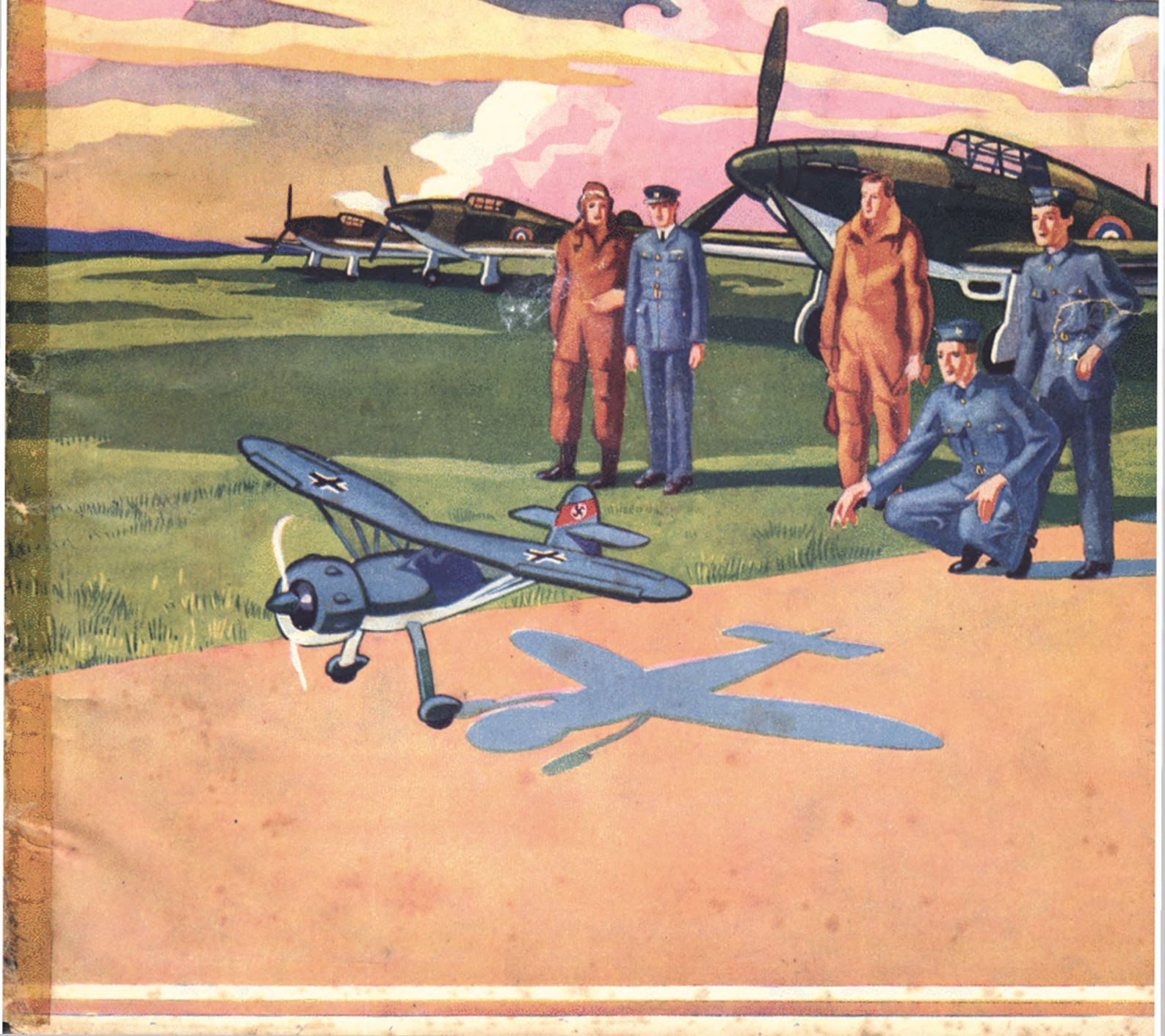
AERO MODELLER

APRIL — 1941
VOL 6. No. 65
NINEPENCE



Digital Edition Magazines.

This issue magazine after the initial original scanning, has been digitally processing for better results and lower capacity Pdf file from me.

The plans and the articles that exist within, you can find published at full dimensions to build a model at the following websites.

All Plans and Articles can be found here:

Hlsat Blog Free Plans and Articles.

http://www.rcgroups.com/forums/member.php?u=107085

AeroFred Gallery Free Plans.

http://aerofred.com/index.php

Hip Pocket Aeronautics Gallery Free Plans.

http://www.hippocketaeronautics.com/hpa_plans/index.php

Diligence Work by Hlsat.

THE AERO-MODELLER

ALLEN HOUSE

NEWARKE STREET, LEICESTER, ENGLAND

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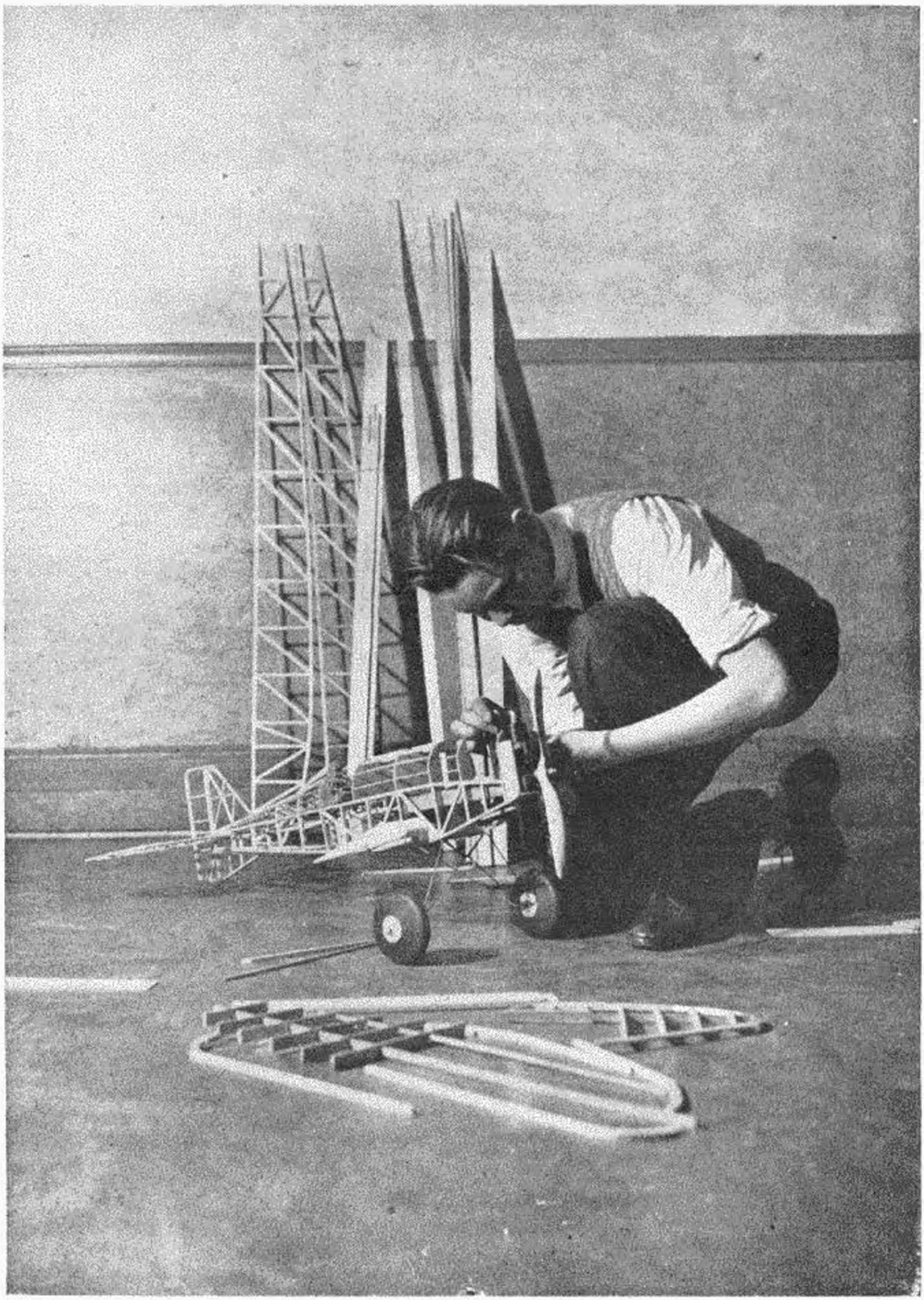
FROM AMERICA . . .



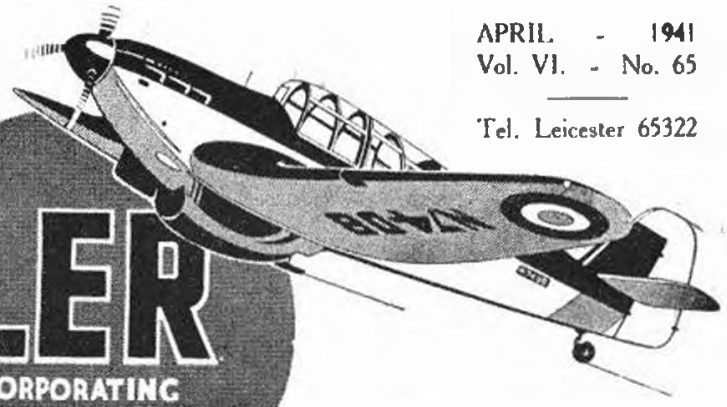
Our photograph shows an American petrol "fan" at work on the engine installation of the well-known SE 5.

The AERO MODELLER

INCORPORATING "THE MODEL AEROPLANE CONSTRUCTOR"

APRIL - 1941
Vol. VI. - No. 65

Tel. Leicester 65322



Editorial

LAST month we commenced our Editorial by pointing out that we had received over 100 letters with postal orders for plans, the senders of which had omitted to state their names and addresses. We are still receiving postal orders and letters without this vital information, and once again we plead with our readers to be more careful when ordering plans, as it only leads to disappointment to them and a lot of extra work for us, when this is not sent.

Now we have another little grouse!

Last month an announcement was made of an "Aircraft Identification" Competition, organised by the Harborough Publishing Company Limited in connection with their latest publication, "Aircraft of the Fighting Powers." On page 146 of THE AERO MODELLER a full set of rules was published, No. 13 thereof clearly stating that *all three* entry forms (those for Sections 2 and 3 being obtainable from the April and May issues of THE AERO-MODELLER) were to be posted in *one* envelope.

So far we have received about 25 entries, consisting solely of the entry form for Section 1!

Once again we have been put to trouble and expense by returning these entries to competitors, and asking them to hold them until they have completed Sections 2 and 3 of the competition, when they can then post all three entry forms in one envelope, in accordance with the rules of the competition!

From many quarters we have received letters expressing approval and great interest in this competition, and undoubtedly there will be many thousands of entries to be judged.

On page 208 of this issue appears the second group of photograph "cuttings" for identification, whilst the schedule of 'planes from which the photographs have been selected is printed on page 218. No. 2 entry form is printed on the back inside cover of this issue, and must be retained, *together with entry form No.* 1, until they can both be sent in *with entry form for Section* 3, which will be printed in our May issue.

We hear from Mr. Furneaux.

