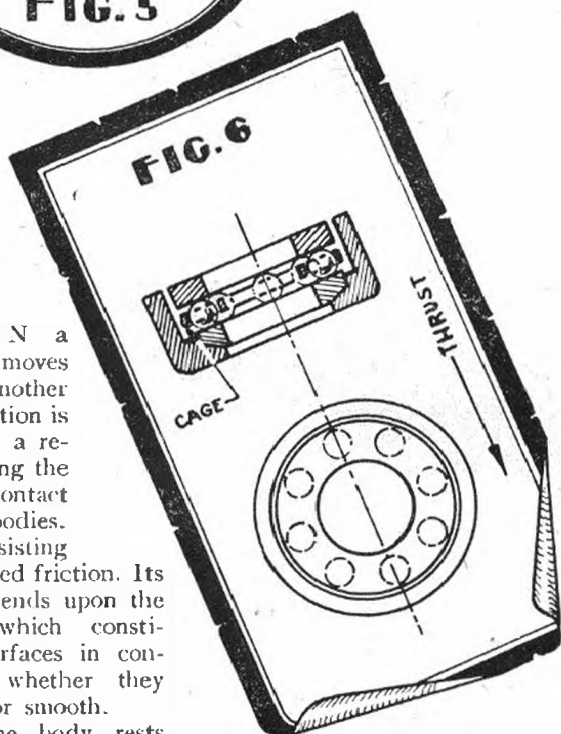
THE MECHANICS OF GAS ENGINES

III.—FRICTION AND LUBRICATION

By C. WILLIAMS



FIG. 5



WHEN a body moves over another body its motion is opposed by a resistance along the surface of contact of the two bodies. This resisting force is called friction. Its amount depends upon the materials which constitute the surfaces in contact, and whether they are rough or smooth.

When one body rests upon another one, and a force is applied to make one slide over the other, friction opposes and prevents the motion, provided the force is not large enough to overcome the friction.

Lubrication.—The sliding friction between two solid bodies may often be considerably reduced by arranging that their two surfaces shall not actually come in contact, but separated by a thin layer of a fluid or semi-fluid substance called a "lubricant." An enlarged view (Fig. 5) shows how the oil grooves which are cut in the piston of a motor, function. Due to the intense heat in the cylinder or combustion chamber of an internal combustion engine, and because of the tremendously high piston speed, it is necessary to have a film of oil between the piston and the cylinder walls at all times.

Oils for Lubrication.—Various kinds of oils are perhaps the best known lubricants, but grease of various degrees of stiffness is sometimes used, the quality of the lubricant depending upon pressure, speed, and other circumstances. For heavy pressures, such as in steam engines, thick grease is employed, but with high speeds, oil is usually supplied to bearings under pressure from a pump to ensure a steady

supply between the rubbing surfaces; such a system is called one of "forced lubrication," and is used on all aircraft engines. Although to many gas-modellers this forced system may not appear practical, and to some it may appear as a radical trend in gas motors, a similar method can be applied to our present-day engines with much success.

Shown in Fig. 8 is a midget airplane motor built in Germany along about 1921. Lubrication is carried out by a gravity feed system. Not only does the "gravity feed" method of lubrication insure well-oiled moving parts, but the beauty is that it allows you to use straight gasoline for fuel, thereby giving you an immeasurable boost in power output. The increase in efficiency would more than balance the small additional weight of the system.

Type of Oil.

Oils for lubricating internal combustion engines should have the following characteristics:—

1. They should be a well-refined mineral oil, that is, should be free from acid, alkali, tarry matter, suspended matter, free sulphur and resinous bodies, or bodies which are removed by filtering through animal charcoal.

2. They should have sufficient body to maintain a lubricating oil film between the piston and cylinder walls, thus insuring a perfect lubrication of piston and cylinder walls and preventing escape of gases past the piston rings.

3. The oil should be resistant to heat and oxidation to such a degree as will insure good lubrication at high temperatures, and will not form a hard carbon deposit in the cylinder.

In general, animal and vegetable oils are not suitable for the lubrication of internal combustion engines; when exposed to high heat they decompose, produce acids and deposit excessive carbon in the combustion chamber.

The choice of a proper lubricating oil for internal combustion engines is one which requires considerable study for each type of engine, and to arrive at a satisfactory selection it is necessary to consider the bore and stroke of motor, the materials of which the piston and cylinder are composed, the clearance between piston and cylinder, the compression and speed of engine, the design of piston and the temperature

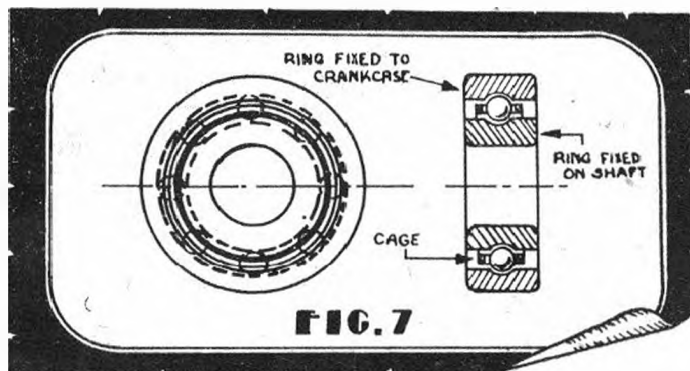


FIG. 7

which is attained by the oil during the operation of the engine.

Small two-cycle motors are lubricated by mixing the lubricating oil with the gasoline in the tank. In this method of lubrication the oil must vaporise in the carburettor and be carried with the gasoline vapour into the cylinder, where it will condense on the walls, and when choosing an oil for this attention should be paid to the characteristics governing its vaporisation.

Heat Generated at Bearings.—The work done against frictional resistances is converted into heat, and in bearings this represents a loss of work. If the bearing is imperfect or is not being lubricated properly, the friction will cause a large loss in power.

Roller and Ball Bearings.

The rolling resistance between two polished surfaces is low; it is less than that between two sliding surfaces. This fact led to the development of roller and ball bearings. A very common example of the use of ball bearings occurs in bicycles, the free-wheeling of which is well known. Fig. 7 shows a ball bearing journal for carrying a rotating shaft which has no end thrust, while Fig. 6 shows a single thrust bearing for carrying a crank shaft which has an end thrust always in the same direction. In both cases the hard steel balls are carried in gun-metal cages in which they are loosely confined, kept at a suitable distance apart, and evenly distributed. In these bearings it is important that the balls and parts provided for them be of the greatest hardness and smoothness. If the whole of the parts in contact cannot be made of the required hardness, linings possessing the qualities desired should be provided.

In the case of ball bearings it is very important that true rolling takes place, and that the finish be of the best, because the supporting area is limited, and therefore sensitive to irregularities in relative motion and character of contact surfaces.

AERODYNAMIC FORMULA.—Continued from page 91.

extra h.p. required may be found from

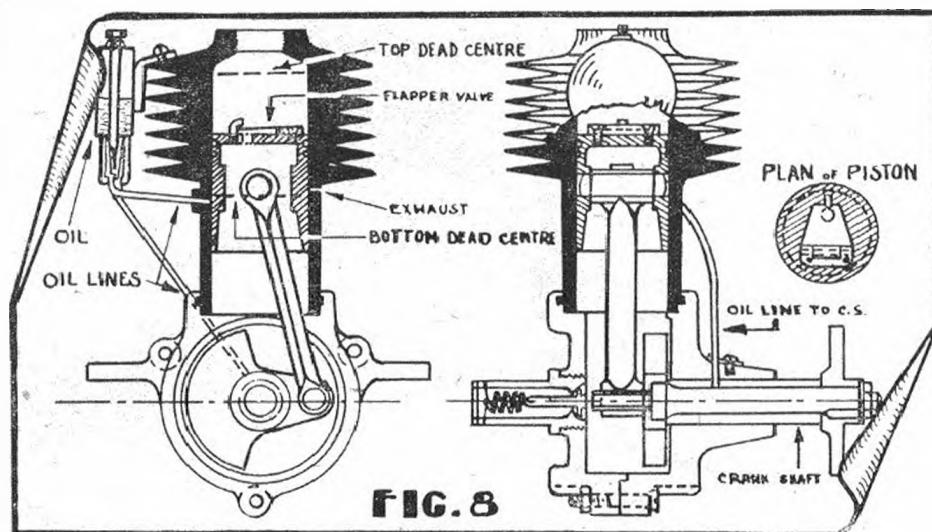
$$\frac{R \times S \times 5,280}{33,000 \times 60} \quad (24)$$

where R = the tractive resistance in pounds,
and S = the speed, in miles per hour.

This extra H.P. will then provide a tractive effort which will be available for acceleration, and the effort may be expressed—

$$F \text{ (in pounds)} = \frac{\text{H.P.} \times 33,000 \times 60}{D \text{ (m.p.h.)} \times 5,280} \quad (25)$$

Now the acceleration of a body is the rate at which its velocity is changing, and to accelerate a mass of 1 pound



Successful performance of ball bearings depends upon the following factors:—

1. A high degree of accuracy as regards to sphericity and uniformity of diameter of the balls. The tolerances of first class ball bearings, between the diameters of the balls in any one bearing 0.0001 in. (1-10,000).
2. A very high degree of surface finish. If the grinding or polishing marks can be detected with a pocket lens the ball should be rejected.
3. High elastic limit of materials.
4. Hardness, and especially uniform hardness throughout each and all balls. Case-hardened balls or races should never be used.

Maintenance points essential to successful operations of ball bearings:—

1. Bearings must be kept free of grit, moisture, and acid. This prohibits the use of lubricants that contain free acids.
2. Bearings must be lubricated. While ball bearings do not require as much lubricant as plain bearings, they must not be run without lubricant.

at a rate of 1 foot per second requires a force or tractive effort of .0312 pounds, and to accelerate our aircraft at 1 foot per second the force required will be .0312 × W, the weight of the aircraft. As the force available for acceleration can be obtained from formula (25) the rate of acceleration will be equal to $\frac{F}{.0312 \times W}$ in feet per second per second. Knowing the acceleration we can determine the distance (5) travelled during the take-off run from

$$S \text{ (in feet)} = \frac{V^2}{2a} \quad (26)$$

where V = the take-off speed in feet per second,
and a = rate of acceleration in feet per second per second.

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AERODYNAMIC FORMULA (4)

By A. H. SMITH

Performance—Power.

THE previous article in this series showed that when the airfoil was set at its maximum or critical angle, we could calculate the minimum flying speed of our aircraft. As most aero-modellers will endeavour to design their models to fly slowly to obtain a good duration, it is obvious that by setting the airfoil at anything approaching the critical angle the drag value will be excessive, and will probably be more than we can provide power for to overcome it and still obtain a reasonable flight.

Article 2 showed that the maximum value of lift/drag would represent the maximum efficiency which could be obtained from the airfoil, and it will be seen from our formula for velocity that the power required for flight is proportional to the product of drag and velocity. As the drag gets less with increasing velocity it is therefore inversely proportional to the value of C_L/C_D , and, as velocity is inversely proportional to the square root of the lift coefficient C_L , the power is inversely proportional to

$$\frac{C_L \times \sqrt{C_L}}{C_D} \text{ or } C_L^{1.5}/C_D$$

and this value is known as the power factor, a high value being essential for small engine power to ensure a good climb and efficient performance.

As the velocity will vary at each angle of attack, the corresponding lift coefficient value will enable us to calculate the velocity at the various angles, and can be substituted in formula (15), then

$$V \text{ in feet per second} = 29 \sqrt{\frac{W/S}{C_L}}$$

Now, as we are applying our calculations to model design we at once realise that we cannot manipulate any control surfaces to change the angle of attack, neither can we vary our thrust or power output to overcome the drag developed under the varying conditions of flight.

What we can do is to rig our aircraft at an angle of attack corresponding to a speed value at which the drag component can be most efficiently overcome.

By using formula (5) $D = C_D \frac{1}{2} \rho S V^2$ the drag of the wings can be calculated at the angle chosen, and formula (10) $D = KAV^2$, can be applied to give the parasite drag of the fuselage and other parts of the aircraft, the sum of these drag values will be the total resistance, which must be overcome by the thrust or power.

Power, as a unit of mechanical work, is represented by the power a horse can exert, as determined by experiments carried out by James Watt in 1784. When a force of 1 pound weight moves its point of application through a distance of one foot in the direction of the force, the work done is 1 ft./lb. And, using the energy developed by a horse moving at a steady pace, a 100 lb. weight was raised from a deep well, and the conclusion drawn from the results measured showed that the weight could be raised at an average of 2½ miles per hour.

Then the work performed by one horse could be given as being equal to

$$2.5 \times 100 \text{ ft./lb. of work} = 250 \text{ ft./lb. per hour.}$$

As Watt considered that a mechanical engine would lose a certain amount of work done due to friction, the above figure

was increased by 50 per cent, and the standard value is given as

1 horse-power = 1.5 (250) = 375 ft./lb. per hour (20).
As 1 mile per hour = 1.467 feet per second, horse-power can also be expressed by—

$$1 \text{ h.p.} = 1.467 \times 375 = 550 \text{ ft./lb. per second,} \\ \text{or } 33,000 \text{ ft./lb. per minute.}$$

Now, to maintain steady horizontal flight the work to be done by our power unit is not to lift a given weight, but to overcome the drag created in the generation of that weight lift, our horse-power will then be equal to the product of the total drag and the velocity divided by the work done by one horse in a given unit of time, as determined by Watts' experiments, then

$$\text{H.P.} = \frac{DV}{375} \quad (21)$$

where D = the total drag, in pounds.

and V = the speed, in miles per hour.

This value of H.P. will, of course, only provide sufficient power to maintain steady horizontal flight, and as we wish our aircraft to climb, when, as the increased angle of attack will mean, from formula (15) $V^2 = \frac{L}{C_L \frac{1}{2} \rho S}$, a reduction in speed, and from formula (5) $D = C_D \frac{1}{2} \rho S V^2$ at the new angle, a corresponding increase in drag, we will need a greater output or increased value of horse-power.

Formula (21) may be rewritten $DV = 375 \text{ H.P.}$, and an increased horse-power will give an increased speed to provide for climb.

As 1 h.p. has been given as 33,000 ft./lb. per minute the rate of climb in feet per minute will be equal to the extra or excess horse-power available multiplied by the work done per minute, divided by the weight of the aircraft in pounds.

$$\text{Then rate of climb } R/C = \frac{\text{EHP} \times 33,000}{W} \quad (22).$$

If we desire a definite rate of climb we can rewrite formula (22) in the form—

$$\text{EHP} = \frac{R/C \times W}{33,000}$$

and thus find the necessary excess horse-power required to give this.

If we wish our aircraft to take-off unaided there will be a certain amount of tractive resistance, which is retarding the efforts of the aircraft to become airborne, and this tractive resistance will for a short time be solely due to the weight of the aircraft on the surface along which it is moving, and is given as—

$$R \text{ in pounds} = \frac{W \text{ (lb.)} \times F}{2,240} \quad (23)$$

where F is a coefficient of friction expressed in pounds per ton weight.

For rubber tyres on a good macadam surface the value of F is only 60 pounds per ton, but for average conditions F may be taken at 300 pounds per ton.

To maintain our condition for rate of climb it means that a further increase of H.P. must be provided to overcome the extra resistance, and is, of course, extra work to be done.

Correcting our speed to terms of ft./lb. per minute the

Continued at foot of opposite page.

A CONSTANT SPEED PROPELLER FOR MODEL AEROPLANES

By P. CORNER

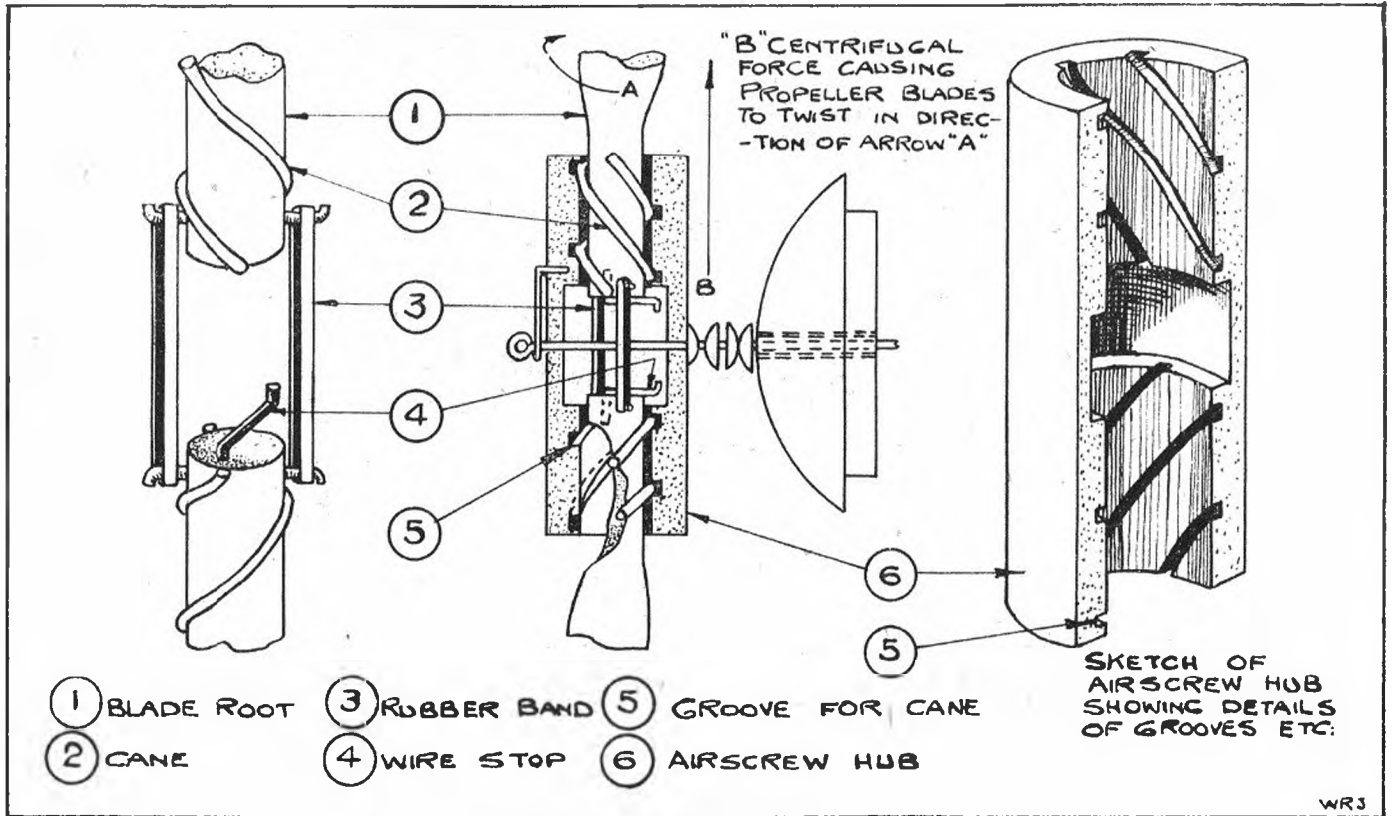
THIS article is written to put forward an idea conceived by the author as to the means by which the pitch on the propeller of a model aeroplane may be made to automatically coarsen as the rotational speed increases, and vice versa, thus using the energy stored in the rubber motor to the best advantage.

The idea is this: To the root of each propeller blade is fixed a piece of $\frac{1}{4}$ -inch diameter dowel, about 1 inch long.

elastic bands, and tends to make the blades fly outwards. In doing so, however, it causes them to twist, increase the pitch, and slow down.

If the 'plane is stalling and the propeller slows down slightly, the reverse happens and the 'plane "changes to bottom gear."

Consider a propeller with blades each weighing .2 oz., diameter 18 in., and distance from propeller shaft to centre



Round this are cemented several pieces of $\frac{3}{32}$ round or $\frac{1}{16}$ round reed cane, so as to convert it into a screw of about $1\frac{1}{2}$ in.—2 in. pitch.

A hub is now made to receive the blades, with sockets, the interiors of which are grooved to correspond with the threads on, and to fit, the dowels. To do this it will, of course, be necessary to split the hub. The ends of the dowels are now connected by rubber bands, and the hub cemented together with the blades in their correct positions. Before doing this, however, stops of wire or bamboo must be cemented into the dowels to confine the alteration in pitch to workable limits. Do not, of course, forget to install a propeller shaft!

What happens is this:

If the propeller starts to go very fast the centrifugal force acting on the blades grows greater than the pull of the

of gravity of each blade 5 in. It is revolving at 500 revolutions per minute.

According to the formula—

$$F = \frac{MV^2}{32R}$$

The force acting at C.G.I of each blade will be approximately .454 poundals, or 14.528 pounds. This will provide ample power to overcome friction and the tendency of the blades (they must be held at or in front of the C.P.) to return to their zero incidence, under the action of the aerodynamical forces, and much of it will need to be taken up by the elastic bands.

If the screw on the dowel be given a pitch of 2 in. then an outward movement of $\frac{1}{4}$ in. by the blades will be sufficient to cause a twist of 45° , which is ample for all practical requirements.

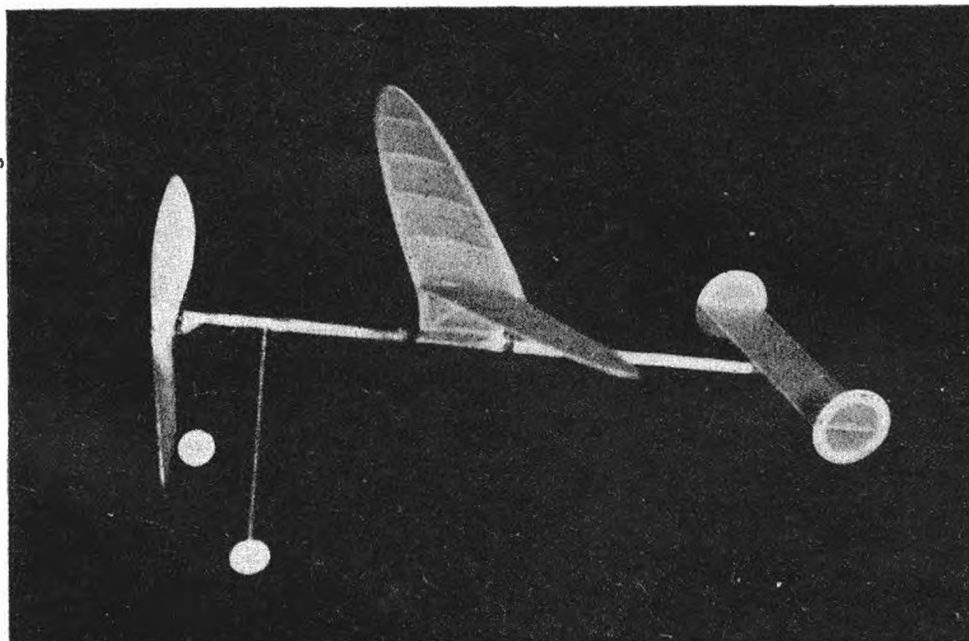
A 50 sq. in. SPAR MODEL ————— By J. H. MAXWELL

Full-size scale plans for building this 50 sq. in. spar model are given on the centre pages of this issue. The model has been timed to give 38 sec. R.O.G. Half a guinea will be paid for the photo of the best-looking model built to the plans and which is received by the Editor not later than March 4th, 1941.