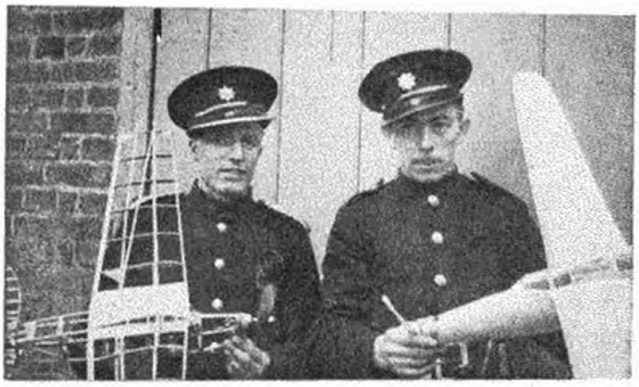
At the end of our last editorial we invited Mr. Furneaux to reply to the letters we had published in our March issue in response to his letter published in our February issue. Our invitation was *not* communicated by a covering letter to Mr. Furneaux but was addressed to him through the medium of our Editorial only . . . and it is gratifying to note that, despite his criticisms of THE AERO-MODELLER, he still buys the journal, as witness the fact that he spotted our invitation! Mr. Furneaux's reply is very interesting, but lack of space prevents us from publishing it this month, and it will duly appear in our next issue. We may say that Mr. Furneaux has taken "what was coming to him" in quite a sporting way!

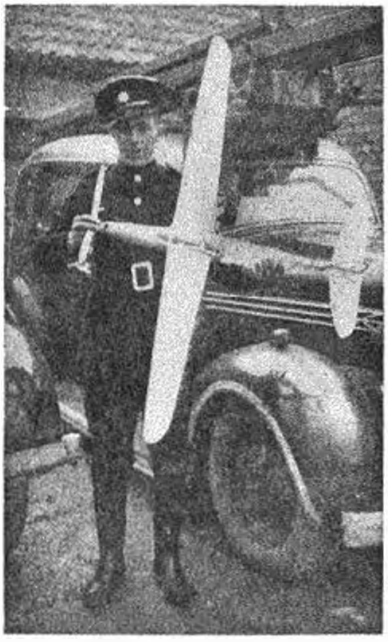
Correspondence in regard to this matter has, of course, continued to come in, and includes a letter from a wretched individual named K. Fish, who contends that "everyone is capable of enlarging plans" and that "the organisers of the S.M.A.E. are nasty old fogeys who 'natter' about aerodynamics and such topics, whilst in reality they are a lot of dense nincompoops." Fish invites us "to print this criticism, if you dare." Well, we dare, and *our* name and address are published in each issue of this journal. Fish evidently has different views on letter writing, and took the precaution of tearing his address off his letter before he sent it to us. However, we see that it was posted in Bury, Lancashire, which seems rather hard on Lancastrians!

Our Readers' Views.

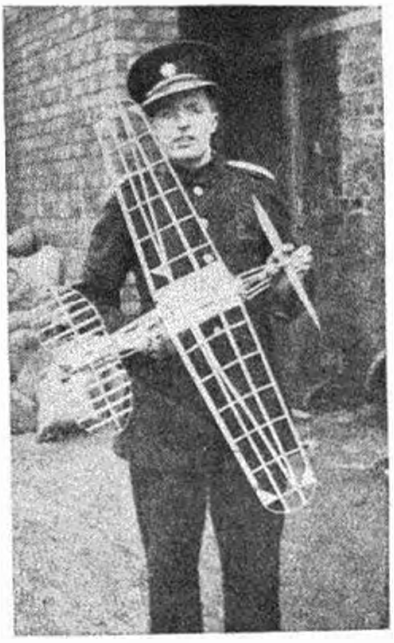
Arising out of the correspondence over the "Furneaux incident," some very interesting opinions have been put forward in regard to the style in which we present plans of model aircraft.

Inevitably we get a considerable number of extreme views. There is a strong body of feeling in favour of plans being drawn out full size and occupying five, six or seven pages; an *equally strong* body of readers object to this, since it means mutilating their copies of THE AERO MODELLER to paste up the plans. Quite naturally, *these* readers are willing to pay for the plan of the model drawn out full size. Another body of readers say they are quite content for plans to be in several different scales, i.e. the wing section full size and the wing plan and fuselage a quarter or one-third full size. Generally, there is approval of our policy of providing a fairly wide range of full size plans and printing reduced scale plans to fit one or two pages of the journal. A number of readers have criticised the smallness of the 'planes we have described, to which we would offer the reminder that we have been passing through the *winter* months and that under *war time* conditions many aero-modellers have had to confine their flying activities to large





The top photograph shows P/O Perrott and A/F Batchelor with two of their models. These men are some of the "pioneers" of the aero-modelling movement in the Bexley Club.
At right is another photograph of A/F Batchelor with his "Dolphin" Wakefield model, built from AERO-MODELLER *plans.*



At left is another photograph of P/O Perrott with his TW 6 modified to take larger gear wheels, and with a bamboo tail unit (lack of balsa wood does not deter these enthusiasts!).
Below is A/F Laws with a high wing monoplane of his own design. This model is equipped with an experimental bomb-dropping gear, from which good results are being obtained.

rooms and meeting halls. However, spring is in the air, and we hope that the plans given in this present issue will suit all parties! First we have plans of a medium-sized glider drawn to full, one third and one-quarter scales. Then we have half-size scale plans for a flying scale model of the Henschel Hs 126. *and* the notice that a set of full-sized plans can be purchased for 3s. post free from our offices. Then we have 1/72 scale plans of a solid model, and finally an "out of the way" model, an old-timer, "A" frame twin-engined pusher," which conjures up memories of flying model aircraft during the last war! In our next issue we shall print plans of a well-known flying scale model, all items being drawn out full size, and therefore occupying several pages. There will also be drawings of a petrol 'plane. (We may fail to satisfy *all* our readers *all* the time, but never let it be said that we don't make a darn good try to please *some* of them *some* of the time).

Model Aircraft of the Fire Services.

Recent correspondence shows that interest is being taken in model aircraft by various war-time Services that have been developed during the past year. We hear that at many wardens' posts, observer posts and auxiliary fire stations, groups have been formed by enthusiastic aero-modellers. In some cases quite large organisations have been developed, great rivalry is shown between local and adjacent units. One of the first such groups to come into being was the Bexley Auxiliary Fire Service Social Group, of whom the hon. secretary is Mr. D. J. Dickson. We publish herewith some photographs recently received, which illustrate the wide range of model aircraft being constructed by members of this group. Enthusiasm is such that members have very soon passed from the "elementary stages," and one or two have tackled such difficult jobs as a twin-engined Blenheim driven by gearing, and a Viper II. In sending us these photographs Mr. Dickson refers in glowing terms to the services and co-operation he has received from various model aircraft firms in providing the wide range of material required for the last named model. Mr. Dickson says: "In

my brief experience of aero-modelling I must say I have never before found a group of people so willing to help one another—not only the amateurs but the actual retailers, who seem to have gone out of their way to give advice and assistance, with no conceivable "axe to grind"—a state of affairs not existing, I fear, in such hobbies as photography or chess, to cite my own experience." D. A. R.

A TOW-LINE GLIDER

By J. W. JACKSON

DURING the summer I was surprised to find how difficult it was to fly gliders in Torquay. Most days were windy, or else the wind was blowing out to sea. However, I decided to build a ship to fly in the highest breeze Torquay could offer. The result was a high efficiency glider, 40 in. span, and with a 20 in. moment arm. I have incorporated many new methods of construction in this model, and she conforms to S.M.A.E. fuselage formula of $\frac{L^2}{200}$.

Fuselage.

Construct two sides to the shape shown on plan, using $\frac{1}{8}$ sq. in. hard for longerons, and $\frac{1}{8}$ sq. in. soft for all bracing. Fill in nose with $\frac{1}{8}$ in. sheet, and tail with $\frac{1}{16}$ in. sheet. Take special care to get bracing running in correct direction as shown. This method of bracing produces a light but strong fuselage, which is hard to twist. Cut out top formers from $\frac{1}{8}$ sq. in. to shape, cement one in position just behind belly, and cement the two sides together at the bottom for about 1 in. Let cement dry thoroughly, then work along the fuselage in 3 or 4 in. sections in both directions, cementing the seam at the bottom and putting in formers at the top. This method of building triangular fuselages is almost mechanical. When the two sides are completely joined, put in bracing and sheet balsa as shown. Finally, sheet the nose for the first 6 in. with $\frac{1}{16}$ in. soft sheet balsa. Use the very front section as a weight chamber and cover the hole with adhesive tape. Hook is 18 s.w.g. bound and cemented to bottom of fuselage.

Wing.

Make a wing section template from $\frac{1}{16}$ in. 3-ply, then cut out top and bottom ribs from $\frac{1}{16}$ in. hard sheet, indoor fashion, $\frac{1}{10}$ sq. in. in section. Cut $\frac{1}{4}$ × $\frac{1}{2}$ in. trailing edge and sand to section. Cut $\frac{1}{4}$ in. × $\frac{1}{16}$ in. spar from sheet. For the hollow leading edge cut two pieces of $\frac{1}{2}$ in. × $\frac{1}{32}$ in. and one of $\frac{1}{16}$ in. × $\frac{3}{8}$ in. Cement $\frac{1}{4}$ in. × $\frac{1}{32}$ in. pieces together to form a little triangle, then bevel edges of $\frac{3}{8}$ in. × $\frac{1}{16}$ in., and cement in place as indicated. The hollow leading edge is very light and strong and not very difficult to build. Pin the leading and trailing edges in position on the plan, cement top ribs in position and leave to dry. Build wing in two halves and cement together finally. Turn wing over and add bottom ribs, then slide spar into position and cement. Wing tips are laminated from six layers of $\frac{1}{8}$ in. × $\frac{1}{32}$ in. medium sheet bent round a cardboard template, cemented in position and sanded to section. The wing has 4 in. dihedral under its tip and is mounted on $\frac{1}{8}$ in. × $\frac{3}{8}$ in. sheet runners to slide along the fuselage. The leading edge should come to position marked by arrow when model is assembled.

Tail Surfaces.

Leading and trailing edges of elevator are solid; no spar is used, otherwise the construction is the same as the wing. The fins are seven laminations of $\frac{1}{8}$ in. × $\frac{1}{32}$ in. wrapped round cardboard template of shape shown on plan. The ring of balsa is sanded to section, notched to fit L and T edges and cemented in place. No struts are required if sufficient cement is used. Put ribs each side of the fins to take the tissue.

Covering.

Cover model with Japanese tissue. Let grain run parallel with wing ribs and parallel with leading edge on the top surface of elevator. The elevator is less likely to warp if grain of tissue is across chord on bottom and lengthwise on top. Water spray model and give it one coat of thick banana oil. No dope is necessary, and the usual effect of dope is to warp models, anyway. The complete model should weigh about 4½ oz.

Flying.

Assemble model with wing in indicated position, and weight nose till model glides correctly. Set rudders for slight right turn, then test out on winch. A glider can only be properly trimmed when it is flown from a tow-line. Good luck and happy landings with your models.

A set of scale drawings of this Glider are on pages 206-7, wing set sections are full-size, wing and tail plane are half full-size, and fuselage is 1/3 full-size.