THE construction of this model is so simple that anyone who has done some balsa butchering before will have no difficulty in building it from the drawing. Therefore, instead of giving the usual building instructions, let us go into some of the details which make all the difference between a "just ordinary" model and a good flyer.

There are three things which often spoil a well-constructed model, and these are an inefficient propeller, a poor propeller bearing, and inexperienced handling on the flying ground. Let us deal with each of these, commencing with the propeller.

First of all take a suitable block of hard balsa, mark it off in pencil according to the sizes on the drawing; then drill the hole for the shaft square through the centre. Now saw or carve the block to the blank shape shown on the drawing. This shape was not taken at random, but is so arranged that the blades will have the desired pitch throughout their length. Now start carving the rear faces of the blades; these are on the side of the block, which has the cut-away in the middle. Carve the rear faces so that they are straight from leading edge to trailing edge all along the blade, and this will automatically give the blade the correct twist. Now you are ready to carve the blade outline shape. First of all, lay one blade down on a piece of cardboard, mark the centre line of the propeller on the card, and then draw round the blade. This will give you an angular shape on the cardboard, and the next step is to draw a nice blade outline inside this shape. Now cut out the cardboard to the blade shape and, using this as a template, apply it to both blades in turn, marking the blades by running a pencil round the pattern. Carve away the balsa outside the outline, and then carve the front faces of the blades. Carve the blades fairly thin and balance the propeller roughly at this stage. Now cement the short length of 18 G. bore tubing into the shaft hole. Sanding can now be started, first with coarse paper and then with fine. Balance the propeller from time to time. Next push the little wire catch for the free-wheel into the front of the propeller near the hub and cement it in place. The final sanding and balancing can now be proceeded with, and after this the propeller is finished with several coats of thick banana oil.



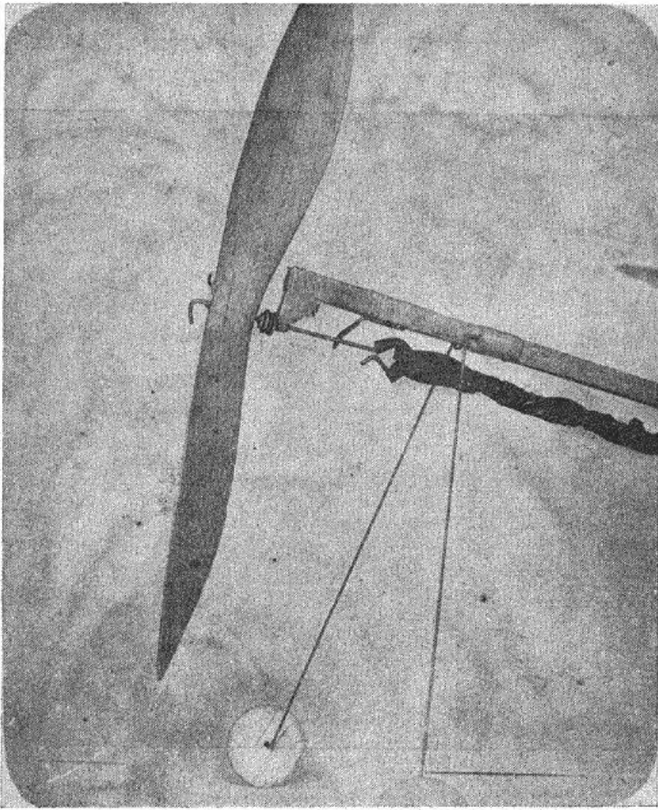
The main part of the propeller bearing consists of a tiny length of 16 G. bore tubing cemented and bound on a piece of hard balsa, as shown on the drawing. The reason for the larger bore of the tube will be explained shortly. The rear part of the bearing is made from a $\frac{1}{8}$ in. strip of thin brass or other soft metal, with a $\frac{1}{16}$ in. diameter hole in it. In addition to steadying the shaft this rear bearing gives a means of adjusting the thrust line, which is often missed on spar models. Down-thrust may be obtained by bending the brass strip forward, thus pulling the shaft up towards the rear, while side-thrust may be had by bending it to the side. The reason for the holes being large will now become apparent; it is that the shaft would jam if made to run at an angle through a tight tube.

The free-wheel is made by bending over the end of the propeller shaft and soldering a washer to the shaft behind the propeller. Under power the end of the shaft engages with the catch on the propeller, but during the glide the propeller slides back against the soldered washer and is free to turn.

Put valve tubing on the propeller hook, can, and rear hook, or, if you want to be able to stretch-wind the motor, make an S hook to attach the rubber to the rear hook and put valve tubing on this.

Make up the motor of either four or six strands of $\frac{1}{8}$ in. rubber and lubricate well. Six strands will give the model a really terrific climb.

Choose a calm day for testing the model. First of all glide it from the hand. Move the wing back or forward as required, until a long steady glide is obtained. The powered flight to aim at is a steep spiral climb against the torque, that is, circling to the right. To obtain this keep the wing in its best position for gliding, and give the propeller a few degrees down- and right-thrust, that is, make it point down and to the right, by bending the rear part of the bearing, as already explained.

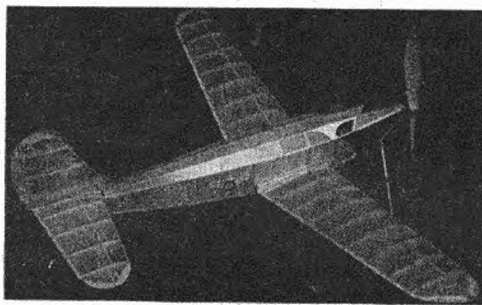


Wind on a hundred or so turns and gently launch the model into the wind. If it behaves well gradually increase the turns in subsequent flights. If any stalling tendency is noticed under full turns, increase the angle of down-thrust but do not move the wing. Under full turns always launch the model (either H.L. or R.O.G.) so that it is pointing about 15 degrees to the right of directly into the wind. The idea of this is that the wind will give the left wing a little more lift than the right, and so prevent the model rolling to the left under the high initial torque of the rubber.

In order to pack in the maximum turns on the motor adopt the following procedure. Get an assistant to hold the model and push a metal or wooden rod, smeared with lubricant, through the loops of rubber at the front. This will give them something to hang on to without putting any strain on the bearing or other parts of the model. Now hook the rear S hook on your winder, disengage the rubber from the can, and walk back until the motor is stretched to five times its normal length. Wind in half the turns without moving and then wind in the other half while you slowly walk back to the model. Put the S hook on the rear hook, slip the motor into the can; see that the free-wheel is engaged before pulling out the holding rod, then, grasping the model by the propeller and stick, you are ready to launch.

Employing this winding procedure and good rubber you should be able to get 50 turns per inch on a six-strand motor, or 62 turns per inch on a four-strand motor, provided the motor has been gradually run in beforehand.

If carefully built this little model will give you many good flights, and it is an excellent "primary trainer" for the bigger jobs.



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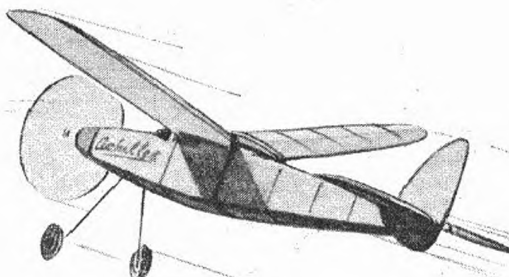
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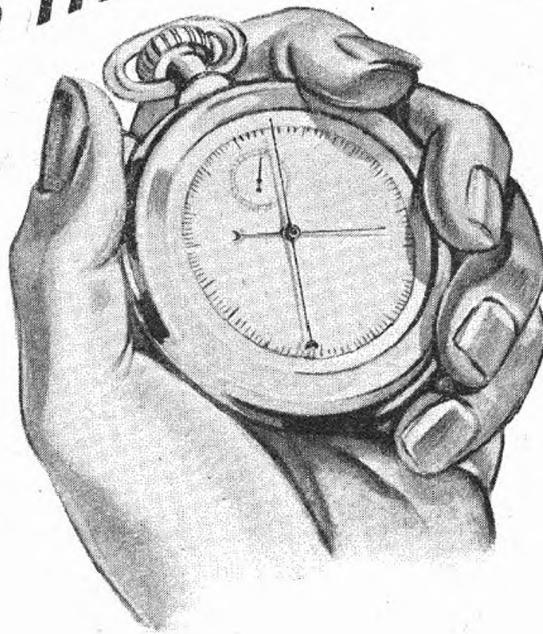
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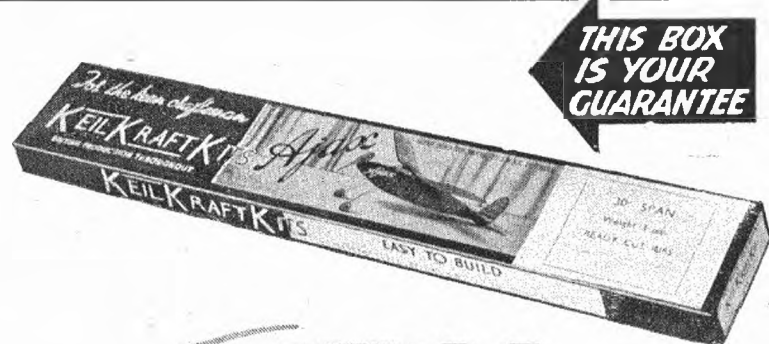
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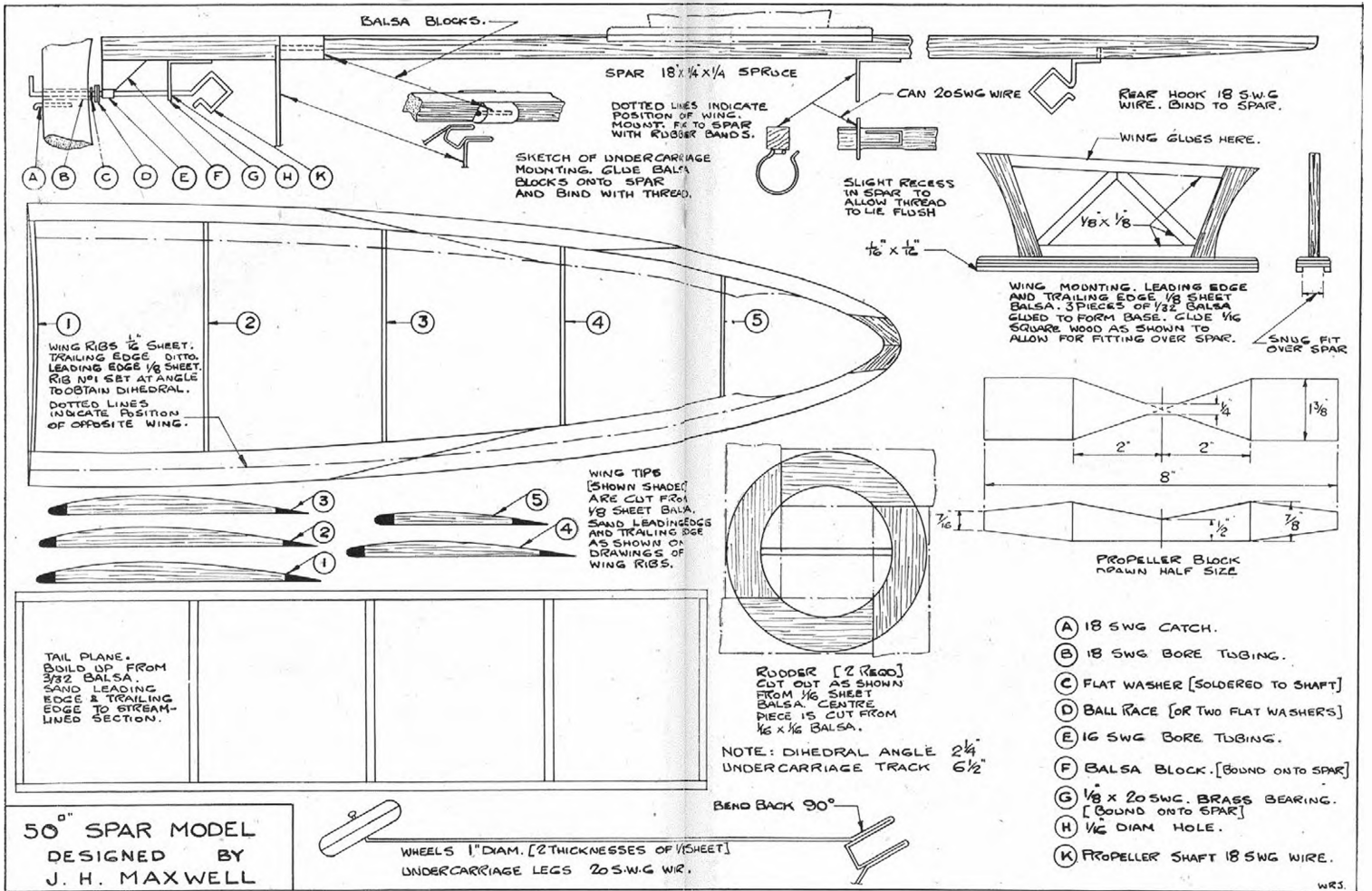
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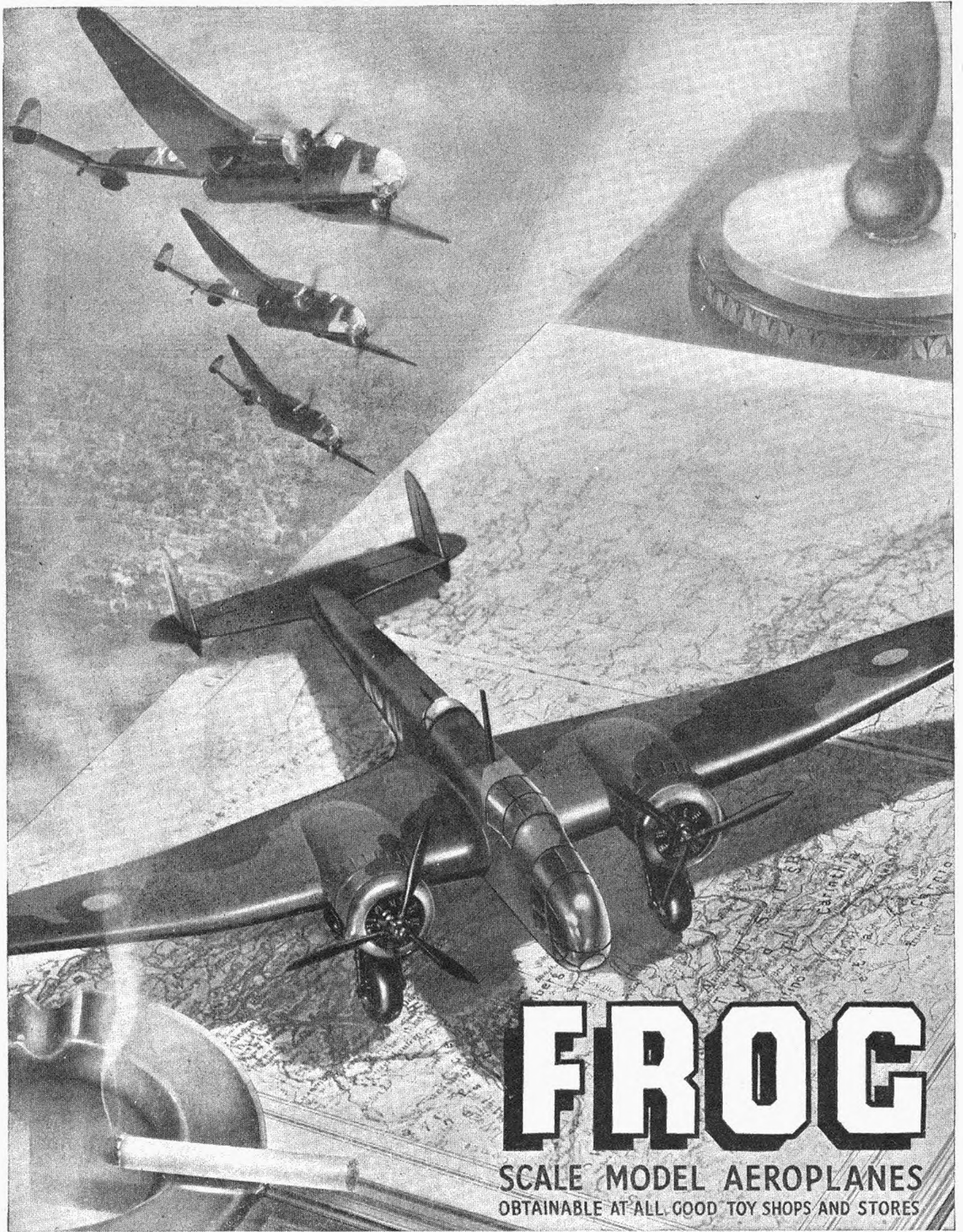
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THE DIHEDRALLED TAIL-PLANE

By W. J. D. ANNAND, B.Sc.

THE object of this article is to set out, as fully as possible, the facts and theories of the case for the use of the dihedralled tail-plane. The G.M.A.C. Research Section has been interesting itself in this idea, and, as I have built and flown successfully two models having this feature, it has fallen to me to present the material accumulated by us.

Briefly, the scheme is to discard the conventional tail unit, consisting of tail-plane and fin, and to substitute one consisting of a tail-plane only, of increased area if possible (it is not possible to increase the area in the case of a Wakefield model, but we shall see later that this is no great drawback), and having sufficient dihedral to make the use of a fin unnecessary.

In case it should be thought that I am writing only on a theoretical basis, I shall set down my facts first and then explain my theories. As noted above, I have made practical trials of the idea, and there were also successful experiments made by two other members of the club. They have unfortunately since left—one to the Air Force, the other to work in an aircraft factory—and so I can only present my own results.

The first of the models in question was small, having a wing area of about 90 sq. in., and was originally intended as a pylon flyer. The dihedralled tail was fitted as an experiment, and to reduce weight. Later the model was tried outdoors and proved very successful, having a best duration of over a minute. Considering its size and light structure, this performance was so good that it encouraged me to build a larger version. I did so, and have been flying it successfully during last summer (so-called). The model will average 90 sec. regularly in Scottish weather, and has a best duration to date of over two minutes. I hope to improve on these figures, but they, at the very least, do show that no instability or crankiness is caused by the tail design. The wing area in this case is 130 sq. in., the T.P. area 45 sq. in. The sections are: Wing, Eiffel 400; tail, N.A.C.A. M6.

The best angle of dihedral for the tail-plane has been found to be about 30° between each plane and the horizontal, or just under. More would cause the 'plane to rock, less would make it directionally unstable. It must be understood, however, that this is only a rough general guide, and the angle must be chosen to suit the model. The area used should be such as to give a projected area on the horizontal equal to that usually required.

Before setting down the theory, it is interesting to note that, although I do not personally know of any full-size powered aircraft which have been fitted with similar units (to the exclusion of fins), C. H. Latimer Needham, M.Sc., etc., in his book, "Aircraft Design," states that: "Tests in the wind tunnel and in actual flight have proved the vee-tail to be at least as efficient as the conventional tail, with approximately a 25 per cent decrease in total area. Thus a saving of both weight and drag should be possible with this tail arrangement." A sailplane fitted with a vee-tail gave a good account of itself in recent years in the competitions for these craft.

The main practical advantage is the saving in weight effected. This saving is attained mainly because of the reduced total area referred to above. In a normal model, the weights of fin and tail-plane are very roughly propor-

tional to their areas, for a given method of construction. Now, assuming that a model requires, say, 50 sq. in. of tail-plane area normally, it is pretty sure that it will require at least 20 sq. in. of fin area, that is, a total of 70 sq. in. tail unit area. The vee-tail set at 30° dihedral each side, and arranged to give the same equivalent horizontal area, requires a total of $\frac{50}{\cos. 30^\circ} = 57.7$ sq. in. area. It is

apparent, even though the figuring and assumptions are very rough, that a noticeable reduction of weight must result. Weight is also reduced by the absence of complication in the structure (no provision required for rudder seating, and so on) and in the attaching fittings. These last are also practical constructional advantages.

Drag is reduced in a similar manner, for the drag of the tail surfaces, if the tail-plane setting is small and the rudder is of symmetrical section, is more accurately proportional to the total area exposed.

Another theoretical advantage is that the tail-plane will assist the wing to right the machine in a sideslip, and will add to the torque controlling abilities of the model. At the same time no loss in directional control is incurred, for a very slight offsetting of the unit will produce a powerful force to turn the model in the required direction. Herein lies the only theoretical snag yet uncovered, that the rolling effect of the tail is opposed to the correct bank: but no trouble has been encountered in practice.

Finally, let me redeem my promise to show that no loss, but rather some gain, is obtained by fitting a vee-tail in the case of a Wakefield model, where tail area is restricted. Imagine two Wakefield models, identical except that Model A has a conventional tail unit with a fin, while B has a vee-tail. Let us tabulate their characteristics, and compare the sinking speeds obtained in a glide.

	Model A.	Model B.
Wing :		
Area	210 sq. in.	210 sq. in.
Section	R.A.F. 32	R.A.F. 32
Angle of attack	3°	3°
$C_L (C_{Lw})$	0.84	0.84
Tail :		
Area	69.3 sq. in.	69.3 sq. in.
Dihedral	0°	30°
Effective area	69.3 sq. in.	60 sq. in.
Section	Clark Y	Clark Y
Angle of Attack	0°	0°
$C_L (C_{Lw})$	0.46	0.46
Fin :		
Area	30 sq. in.	—
Weight	0.17 oz.	—
Total :		
Weight	8.5 oz.	8.33 oz.
Drag	1 oz.	?

$$V^2 = \frac{L}{0.0001321(C_{Lw} \times S_w + C_{Lr} \times S_r)}$$

$$= \frac{L}{0.0001321(0.84 \times 210 + 0.46 \times 69.3)}$$

$$= 309$$

Forward speed $V = 17.6$ ft./sec.

(Continued at foot of next page).

THE PREVENTION OF CRASH DAMAGE TO NOSE UNITS By G. WOOLS

SINCE being called to the Colours I have had little time or opportunity for the construction of models, but I have followed progress closely and have devoted considerable thought to the subject.

From previous experience I know that frequent damage is caused to airscrew, shaft, gears, or fuselage, by the airscrew hitting the ground during either a bad landing in the case of a normal model, or a flying-scale with a retracted undercart.

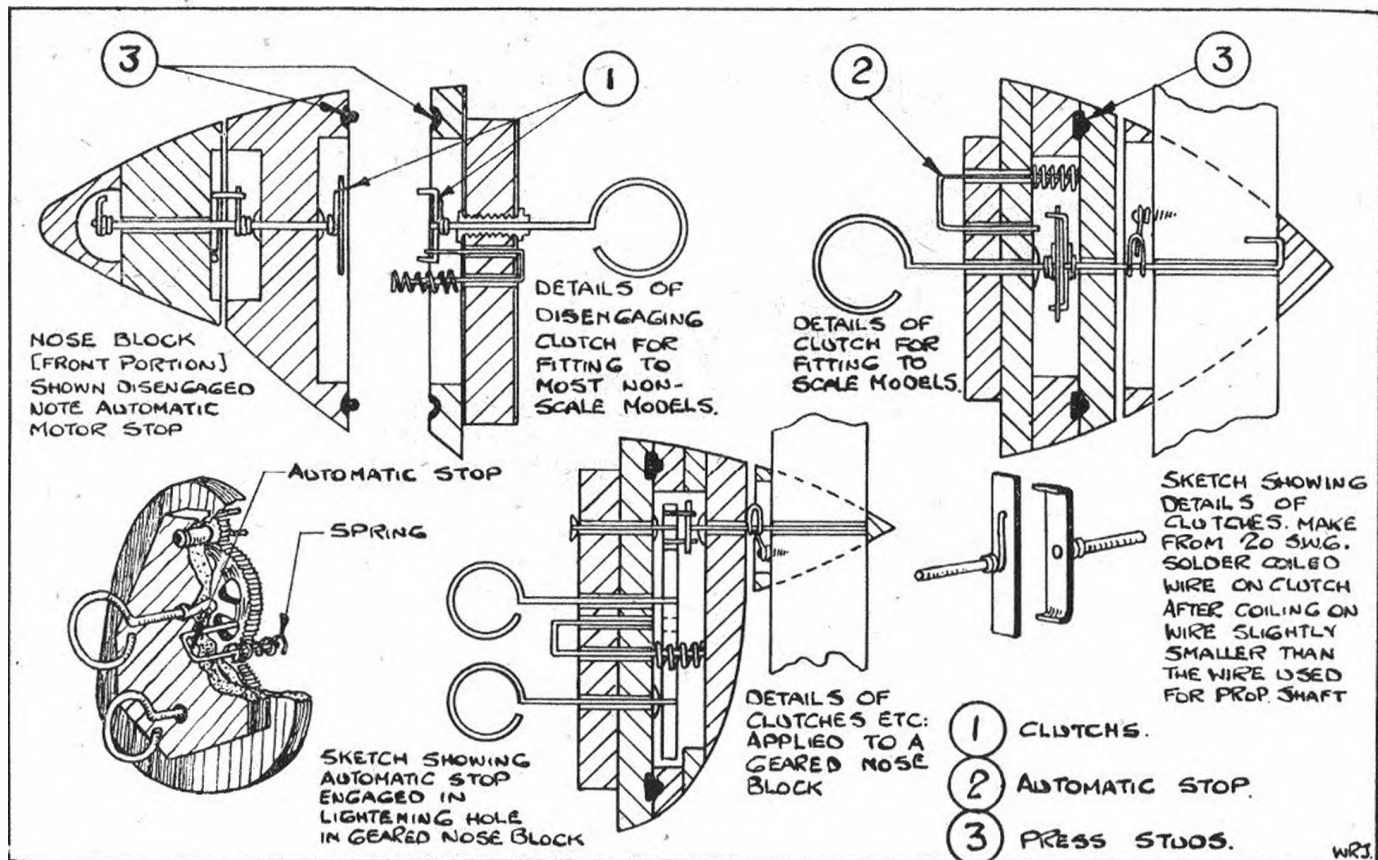
Knowing this I decided to attempt to design a method by

bands), and the latter joined by means of disengaging clutches. The airscrew on striking the ground will pull clear, leaving the rear of the block in place of the fuselage.

In order to prevent the motor from unwinding in a burst and wrecking the fuselage, an automatic stop is fitted which locks the motor directly upon removal of the front portion.

The drawings should make the device clear, but a few notes on its construction should not come amiss.

The clutches should be made of about 20 gauge brass or steel, and should be very securely attached to the shafts.



which this may be prevented, and the following idea emerged. It should be stated that while I have been unable to make any practical tests with this device, I can find no reason why it should be unsuccessful.

The nose-block and shaft are divided into two portions, the former being held in place with press studs (or elastic

The two sections of the nose block should be made as one and divided afterwards, in order to ensure the shaft being in alignment. Care should be taken when fitting the press studs to preserve this.

Should anyone incorporate this device I should greatly appreciate a report as to the results.

THE DIHEDRALLED TAIL-PLANE.—Continued from page 99.

$$\begin{aligned} \text{Sinking speed } V_s &= \frac{DV}{L} \text{ (approx. for small angles of glide)} \\ &= \frac{1 \times 17.6}{8.5} = 2.07 \text{ ft./sec.} \end{aligned}$$

Model B.

$$\begin{aligned} V^2 &= \frac{8.33}{0.0001321(0.84 \times 210 + 0.46 \times 60)} \\ &= 300 \end{aligned}$$

Forward speed $V = 17.6$ ft /sec.

$$\begin{aligned} \text{If Model B had a fin the fin drag would be} &= KAV^2 \\ &= 0.00006 \times \frac{30}{144} \times \left(\frac{17.6 \times 15}{22} \right)^2 \times 16 \\ &\text{(by D. A. Russell's formula)} \\ &= 0.0288 \text{ oz.} \end{aligned}$$

Therefore, since it has not, its drag = $1 - 0.0288$ oz. = 0.9712 oz.

$$\therefore V_s = \frac{0.9712 \times 17.6}{8.33} = 2.05 \text{ ft./sec.}$$

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I AM glad to have heard from some of you, and to know that many squadrons are taking an active part in model aeronautics. I feel, however, that I would like to have more reports from model making classes, and now that we are into 1941, and all the glamour and fun connected with Christmas is over for another year, we can get down to "brass tacks," and make our arrangements for the spring.

For this reason I have included some notes on running an exhibition, and on a popular and interesting competition, both of which you can get going in the near future.

I am asked by Squadron Leader H. W. Woollett, D.S.O., M.C., London Area Controller A.D.C.C., to make the following appeal:—

"London Squadrons of the Air Defence Cadet Corps are in need of officers and instructors in many subjects, including wireless and physical training. Would anyone willing to help please get in touch with the London Area Controller, Headquarters Air Defence Cadet Corps, 1a Pall Mall East, London, S.W.1, who will put him in touch with his nearest Squadron."

There must be many among my aero-modelling friends who have the necessary qualifications for the above, and if

you can spare the time from A.R.P. work, etc., your help will be welcome.

I hear that No. 144 Squadron (Mortlake) is commencing operations on solid scale models, and that C/Pilot Officer W. Kates Furness, himself a past R.F.C. member, is supporting the venture in a practical way. Bravo, Mortlake, I'm sure you'll succeed, especially if my friends of the Barnes Club can find time to help you.

King's Lynn Squadron has been dealt a hard blow. It was to have held an exhibition early in the New Year, but owing to a serious fire the premises on which the show was to have been held were destroyed, and so their venture is indefinitely postponed. Hard luck, King's Lynn, but I'm sure you will find another suitable venue, if you all buckle to and make a worth while effort. I'm glad to know that your aero-modelling section is progressing. One of the King's Lynn Cadets, Michel Boulesteix, sent me a design for a duration model to look over. He has certainly gone to a great deal of trouble to work it out theoretically correct, and I can see that he has made a close study of Mr. Stubbs' book on Wakefield models. I trust that practical tests will support his efforts. I'm pretty sure they will.

ON RUNNING A SQUADRON EXHIBITION

EXHIBITIONS of models and accessories are usually arranged for one of two reasons—to depict the activities and progress made by the members of the organising body, with the object of gaining new members, or to raise funds for the organisation, or some charitable institution, or both; and believe me, unless well organised and supervised, an exhibition can be very boring and defeat its own ends, so that the most important factor at the outset is to make an instant appeal, for the first impressions of the visitor very often decide the measure of his or her support, and if the first impression is good very often one who attends to scoff may go away and marvel, and very often the support, both moral and practical, of your toughest critics is the measure of success of your venture.

If therefore you decide to hold an exhibition of your models, which can be padded with judicious A.D.C.C. propaganda, find a hall in the best possible position and easily accessible, and well placard it with lively posters, which make those who read them anxious to go in and see what it's

all about. In other words, "It pays to advertise!" Also, if funds permit, small posters may be distributed to local tradespeople for displaying on their premises. Now I don't think that it is wise to charge an entrance fee. I believe in getting your customers in first. If your show has "pulling power" you will get more from your visitors than a nominal entrance fee, and if they cannot afford anything no harm is done, but they go away and tell their friends who make up for them, and who in turn will gladly drop their coins in your judiciously placed collecting boxes. After all, most of us like to feel we are getting something for nothing, so take my tip and make the big headline on your posters

Free Exhibition of Model Planes,

and you are well on the way to success. A ceremonial opening of your exhibition makes for a good send-off. Your Mayor and Mayoress and other civic officials these days are almost sure to be intensely interested in all matters connected with the air, and with the support of the local paper



Here is the Mayor of Islington inspecting models built by members of No. 9F Islington Squadron, A.D.C.C. Mr. H. L. Simmons is holding one of the models and other members of the Corps are in attendance.

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Photopress,
London.

(and please don't underrate the value of the co-operation your local paper can give; very often it can make or mar your efforts), the potential success of your exhibition is assured. I don't suppose very many squadrons can effect a large display of models of their own, and it may be worth while to solicit the support of a local dealer in model supplies, and/or your local model aeroplane club. The dealer may even have some kits on sale, and help to augment your funds for the privilege. Your local club would doubtless give you valuable support with models, engines, photographs, and even arrange for some of its experienced members to give short talks and demonstrations. Something, or somebody working, is always fascinating, so two good ideas are to have a pole-flyer in action, or a petrol engine being run up (at certain advertised times, not all day to drive your visitors away, and your helpers mad with the noise), and to have some of your members actually at work building models. Demonstrations of covering, making up and testing rubber motors, etc., or shaping and assembling solid scale models, will always command attention, and if your demonstrators can also "tell the tale" interest is further intensified to the mutual benefit of all. A few stunt competitions, such as guessing the weight of a model; a piece of balsa wood, and a piece of ordinary wood; or guessing the number of turns at which a specified rubber motor will break; or guessing the height at which a certain model is suspended above the floor; are all easy to run, and if you arrange that a competition runs for only one day (that is, it starts and finishes on the same day), it comes within the law of the Lottery Act. And talking of competitions also reminds me that it is a good idea to offer some prizes for the best models on show. Here again the visitors could join in the fun of judging them by filling in a simple form, and you would get many of them in again on the last day of the show to see if their fancy had won, thereby possibly getting their practical support twice! Maybe, someone you know has a lecture lantern, and can show a display of slides dealing with the activities of the A.D.C.C. or R.A.F., or the Empire Air

Lines, or perhaps a "ciné fan" has some interesting shots of models and model flying, or of your squadron activities; if so, rope them in! Don't let your show be as dry as dust, but bright and cheery. See that your stage management is sound, and that everyone makes it a point of honour to do his job conscientiously and efficiently, but don't give anyone too much to do, for that is how confusion and inefficiency creep in. On the other hand, "too many cooks spoil the broth," they say, so be careful in the choice of your management committee, and make haste slowly. Finally, if you feel that a musical background will help to enliven the proceedings, see that it is *only* a background, for nothing is more irritating than a radio-gram, or even an orchestra, that is pumping out music too loudly, and interfering with the conversation of visitors and exhibitors. I know; I've had some!

Good Air Cadets.

In this series of illustrated cameos I am going to introduce you to "Good Air Cadets." I don't mean just from the building and flying point of view only, but "Good Air Cadets," inasmuch that each of them has done something towards helping the aero-modelling classes, by instructing them, or organising them, or just being conscientious aero-modellers who have helped their squadrons.

My first "Good Air Cadet" is Mr. H. L. Simmons, who is instructor in aero-modelling to No. 9F Islington Squadron, the members of which receive their tuition at his able hands, at the Gifford Street M.J. Institute, held at the Robert Blair School, Blundell Street, London. N.7

Mr. Simmons is distinguished in that he is firstly a splendid aero-modeller, and also founder of the Blackheath M.F.C., 1932. He has represented Great Britain in international contests on two occasions, once in Yugoslavia in the King Peter Cup competitions, and again in England in the Glider Team, also for the King Peter Cup. He holds the Blackheath Club's official duration record of 13½ min. with

a Wakefield type model. I'm sure that when peace reigns once more we shall see him once again striving for a place in the British Wakefield team.

No. 9F Squadron is indeed fortunate to have the benefit of his knowledge, and he tells me the class is in its second year, and many successful models have been turned out. At the moment several streamlined gliders are on the stocks, and a sprinkling of "round the pole" models. There is also a large petrol-engined model under construction. The engine for this model was machined from

castings by the cadets themselves, and is almost complete.

Throughout the session lectures are given in simple aerodynamics, and a written knowledge test on the subject was recently held, several of the cadets receiving promotion for high marks. Jolly good effort; more power to Mr. Simmons's arm, and those aero-modellers residing in Islington, who want to make progress in their chosen hobby and get a good grounding in other subjects connected with flying and the R.A.F. preparatory to being called up, should join No. 9F Squadron.

SIMPLE RULES FOR A CONSTRUCTION AND FINISH COMPETITION

NO competition for model aeroplanes, in my opinion, is more interesting, both for the competitors and for the "looker-on at the game," than a construction and finish competition. We have run one each winter season in the Northern Heights for several years, and we time the conclusion of the competition to coincide with the commencement of the flying season, so that every member, in building his models for the next year's flying contests, stands an equal chance to pick up a prize for his workmanship, and a fact worth considering is that a well-built and well-finished model is also well on the road to success in the flying competitions, if its fundamental design is sound. Well, in this competition the competitors are invited to bring along their complete *but uncovered* models to be judged for construction, and a panel of three judges is appointed for the job. Each judge is allowed to grant up to a maximum 20 points for construction, and he does this entirely on his own findings, no consultation with his fellow judges being allowed. This we find a very fair way, because one judge may see points

to commend the job being criticised which his two colleagues miss. On the contrary, he may see a very bad feature that they miss. It is surprising, however, how near in points value the three judges get.

When all the models have been judged the results are filed to await the final judging for finish, which we usually arranged to take place about a month later, for we find that most people can cover and finish a model in a month. The same procedure is followed in the judging, and the two sets of results added together to prove the winner. The competition can be run in classes, such as Seniors Section, Juniors Section, and Novices Section. (Usually novices are considered as those members who have not completed more than one year's aero-modelling).

When the competition is completed, you have the nucleus of a first-rate exhibition, and a splendid excuse to invite your president or wealthy patrons along to see how good your members' work can be.

FOR AIR CADETS ONLY!

A COMPETITION FOR 1/72 SCALE SOLID MODELS

1st PRIZE £5 CASH AND SOLID SILVER TROPHY

2nd PRIZE £3.

3rd PRIZE £2,

4th PRIZE £1.

10 Consolation Prizes of 10/- each.

RULES.

- (1). This competition is limited to members of the Air Defence Cadet Corps.
- (2). There is no entry fee for this competition.
- (3). Each entrant may enter only one model for the competition.
- (4). Entries must be made on the official entry form, which will be published in the April issue of THE AERO-MODELLER on sale on or about March 20th, 1941.
- (5). All entries must be accompanied by coupons taken from the February and March issues of THE AERO-MODELLER. The February coupon is at the foot of the back inside cover page of this issue.
- (6). The model which forms the subject of the entry must have been entirely constructed by the entrant. Proprietary accessories, such as propellers, wheels, machine-guns and the like, are not allowed. These items and similar ones must be constructed from raw materials which may be of any description.
- (7). Models will be judged on:—
 - (a) Construction.
 - (b) Finish.
 - (c) Attention to detail.
 as shown by the photographs submitted by the entrant. Up to six (6) photos may be submitted, and professional reproductions are advised.
- (8). Models must be built to a scale of 1/72 full size, and must be chosen from one or other of the 87 aircraft described in "Aircraft of the Fighting Powers," published by the Harborough Publishing Company Ltd.
- (9). It is a condition of entry that the copyright of all photographs of prizewinners will become vested in the Model Aeronautical Press Ltd., the proprietors of THE AERO-MODELLER.
- (10). Whilst no legal responsibility for the care of photographs submitted for this competition is assumed by the proprietors of THE AERO-MODELLER, unsuccessful entrants' photos will be returned, as far as possible, provided suitably stamped addressed envelopes are sent with them.
- (11). A panel consisting of the Managing Editor and the Editor of THE AERO-MODELLER, Mr. H. J. Cooper, and Mr. Leonard Taylor, and Squadron Leader C. F. Gordon, of the Air Defence Cadet Corps, will judge the competition, and it is a condition of entry that their decision must be accepted as final and binding on all points.
- (12). Entries must reach the offices of THE AERO-MODELLER, at Allen House, Newarke Street, Leicester, not later than April 15th, 1941.

JOB LOOPS THE LOOP



"Ain't it lovely?" said Job.

If there is one thing I like more than anything about this hobby of ours, it is the fact that it combines most perfectly indoor and outdoor operations. In the winter we make and remake our models, attend club meetings, and have indoor flying. Then, best of all, comes the summer with its excursions to out-of-the-way places; long hours spent in surroundings of peace and wild beauty.

Did I say peace? Well, it was certainly to an out-of-the-way place that my friend Job and I walked one bright June evening. Peace? Job is one of the most cheery and nonchalant of club members. When you go with him you never know what is going to happen. As he was in one of his most boisterous moods on this occasion I expected the worst. I was not disappointed.

For an hour we had walked through the lanes that lead from Camford to Midtown. The country was new to me, but Job knew the way. Indeed, he had something up his sleeve, and again and again he had assured me that he was leading the way to the aero-modellist's paradise. He swung his model case jauntily, and ever and anon aimed his great fist at the gnats, or pushing his hat from his curly hair, excavated for the more adventurous. Just in order to stop his whistling *Rule Britannia* for a brief moment, I asked him just *why* the place he knew of was so wonderful.

"You'll soon see," he replied, and changed the tune to his own special hot variety of *There'll Always be An England*, or it might have been *The Maiden's Prayer*. You never know with Job.

So I constrained my curiosity and drank in once more the full beauty of the lovely scene. Our lane was fringed on either side with the gold and yellow of a myriad moon daisies, meadowsweet, and the regal purple of cornflowers just burst-

ing from the hard brown heads. Beyond the hedges, the mowing grass sighed in the scent of a million concealed blossoms; scent that tasted sweet with its very intensity.

Suddenly Job stopped. "We go down here," he said, and led the way through a broken gate, and down a lane tangled with nettles, wild geraniums and dog roses. The way was prickly. It got deeper and deeper.

"Job," I said, "I thought we were flying, not courting." We were beneath a tiny bridge, over which a single railway track ran. Job only chuckled. "Boy," he said, "you ain't seen nothing yet." And the next moment he had led the way up the steep embankment to the railway.

The track was a disused one. Formerly it had been used for carrying stone from the quarries near by, but now it ran, yellow with rust, through cuttings occupied only by jackdaws, jays and magpies. Once on the sleepers I could see the rails running away through the tall grass.

Job put down his case, swung at the gnats with a blow that would have felled an ox, but only just grazed my ear. "Worth coming for, eh, boy?" he grinned.

I suppose he was right. Beneath the hot sun the scene danced with colour. Masses of crimson herb Robert lay between the sleepers in such thick clusters that even the unpoetic Job paused to admire the view.

"Lovely heather, ain't it?" said Job.

"It happens to be herb Robert," I said, "but as we haven't come to study botany, perhaps you'll explain just what the game is. I'm tired."

He did not answer, but picked up his case and the thread of his abandoned tune and led the way along the railway towards Camford. The sun was hotter than ever here. Ahead the heat crinkled against the distant vegetation. The clinkers drew at my feet with their intense heat.

Job stopped and felt the rail. "I feel it," he said. I did so. It was hot to the touch. He swept his arm towards the clinkers that here lay alongside the track. "I thought there might be a few thermals. Nothing like giving the bus a good start."

"Do you mean to say," I started, but Job stopped me.

"You just wait. 'Tain't thermals only I've brought you here for."

We plodded onwards, and all the time the track seemed to get more wild looking. But I cast a look around me and noted with approval that the fields on either side were level and bereft of trees. Ahead there appeared a long low wooden structure that seemed to grow from the grass. At one end of the platform the planks sloped gently to the grass, and it was up this that we walked.

"This is a station," said Job. "Or, at least, it was."

The station was completely dismantled except for the platform and what appeared to be the remains of a booking office. The platform was a clear, level space almost sixty yards long, a natural run-way hoisted well above the level fields on either side.

"Ain't it lovely?" said Job. "Why, thirty fellows could launch from here all at once. Now have I got brains, or am I clever?"

"It's one up on you," I said.

"I've got permission from the railway cove who comes

By ARTHUR MOUNTSTEPHENS

round here sometimes on a platelayer's trolley," said Job. "And the hut there'll do for shelter when we want it." He had begun to unpack his model.

Ready for the first power flight, Job gave his model about twenty yards of runway, diagonally across the boards. It was the most ideal of start-offs for a model that I had seen. The model used the platform like a real 'un, and began to climb swiftly over the fields.

Fifteen minutes passed, and the 'plane was still up, coming back over the railway when in need of a thermal refresher. The solid thermals backed her up until I thought she would never come down.

I walked along the platform to the ramshackle hut and went in. There still were seats round the walls, but a general mustiness of neglect brooded there. It was stuffy. I was tired. I sat down and began to snooze.

I fell into a deep sleep. The place was as quiet as a churchyard, but looking back afterwards I realised that my nap had not been absolutely undisturbed. I remember that I dreamed about gnats, and of a great gnat that would sometimes fly towards me with a roar. I stirred and awoke. Walking out to the platform I found that the sun was a good deal lower in the sky.

Now I think I have described the scene. For a great distance round there was not the slightest cover. Yet Job was nowhere to be seen. In the field, quite near the railway, was the aeroplane, in a position which clearly showed that it had not been touched since it landed there.

In vain did I look for Job. It was just as though he himself had been taken up on one mighty thermal. I began to consider. What had happened to him? He wasn't the sort to have walked away without waking me. Besides, the nearest pub was three miles away. It was all very strange, and what with the declining light, the general eeriness of the

scene, I began to feel a little scared. Had Job come to some harm? If so, what?

There was a distant sound. Something was coming along the railway track. As it came nearer I saw that it was a platelayer's trolley. "I'll stop the bloke," I thought. I would be able to ask him if he'd seen Job. It was on me suddenly. I saw a scared face; a fatuous grin. It was Job.

Job and the trolley went past me, and off into the twilight. Of course, it was clear now. I had seen the trolley a little way up the line, before I went to sleep. Job must have seen his aeroplane coming down some distance away and borrowed the trolley to go after it. That was like Job. He'd start anything. The trouble was, as I found afterwards, he didn't know how to stop it. He was on a loop line, and had been going round waiting for the petrol to run out.

I would have to wait. I might be hours. It might be . . .

But here he was again. He was waving wildly towards something behind me. I turned. There, on the track, was a cow. It was too late to do anything. Heart in mouth I watched Job's trolley hit that cow in the behind. The cow gyrated and left the track with a rush. There was a grind as two wheels left the track, and Job stopped a little later in a cloud of flying cinders. Almost at the same time a man came tearing across the fields.

Well, it cost something to keep that chap quiet. That once accomplished and the trolley righted, Job began to explain.

"Come on," I said. "It's a long way home." I pushed the model box into his arms.

"The aeroplane," Job said. "We must look for it."

But I was firm and led him away.

As we walked back along that railway Job put on another record. It wasn't a cheerful one. All the way he grumbled about that lost aeroplane. No, I did not tell him that he was carrying it under his arm. Why should I?