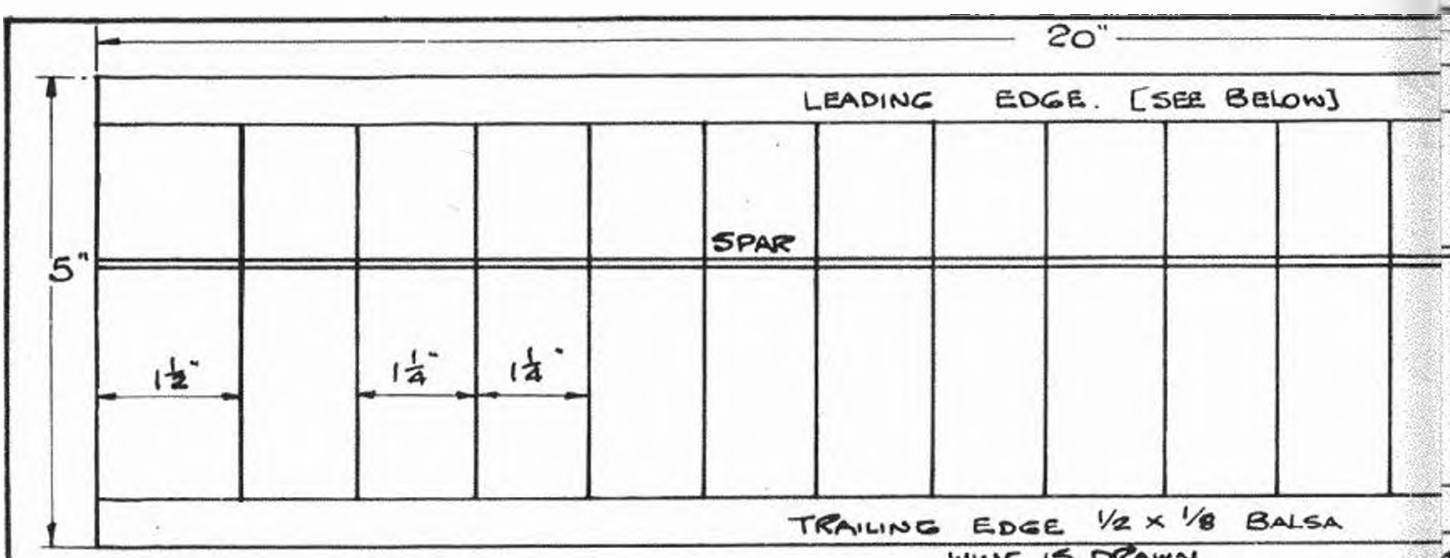
SECTION 2 OF THE "AIRCRAFT IDENTIFICATION" COMPETITION,

organised by The Harborough Publishing Co. Ltd., is on page 208. The schedule of planes is printed on page 218, the entry form is on the inside cover page.

FIRST PRIZE £50

Second Prize **£10**	Third Prize **£5**	Fourth Prize **£4**
Fifth Prize **£3**	Sixth Prize **£2**	Seventh Prize **£1**

The full set of rules and information in regard to this competition were published on page 146 of the March issue of "The Aero-Modeller."



WING IS DRAWN HALF FULL SIZE.

SEE ... FOR ... BUILD ... WING TIPS.

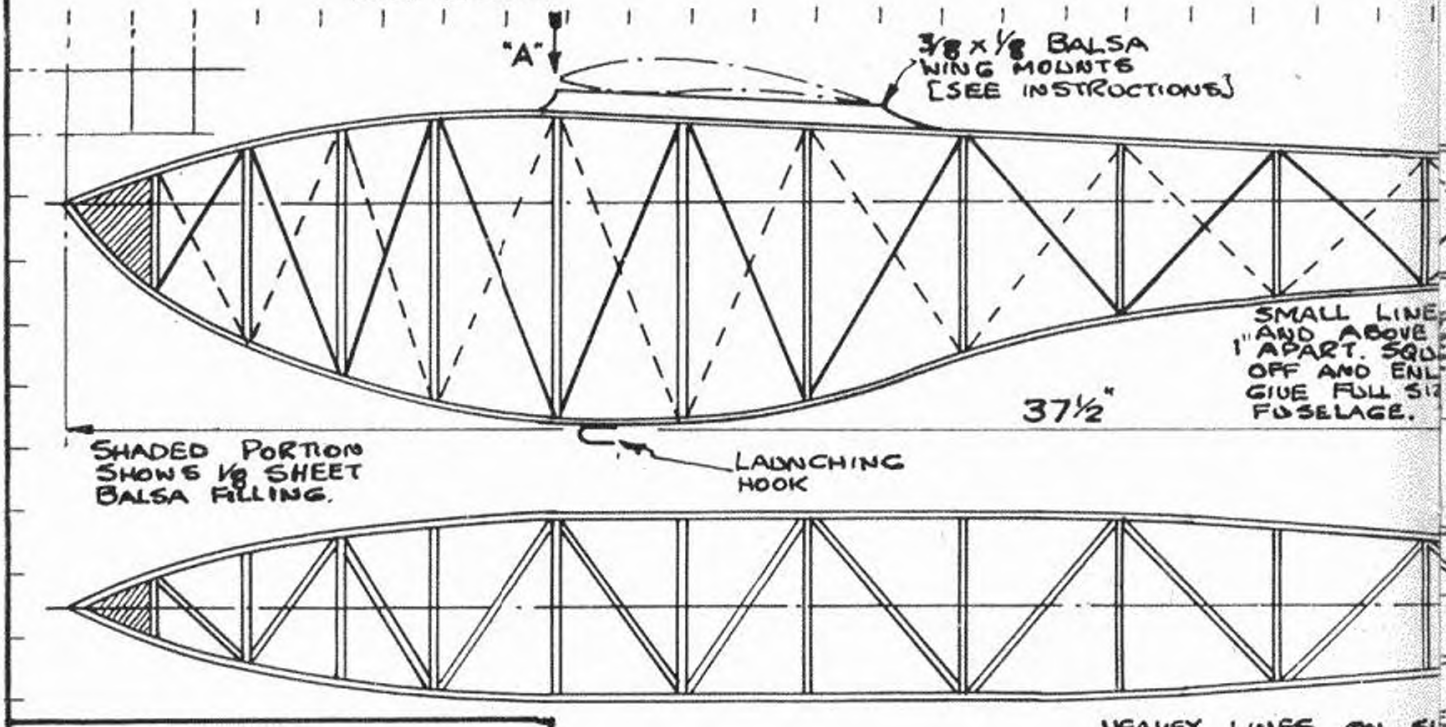
BUILT-UP LEADING EDGE USE ½ x 1/32 MED. BALSA.

FULL SIZE WING RIB. CUT TOP & BOTTOM SURFACES FROM 1/16 HARD BALSA.

RUDDER OUTLINE

SKETCH SHOWING METHOD OF BUILDING-UP RUDDER [SEE INSTRUCTIONS] RUDDERS ARE NOTCHED INTO LEADING EDGE OF TAILPLANE.

FULL SIZE TAILPLANE RIB. CUT TOP & BOTTOM SURFACES FROM 1/16 HARD BALSA.



TOW-LINE GLIDER

— DESIGNED BY —

J. W. JACKSON

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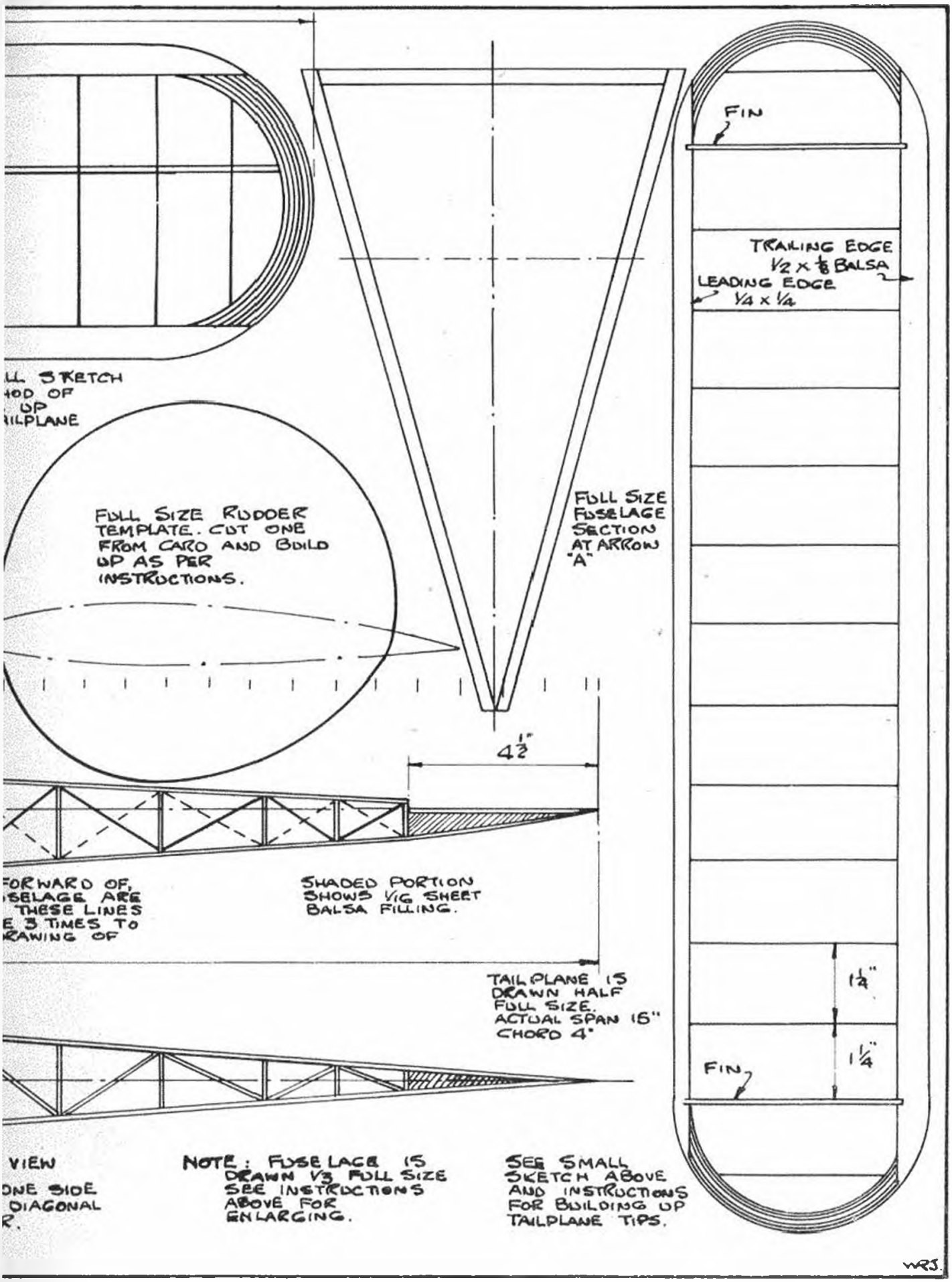
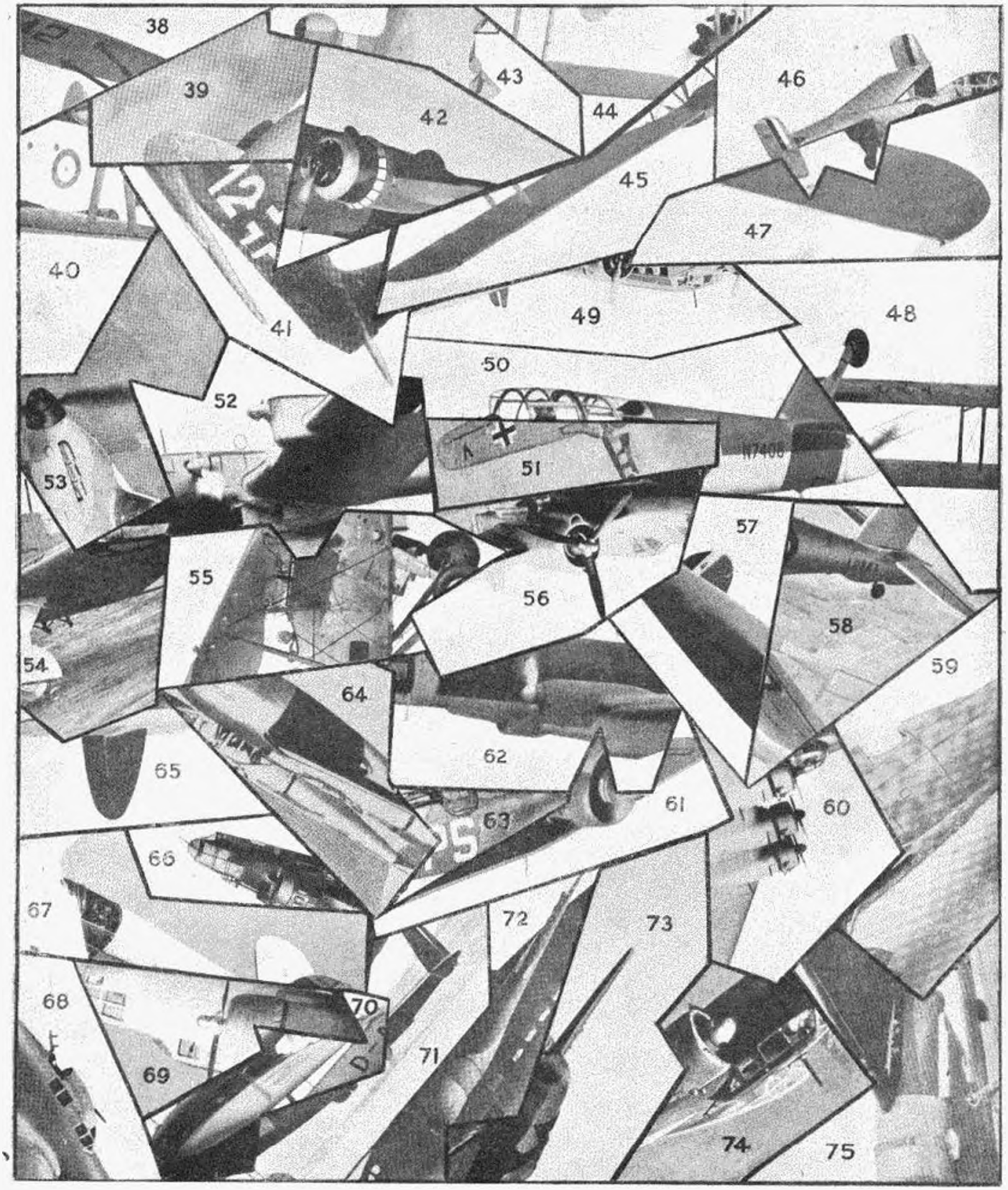