He'd sure to be wanting to fly it again.

A TALE OF WEIGHT

By G. HEIGHTON

A CHAPTER in Dr. Forster's Petrol Topics (November issue) has caused me to write this article. The chapter in question stated that several aero-modellers had turned their petrol 'planes into rubber models, and concluded with the remark that the models simply had to fly and not just float around the sky like a piece of waste paper. I was very interested in this, as it bears out an opinion of mine, and that is that so-called duration 'planes built on light-weight lines, with everything sacrificed to keep the weight down, are not aeroplanes, but almost lighter-than-air machines. For instance, it is a common thing on a warm day for a 'plane of that type to make a spectacular flight of 15 minutes or more. To my way of thinking this is just a bigger version of a piece of paper floating up a chimney on the heat from the fire. Many aero-modellers have written articles on designing with the purpose of creating a 'plane that will catch every thermal, however slight, with the intention of prolonging the duration. My answer to them is to seal up the fuselage of their 'planes and fill them with gas. then perhaps they will be satisfied with a duration of several hours!

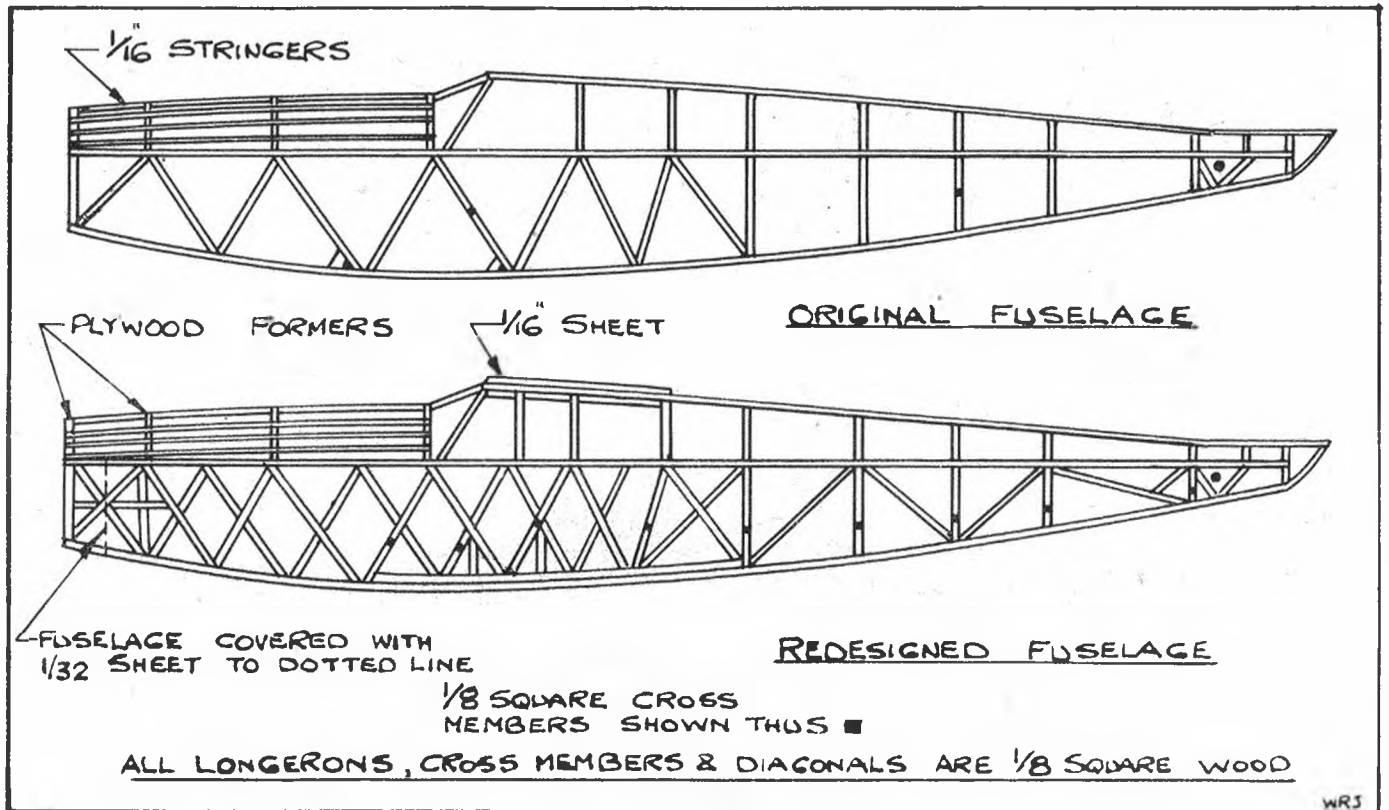
At this point several of you will turn over the page and say "This bloke is nuts!" Perhaps you're right, but whether I'm nuts or not I can give you proof that a duration 'plane, built with an eye to strength, and the original weight increased by three or more ounces, is capable of giving consistent flights of 2-2½ min. in any weather short of a gale. I have actually flown mine in a half-gale, but I will leave that till later. Below are particulars and sketch of my model, which has been considerably strengthened.

Perhaps some of you will have read my article on "Designing" in the March issue of THE AERO-MODELLER. The 'plane I described then has since come to an untimely end. So I chose a 'plane of well-known design, with a wing span of 44 in. It was a cabin monoplane type of the Wakefield class. I spent about two months building this 'plane, but after three unsatisfactory flights the fuselage was completely wrecked on a bad landing. The ensuing week was spent in building a new fuselage. Sunday morning found me ready for a day's flying, but before setting off for the flying field I decided to try it out in a nearby field. Having trimmed the model to my satisfaction I put 100 turns on the motor

by hand. The model climbed to a height of about 20 feet from a hand launch, and flew about 100 yards across the field, where it made rather a heavy landing. Imagine my dismay, on picking up the model, to discover that the fuselage was smashed beyond repair. I built four more fuselages, which all shared the same fate, before I decided to alter the construction of the model. The following sketches will explain it better than I can describe in print.

performance, in fact, I began to get consistent flights of 2-2½ min.

The model now seemed so strong that I decided to try it out in a high wind, and, as I did not possess a box large enough to hold the model I had to carry it complete to the flying field. The wind was so strong that it almost tore the wings off the model, and I was advised to turn back, but my mind was made up; I was determined to fly the model or



In every smash it was the nose of the machine that came off the worse, so, as can be seen from the sketch, I put plenty of bracing in that part of the machine. The weakest points in the whole machine were along the second longeron and, as can be seen from the sketch, the original model had two 1/8 in. sq. spacers across the inside of the body. As can be seen from the sketch the redesigned model had nine placed at intervals along the fuselage, and the amount of strength these imparted to the model was considerable. Soon everything was completed, and one Sunday morning the model had its first flight. To my amazement and delight it landed unharmed, but I decided that another two strands of rubber were necessary to give the model that extra bit of power it seemed to be lacking. With this addition the model improved tremendously, and I had quite a number of good flights out of it. But my troubles were not yet over, for after one nasty landing the centre section of the wing cut right through the top two longerons. This damage was repaired and strengthened by the addition of a piece of 1/16 in. sheet to the top of the cabin. At this stage I weighed the model, and to my horror found that it weighed slightly over 11 ounces, over 3 ounces more than the original model! But this seemed to add too, rather than detract from, the model's

bust it in the attempt! It was next to hopeless to attempt to glide the model in the face of that wind, but I had marked the wing position on the fuselage, so I decided to trust to providence. I found a hollow in the ground which gave a certain amount of protection from the wind, so, crouching in this hollow, the model was wound up, 700 turns being put on the motor. I waited for a lull in the wind and stepped out of the hollow. Before I had time to launch the 'plane a gust of wind tore it out of my hand. With my heart in my mouth I watched it do a perpendicular climb to a height of about 50 ft. At the top of its climb it turned with the wind and tore across the field at an incredible speed. About half-way across the field one undercarriage leg (it was already loose) fell off, to be followed a few seconds later by the other one. The machine was now flying without its undercarriage. As the 'plane disappeared over the hill I set off running and eventually found it about a mile away lying on its back. With the exception of a few tears in the tissue the model was unharmed. Needless to say, I never found the undercarriage.

In conclusion, I ask you to judge for yourself whether I am right in my reasoning, or just a harmless lunatic talking about something he doesn't understand.

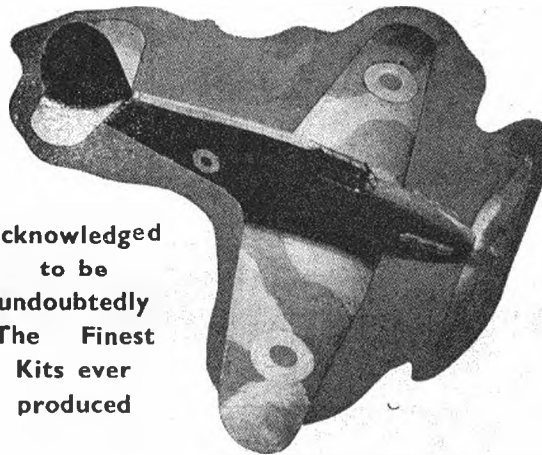
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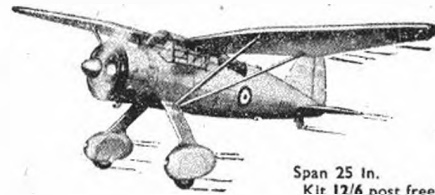
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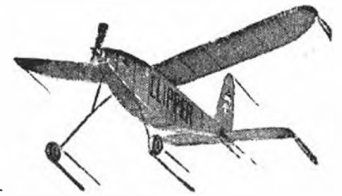
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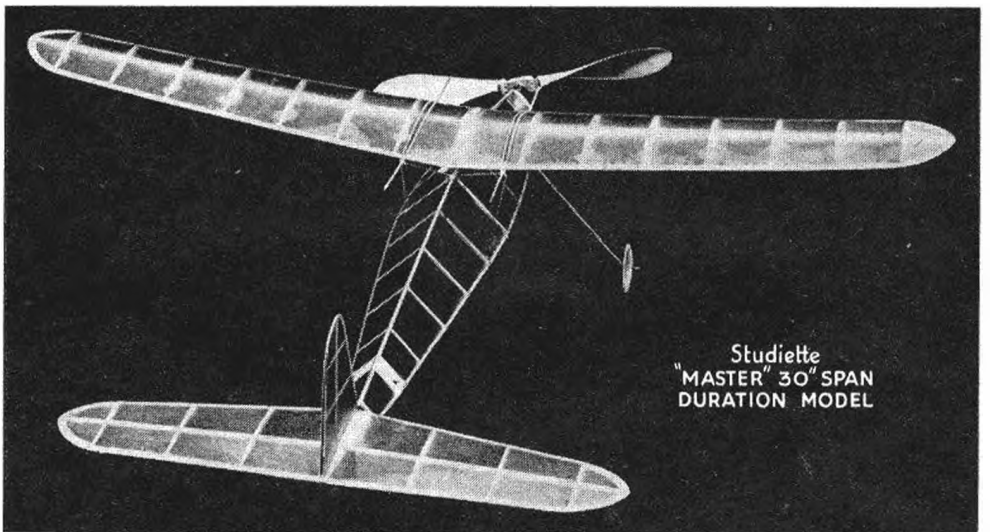
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AN AUTOMATIC RETRACTING AND DETRACTING MONO-WHEEL UNDERCARRIAGE

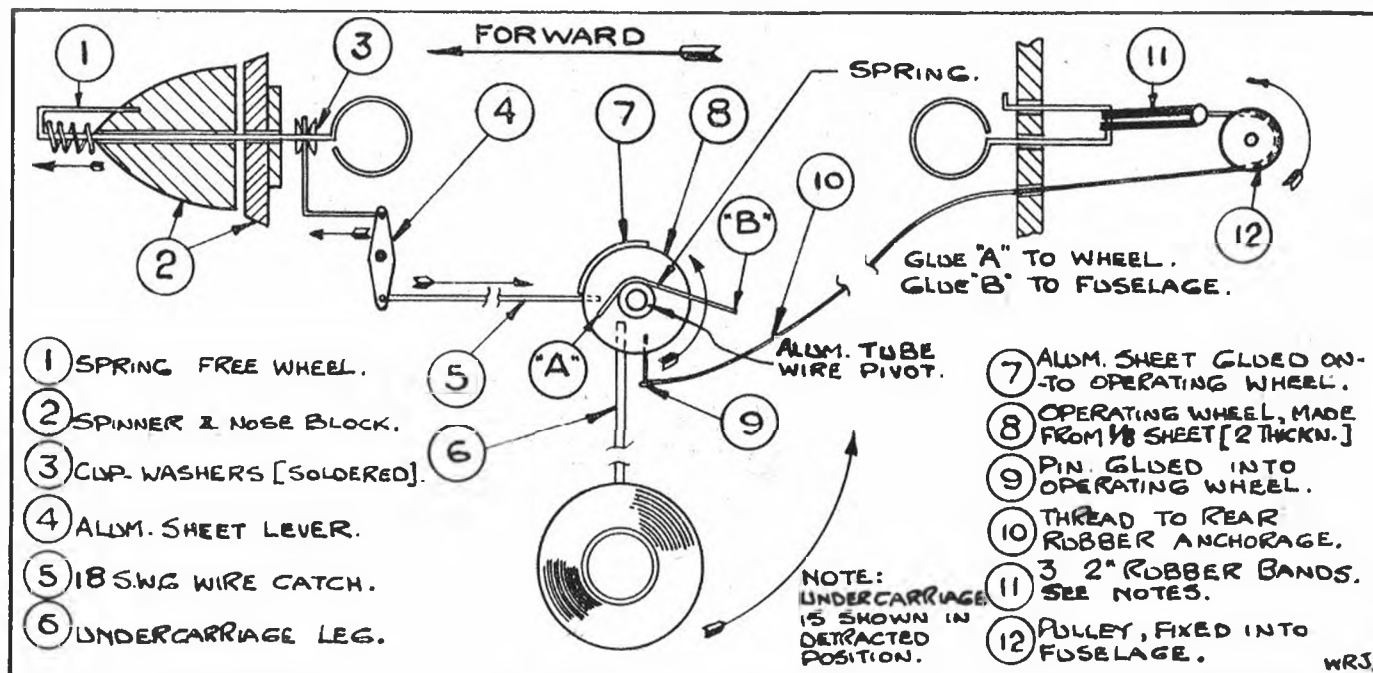
By A. O. SUTCLIFFE

HERE is an ingenious device which should work well if properly built up in accordance with the diagram. In operation, when the rubber is wound up, the rear hook is pulled inwards, stretching the 2 in. rubber bands (11). Until the machine leaves the ground the wheel is held in the detracted position by the weight of the machine, but when it takes off the tension of the rubber bands (11) pulls the thread fixed to the pin (9) round the buffer wheel (12) and thus retracts the wheel.

When the rubber motor has unwound, the spring, which is glued to the operating wheel (8) at A, and the fuselage at B, eases the wheel back again into the detracted position.

At the same time the free-wheel comes into action, and by means of the lever (4) operates the wire catch (5), to engage with the piece of aluminium sheet (7), which is securely fixed to the operating wheel (8).

It will thus be seen that the pivot wheel is now locked, and the undercarriage leg (6) is firmly held in position.



A USEFUL WINDER

By S. F. BUTTERWORTH

ALTHOUGH I must begin by disclaiming any credit for the original idea, which, as far as I am concerned, belongs to a previous contributor to THE AERO-MODELLER, the winder which I shall attempt to describe varies in detail, and may therefore prove of interest.

The hand drill from which the tool was made came from the usual source and cost 6d. a part, which is convenient inasmuch as the chuck is not required. In the first place the handle was discarded, and the T-shaped grip substituted (A in sketch). This was screwed into the body of the drill where a thread already existed, and pinned to prevent any further movement. Next, a new winding handle was made, longer than the one supplied, and cranked to give greater leverage and a more convenient position (as B in sketch).

Next, the construction of the revolution indicator was decided upon, with a view to arranging for it to lie along the top of the grip, where it could be easily read. The bracket was made, and the piece of threaded brass rod with three

nuts rescued from some wireless scrap. Reference to the sketch will make clear the general lay-out, but a few hints on the construction may be necessary.

At one end of the rod a nut is screwed on and pinned, the first pin going right through and extending about $\frac{1}{4}$ in. at each end from the faces of the nut, to form two of the striking pins. Four more pins are then fitted, one to each remaining face of the nut, and thus six striking pins are provided. The pins should be a tight fit in the nut and at right angles to each face, and it is advisable to solder up the whole assembly. The traversing nut (C) and the spring pointer (D) require careful attention, the nut being grooved to take the piano wire from which the pointer is to be made, and this is done by sawing along two opposite faces as deep as possible, without actually cutting into the inside thread. When assembled, the spring, by creating an upward pressure on the nut, provides just that amount of friction tightness which is required to prevent the screwed rod from

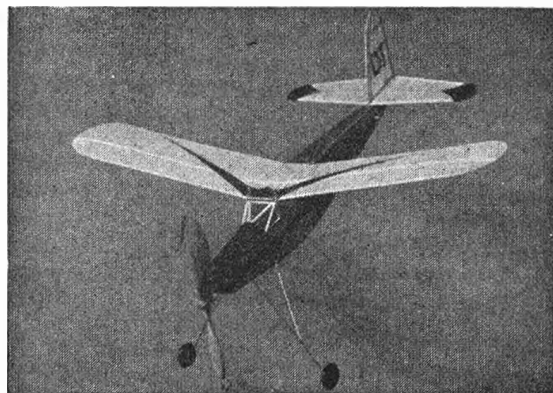
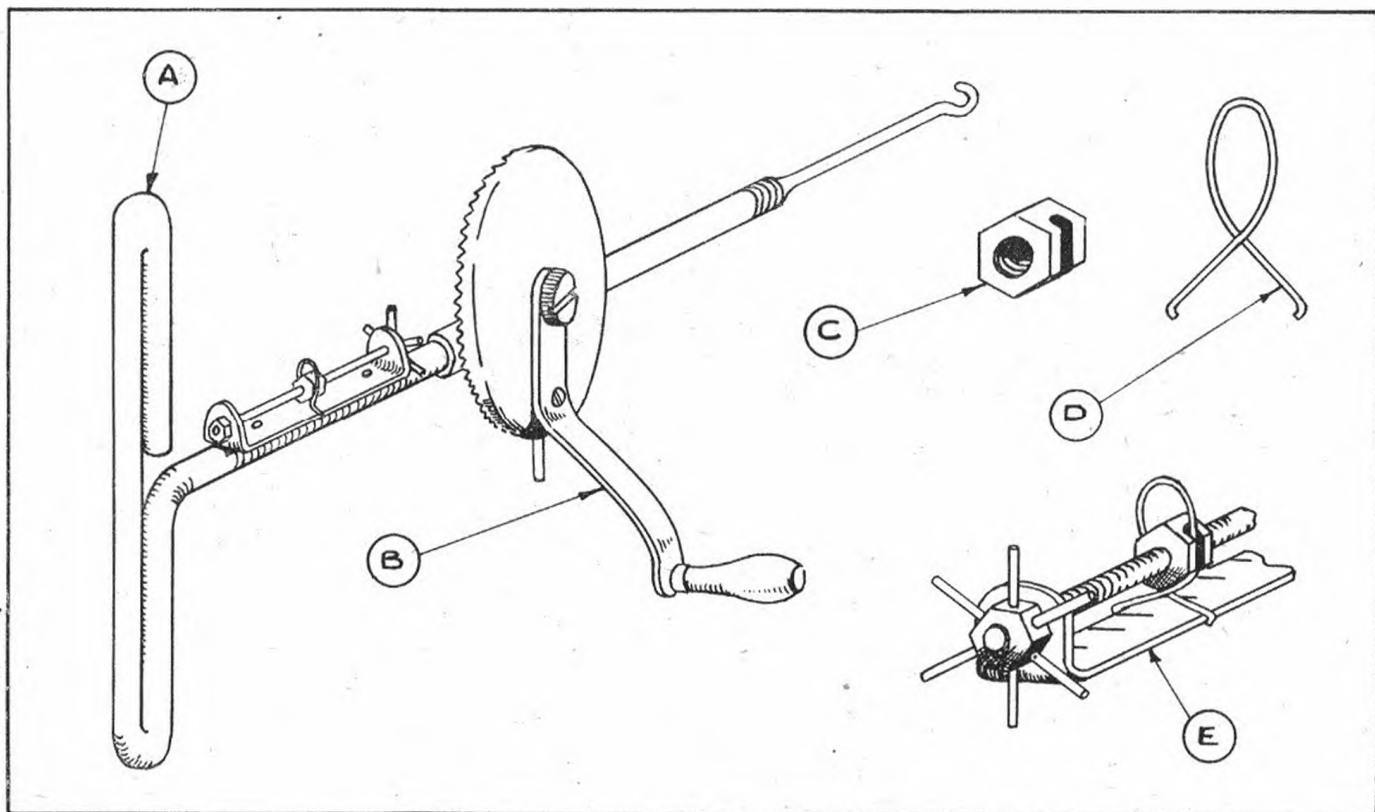
rotating more than one division at a time when winding quickly. With a final reference to sketch (E) this should now be quite clear. At the other end a nut is screwed on sufficiently to take up all end play, while allowing the rod free movement to rotate, and then peened or soldered.

The striking pin in the hand wheel should be a tight driving fit, and extend about $\frac{3}{8}$ in., and it will be found best to place it pointing towards the winding handle, as shown in the main sketch. The indicator can now be fitted to the handle by riveting or any other suitable means, and the correct position for the striker found, before drilling holes, by trial. Providing the pin in the hand wheel is tight a little adjustment, by bending one way or another, is possible.

The winding hook needs no description, but should be welded into the spindle for a really satisfactory job.

The graduation of the scale can be calculated from the gear ratios and threads per inch, or merely by marking a zero and winding, and counting, say, 100 turns at a time, and again marking each new position of the pointer.

On a scale which is $2\frac{3}{4}$ in. long, 1,200 turns can be registered within limits of accuracy, which are considered satisfactory for the job to be done. If you file grooves for the scale markings, keep them away from the edge where they would foul the pointer as it travels along. When winding back, after each 1,200 turns, it is advisable to return the pointer past your zero, and then "come up to it" again with any lag taken up, otherwise the first 100 on the scale may be a little overweight.



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DEWFLY HIGH GRADE AERO RUBBER, $\frac{1}{8}$ " 10d, $\frac{3}{16}$ " 1/-, $\frac{1}{4}$ " x $\frac{3}{16}$ " 1/6, per dozen yards, postage 3d.