FIN
TRAILING EDGE
1/2 x 1/8 BALSA
LEADING EDGE
1/4 x 1/4
FULL SIZE RUDDER TEMPLATE. CUT ONE FROM CARD AND BUILD UP AS PER INSTRUCTIONS.
FULL SIZE FUSELAGE SECTION AT ARROW "A"
4 1/2"
SHADED PORTION SHOWS 1/16 SHEET BALSA FILLING.
TAILPLANE IS DRAWN HALF FULL SIZE. ACTUAL SPAN 16" CHORD 4"
1 1/4"
1 1/4"
FIN
NOTE: FUSELAGE IS DRAWN 1/3 FULL SIZE SEE INSTRUCTIONS ABOVE FOR ENLARGING.
SEE SMALL SKETCH ABOVE AND INSTRUCTIONS FOR BUILDING UP TAILPLANE TIPS.
WRJ

"AIRCRAFT IDENTIFICATION"—Section 2



RUBBER

By R. H. WARRING

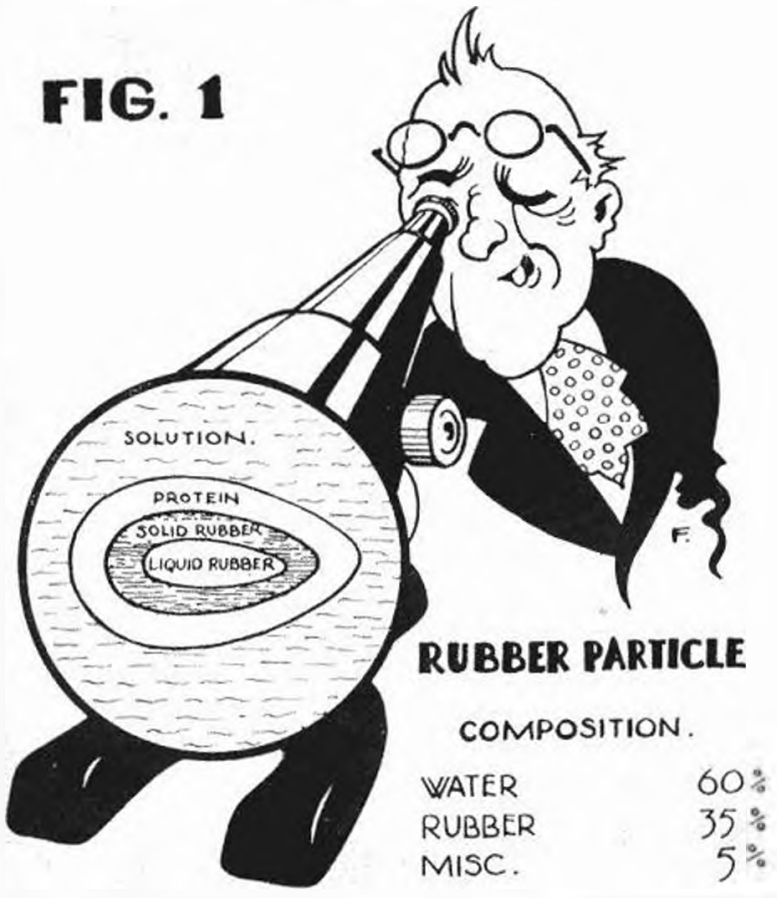
Illustrated by "Freddie"

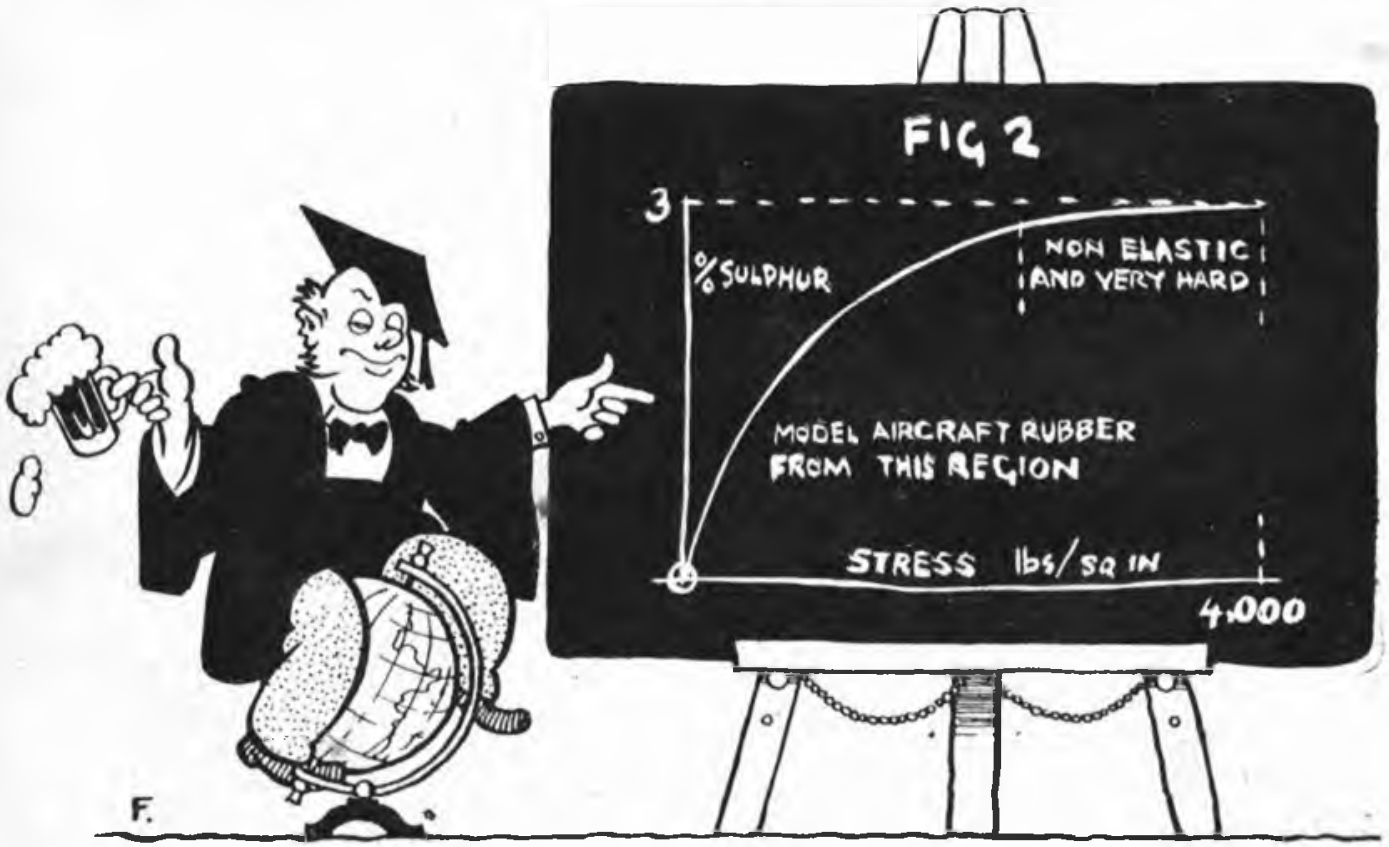
IN view of the enormous quantity of rubber consumed (not literally) by the average aero-modeller, a word or two on the composition and preparation of this substance would perhaps not be out of place. I do not claim that this article will reduce the number of broken motors, but, if by reading it one solitary aero modeller is converted to treat his motors with care and respect, it will have achieved its purpose.

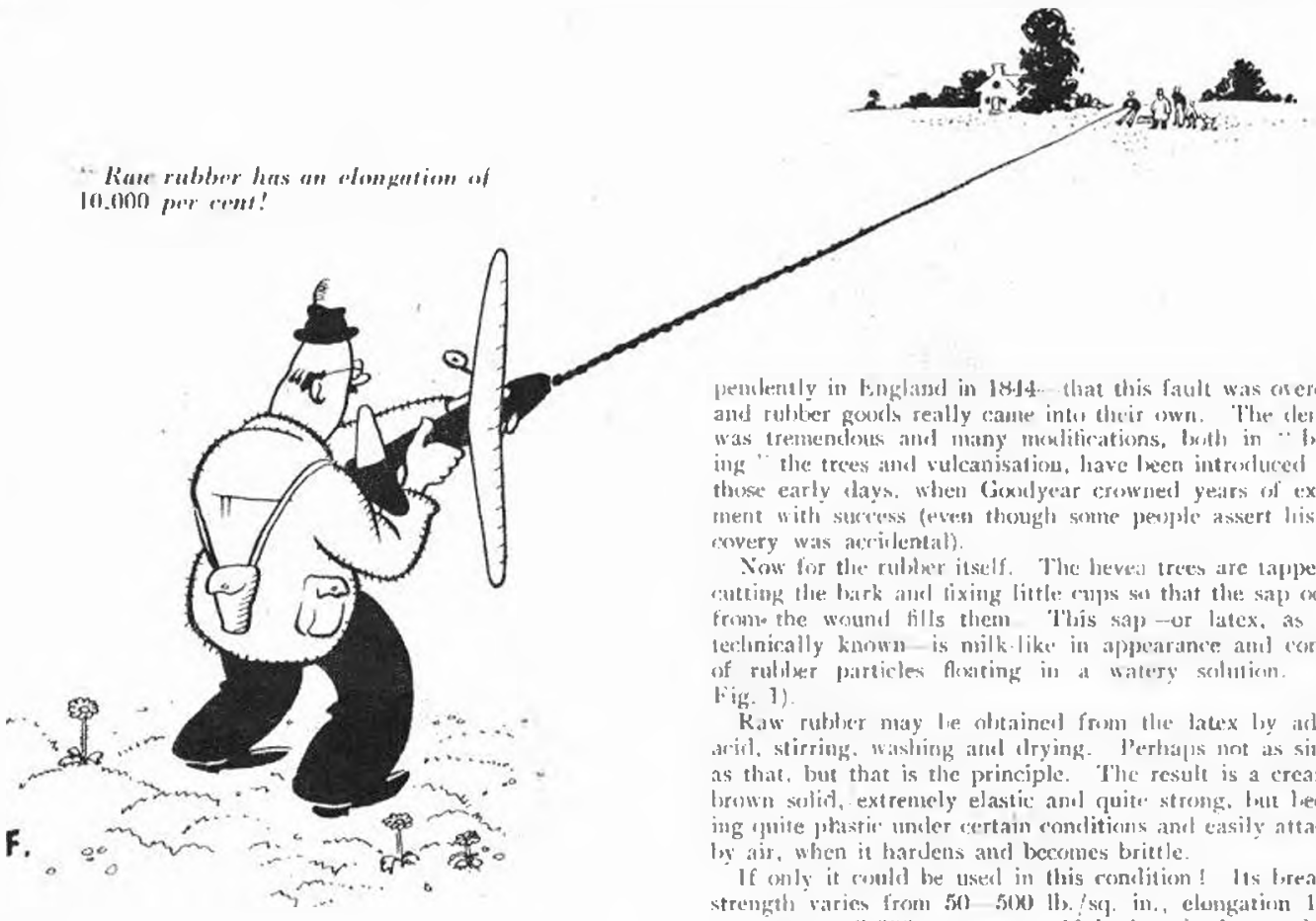
Starting 'way back in the early sixteenth century, we find the first mention of rubber in the form of rubber balls and crude ornaments used by the Mexicans. It was not until about 1770, however, that any particular interest was taken in it by the "civilised" world, when enquiries showed that the milky white liquid obtained from the hevea tree coagulated and hardened on exposure to air. It could be made into certain serviceable articles such as shoes, etc., but suffered from the defect that it perished quickly.

It was not until vulcanisation was discovered by Goodyear in America, 1839, and Hancock inde-

FIG. 1







" Raw rubber has an elongation of 10,000 per cent!

pendently in England in 1844—that this fault was overcome and rubber goods really came into their own. The demand was tremendous and many modifications, both in " bleeding " the trees and vulcanisation, have been introduced since those early days, when Goodyear crowned years of experiment with success (even though some people assert his discovery was accidental).

Now for the rubber itself. The hevea trees are tapped by cutting the bark and fixing little cups so that the sap oozing from the wound fills them. This sap—or latex, as it is technically known—is milk-like in appearance and consists of rubber particles floating in a watery solution. (See Fig. 1).

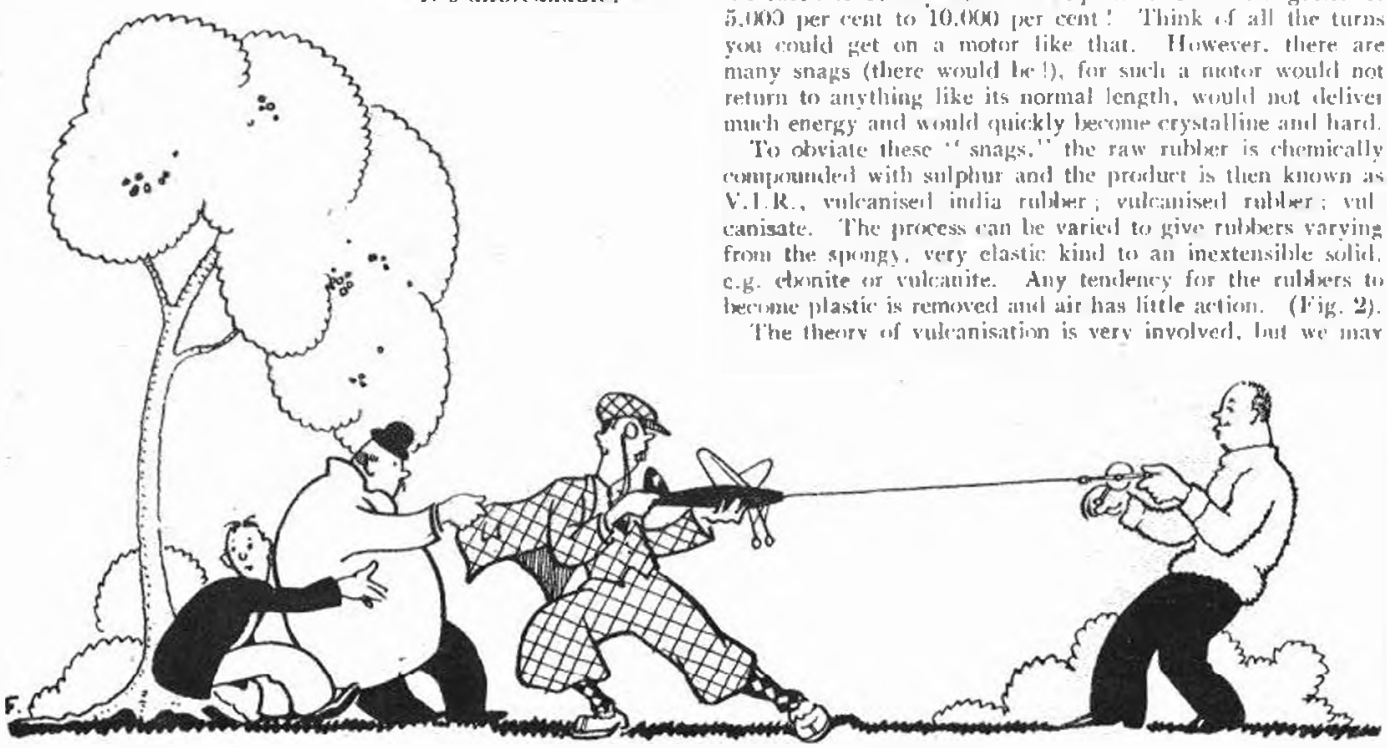
Raw rubber may be obtained from the latex by adding acid, stirring, washing and drying. Perhaps not as simply as that, but that is the principle. The result is a cream or brown solid, extremely elastic and quite strong, but becoming quite plastic under certain conditions and easily attacked by air, when it hardens and becomes brittle.

If only it could be used in this condition! Its breaking strength varies from 50—500 lb./sq. in., elongation 1,000 per cent to 2,000 per cent. If broken in by gradually increasing the elongation, in the same way as we normally break a motor in before use, the breaking strain may be increased to 1,000—2,000 lb./sq. in. and the elongation to 5,000 per cent to 10,000 per cent! Think of all the turns you could get on a motor like that. However, there are many snags (there would be!), for such a motor would not return to anything like its normal length, would not deliver much energy and would quickly become crystalline and hard.

To obviate these " snags," the raw rubber is chemically compounded with sulphur and the product is then known as V.I.R., vulcanised india rubber; vulcanised rubber; vulcanisate. The process can be varied to give rubbers varying from the spongy, very elastic kind to an inextensible solid, e.g. ebonite or vulcanite. Any tendency for the rubbers to become plastic is removed and air has little action. (Fig. 2).

The theory of vulcanisation is very involved, but we may

" It's unbreakable! "



take it that a complex change occurs, the hydrocarbon molecules polymerising, clinging together and mixing with the sulphur molecules, both chemically and physically. As for the actual ingredients used during the process, they are many and varied, but may be divided into four groups, although these overlap.

Metallic oxides, known as *fillers*, are employed as catalysts, to accelerate the process of vulcanisation. Carbon black, zinc oxide, china clay and lithage may be added to induce toughness and increase the tensile strength. Chalk "deadens" the rubber and is also added for cheapness, but renders the rubber more or less useless for model aircraft work. By this I was not referring to French chalk in which rubber is usually dusted, but chalk added to the rubber during the process of vulcanisation, and subsequently mixing with it. I should hate anyone to think that I am condemning the time-honoured method of storing rubber!