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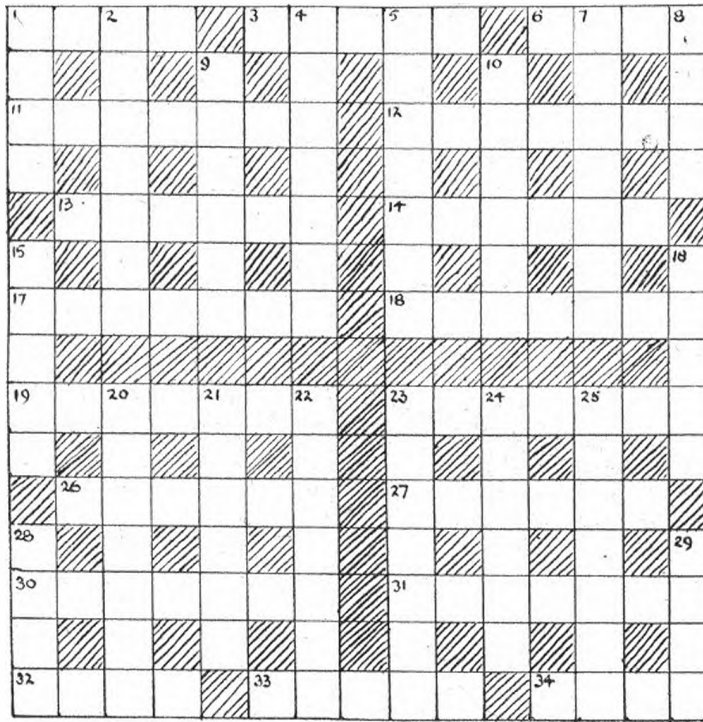
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THE AERO-MODELLERS' X-WORD

No. 4

ACROSS.

1. Far from the mark (4).
3. Important section measurement (5).
6. With 'plane will certainly through the air (4).
11. and 12. Miles done by Mr. Towner (2 words, 7 and 7).
13. Forgone signalled with one in the midst (6).
14. This clue will help (6).
17. Childhood in imagination (7).
18. Trial consumed the will (7).
19. Need be edgy for its foremost (7).
23. Obvious one is a leader, for he is in the middle of the stage (7).
26. Aero-modeller's club team (6).
27. Rushy is certainly this with tissue (6).
30. Ornamental edge, but not of a wing (7).
31. Gets into even the thickest skull (7).
32. The deer was carried along (4).
33. The goal of the R.A.F. (5).
34. Rip the rate and weep over it (4).



DOWN.

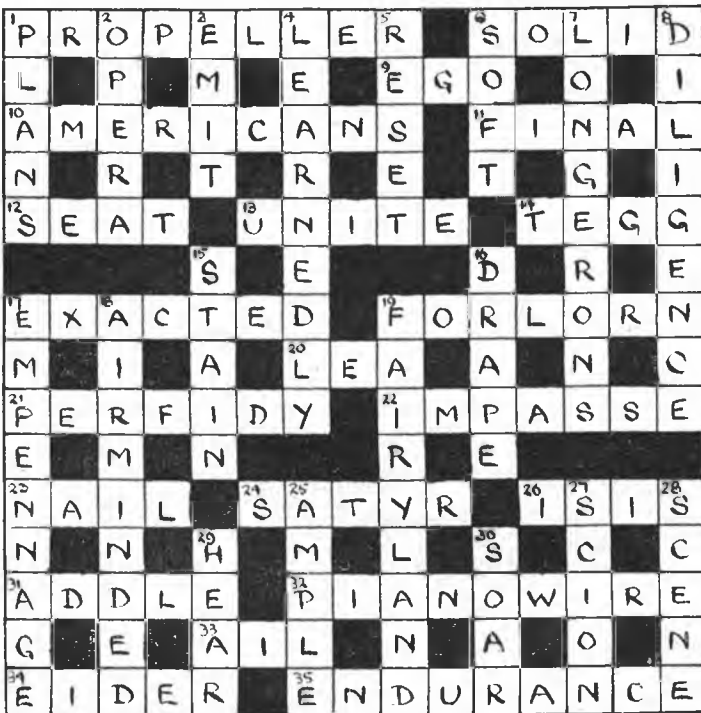
1. and 15. Northern town patron (2 words, 4 and 5).
2. Ladies on this side, please (7).
4. The sort of spirit seen at most competitions (7).
5. Pull back under the twisted tail (7).
7. State that you forget (7).
8. Title (4).
9. Not this verdict in Scotland (6).
10. Large numbers of fools in these (6).
16. Rages in the nosepiece (5).
20. Everybody knows now that the whole of the bells sounded (2 words, 3 and 4).
21. You will discover this in the outlet (6).
22. Lads fore and aft in bombers (7).
23. The sower starts with a definite idea (7).
24. Member of ground staff in coaching days? (6).
25. Make the serf (7).
28. R.A.F. a long way off (4).
29. Ruler of confounded sailors (4).

10s. 6d. will be paid to the sender of the first correct solution to this crossword puzzle received at our Leicester offices. Entries should be marked "Crossword" on the top left-hand corner of the envelope. Closing date, February 4th, 1941.

No entirely correct solution to No. 3 X-word has been received, and the 10/6 prize is awarded to Mr. R. Briault, 69 Millers Road, Brighton, whose entry had the least number of mistakes of those received.



Solution to No. 3 X-Word



REMEMBER!

1. The N.G.A. Membership Form is on the back inside cover of this issue. Subscription is 6d., plus 1s. for lapel badge, and the black and gold transfers are two a penny.
2. There is a 10s. 6d. prize for the best looking model built from the plans of the 50 sq. in. spar model on pages 96, 97.
3. There is also a 10s. 6d. prize for the best looking model of the "Crimson Streak," built to the plans on pages 78, 79.
4. That entries for both of above prizes, and also for No. 4 Crossword puzzle, must be received by the Editor by March 4th, 1941.
5. That the next issue of THE AERO-MODELLER, on sale Saturday, February 22nd, will contain full particulars and entry coupons for an amazing free-for-all competition in Aircraft Identification. Cash prizes to a total value of £75, including a first prize of £50 cash, will be awarded.
6. That in view of the increased demand there will be for copies of the next issue, it is essential to place a firm order with your local newsagent to avoid disappointment.

LETTERS TO THE EDITOR

DEAR SIR,

I read with interest the article of your contributor, Mr. W. G. Heath, on his 20 in. span model, "Eureka." I am a small duration fan myself, and have made many experiments on this type of model. He is to be congratulated on his model's performance, and also its consistency. This latter quality is surely one of the most difficult to impart to a design so small, in which torque and stability problems are magnified out of all proportion to the size of the model. About a year ago I was building the large duration models until one of my fellow "f-liers" built a 20 in. commercial model, and astounded us with its easy flight and "repairability." I then decided this field of aero-modelling warranted investigation, and consequently read all my "Frank Zaic," and other such literature on stability problems, etc., that I could find. I would mention here what great help THE AERO-MODELLER has been in this respect, and I would like to see more such articles of this nature in the future. Having procured all necessary equipment I designed my 20in. span "Sunbug," a super light-weight (but strong) duration model. Its performance was truly amazing, surpassing my fondest hopes. Since then several of my friends have built "Sunbugs," and been rewarded with exceptional performances. The "Sunbug's" stability is such that none has spun yet, or even stalled, and the torque control is best demonstrated by the fact that it has withstood six strands of $\frac{1}{8}$ in. rubber with an 8 in. diameter propeller, without rolling and diving into the ground. As to actual flying performance with a 7 in. balsa propeller and four strands of $\frac{1}{8}$ in. rubber, it has reached an altitude of 100 feet, and the glide, when fitted with a free-wheeler, is something to see. As regards sturdiness, it has dived into terra-firma from 20 feet under full power, and believe it or not, only bent the propeller shaft. Another time it flew into a speeding Army lorry, and received nothing but a crushed wing-tip. Regarding actual time in the air, I can safely say that it will better 30 seconds in almost any weather conditions. To date, its best flight has been one of 57 seconds, on a sunny evening in August this year. Three of my friends will verify this, as it constitutes a club record for this class of machine. Furthermore, with careful trimming, she consistently clocked 45 sec.

Please find enclosed a small 3-view of the latest "Sunbug." (Drawn out by Mr. Jones, and reproduced on opposite page.—Ed.).

Yours truly,

JAMES S. BROOKS (JUNR.).

DEAR SIR,

The letter from Messrs. Costenbarder and Kelsey in the January AERO-MODELLER should arouse interest in all who have the rights of the individual at heart.

The dearth of suitable flying grounds near large cities is acute, and for small bands of aero-modellists to attempt to earmark very large tracts of common land for their own private flying is not only greedy, it's impossible.

I have no knowledge of the "manorial rights" so glibly quoted by Messrs. Costenbarder and Kelsey, but I do challenge the statement that one man is dictator of model flying on Epsom Downs, and that their own club has sole flying rights there. This also applies to Richmond Park and Chobham Common—two other large areas about which local clubs have complained of visitors.

Messrs. Costenbarder and Kelsey exaggerated the difficulty of moving cars wrongly parked at the Summer Gala. We moved immediately to the assigned place when requested.

I have no knowledge of the other incident quoted in their letter, but I myself have experienced tactless officiousness which could easily cause friction between various model-flying communities.

The litter problem—"Rip's" *bête noir*—is, like the poor, always with us. On Epsom Downs, on the day in question, the motorists, cyclists, walkers, cricket players, etc., were not letting the modellists make all the mess—they were doing their best to help.

May I suggest to the various clubs operating on public commons that the chap who troubles to travel to a specific ground is generally a keen modellist, who will readily fall into line with local requirements. Private land flyers invariably extend a very hearty welcome to visitors, and I think some of the so-called "resident" clubs on common land should lose their "keep off, we were here first" attitude.

Yours faithfully, ANDERSON.

Hayes and District M.A.C.

DEAR SIR,

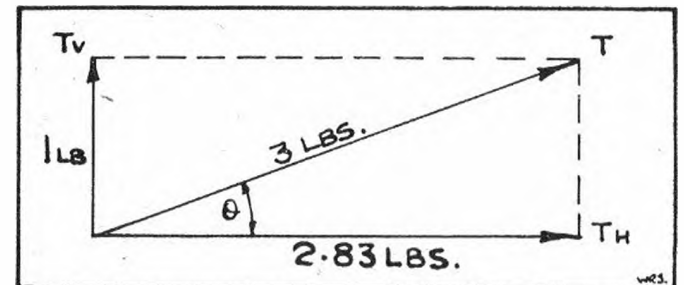
In your Christmas number, which, unfortunately, is now "somewhere in Southampton," I remember reading someone's bland assumption on the matter of "down-thrust."

It was, I believe, to the effect that the model tended to fly along the line of thrust. I.e. for "down," the model flies tail down, and vice versa. I used to think this was so until about four years ago, when a new aspect of the matter struck me. The article in the Christmas Number made me think again, so I decided to take a hypothetical model and work out the effect of down.

I have taken the example of a 6 lb. petrol model flying at 30 ft./sec.

The thrust might be, say, 3 lb. Assume a condition of level flight and zero lift on the stabiliser.

Suppose the angle of thrust from the horizontal is positive (i.e. up-thrust). Then the force diagram might be like this:—



I.e. the "up-thrust" can be replaced by 2.83 lb. horizontal thrust, and 1 lb. vertical thrust (at nose).

Now assume a 14 in. airscrew on a 7 ft. job. Then if in level flight the slipstream flows directly over the wing surface, the affected wing area—allowing for centre section loss—will be about 1-10th the total.

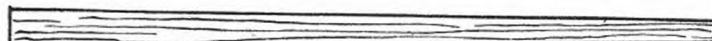
Now to cut the calculation the angle of attack over this area will be changed to effect a decrease in lift amounting to, perhaps, 2 oz.! More important, the C.P. moves back and produces an unbalanced moment. If over this 1-10th span the C.P. moves, say, 1 in. at the outside. The negative pitching moment produced is $\frac{2}{3}$ inch/lb.

Now, the positive pitching moment produced by 1 lb. acting vertically at, say, 12 in. from the C.G., is exactly 12 inch/lb.

Thus, the couple tending to raise the nose is about 11 inch/lb. The case for down-thrust is almost a reversal of the preceding.

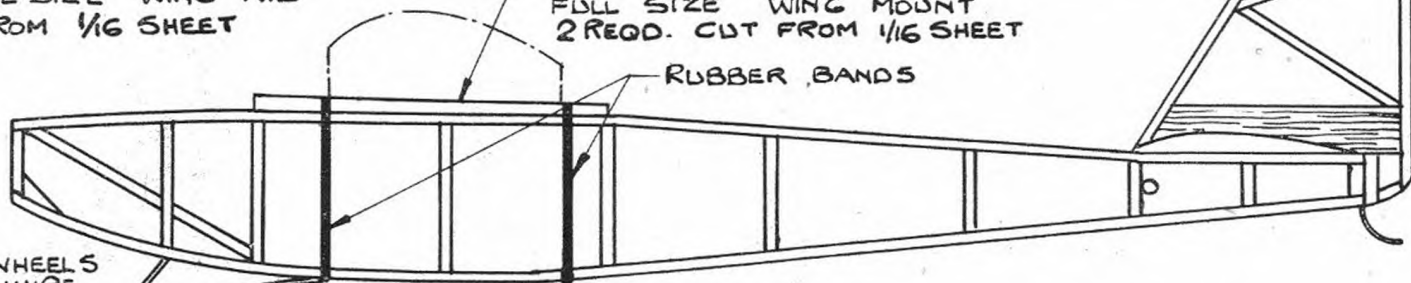


FULL SIZE WING RIB
CUT FROM 1/16 SHEET



FULL SIZE WING MOUNT
2 REED. CUT FROM 1/16 SHEET

RUBBER BANDS



SPAN 20"
LENGTH 16"

PROP. 7" DIAM.

LONGERONS 3/32 x 3/32
UPRIGHTS DITTO.

WINGS
SPARS 3/16 x 1/16
L. EDGE 3/32 x 3/32
T. EDGE 1/4 x 1/8

TAIL PLANE & RUDDER
SPARS 1/8 x 1/16
L. EDGE 1/16 x 1/16
T. EDGE 3/16 x 1/16

1" DIAM. WHEELS
20 SWG WIRE
UNDERCARRIAGE
LEGS.

TRACK 7 1/2"

3"

1"

1/4"

1/2"

1/2"

1/2"

1/2"

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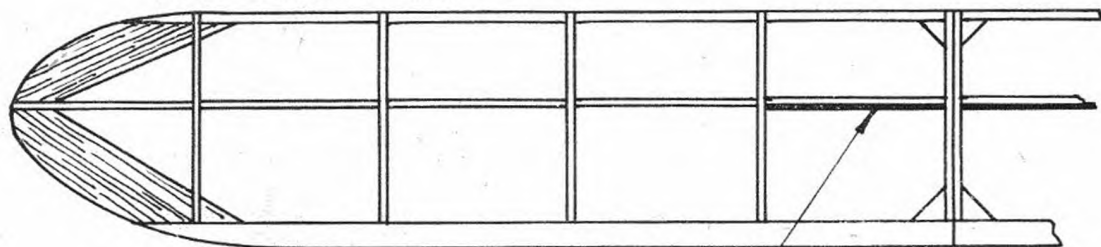
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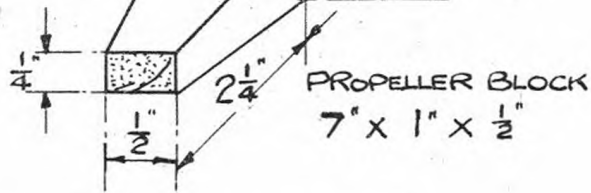
1/2"

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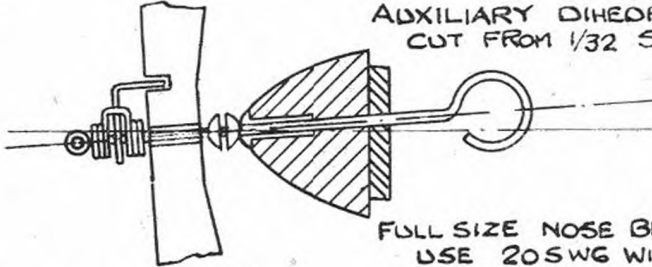
NOTE: FUSELAGE WING TAILPLANE & RUDDER
ARE DRAWN HALF SIZE.



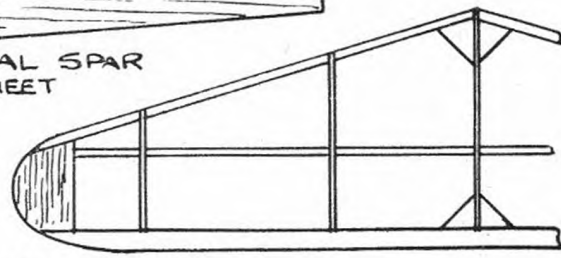
AUXILIARY DIHEDRAL SPAR
CUT FROM 1/32 SHEET



PROPELLER BLOCK
7" x 1" x 1/2"



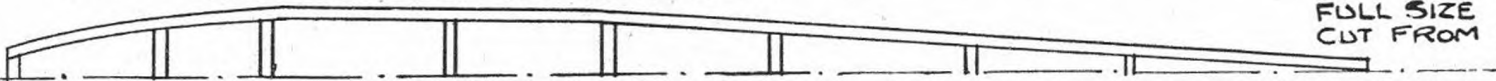
FULL SIZE NOSE BLOCK
USE 20 SWG WIRE
FOR PROP SHAFT &
FREE WHEEL DEVICE



FULL SIZE TAIL RIB
CUT FROM 1/32 SHEET

- SUNBUG -
DESIGNED BY
J. S. BROOKES

NOTE: WING TAILPLANE & RUDDER TIPS
ARE CUT FROM 1/16 SHEET WOOD.



So we come back to the old, old story, that for testing petrol models (high-wing) we add "down" to:—

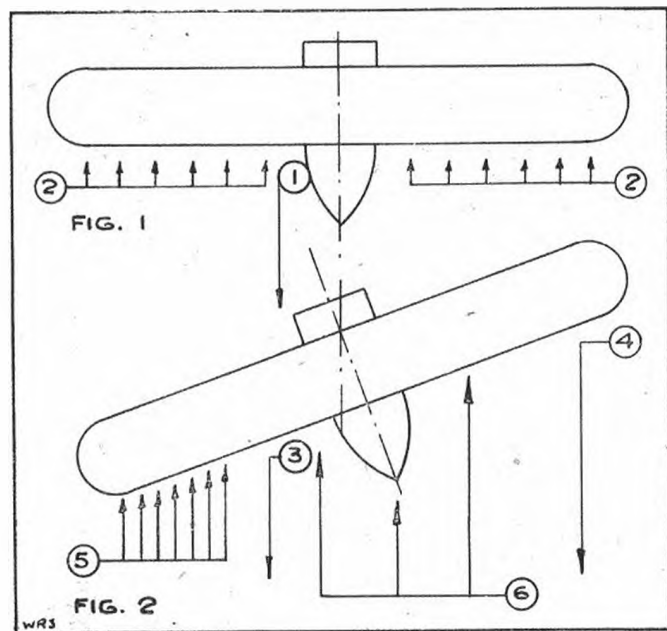
- (1) Get the thrust line as near to the centre of drag as possible.
- (2) Reduce the possibility of a stall during the short engine runs allowed.

If anyone is outraged by the "bland assumptions" I seem to have made just let me know, and no doubt I can bore you with the necessary figures.

Yours faithfully, A. G. PARRY.

DEAR SIR,

Further to the three cases of lateral stability by Mr. T. A. Brown in the October AERO-MODELLER, I claim yet a fourth.



In Fig. 1 on the enclosed drawing it may be clearly seen that while the 'plane is flying on an even keel the airflow is equal on both wings. While in Fig. 2, when the 'plane is in the sideslip, the foremost wing will obviously take the effect of the increased airflow before the other wing, so righting the 'plane. I think this is fairly well explained in the figures.

Yours faithfully,

H. H. O. HILL.

DEAR EDITOR,

Before I start I will tell you quite frankly that this epistle is to be severe in its criticism. Though not prominent in modelling circles, I am, nevertheless, experienced. I am not a veteran of ten or fifteen years at the game, but only a nearly five. It has been five years of interest in theoretical, scientific and executive side of modelling rather than the practical and constructional side (in other words, a kibitzer. A definition of a kibitzer is a man of very few words who, when he speaks, says a lot). This has nothing to do with what is to follow except to describe who and what I am. (I can hear it already—"a—fool.")

From my entry into the organised (?) model world I felt that something was missing—that punch necessary to keep enthusiasm alive. Those people who did keep in the game were supporters of the "old school," and consisted mainly of people who had done two minutes and were content to rest on the laurels of that for the remainder of their lives. And so progress was slow, and we did in many cases fall behind

U.S.A. (Yes, I am one of those people who make tin gods out of the Yanks.)

Further investigation showed that the main fault lay in the organisation of the S.M.A.E. (of which I am now not a member), who seemed to be a lot of "yes-men" to those that were patrons to their cause. (At this there will be protest, but research will prove it). Mind you, I don't blame the officials so much as the system they work under. Their positions are voluntary, which is a setback in the first place. Then again I never really found out just how they came to power, but it seems highly probable that they just assumed it automatically at a time when model aeronautics in Great Britain were at a low ebb.

This governing body has, during its career, done some good and some bad things (mostly bad, the bright star being the introduction of the Wakefield Cup, but they mustn't rest on that too long). If the S.M.A.E. Council is to spend its time arguing about notepaper and billheads for same, or diaries and other minor sundries, where are they to find time to create a more satisfactory arrangement in the club system? Another person who had plenty to say about this question has been effectively muzzled (or so it seems), and he was "The Moving Finger," the Walter Winckell of aero-modelling.

Now let me give some constructive criticism which is more satisfactory to all. Let us rid ourselves of the old system and organise a new one. Firstly we have the clubs, of which nowadays two or three exist in a small area, and these could form district councils, to formulate local policy, rules, contests, etc. Extending the scheme still further, we get area councils (southern, northern, and so on), composed of delegates from district councils, or where no council exists, from the individual club in that area. There would be controlling organs for national work. And lastly, we get the National Council, which would meet annually, and would have delegates from all over the country. The area councils would have an executive committee, formed from its delegates and one delegate from each of these would form the national executives. These executives would meet at any time of emergency and would also preside over ordinary meetings. This system may have small errors, but on the whole it is more satisfactory than the present one. It would cost less money and give modellers a chance to formulate their own rules and regulations rather than suffer the semi-dictatorship of the present day. Lastly, instead of charging affiliation fees to clubs, charge 5s. per annum for each individual member, and limit the membership of clubs to affiliated members (only charge 2s. 6d., as an afterthought).

Now existing competition rules go through the mincing machine. I cannot possibly understand why, when a new type of model appears, the S.M.A.E. establish a new set of records to include that model. Cannot the S.M.A.E., with due apologies to U.S.A., establish the same system of record classification as they have. It is far more satisfactory to modellers, and more of an incentive to scientific progress.

Gas (pardon me, petrol) models have made literally no progress in this country. You must admit, quite frankly, that in U.S.A. progress in this field has been simply stupendous, and is the leading exponent in the world. (Now, don't start roaring about overpowered paper-bags, you diehards). Do existing British rules and contests allow for progress? I don't think so.

Now let me criticise your journal, THE AERO-MODELLER, which is the only existing mouthpiece of us all. Does it satisfy the needs of the aero-modeller? Do you think it does? How often do I see the names of Copland, Bullock, Stott, Henery, Crow, Goslin, Chasteneuf, and so on heading plans

or technical articles? (Not unless one pays 1s. 6d. or so on for a set of full size prints). Don't you think it is rather an insult to British modelling and modellers to give plans of a job that averages only 13 seconds (November, 1940)? How many modellers built it? It seems rather queer when an American counterpart gives plans of rubber jobs averaging at the least three minutes. ("Yes, but the conditions are different"—pardon me, while I laugh up my sleeve). That is my largest complaint against you—the quality, style, and presentation of plans. Please, for the sake of aero-modelling, give something decent in the way of duration, gas and scale models that are fit for building, and don't fling mud in our eyes by charging 1s. 6d. for them, for almost anyone is capable of enlarging scaled plans given sufficient data.