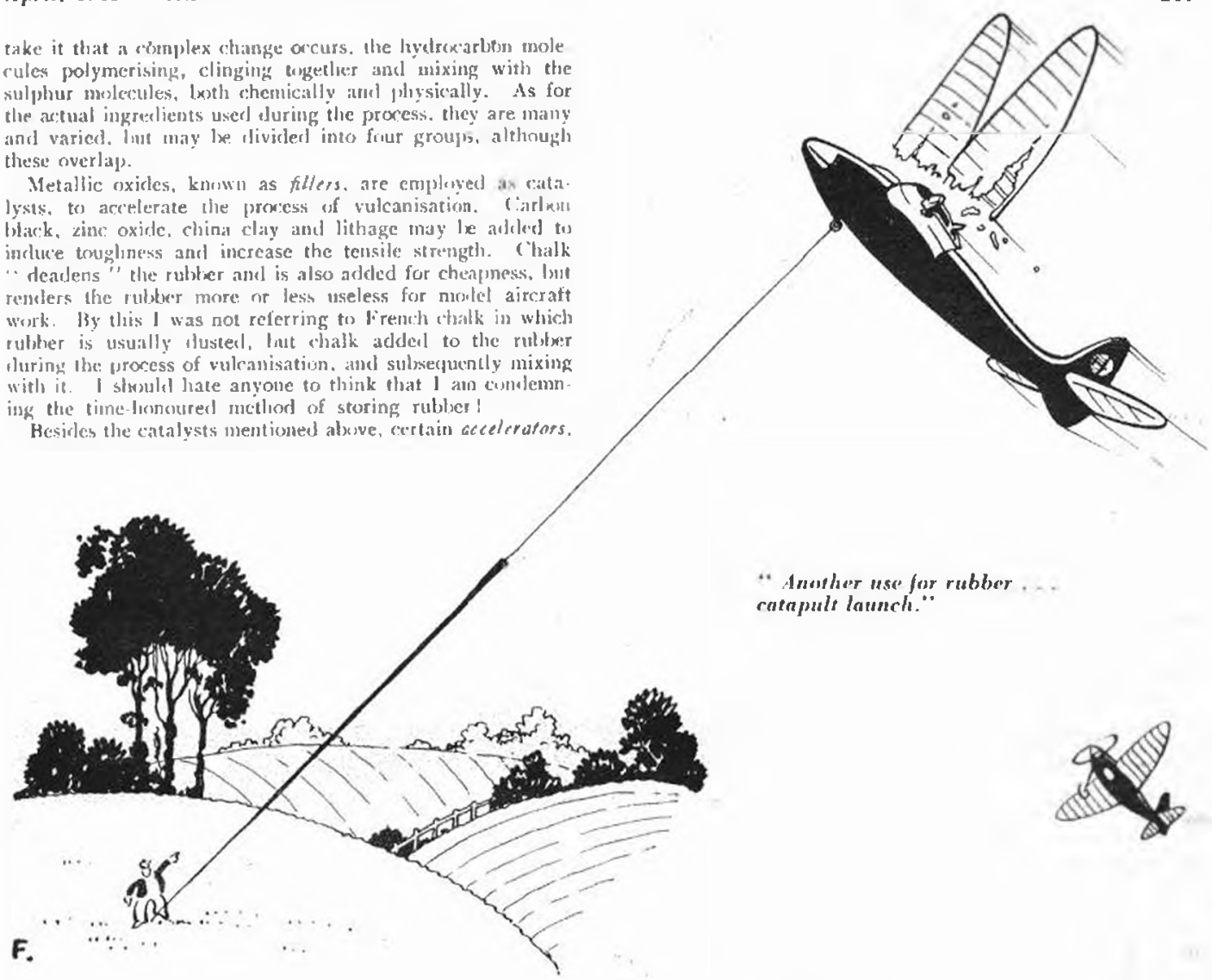
Besides the catalysts mentioned above, certain *accelerators*, e.g. lithage and complex alkaline compounds with sulphur, hasten the process, reducing both the time and temperature necessary.

Softeners, in the form of paraffin-wax, tars and pitches, facilitate mixing with other substances.

Anti-oxidants minimise the amount of deterioration the air and any other oxidising agents may have.

Finally, all sorts of *miscellaneous* materials may be added, particularly in the case of cheaper rubbers. Reclaimed rubber, substitutes, linseed oil, glue and colouring material added. Once again the aero-modeller must be finicky and avoid such constituents, or rather, since he does not make his own rubber, insist on a good, well-tried brand!

The actual processes, very briefly explained, are as follows: Raw rubber, warmed and softened by passing through heated rollers under pressure, is mixed with the other ingredients, the sulphur being added last. The temperature is controlled and is not allowed to rise above a certain point. It is rolled to suitable thicknesses, cut and formed. Finally, it is enclosed in moulds and heated in steam to the vulcanising temperature for the requisite time.



"Another use for rubber . . . catapult launch."

"Flak! Rubber again!"

Small, thin-walled articles may be treated in a simple manner called the *cold cure* process. The article is dipped into a solution containing active sulphur or exposed to sulphur chloride vapour or a mixture of sulphur dioxide and hydrogen sulphide. Those of you who still retain faint memories of your sixth form chemistry will no doubt appreciate that active sulphur is present in the above cases, and thus readily reacts with the raw rubber and vulcanises it.

A modern process fairly recently introduced typifies the modern need of speed. In this the goods are prepared direct from the latex. The various compounds are introduced, forming a colloidal solution, and vulcanisation is carried out at a comparatively low temperature. Certain goods may even be "rubber-plated" and then so treated.

So much for the vulcanisation. The manufacturer's responsibility does not end here—in fact a large number of highly skilled technicians and chemists are engaged on tests and research, subjecting our rubber to a series of exhaustive tests, covering, briefly:

(i) Quantitative analysis.
(ii) Physical tests—
  (*a*) Elongation.
  (*b*) Hysteresis (or "energy losses.")
  (*c*) Ageing.
(iii) Specialised tests—depending upon what particular use the rubber in question is likely to be subjected to.

Now, I hope I have given you some idea of the complexity of rubber, and since this is the very heart of the model and the need of buying rubber from a reputable firm. The perfect rubber is still an aero modeller's dream. We know its requirements. Mr. Houlberg outlined them in his excellent article in a recent edition of THE AERO MODELLER, but the manufacturer is at present unable to meet our demands.

Until that day, then, we must expect that "broken strand" which is so irritating, and other peculiarities, but remember these unwanted incidents and broken motors can be almost entirely eliminated by proper care of motors and scientific experiment and research along the lines suggested by those articles on motors recently appearing in THE AERO-MODELLER.

If you think broken motors inevitable, think how many times the leading "flyers" have broken their Wakefield motor at, say, the trials. . . . Though they know the capabilities of their motors, know the maximum turns under the prevailing conditions, and get the best results.

A hint to finish with: Don't rely on formulae or charts for maximum turns. Find it by practical experiment, even though it does cost you a motor—it will pay in the end.

IMPORTANT NOTICE TO ALL "SOLID" MODELLERS—

There are now running two competitions: one for members of the AIR TRAINING CORPS, and the other for NON-MEMBERS. Full details and rules were printed on page 176 of the last issue.

THE ENTRY FORM IS PRINTED ON PAGE 243 OF THIS ISSUE. CLOSING DATE IS APRIL 15th, 1941. ENTER NOW. CASH PRIZES TO BE WON!

THIS YEAR—WE CLIMB TO VICTORY

YOU CAN HELP YOUR COUNTRY and yourself at the same time if you do *your best*, but you are not doing your best if you waste time.

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

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

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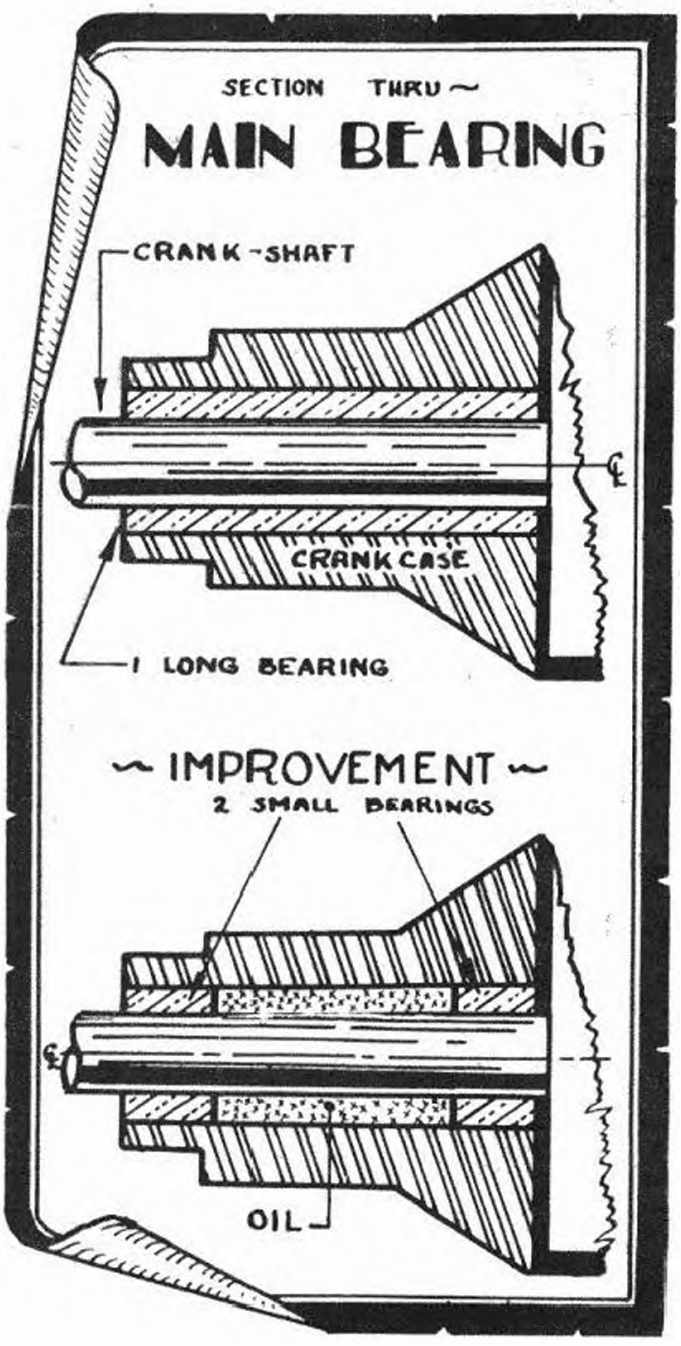
THE MECHANICS OF GAS ENGINES — V

"The time has come," the Walrus said,
"To talk of many things:
Of shoes—and ships—and sealing wax—
Of cabbages—and kings—"
"Of pistons—and of piston rings—
Of gas engines—and efficiency!"

If you've test-run your motor as told in the previous article the next thing you'll probably want to know is how to improve its efficiency. The engine's performance can be increased, but to be truthful about the whole thing, you can't really do so any more than you can get more power from your automobile engine. Of course, it can be done by using acetone or even ether as fuel (or plain dynamite for that matter!), or you can increase your compression ratio by cutting about a sixteenth of an inch off the cylinder head, but the subject is a work in itself.



But there is no harm in thinking up new ways of improving a motor's efficiency. The knowledge gained thereby will, I'm sure, make up for the bit of time taken off your beauty sleep. Here are some ideas that should make you gas bugs put your thinking chapeaux on.

The first thing to do when tackling a problem is to eliminate each difficulty as it arises. Our first difficulty is doing away with a tremendous amount of unnecessary friction.

Friction in a small two-cycle engine may not be much with only three moving parts, but you must remember that we are dealing with fractions of horse power, not many horse-power, and the least little teansy weansy bit of friction is going to cut the power down a big slice. There are only three points of friction, namely: main bearing, connecting rod ends, and the piston. Taking each moving part separately, we'll see if we can chop the friction down.

Main Bearing.—The main bearing is the greatest source of friction in the engine. Although a certain amount of friction cannot be avoided because of the compression in the crankcase, a lot of it is totally unnecessary. Illustrated is a drawing of a main bearing. The upper sketch shows the conventional type of main bearing now being used by a large number of engine manufacturers. It is cheap, so they say, and also cuts down on the output of the motor. The lower drawing is an improvement over it. It is two very small bearings at each end, and the compression is sealed by filling the portion between the bearings with oil.

This system is employed by one or two engine manufacturers, who tell of large economy in the consumption of fuel, and also an increase in power. Ball bearings are also used with great success.

Piston.—The piston also has a very great affinity for friction. This cannot be done away with because the piston is employed to compress the combustible mixture, and must, therefore, fit tightly in the cylinder. It acts as a sliding valve, which is another factor to be taken into consideration. The best way to deal with this problem is to follow the actions of the aircraft engineers, and do what they have done with the pistons in their motors. They cut away sections of the piston which don't do anything but rub against the cylinder walls until the piston looks like a framework of small pieces of metal.

This method can be applied to our engines by cutting away sections that do not act as sliding valves. It can be done without any loss of strength, and the weight of the piston will be considerably reduced, as will the friction.

Connecting Rod Ends.—The last but not least source of friction is the connecting rod ends. Again the trouble can be dealt a telling blow by cutting away some of the bearing surface.