Assuming this gets published let me have some criticism both from you, the Editor, and your readers. Thank you.

Yours truly,

HUGH C. FURNEAUX.

Evidently, our "kibitzer" correspondent is unaware of the S.M.A.E. area scheme, with its delegates. However, he asks for replies to his letter, and no doubt he will get them!!

We confine our own remarks to dealing with some of the criticism levelled at THE AERO-MODELLER.

Firstly, in regard to the absence of certain names on our list of contributors, we cannot compel them to write for THE AERO-MODELLER. Actually, however, several of the names mentioned have been absent for the last year or so, for the reason that there is a war on, and these men are serving their country and have little time for aeronautics.

Secondly, in regard to plans. The proof of the pudding is in the eating.

We have, on several occasions, fully explained our policy with regard to full-sized plans. (Evidently, our correspondent, whilst paying fully for his AERO-MODELLER, only reads part of it).

For the benefit of Mr. Furneaux we will again explain that supplies of paper are limited and apart from this it is obviously waste of paper and printing to run off 27,000 copies of a plan to give away with an issue, when possibly only several hundred models will be built from it.

As an alternative to this we introduced in the summer of last year our "Plans Service" feature, making available to readers a fairly wide range of full-sized plans of models.

It is not uncommon for us to receive over 100 orders in one day, and as our monthly sales run into four figures it is plain that this service has met with the approval of the vast majority of our readers.

As to it being an "insult" to offer our readers plans of a small, easy-to-build model with a duration of 13 seconds, this is in accordance with our policy of catering for ALL CLASSES AND AGES of readers.

Everybody has to make a small and easy start.

Our contributor says that he has had five years experience of modelling, and assuming that he is nearing his years of discretion (pardon us, whilst we laugh up our sleeve) he cannot have built models when he was 6 or 8 years old, as we know that a number of our young readers do.

As for the suggestion that anyone is capable of enlarging scale plans, while readers may be CAPABLE of doing so, few of them care to spend their time in doing this, when for 2s. or 3s. they can obtain from us a set of plans all drawn out.

This is an attractive feature of our "Plans Service," and in fact THE one which is most appreciated.—ED.

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Chord	R.A.F. 32 (mod.)	Clark Y	
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3½ in.	5d. doz.	4d. doz.	
3½ in.	5d. doz.	4d. doz.	
4 in.	6d. doz.	5d. doz.	
4½ in.	6d. doz.	5d. doz.	
4½ in.	7d. doz.	6d. doz.	
4½ in.	7d. doz.	6d. doz.	
5 in.	7d. doz.	6d. doz.	
5½ in.	8d. doz.	7d. doz.	
5½ in.	8d. doz.	7d. doz.	
5½ in.	8d. doz.	7d. doz.	
6 in.	9d. doz.	8d. doz.	
6 in.	9d. doz.	8d. doz.	
6½ in.	10d. doz.	9d. doz.	
6½ in.	10d. doz.	9d. doz.	
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? ASKED ————— AND ANSWERED —By "Rushy"

- Q. *Can you give me general details of the Douglas B-18a?*—(N. D., Preston).
- A. Main dimensions of this machine, which has been ordered by the R.A.F., are: Span, 90 ft. 0 in. Length, 58 ft. 0 in. Height, 15 ft. 1 in. Tail-plane span, 26 ft. 8 in. Root chord, 14 ft. 2 in. Track, 18 ft. 0 in. Equipped with two Wright "Cyclone" G. motors, each of 900 h.p., this machine has one gun in the nose-turret, another above the fuselage, and a third below, behind the trailing edge of the wing.
- Q. *Can you give me any particulars of the T.K.4?*—(T. A. D. H., Chelmsford).
- A. This machine was a tiny low-wing built by the students of the De Havilland Technical School in 1937. Built as a racer, this machine closely resembled the "Mew Gull," and was powered by a Gipsy Major of 137 h.p., with which a speed of 200 m.p.h. was attained. On a test flight, however, the then D.H. test pilot, the late Mr. R. J. Waight, was killed, and since then no further experiments have been made. Main dimensions and weights are as follow:—Span, 19 ft. 8 in. Length, 15 ft. 9 in. Wing area, 56.5 sq. ft. Dihedral, 5 degrees. Incidence, 2 degrees. Tare weight, 900 lb. Loaded weight, 1,300 lb. Wing loading, 23 lb./sq. ft. Power loading, 9.5 lb./h.p.
- Q. *What are the main dimensions of the "Sunderland" flying boat?*—(A. F., Bath).
- A. Span, 112 ft. 9½ in. Length, 85 ft. 4 in. Height (on beaching chassis), 32 ft. 10 in.
- Q. *I am desirous of building a twin-engined rubber-driven flying boat and the two propellers would be situated in the wings. What size propellers should I use on a machine of 39 in. span?*—(P. J. C., Cheam).
- A. You do not say how you intend driving the two airscrews out on the wings. Possibly you will use a flexible drive and keep most of the rubber in the length of the fuselage. Generally speaking, the diameter of a single airscrew on a rubber-driven 'plane should be from a quarter to a third of the wing span. This would mean about 12 in. or 13 in. if your 'plane had a single airscrew. As you propose using twin-airscrews I would advise you to fit them of 9 in. to 10 in. diameter if they are two-bladed, and about 7 in. or 8 in. if they are three-bladed.
- Q. *Can you give me the main dimensions of the Fiat C.R.42?*—(T. W. M., Palmers Green).
- A. Span, 31 ft. 10 in. Length, 27 ft. 1½ in. Height, 10 ft. 0 in.
- Q. *How can I find the mean chord of an elliptical wing?*—(A. D. G., Crewe).
- A. The mean chord may be found by dividing the area by the span. The accurate method of finding the area is to use the following formula:—
- $$A \times a \times \pi = \text{Area.}$$
- where A is span.
a is max. chord.
 π is 3.142856.
- Q. *Do the wheels of the Wellington completely retract into the engine nacelle?*—(W. R. C., Cheam).
- A. On the first production models the wheels were completely enclosed, but on the version now being delivered to the R.A.F. squadrons a small portion of each wheel projects slightly below the nacelle.
- Q. *Can you give me details of the D.H.4?*—(G. T., Chingford).
- A. Span, 42 ft. 4½ in. Length, 30 ft. 2 in. Chord, 5 ft. 6 in. Stagger, 1 ft. 0 in. Height, 12 ft. 0 in. Tail-plane span, 14 ft. 0 in. Tail-plane chord, 5 ft. 0 in. The armament was one synchronised Vickers gun for the pilot, and a Lewis gun over the rear cockpit for the observer. Bombs were carried beneath the lower wings.
- Q. *Can you give me details of an ignition coil suitable for a 5.8 cc. petrol engine?*—(P. K., Grove Park).
- A. I regret that I cannot give you a specification, and would strongly advise you not to attempt to build such a coil. The design of an ignition coil for manufacturing a petrol engine is a very scientific preparation, and even if you were given a full specification, unless you had an accurate lathe, it would be impossible for you to properly wind on the many hundreds of feet of fine wire that go into a coil.
- Q. *Can you tell me the position of squadron markings on both port and starboard sides of the fuselage?*—(E. W., Sheffield).
- A. Regarding squadron letters painted on military aeroplanes, it is usual for the two letters denoting the squadron to be carried on the port side in front of the cockade and the individual letter to be painted aft. Thus one Blenheim seen by the writer on several occasions is marked:—
- Z K cockade H on the port side.
- On the starboard side the letters are in the same order, but the Z K is behind the cockade with the other letter below the gun cupola. In some cases the two squadron letters are divided by the cockade, but their order is never changed, as they take the place of the squadron numbers formerly used, and any alteration would cause confusion. As you probably know, they are painted a light blue-grey on the aeroplanes.
- Q. *I am having difficulty in running my synchro "Bee" petrol engine, and cannot get it to run off the specified 4-volt battery. Can you give me any information?*—(R. H., Blackpool).
- A. From the small amount of information provided it is difficult for me to judge what may be the trouble you are having with your engine. Your plug might be faulty or the points at the make-and-break may be incorrectly set. The agents for the synchro "Bee" are the Model Shop, Barras Bridge, Newcastle-on-Tyne, to whom I suggest you send your engine and coil with the request that they test it out for you.
- Q. *Can you give me details and history of the "Curtiss Jenny"?*—(E. H. B., London).
- A. Span, 45 ft. 0 in. Length, 28 ft. 0 in. Height (tail down), 9 ft. 0 in. This aeroplane, a two-seat trainer, was introduced into the U.S. Army Air Service in 1917, and was equipped with either a 90 h.p. Curtiss V-8, OX-5, or a Hispano-Suiza engine, giving a maximum speed of 75 to 80 m.p.h. It was of wooden construction and wire-braced throughout. In general, it is the American counterpart of the old Avro 504K biplane of 1913. In the same way, after it ceased to be used for military training, it was used by civilian pilots for "joy-riding" purposes.

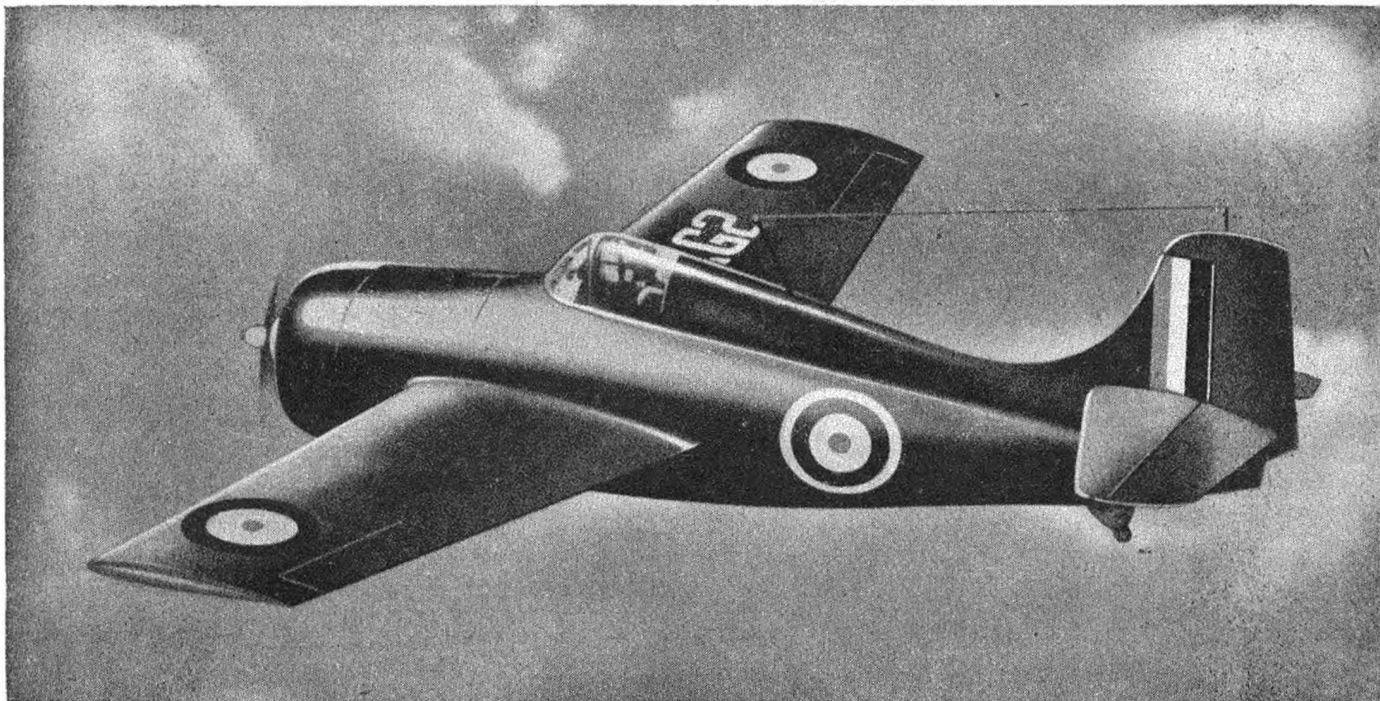
FIGHTING AIRCRAFT OF THE PRESENT WAR ——— I

By H. J. COOPER

This article is the first of a series descriptive of aeroplanes of all those countries which are at present, or were at some time, or in future may be, engaged in the international idiocy prevailing over a large portion of this planet.

In war-time every aeroplane in each of the countries concerned is a fighting aeroplane. A trainer producing pilots and other members of air-crews is doing just as much towards the war effort as is the bomber destroying factories in the enemy's country (and the countries he has occupied), or a fighter shooting down bombers raiding its own; so the types described and drawn will not necessarily be of fighters and bombers and other aeroplanes usually associated with fighting. Obsolete and obsolescent aircraft which are still in use in some capacity or other will be included. With production and re-equipment developing so quickly, the older biplanes are flying and fighting with the newest monoplanes.

To make this series popular, I shall be glad to consider requests for certain types to be included, and if readers have any queries on solid modelling or identification and write to me c/o of THE AERO-MODELLER, I shall be pleased to deal with them.



THE GRUMMAN G-36 FLEET FIGHTER

BARRELS have well-known but limited uses in this country, but in America experiments have been made with them whereby they are fitted with wings, tail unit and an engine, and are made to fly!

These researches appear to have started somewhere around 1930, with the little "Gee Bee" monoplane, which had wheel spats nearly as big as itself, and have developed through various racing and military aeroplanes until what is perhaps the perfect streamlined barrel has been attained.

The newest aeroplane in this line of development is the Grumman G-36 Fleet Fighter, accepted by the British Purchasing Commission for issue to the Fleet Air Arm.

The name of Grumman immediately forms visions of tubby little biplanes with colossal radial engines and tiny wings, but their latest product is a departure from this formula, be-

ing a mid-wing monoplane fighter, although the apparently inherent corpulency still persists.

Unorthodoxy is accentuated by the square-cut wings and tail surfaces, reminiscent of the little Vickers "Venom" experimental fighter of 1936, which create the general impression that the 'plane has been built up "just like the picture on the lid."

However, the general design is clean, and fat fuselages have been proved conducive to speed. The undercarriage retracts completely, and apart from the oil coolers under the wings, there are no ugly excrescences to offer resistance to the air. That is, there are none yet; provision has been made for racks for light bombs to be fitted below the outer wing sections if required.

The Grumman G-36, or F4F 3, as it is known in the

United States (no doubt all concerned will be thankful when it is officially named) is of all-metal construction, except for the control surfaces, which are fabric covered. The fuselage is of monocoque construction. The wings and tail unit are fully cantilever, and have square tips for ease of production, these being allowed without losing aerodynamical efficiency by the N.A.C.A. airfoil sections used.

Vacuum-operated split flaps are fitted to the trailing edge of the wing between the ailerons and the fuselage.

The undercarriage is of typical Grumman design, and consists of two manually-operated units which retract into the fuselage, panels covering the operating struts but leaving the wheels themselves visible. The tail wheel is fully castoring and does not retract.

The pilot is accommodated in a transparent covered cockpit above the wing, where the view is good in all directions. Small windows in the fuselage below the wing afford him a downward view, and are an unusual but necessary feature. The top cover slides for access and egress.

American reports indicate that the Grumman will be particularly suited for "deck-flying" (one of the few American expressions which is really appropriate) as the undercarriage is very strongly constructed, and the flaps lower the landing speed to 68 m.p.h.

Full equipment for naval duties and wireless are carried. The radio mast is situated at the rear of the cockpit, allowing the cover to slide, and is raked forward to permit the fitting of a sufficient length of aerial.

The Grumman is powered by a Wright "Cyclone" GR-1,820—G-205A motor of a normal output of 1,000 h.p., which drives a three-bladed electrically controlled constant speed Curtiss airscrew.

As supplied from the U.S.A. the Grumman is equipped with only two .50 Browning guns mounted above the engine cowling, so that it is about as lethal as Italian aeroplanes in the same category, which are themselves inferior to their German counterparts. On arrival in this country, however, two .30 guns are fitted in the wings, making the Grumman half as heavily armed as the recently introduced Fairey

"Fulmar" two-seat fleet fighter, which has eight forward guns . . . and which must be nearly as fast as the Grumman.

It is unlikely that the Grumman, when it appears in numbers over here, will be confused with any other aeroplane, except perhaps the Brewster Buffalo (another barrel), but the angular wings and tail will be outstanding in any but a direct head-on view. The upswept tail is another distinctive point, and should make accurate identification certain.

The simple plan-form of the wings of this aeroplane should make it popular with modellers, the "lug and socket" method being the most convenient for fixing the two sections of the wing to the fuselage.

The fairing between the cabin and the fin can be made integral with the fuselage or built up with plastic wood, when it can be nicely faired on to the fin.

The tail-plane and elevators are best made in two parts and fitted in a similar manner to the wing.

The cabin framework can be simply and effectively constructed from brass wire and covered with "Cellophane" or thicker celluloid.

Grummans in service with the Fleet Air Arm will presumably be coloured in the usual dark green and brown camouflage on the sides of the fuselage and on the upper surfaces, and light blue or grey underneath. The fin should be painted with the red, white and blue stripes now standard on all British military aircraft. The first machines produced for Great Britain had the colours painted on the rudders in error. These stripes were originally painted on the rudders of R.A.F. and F.A.A. aeroplanes, but in 1934, when slightly faster aeroplanes began to appear, the colours were removed for aerodynamical reasons. Then towards the end of last year identification became difficult enough to necessitate the reinstatement of the colours, and they were then painted on the fins.

The wings carry red and blue cockades on the upper surfaces, and red, white and blue cockades underneath. On each side of the fuselage cockades are red, white and blue, surrounded by the additional yellow ring, also now part of the standard scheme.

SPECIFICATION :

Dimensions : Span, 38 ft. 0 in. Length, 28 ft. 10 in.

Height (on ground, tail down), 9 ft. 3 in.

Areas : Wing (including ailerons), 260 sq. ft. Ailerons, 11.48 sq. ft. Rudder, 9.38 sq. ft. Fin, 13.2 sq. ft. Flaps, 29.7 sq. ft. Tail-plane, 30.43 sq. ft. Elevators, 18.62 sq. ft.

Performance : Maximum speed, 353 m.p.h.* Cruising speed, 305 m.p.h. Stalling speed (flaps lowered), 68

m.p.h. Climb, 3,450 ft./min. Climb to 10,000 ft., 4 min. Service ceiling, 34,000 ft. Absolute ceiling, 37,000 ft. Maximum range, 1,150 miles.

Weights : Tare, 4,649 lb. Useful load, 1,451 lb. Gross, 6,100 lb.

Loadings : Wing, 23.5 lb./sq. ft. Power, 6.79 lb./b.h.p.

* Above are American figures. British figures show a maximum speed of 325 m.p.h.

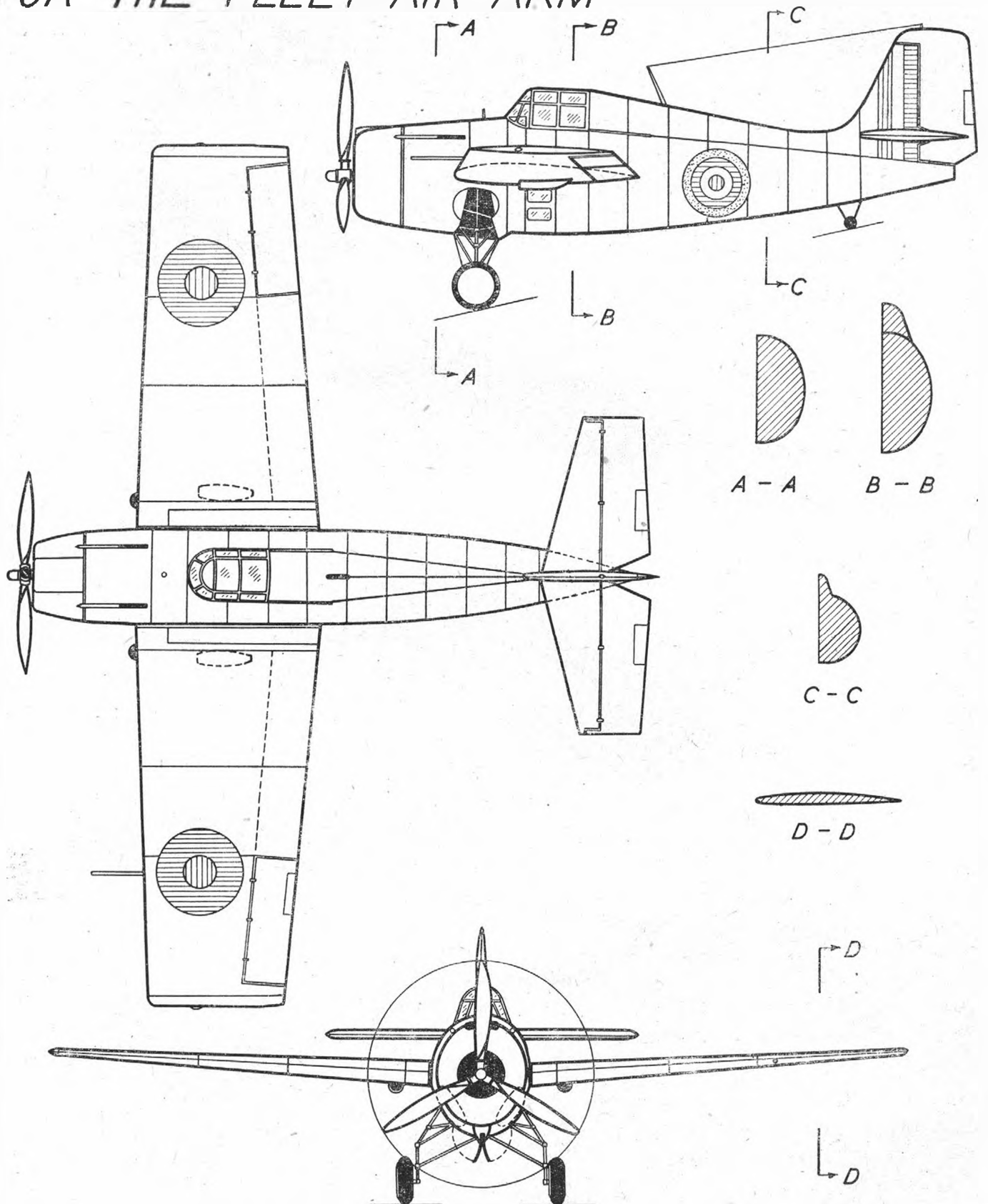
ON THE OPPOSITE PAGE IS A 1/72 SCALE PLAN OF THE GRUMMAN G-36 FLEET FIGHTER

SPECIALLY DRAWN FOR "THE AERO-MODELLER" by MR. H. J. COOPER
who, with MR. O. G. THETFORD, compiled

"AIRCRAFT OF THE FIGHTING POWERS"

WHICH CONTAINS 87 PLANS DRAWN IN
SIMILAR STYLE ————— SEE PAGE 66 OF THIS ISSUE

FOR THE FLEET AIR ARM



A - A B - B

C - C

D - D

THE GRUMMAN G-36 FLEET FIGHTER

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CLUB NEWS

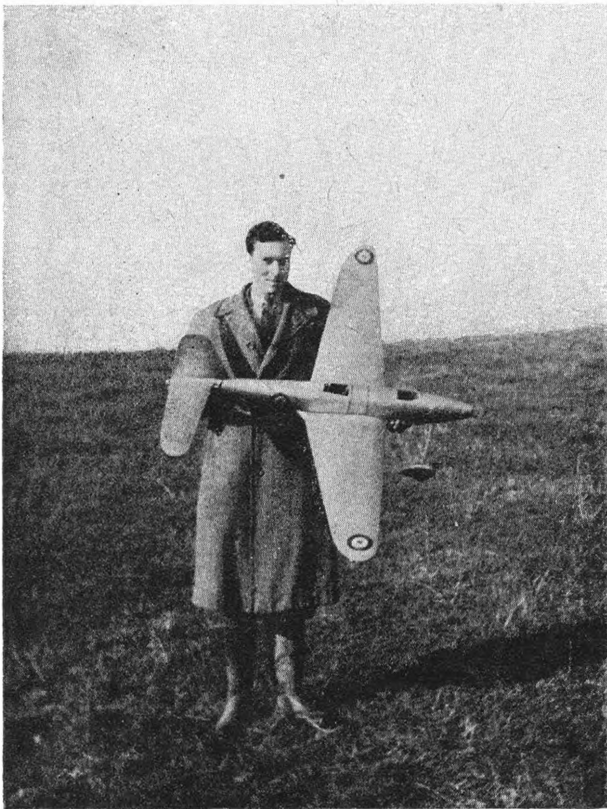
by "Clubman"

I'VE picked a good time to start this monthly chatter on thisser and thatter—'tis the eve of the New Year, and I've dusted the old typewriter and got down to brass tacks while waiting for the witching hour, when I can open the carefully hoarded bottle of "pop." All of which, of course, leads me up to the point that I'm going to look back over the past season's highlights, and see what we learn.