Even though much has been done to improve the internal combustion engine, it is still rather inefficient at normal speeds. Of the tremendous energy in a gallon of gasoline, only about 10 per cent is usefully used as power. But this is more efficient than many other things. A steam locomotive

Increasing Efficiency . . . .

By C. WILLIAMS

utilizes only about 8 per cent of the heat in coal when it is running most efficiently. We usually think of nature as an efficient worker, yet vegetation only uses one-tenth of one per cent of the heat it obtains from the sun. So, after all, the internal combustion engine is good when compared with other things. Under best conditions it is possible to obtain 25 to 30 per cent efficiency from gasoline engines.

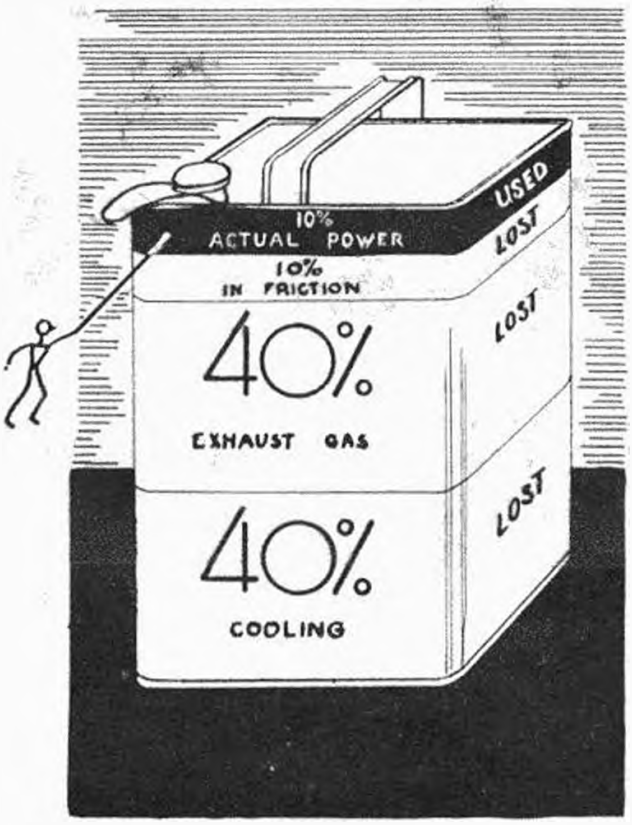
The other 90 per cent of the energy is wasted, and some method must be provided in the engine to take care of these large quantities of heat. The cooling system absorbs 40 per cent of this waste, and rejects it to the air.

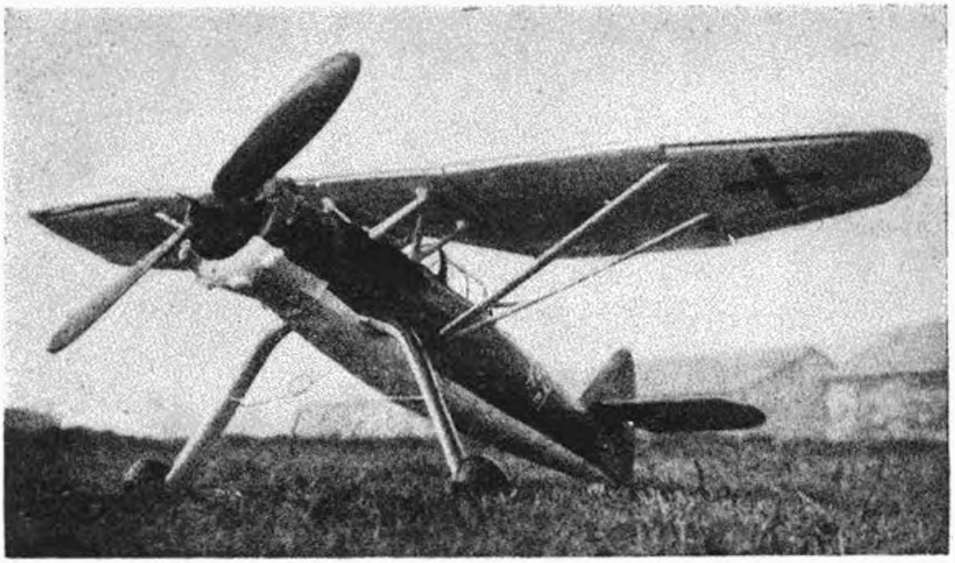
The exhaust gases are at a very high temperature when they are forced out of the cylinder. Another 40 per cent of the heat is expelled with them.

The remaining 10 per cent is used up in the friction of the piston, bearings, and other rubbing parts.

There's everything in a coconut, fellows! You may or may not be able to increase your motor's efficiency, but you will agree with me that a great deal can be learnt by merely thinking these problems out. If you have any trouble with sleepless nights, I suggest you induce your local plumber to give you a length of nice shiny steel pipe not to conk me with for starting you thinking, but merely to tap yourself for listening to me.

If you think I'm wrong tell me, and I'll apologize and shut up like this. . . .





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will be paid to the sender of the photograph judged to be the best by the Editor, and received by him not later than May 31st.

THIS model was built to a scale of $\frac{3}{4}$ in. to 1 ft., and the wing area is thus 195 sq. in.—within Wakefield proportions. If light shrinking dope only is used it can be built to weigh 5½ oz. to 6 oz., or less, without any rubber, so that a reasonable flying performance can be expected. Photographs taken in not too favourable conditions reveal that it lacks little in realistic appearance, so that altogether it should appeal to a fairly wide section of the modelling fraternity.

There has been little deviation from true scale proportions: the legs have been lengthened very slightly and the propellers fitted will not necessarily be to scale.

As reproduced herein the drawings are exactly half the size of the original model. Made to this size (with certain slight modifications in material used—balsa sizes, etc.)—it would appear to be an interesting miniature scale job. Perhaps some of you may try it.

Fuselage.

Cut out balsa formers, also two birch-ply, as indicated. Cut out the keel, keeping top piece in one piece until fuselage is finally completed. Fit in pieces of $\frac{1}{8}$ in. hard balsa to carry N struts and wing supports. Fit in the undercart springing device. Lay on, last, the stringers. These are of $\frac{1}{16}$ in. hard sheet cut in $\frac{1}{4}$ in. strips and laid on so that there are only $\frac{1}{8}$ in. gaps at the widest part of the fuselage. This gives the model, when covered, a very clean, rounded appearance which is essential. At the nose and tail the stringers form a solid covering, reinforced with a piece of birch ply where the motor peg is inserted. The engine cowling is built on over the front before covering.

Centre Section.

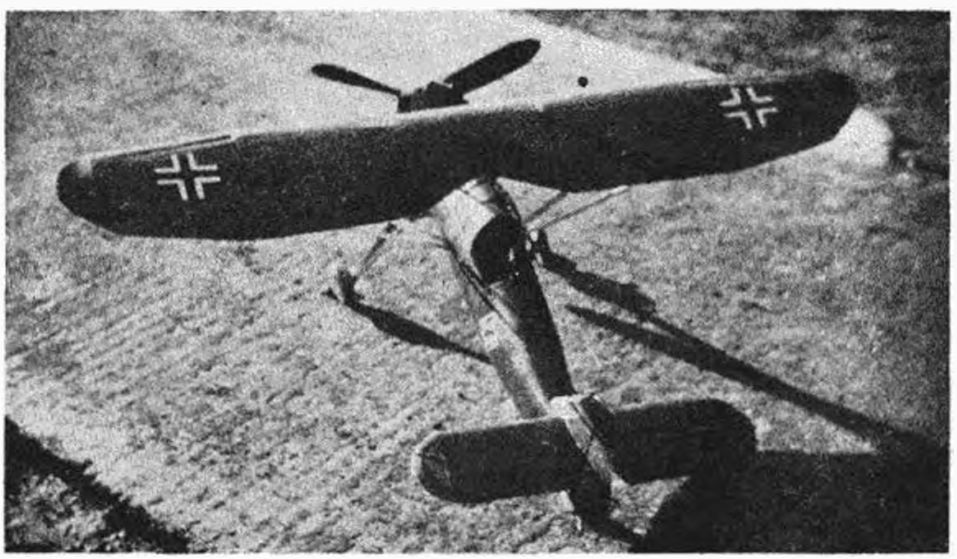
This has a dead flat $\frac{1}{32}$ in. sheet under surface and 1/64 in. sheet top. Note method of attaching wings to this section, the fitting of which to the body is the most important task of all, and which is done when all else is completed.

Tail and Rudder.

The stabiliser and elevators are made in one piece, cut and refitted with hinges after backing the cut-away parts with the same 1/64 in. sheet which forms their covering. The fin is fitted to the fuselage first, taking care to ensure it is vertical. It is built on to a soft balsa step, faired into it and cemented in place. The stabiliser is then fitted on to the lowest rib and kept firmly in place with the pieces of $\frac{1}{32}$ in. sheet partly covering the fin. The elevators are fitted last. All hinges should be made of a fairly stout copper wire about 20 s.w.g.

Wings.

These are built entirely of 1/64 in. hard sheet covering and $\frac{1}{32}$ in. hard sheet ribs. Cut out L.E. and T.E. sheets. Pin on to a plan. Cement ribs on to the bottom sheet, taking care of the bottom camber and ensuring that the ribs are cut away carefully to allow for the thickness of the sheet. Fit a stringer down the slots in the L.E. and bend the sheet round to it when dry. The T.E. is formed by the jointing of the T.E. sheets, top and bottom. Cover the top ribs after inserting the soft balsa wing support blocks. The ailerons



Who would deny that this photo might not have been taken from the roof of the "Control Towers" at the local aerodrome?

— THE HENSCHEL Hs.126 —

A ¾ inch to the foot FLYING SCALE MODEL

Designed by **D. J. MILLER**

Whilst the "flying" type airscrew and the wire coils attached to the landing legs reveal these photographs as those of the model, the general composition of both of them is excellent.

are made in the same way as the elevators. The slots fitted are optional. I found them very much worth including, and made them after Colonel Bowden published his experiences with them. They are fitted on the German machine. If desired, the ribs may be cut out without being cut away and ⅛ in. strips of 1/64 in. sheet with the grain crossing may be cemented to make I-section ribs. This is advisable if a very good finish is desired.

Undercarriage.

The drawings show how this is made. I do not know if it is original in any way, but must stress that for a 'plane which may weigh up to 10 oz. 14 s.w.g. is necessary, and that the wire must be firmly anchored. In that form it is effective and requires no other external support, so preserving scale characteristics and saving many severe fractures in landing heavily. A pair of substantial vulcanite wheels were fitted.

Propeller and Motor.

A 13 in. propeller is fitted, but may be varied. The pitch is 16 in. The motor consisted of eight loops of ¼ in. by 1/30 in., each 66 in. long, tensioned and doubled over to fit between propeller hook and peg in the rear. This was for a heavily finished model, and the power was ample—possibly a little too much for full turns, owing to the rather high centre of resistance. With 500 turns the model will r.o.g., fly in a wide left circle, climbing steadily. A pawl and ratchet type of free-wheel was fitted, but this arrangement, with other minor details, can be left to the model maker.

Assembly of Wings—Balancing.

After model has been covered and all details completed except fitting of N struts and wings, this last operation must be performed in such a manner that the C.G. is about ¼ in. in front of the C.P. position marked on the wing in the side elevation diagram. It should be very little out and it will be noticed that N struts can be moved in the slots cut for them; also they can be varied in position beneath the centre section of the wing. Care must be taken to get the incidence as near correct as possible—a little too little is preferable to too much, as otherwise head resistance high above the thrust line will, of course, result.