Retrospect can teach us a lot when we are planning a new season, and many lessons can be learned from the mistakes of the past years. It seems much more than a year ago that I wished you a Happy New 1940—and boy-o-boy what changes and fun and games we have had since then! Naturally, it is not necessary for me to detail much of what has taken place, and I content myself with reminding you of a few of the things that affect us aero-modellers directly.

The commencement of "blitzing" has lost us a number of chaps we could not afford, and our first thoughts should

This photo is of Mr. A. B. B. Fox, of the Yeovil and District M.A.C., with his three-year-old Fairey "Battle."



be of those fellows—and ladies—who are no longer with us. The knowledge that in these times every activity must lose some of its best members does not lessen the loss, and the circumstances are so maddening. So—a thought to those fellow enthusiasts who have passed on.

This time last year we had word from our old friend, Father Amiard. I wish we could hear now, and from those many other friends of the aero-modelling fraternity overseas. Van Hattum, Wymersch, Fillon, Gilliet, and a host of others who were great pals in happier times. Let us hope that fate has dealt with them kinder than their unhappy countries, and I for one look forward to hearing from some source or other from these stalwarts of the "only game worth while."

Competitions during the past season have been surprisingly well supported in view of the conditions, and some extraordinarily good times put up. Unfortunately, we are still without the final results of individual competitions, such as the "Plugge" and "Thurston" cups, but I am sure you will all appreciate the situation which has prevented Mr. J. C. Smith having these results to hand at the usual time.

The 1941 programme will be run as near as possible to coincide with that of 1940, and I'm sure you will all welcome the one alteration with regard to the National Cup, which will now be a "free-for-all" high duration event instead of flying to a limited mark.

The introduction of indoor competitions into the S.M.A.E. programme will give a leader to future planning, and I hope all clubs will support these meetings to the best of their ability. I'm afraid far too many clubs plan well ahead for the summer and leave the winter to take care of itself, which in my opinion is all wrong. Granted it is not possible for every club to conduct full organised winter meetings, but I am sure that most of us could do a lot more than we are doing at the moment.

One thing I think we missed more than anything else during 1940 was the lack of international competitions. Local events are all very well, but they never seem to have the attraction that these major events seem to command, and I for one will be jolly glad to see some of the old faces from abroad, and enter into competition with them. (Flying, I mean, not facially!) We must remember that our American contemporaries are bound to be piling up a lot of practice which we are lacking at the moment, and we shall really have to pull our socks up to get down to competing with these chaps for the Wakefield Cup.

Quite a number of clubs have lost some of their best members to the Forces, etc., during the past season, and I trust those who have been left to carry on their work will do so with full regard to the task with which they have been entrusted. It would be a pity for much of the hard work put in by these old stagers to be discounted by any slackness

from now onwards, and I hope every official will realise the responsibility he has undertaken. It's not good enough to just say "yes" when nominated at an annual general meeting; the job entails much more than this. Likewise, ordinary club members should see to it that the persons they elect do keep up to scratch with their jobs, as, after all, that is what you elect them for. I speak rather feelingly on this, as a number of requests made from these columns have been distinctly ignored in some cases, and the club as a whole suffers in consequence—so all officials, let one of your New Year resolutions be to keep pace with your job, and do it thoroughly.

The starting of air blitzes has robbed a number of clubs of their meeting places, and has undoubtedly led to the reins being tightened up on some of the lads during the dark evenings. It is only natural for parents to wish to keep their youngsters at home when there is a possibility of warnings being sounded, and I recommend Saturday afternoons as being preferable to evening meetings in the majority of cases. This also applies to indoor flying meetings, and you will appreciate that an afternoon meeting has much to recommend it, both from a travel and black-out point of view.

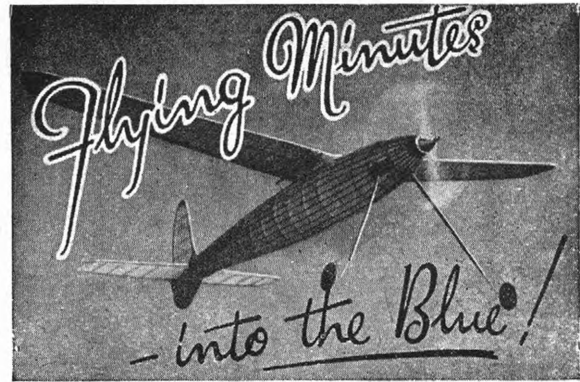
I wish to thank the many readers of "Club News" for their good wishes for Christmas and the New Year, and I assure you they are heartily reciprocated. Here's hoping that we shall soon get back to better days, when we can wind our models till they bust, and don't have to bother where the next stick of balsa is coming from!

I have had a letter this month from a chap who makes three suggestions, and I think they are well worth passing on to you. One is in regard to the unwanted undercarriage, and he suggests a separate cradle trolley which is left behind after the take-off. This idea was incorporated into a petrol model designed by a prominent American builder, and caused much controversy at the time, and I think I am right in stating that this class of model is now banned from competitions in the States. This rule would also apply here, at any rate, in national events, as the S.M.A.E. rules state "that no part of the model may be dropped in flight."

Suggestion No. 2 is regarding the adoption by clubs of registered colours and designs. While this is by no means a new idea, it has much to recommend it, and it is well worth keeping this in mind for regular adoption once the big national and international meetings recommence. Obviously, for this to be undertaken properly it would have to be worked on a national basis, and would be a really big job for somebody to work out. Still, it has possibilities.

Suggestion No. 3 was that concerted action should be taken by all gas modellers, and the authorities petitioned with a view to permitting the flying of tethered machines. This has been suggested in one or two quarters recently, but I'm afraid I cannot see my way to supporting any suggestion of approaching the Air Ministry at the moment. Obviously, the ban is too recent for modifications to receive much consideration, and I'm afraid it would be a case of putting your head in the lion's mouth to start bothering them with petitions, etc., at this stage. I am sure the Emergency Committee would be only too willing to move any modification as and when the time permits, and I would suggest that they are obviously in the best position to know when the time is ripe.

I trust as many affiliated club members as possible will make it their duty to attend the S.M.A.E. Annual General Meeting. There will be a number of extremely important matters to be discussed; also election of officials, etc. This



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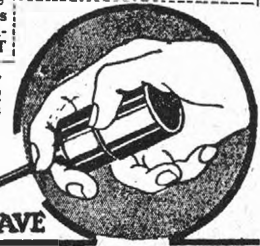
Said OO, with a smile,
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Said OH, with a grin
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I'm no ignoramus,
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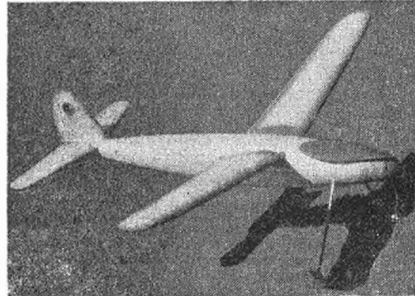
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Beginner or expert, you will find something to interest you in this compre-



** The "COPLAND'S WAKEFIELD MODEL"

(By R. Copland, world record holder)

Bob Copland, long famed for his designs and flying of the high-class contest type of model, has designed this machine on the latest aeronautical practice. Of super streamline, shoulder-wing category, this model embodies the best ideas yet produced. Span, 44" Price 1/3 post free.

The "JEEP"

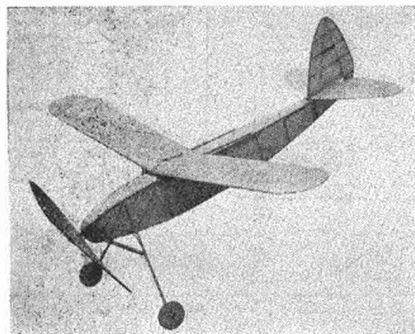
(by C. A. Shaw)

An easy-to-build high-wing, cabin type Monoplane, embodying twin rudders and a single-bladed propeller. Suitable for the beginner or expert. Span, 28" Price 2/- post free.

** "TOOTS II"

(By R. A. Cherry)

Cabin type, high-wing Monoplane of semi-scale appearance. Winner of many contests, and has made many flights of over two minutes. Span, 26" Price 2/- post free.



** The "AIR CADET"

(By C. A. Rippon)

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

NEW!

** "R.F.L.G.- 53"

(By R. F. L. Gosling)

(Holder of British Tail-less Gliding Record.) Designed by a well-known aero-modeller, this model is the result of intensive testing and selection over a number of years. Of unusual, yet sound design, this machine recently raised the British hand-launch record to 52 seconds, and the tow-launch record to 85.5 seconds. Simple yet sound construction ensures a model that will give pleasure and satisfaction. Full working drawing size 30" x 21" Span 48" Price 2/- post free.



The "G-ADAR"

(By D. A. Russell, A.M.I.Mech.E.)

A high-wing cabin petrol-engined Monoplane suitable for most types of engine of from 9 cc. to 14 cc. Three large drawings, 52" x 30". Span, 8" Price 10/6 post free.

The "A.P.6"

(By Dr. Ing. F. Piattelli)

A super type Continental Glider, of a class becoming increasingly popular in England. Fully detailed drawing 40" x 41" Span, 6" Price 5/- post free.

The "KIRBY KITE"

(By Dr. Ing. F. Piattelli)

Clever reproduction of the well-known English Sailplane. Drawing 40" x 27" Span, 6" Price 3/6 post free.

The "STOTHERS GLIDER"

(By K. L. Stothers)

All balsa, mid-wing Glider, holder of club records. (Wing in two halves for easy transport.) Span, 5" Price 1/3 post free.

The "HEINKEL He.112"

Another German Fighter type model, featuring detachable wings. Average performance 35 sec. Drawing 23" x 18" Span, 18 1/2" Price 1/3 post free.



The "MILES KESTREL"

(By H. J. Towner)

A triple-gear replica of the popular low-wing Monoplane, this is one of the finest flying scale models yet built. Drawing 40" x 27" Span, 39" Price 3/4 post free.

THE LAST

May we remind all those who have yet to given away with the Christmas issue of the acceptance of these is the 31st January. that

We expected a rush for the Plans Service exceeded the supply, and we extend our wait for delivery

IMPOR-

It is our wish to meet the popular demand your suggestions regarding future types, us to meet the demand wherever possible. the list, and be up to date

PLEASE NOTE THAT THE "PLANS SER-DRAWINGS ONLY, AND KITS OR MATE-

The "D.H. MOTH MINOR"

(By G. W. Day)

A simply constructed replica of the new De Havilland training machine. Strong yet light construction makes a useful flying model, with an average performance of 45 seconds. Drawing 30" x 22" Span, 35" Price 2/- post free.



THE "MESSERSCHMITT Me.109"

Flying scale model of the much publicised German Fighter machine. Drawing 30" x 22" Span, 19 1/2" Price 1/3 post free.

(Note: All items marked * include a copy of "The Aero-Modeller," containing a full

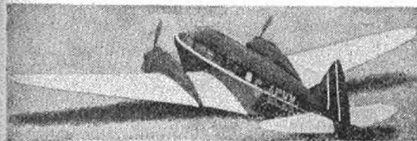
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The "AIRSPEED ENVOY"

(By H. J. Towner)

A beautiful flying replica of the twin-engine low-wing Monoplane, designed by a recognised expert in this class, and containing many interesting features. Drawing 40" x 29" Span, 52" Price 3/6 post free.

FEW DAYS!

make use of their special voucher coupons, "Aero-Modeller" that the latest date for No special rebate will be allowed after date.

drawings, but the demand has temporarily apologies to those who may have had to of their orders.

TANT

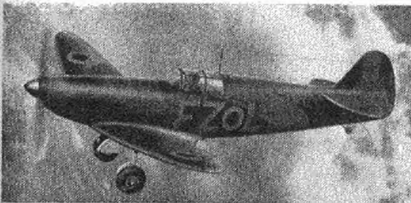
in this service, and we would appreciate sizes, etc., of models, thereby enabling us look out each month for new additions to with the latest designs.

VICE" IS FOR THE SUPPLY OF WORKING
RIALS ARE NOT LISTED IN OUR SUPPLIES

"A BABY R.O.G. MICROFILM INDOOR MODEL"

(By J. S. Isenberg, Canada)

Can be flown in an ordinary lounge or small hall, for flights of two minutes and longer. Span, 13" Price 1/6 post free.



THE "SUPERMARINE SPITFIRE"

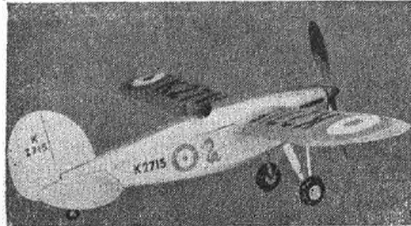
An all-balsa miniature of the well-known British Fighter plane. Flights of from 30 to 35 seconds, Span, 15" Price 1/3 post free.

NEW!

The "SUNSTAR"

(By A. H. Smith)

Yet another design of interest to the beginner, this model is of high-wing cabin type, employing simple, rugged construction. A steady average flight is guaranteed, the original model having been timed for many flights of over two minutes. This model should appeal to those looking for a useful medium-sized machine, capable of good competition performance and easy to transport. Span 28" Price 2/- post free.



"VIPER II"

(By C. Rupert Moore)

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

The "KING FALCON"

(By R. E. Bowyer)

A finely designed British Glider, following some of the best Continental practice, this model has a guaranteed performance. Winner of many contests, this model has high performance, and comes within the regulation size laid down by the Air Ministry. Span, 76" Price 5/6 post free.

The "MEW GULL"

(By C. B. Chadwick)

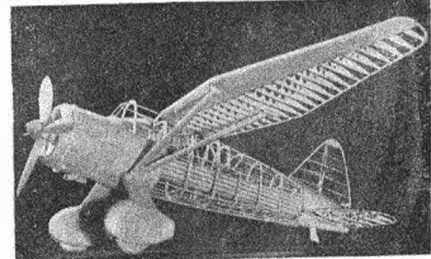
Build a replica of the popular low-wing machine. Design incorporates simple construction, and ensures good performance. Span, 16" Price 1/3 post free.

The "FIREFLY"

(Canadian Stick Model Record Holder)

(By F. J. Rogerson)

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



The 'WESTLAND LYSANDER'

(By Howard Boys)

A finely designed, large flying scale model of one of the most popular types in this class of model. Drawing 41" x 40" Span, 50" Price 5/- post free.

The 'SPARROWHAWK'

(By J. Van Hattum, A.F.R.Ae.S.)

A good design for the beginner, this model is designed by a well-known Dutch aero-modeller, famed for his many successful designs and instructive writings on aero-modelling. Span, 30" Price 1/3 post free.

The "J.B.3"

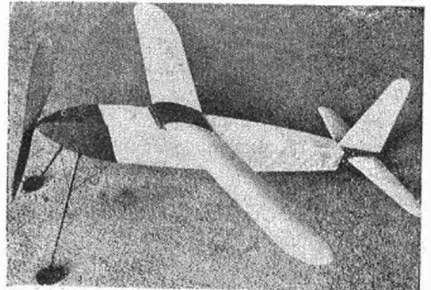
(By J. Bezemer)

A high-wing cabin type Monoplane suitable for the beginner. Span, 36" Price 2/- post free.

The "PTERODACTYL"

(By S. E. Capps)

An unusual type of model for those who like something out of the ordinary. Span, 60" Price 2/- post free.



The "1940 GAMAGE CUP WINNER"

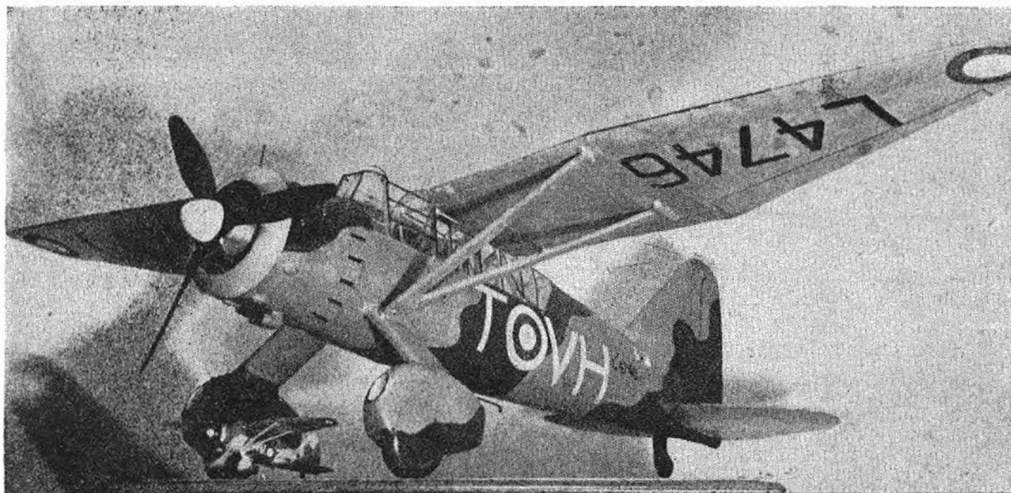
(By A. F. Houlberg, A.M.I.Ae.E.)

Winner of the first main competition of the 1940 season, with a total time for three flights of 717.4 seconds. Consistency, coupled with sound design by a well-known aero-modeller, makes this an asset to any collection of contest models. Drawing 30" x 40" Span, 44" Price 3/6 post free.

description of models. Items marked ** complete with fully-detailed building instructions.)

of its kind in Model Aeronautics.

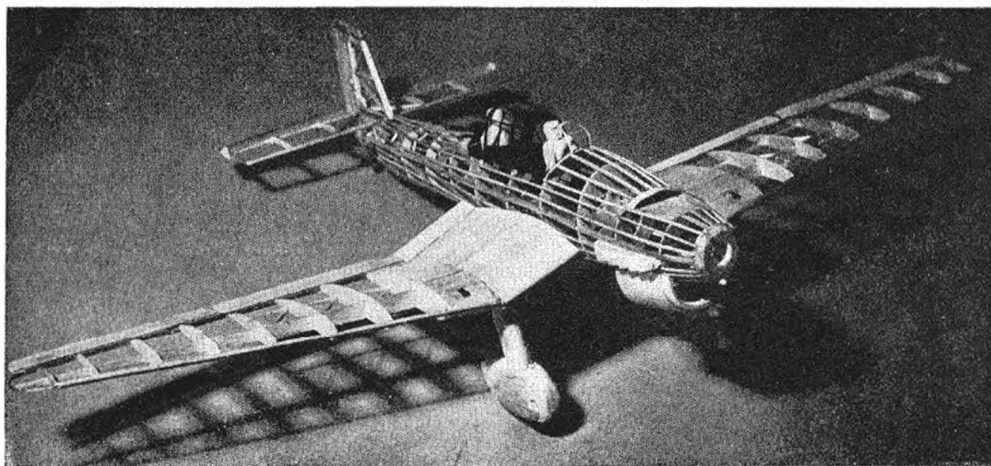
Allen House, Newarke Street - LEICESTER



Here are a couple of examples of how photographs of models should be taken. The photo on the left is of a 50 in. span Westland "Lysander," and a 1/72 scale ditto, built from AERO-MODELLER plans, by Mr. J. H. P. Green, of Dundee.

In the lower photo is seen a 34 in. span Junkers 87B, built by Mr. D. Goldsworth, of Nottingham.

Budding photographers should note the complete absence of any "thing" in the background; it is just a neutral tint allowing all attention to be focussed on the models. In both cases the lighting has been well arranged; in the upper photo to cast effective shadows on the background; whilst in the lower, the box-like construction of the wings is emphasised by the shadows on the platform on which the model was photographed.



you will appreciate is a very important matter at present, and I cannot stress too much the necessity of carefully weighing up the capabilities of various people, who are to be entrusted with the continuation of our sport.

I am pleased to see that the CROYDON AND D.M.A.C. are giving the lie to the tales one hears about London clubs not being able to operate. I may be wrong, of course, but there seems to be a tendency to chuck things up too easily on the part of some clubs. Flying is carried out on every suitable Sunday, and some very good flights have been put up recently in spite of poor conditions.

The mass production of models being carried out by the WHITSTABLE, TANKERTON AND D.M.A.C. is going strong, and a second contribution has been made to the "Fighter Fund." Dave Rice recently broke the club record. Unfortunately, no times are given. The Secretary is building a 42 in. span Empire flying boat, which will incorporate four motors driven through extension drives.

The BLACKHEATH M.F.C. are resuming flying on Epsom Downs as soon as conditions permit in the New Year, and a full 1941 programme is being prepared. Although at present it is impracticable to hold indoor meetings, these chaps are carrying on a correspondence scheme during the winter months, and are finding quite a bit of fun in consequence.

The OXFORD M.F.C. are finding things a bit more difficult this winter, having been unable to obtain a club-

room. (All small halls and rooms being crowded with evacuees with more coming in every day). What with floods, fog and snow, very little flying has been done, but the club has been pleased to welcome some ex-members, who packed up modelling for gliding, and have now returned to the fold. These chaps are co-operating with the local Home Guard, who are gaining a great deal of experience in judging height and distance with the help of the members.

The HINCKLEY M.A.C. held their fourth annual exhibition of models in November, the proceeds going to the "S.M.A.E. Fighter Fund." Six guineas resulted from this effort, which is very praiseworthy.

Another club to hold a model exhibition is the ILKES-TON M.A.C., the local Spitfire Fund benefiting to the extent of £38 6s. Here's hoping that they stage another one and let the S.M.A.E. fund benefit also! Since their last report three silver trophies have been acquired, and altogether this club seems to be progressing very well indeed.

The HAWICK A.M.C. are progressing steadily, membership now totalling 28. Unfortunately, the club "stores" has had to close down owing to lack of supplies, and it looks as though they'll start carving solids out of chunks of oak trees from now on! Pole flying is being tried out, times averaging around 30 seconds at the moment, but it is hoped to better this later on.

Should the EASTERN ENFIELD M.A.C. be unsuccessful in obtaining a suitable ground in readiness for the

spring, the Northern Heights club kindly offered them the use of their ground. This is a gesture, I am sure, that will be appreciated, and is one I can recommend to other clubs who could do quite a bit in this "help each other stunt." Mr. M. Wilson holds the club record flight at the moment with a time of 79.8 seconds, but it is hoped to beat this by a big margin during the coming season.

A large gathering was present to hear Mr. M. R. Knight giving his long awaited talk on "Controversial Items," or "Things I Do Wrong," at the NORTHERN HEIGHTS M.F.C. This talk was up to his usual high standard, and was illustrated with a very interesting model, which incorporated a single-bladed airscrew, twin fins, dihedralled tail-plane, mid wing, and a tricycle undercarriage. He discoursed on his reasons for using these, and also touched on the thorny subject of lifting tails. Another very interesting talk was given by Mr. C. R. Clarke on the working of the Observer Corps. Flying has been somewhat hampered by the weather recently, while a line of poles across the centre of the field does not encourage members to fly good models!

The LOUGHBOROUGH COLLEGE SCHOOL M.A.C. held a very successful exhibition, and we are promised a photograph for the next report. I am asked to correct a mistake which appeared in last month's report, the secretary's name and address being Mr. G. T. Magre, 98 Beacon Road, Loughborough.

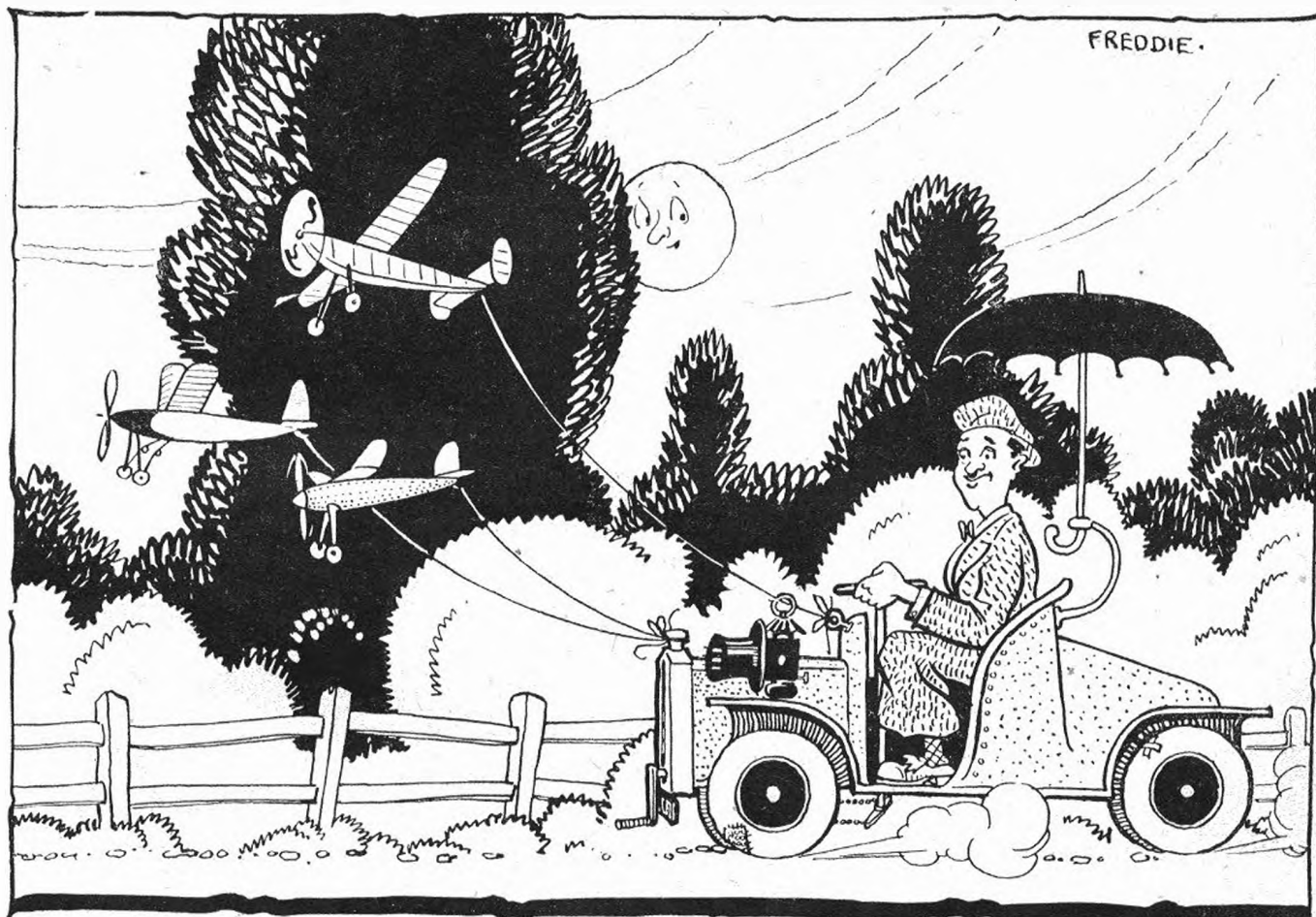
The ALDENHAM SCHOOL M.A.C. have effected affiliation to the S.M.A.E., and due to their report in the

Christmas Number have enrolled quite a number of new members, including some ex-members of the Watford club, which has suspended operations.

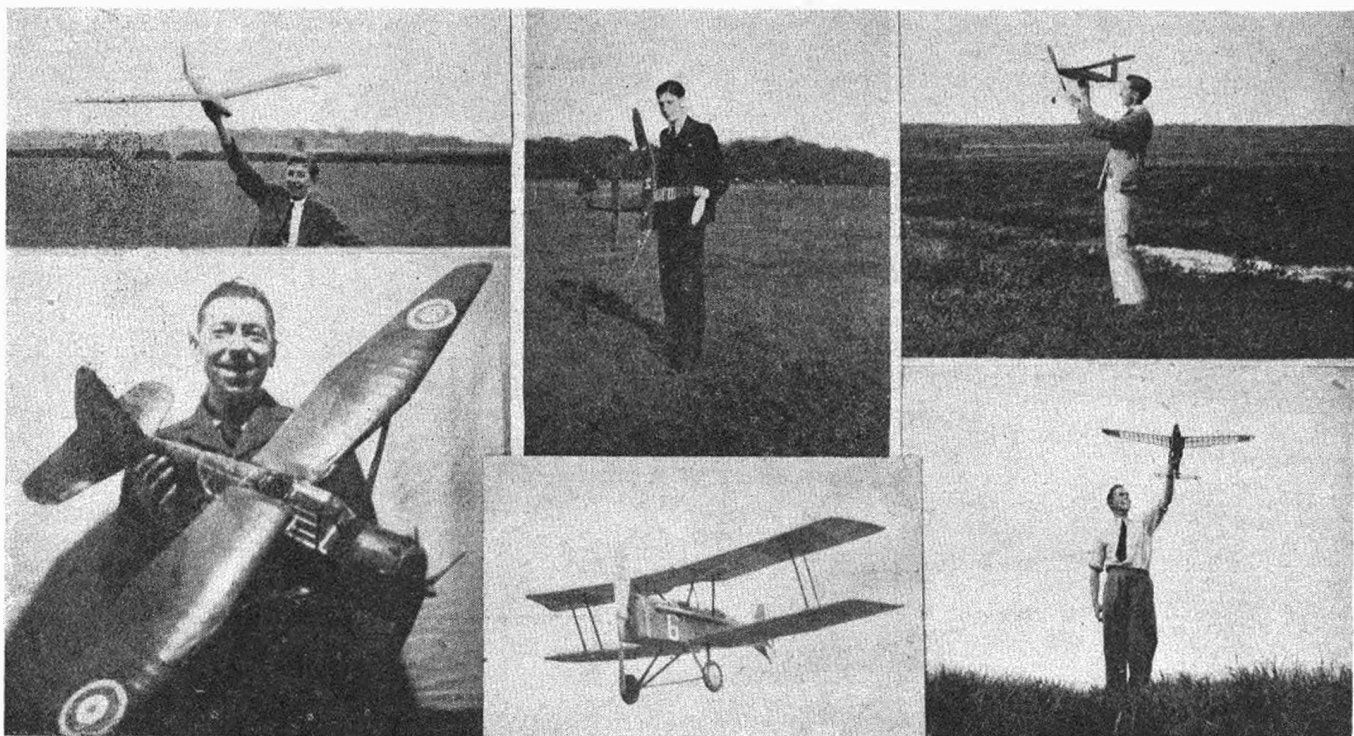
The LEICESTER M.A.C. are holding regular indoor meetings at the Alderman Newton Boys' School, although attendance has not been as good as expected. At the last meeting G. E. Dunmore set the indoor record at 104 sec., flying the model described in the December issue.

The WALTON AND D.M.F.C. are negotiating for affiliation to the S.M.A.E., and are preparing a comprehensive programme for the new season. This club has been completely reorganised, and fortnightly meetings are held at the Old Cottage Café. At a general meeting held on December 15th, the old club was wound up and prizes for the past season presented. Mr. M. Gale won the President's Cup for the longest duration, with a time of 8 min. 30 sec., this also being the club record. V. Clarke bagged both the Glider Cup and Light-weight prizes, the latter being a very posh dart board! This club has built a 6 ft. span Spitfire, enlarged from AERO-MODELLER plans, with which they hope to rake in a hefty pile of shekels for the "Fighter Fund." This model is offered on loan to any other club who might care to use it at an exhibition, application being made to Mr. M. Gale, Old Manor House, Shepperton-on-Thames, Middlesex.

Although the palmy days on Fairey's Aerodrome are no more, the HAYES AND D.M.F.C. refuse to die, and are



FREDDIE SOLVES THE PETROL SHORTAGE PROBLEM



(Top, left to right) Mr. Cameron, of the Wirral M.A.C., with his model that took second place in the Thurston Cup with a time of 256.6 secs. Mr. Pankhurst, of the Liverpool M.A.C., with his "Korda." Mr. Wilson, of Poole, flying on a nice field—all complete with pitfalls for the unwary!
 (Bottom, left to right) A/C. J. Palmer, with his 50 in. span Lysander. A well-built S.E.5 by Mr. Corkhill, of Liverpool. K. G. Taylor, of the Oxford M.F.C., about to launch his King Peter Cup glider.

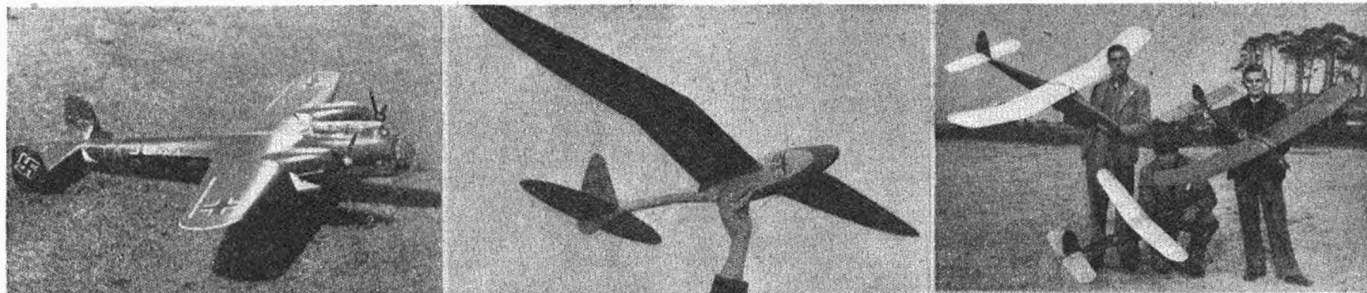
carrying on with a few but very active members on Chobham Common. They claim considerable technical progress, particularly with large gliders. Their "fly-away" losses to date are two 7-footers by A. H. Wilson, and one 9-footer by W. Gurney (pre-ban, of course). Other models have been away for days, and one came back after six weeks. They find their gas model experience very useful when designing these big gliders, and are looking forward to once again competing with the continental cracks. (I can strongly recommend gliding to any petrol enthusiast who is at a loose end: it is very instructive and interesting). In the rubber-driven sphere they have had a number of successes in open events, and also won the Bedfordshire Cup. Folding propellers, shifting C. of G., floating symmetrical tails, and high-powered climb have all received attention, so 1940 has not been wasted after all.

The LIVERPOOL M.A.C. welcome the innovation of decentralised R.T.P. competitions, as they have found a tremendous amount of interest in this branch of flying.

The CARNOUSTIE M.A.C. are struggling along in spite of the majority of their senior members being called up, and on Home Guard duties, etc. The committee consists now of boys about 16 years of age, but my experience proves that age is no bar to keenness, and I wish them the best of luck.

Well, that's all for this month; quite a few reports unfortunately, but let's hope I hear more of you from now onwards. With best wishes to all clubs and members for the New Year.

"THE CLUBMAN."



(Left) A 1/72 scale Do.215, built by Mr. Truster, of the Northern Heights M.F.C. This tiny model is fitted up with cabin lights, controls, etc.
 (Centre) Another of Mr. Truster's models—a modified "Phantom" of 6 ft. span.
 (Right) Messrs. Gurney, Wilson and Wilson, of the Hayes and D.M.A.C., with some useful looking gliders.

Small Traders' Announcements

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

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

BLACKPOOL.—The Sports Shop, 4 Palladium Buildings, Waterloo Road, Blackpool. Remember to buy your supplies of Balsa Wood, Cement, "Cloucraft," "Airyda," "Tower." Kits, Dopes, from The Sports Shop, Waterloo Road, Blackpool.

BROMLEY.—H. E. Hills & Son, 481 Bromley Road, Downham, 646 Downham Way, Bromley. (Phone HIT. 4197). Model aeroplane supplies. Dozens of kits, plenty of spares, miles of balsa. Complete kit of parts and plan for Copland's Wakefield, 21s. post free.

CHISWICK, W.4.—A. A. Baker, 526 High Road. Large selection of Atlanta, Aeromodels, Cloud, Club, Comet, Keelbild, Swyleada, Truscale, Veron, Kits, etc. Large stock of propellers and all accessories. Agents for Hobbies. Phone Chiswick 3816.

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

DAGENHAM.—V. Cowing Ltd., 157 Broad Street, for Flying Scale, Duration and Solid Kits, by Keil Kraft, Cloud, Skylead, Studiette, Veronite, Chingford, etc. Balsa, Stripwood, Joyplane Dopes, Cements, Japanese Tissue, Ball Races, etc., also Ship Kits. Fresh stocks now in.

DUMFRIES.—Campbells, 46 High Street. Send for our free lists all model aeroplane kits, balsa wood and sundries. Largest stockists in Scotland. Frog, Penguin, Airyda, Scalecraft, Truescale, Star, C.M.A., Veronite.

DUMFRIES.—Campbells, 46 High Street. Still a few Christmas Numbers, AERO-MODELLER. Post free for 1s. 8d. All Model Aeroplane Books in stock.

EDINBURGH.—"Calling all aero-modellers." Whatever your requirements Frank Royle, 54 South Clerk Street, is at your service. Fullest range of kits, balsa wood, accessories.

EDINBURGH.—Everything for the aero-modeller. All the leading models stocked. Joy-plane cements, dopes, Japanese tissue, ball races, etc. Wade & Co., 40 Chambers Street.

GUILDFORD.—Model Aircraft Stores have all the latest kits, spares, and accessories. Dopes, Cements stocked for Skylead, Keil Kraft, Atlanta, Aeromodels, etc. All goods sent C.O.D. 107/8 Woodbridge Road, Guildford.

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

CATON LIMITED

Manufacturers of

SUPER-POWER AERO STRIP

regret to state that their premises at 1 Mermaid Court, Boro', S.E.1, were completely destroyed by enemy action on December 29th last.

Fortunately, supplies of our strip, lubricant and wheels were in the process of manufacture elsewhere, and these are now becoming available for urgent orders.

Will customers please continue to address orders and correspondence to **1 MERMAID COURT** until we are able to announce our new London address.

HERNE HILL, S.E.24.—For all model aeroplane supplies, Cloud, Keil Kraft, Skylead, Keelbild, Studiette, Veronite. All accessories. Postage 6d. extra. Satisfaction guaranteed. —T. W. Standivan, 10 Milkwood Road.

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LEICESTER.—Aero-Modellers! C. Farmer can supply all your requirements. Kits, balsa, tissue, propellers, wheels, dope in bottle or sold loose, wire, cement. Caton's rubber, etc. Call and have a chat. The address is 183 Green Lane Road (phone 27722). Also THE AERO-MODELLER in stock.

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

STOCKPORT'S Aeromodel Shop.—All materials and accessories in stock. Large range of kits—Frog, Cloud, Studiette, KeilKraft, 'Drome, Tower, Chingford, etc. 54 Wellington Road South.

WARRINGTON.—Burton's Model Aero, 55 Bewsey Street. Good stock kits all prices and makes, Balsa Wood and all accessories. Books for the aero-modeller.

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

WEST DRAYTON.—Sipson, 45 Sipson Way, Spencer's (Cycle, Radio, Cloud, Atlanta, Skylead, Keil Kraft, C.M.A. Solids, Accessories, Dopes, Cement, Tissue, Balsa Woods, etc. Phone West Drayton 2357.

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WANTED.—3 cc. PETROL ENGINE with coil and condenser. Must be in good condition.—Apply to: T. Walters, 14 Edward VII Avenue, Newport, Mon.

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A. J. HOLLADAY & CO. LTD.,
c/o Cotman Hooper & Co.,
10 Coleman Street,
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PRO FORMA

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Whereas NATIONAL GUILD OF AERO-MODELLISTS, per DUDLEY SHIP, Esq., hon. secretary, of 44 Holdenhurst Road, Bournemouth, for and on behalf of its members (hereinafter called "the Assured"), have paid £..... Minimum and Initial Premium or Consideration to Us, who have hereunto subscribed our Names to Insure against Loss as follows:—

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2. Damage to property actually the Insured Member(s) own or in the Insured Member(s) custody or control.
3. Injury or damage directly or indirectly caused by accidents occurring outside the limits of the United Kingdom.
4. Loss or damage or any liability directly or indirectly occasioned by, happening through or in consequence of war, invasions, act of foreign enemy, hostilities (whether war be declared or not), civil war, rebellion, revolution, insurrection or military or usurped power.

PROVIDED THAT:

1. In addition to Compensation as above, the Underwriters agree that, in the event of their requiring any claim to be contested by the Insured Member(s), they will pay all costs, charges and expenses in connection therewith subject nevertheless to the following conditions:

(a) If the claim is successfully resisted by the Insured Member(s), they will pay all costs, charges and expenses incurred by the Insured Member(s) in connection therewith up to but not exceeding the sum insured under this Policy.

(b) If a payment exceeding the sum insured has to be made to dispose of a claim, the liability of Underwriters to pay any costs, charges and expenses in connection therewith shall be limited to such proportion of the said costs, charges and expenses as the sum insured by this Policy bears to the amount paid to dispose of the claim.

2. The liability of Underwriters shall not exceed the sum of £5,000 (five thousand pounds) in respect of any one accident or series of accidents arising out of any one event, and is unlimited in respect of any and all accidents occurring during the currency of this Policy, except that the Underwriters shall in addition pay all legal and other costs incurred with their consent in the defence of any claim made against Insured Member(s), but subject to provision No. 1 above.

SCHEDULE

Basis on which the premium paid by the Assured is to be adjusted:

On the total membership of the assured Guild during the currency hereof, it being understood that the said Guild comprises two classes, i.e. (1) Members who fly rubber-driven model aircraft. (2) *Members who fly petrol-engined model aircraft: during the period of 12 months commencing with the first day of February, 1941, and ending with the last of January, 1942, both days inclusive, and for such further period or periods as may be mutually agreed upon.

If the Assured shall make any claim knowing the same to be false or fraudulent, as regards amount or otherwise, this Policy shall become void, and all claims thereunder shall be forfeited.

How know We, that We the Underwriters do hereby bind Ourselves, each for his own part, and not one for Another, our Heirs, Executors, and Administrators, to pay or make good to the Assured or to the Assured's Executors, Administrators, and Assigns, all such Loss or Damage as aforesaid as may happen to the subject matter of this Insurance, or any part thereof during the continuance of this Policy; such payment to be made within Seven Days after such Loss is proved and that in proportion to the several Sums by each of Us subscribed against our respective Names not exceeding the several Sums aforesaid. **In Witness** whereof We, Underwriting Members of Lloyd's, have subscribed our Names and Sums of Money by Us insured. Dated in London, the

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CONDITIONS

(1) This Policy is subscribed subject to the Conditions contained herein or endorsed hereon, all of which are to be deemed Conditions precedent to the liability of the Underwriters.

(2) If after the Insurance has been effected the risk be materially increased without the assent of the Underwriters the Insurance shall be void.

(3) Upon the happening of any occurrence likely to give rise to a claim under this Policy and/or upon the receipt by the Insured Member(s) of notice of any claim or of any other subsequent proceedings, notice in writing, with full particulars, shall be given to the Underwriters as soon as possible after same shall come to the knowledge of the Insured Member(s) or the Insured Member's representative.

Every letter, claim, writ, summons or process shall be forwarded to Underwriters immediately on receipt by the Insured Member(s).

N.B.—It is agreed that "Notice" as specified above, may be given by the Insured Member(s) through his (their) Agent, Dudley Ship, Esq., c/o THE AERO-MODELLER Office, Allen House, Newark Street, Leicester.

(4) No liability shall be admitted and no admission, arrangement, offer, promise or payment shall be made by the Insured Member(s) without the written consent of Underwriters, who shall be entitled, if they so desire, to take over and conduct in the name of the Insured Member(s) the defence of any claim or to prosecute in his (their) name for their own benefit any

claim for indemnity or damages or otherwise against any third party, and shall have full discretion in the conduct of any negotiations or proceedings or the settlement of any claim, and the Insured Member(s) shall, whenever possible, give all such information and assistance as Underwriters may require.

(5) If any claim under this Policy is also covered in whole or in part by any other Insurance, the liability of Underwriters shall be limited to their rateable proportion of such claim.

(6) The Underwriters may, by a Registered Letter sent (by or on the instructions of the Underwriters) to the Assured's last known address, give 10 days' notice of their intention to cancel this Policy, such notice to take effect from midnight of the day following that upon which the letter is posted, and no liability shall attach hereto in respect of any accident occurring after the expiration of such notice. On the expiration of such notice of cancellation the Underwriters shall on demand return to the Assured a proportion of the premium corresponding to the unexpired period of this Policy.

(7) The Insured Member(s) shall and will at all times exercise reasonable care in seeing that appliances used are substantial and sound, and in proper order, and fit for the purposes for which they are used, and that all reasonable safeguards and precautions against accident are provided and used.

*** This part of the insurance is invalid during the existence of the Air Ministry's bar on the flying of petrol planes.**