After this, any variation in weight caused by repairs, dope, motors or propellers must be counterpoised by weights put in the nose or tail. Decide, therefore, first whether you intend to get either maximum detailed finish, with plenty of dope, or absolute minimum weight for flying. If the latter, then a 2½ oz. motor will give about the best results—twelve strands of 30—33 inches tensioned to take up slack.

General.

On the original I fitted the slow flying flaps, but have glued them up again as they introduced too many unknowns and would get displaced often on landing. The ailerons will help you take care of the torque, which is heavy when the model is heavy; but the model is *very* sensitive to slight alterations. Don't move only one—use both. If you are after full power flights you will, of course, need to introduce a slight degree of down thrust and side-thrust. The elevator is set at about one degree negative incidence: when you have the right setting for flight, fix it with a spot of cement on each side. I found the elevators required to be very slightly down. Everything turns on weight and flying speed, so when you fly—choose a calm day, and, if possible, a flat, smooth ground. Begin with enough turns to get her off the ground a foot or so, and watch what happens, gradually increasing the turns as you improve the trim. With a 10 oz. machine and a 16 in. pitch propeller, 700—800 r.p.m. on the propeller should give you flying speed and a duration of power flight of 40—50 seconds.

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Schedule of 167 Aircraft from which 130 used in this competition have been selected

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Arado Ar.96b.
Arado Ar.196.
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Armstrong-Whitworth Whitley III.
Armstrong-Whitworth Whitley IV.
Avro Anson.
Avro Tutor.
Bell Airacobra
Blackburn Skua
Blackburn Roc.
Blackburn Botha.
Bloch 151.
Blohm Voss Ha.138.
Blohm-Voss Ha.139.
Blohm-Voss Ha.140.
Boeing B.17b.
Boulton-Paul Sidestrand.
Boulton-Paul Overstrand.
Boulton-Paul Defiant.
Breda 65.
Breda 88
Breguet 690.
Brewster Buffalo
Bristol Blenheim I.
Bristol Blenheim IV.
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Bristol Beaufort.
Bucker Jungmann
Bucker Jungmeister.
Cant Z.501.
Cant Z.506.
Cant Z.505b.
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Consolidated 28-5.
Consolidated B.24 Liberator.
Curtiss Hawk 75a.
Curtiss SBC-4.
Curtiss P.40 Tomahawk
D.H. 60 Moth.
D.H. Tiger Moth.
D.H. Hertfordshire.
D.H. Moth Minor
Dewoitine D.510.
Dewoitine D.520.
Dornier Do.17.
Dornier Do.18K.
Dornier Do.215.
Dornier Do.24.
Douglas D.B.7 Boston.
Douglas B.18a.
Douglas (Northrop) 8.
Douglas (Northrop) 8a.
Fairey Fox II.
Fairey Fox VI
Fairey Firefly.
Fairey IIIF.
Fairey Gordon.
Fairey Seafox.
Fairey Battle.
Fairey P4/34
Fairey Fulmar.
Fairey Swordfish.
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Heinkel He.111K.Mk.IIa.
Heinkel He.111K.Mk.Va
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Vultee Vanguard.
Westland Wapiti.
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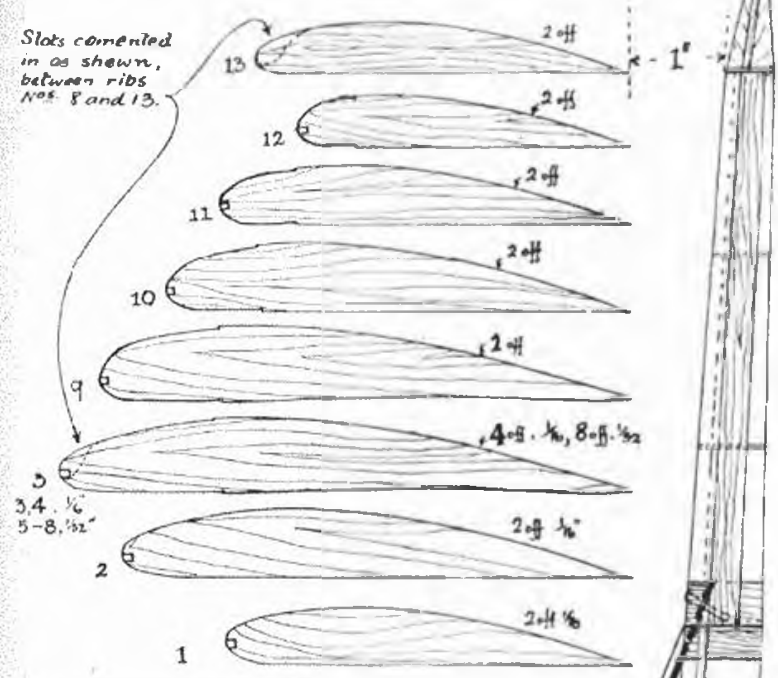
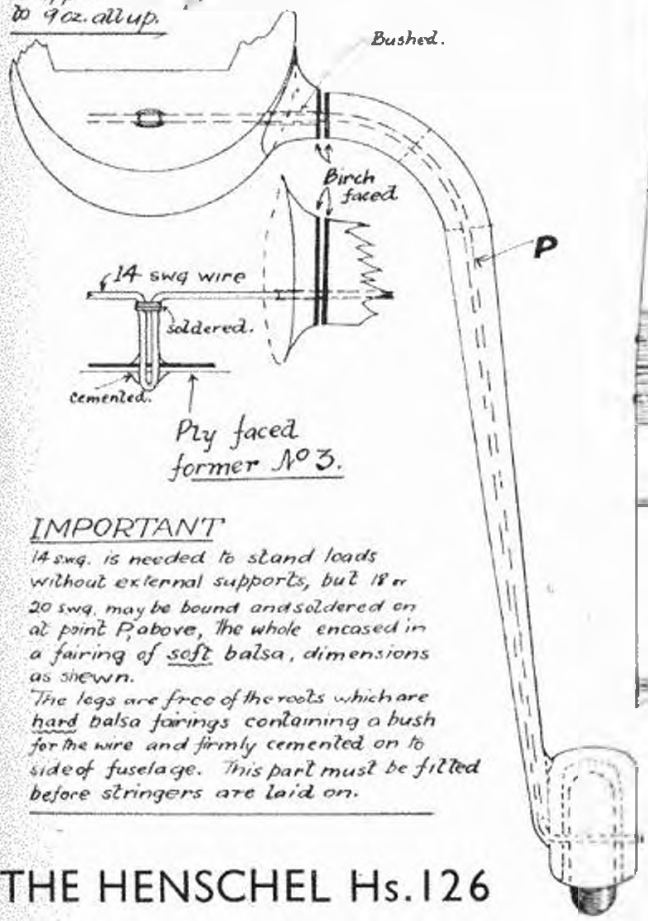
No. 2 ENTRY FORM IS ON THE BACK INSIDE COVER OF THIS ISSUE

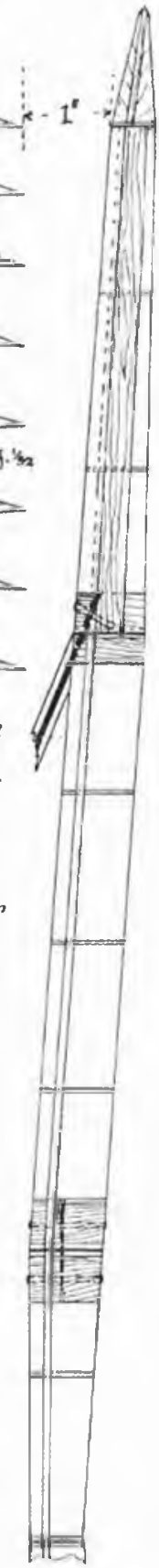


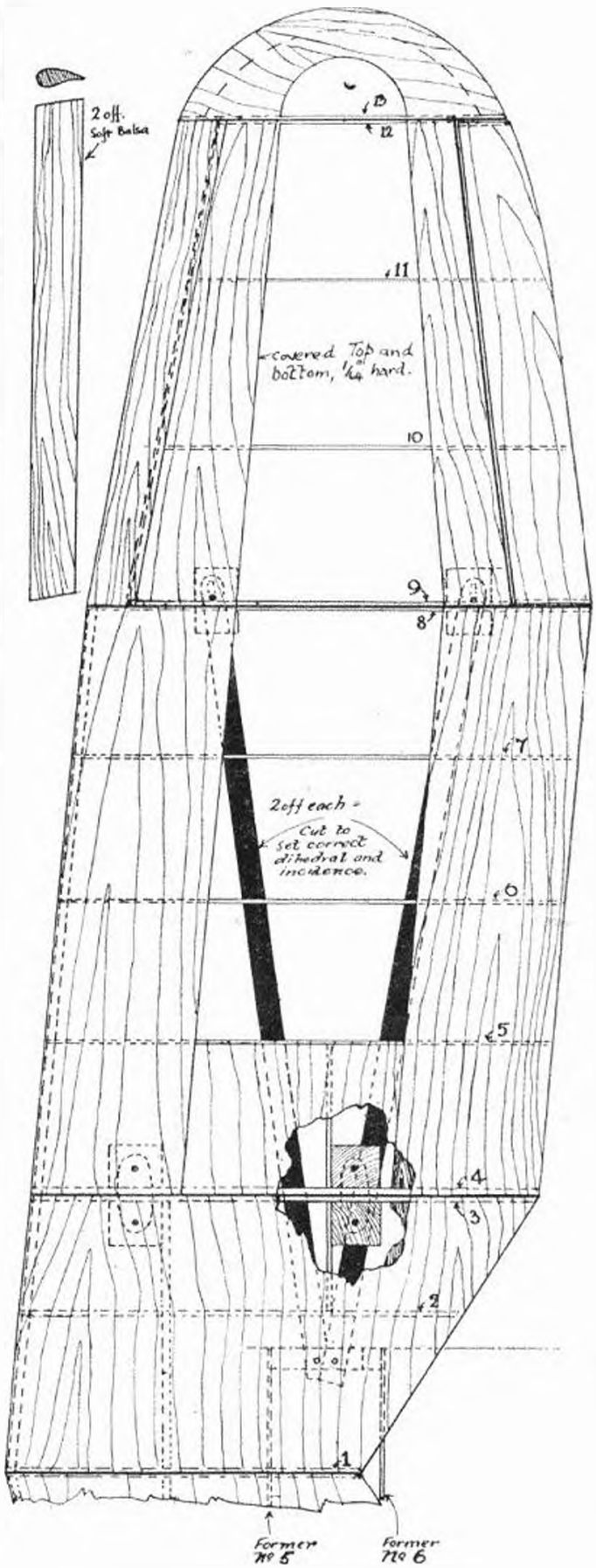
Size of Motor and pitch of propellor depend on finished weight without motor. Heavily doped with coloured dope and fully detailed, model weighed 7½oz and took .303 Rubber: 16 strands ¼ x 1/16, 36" long. Rudder, aileron, downthrust and side thrust were necessary for 35-40 second flights. Carefully made, using light shrinking dope only much longer flights can be obtained. Wing area is approx. 195 sq. ins and model can be built down to 9oz. all up.



IMPORTANT

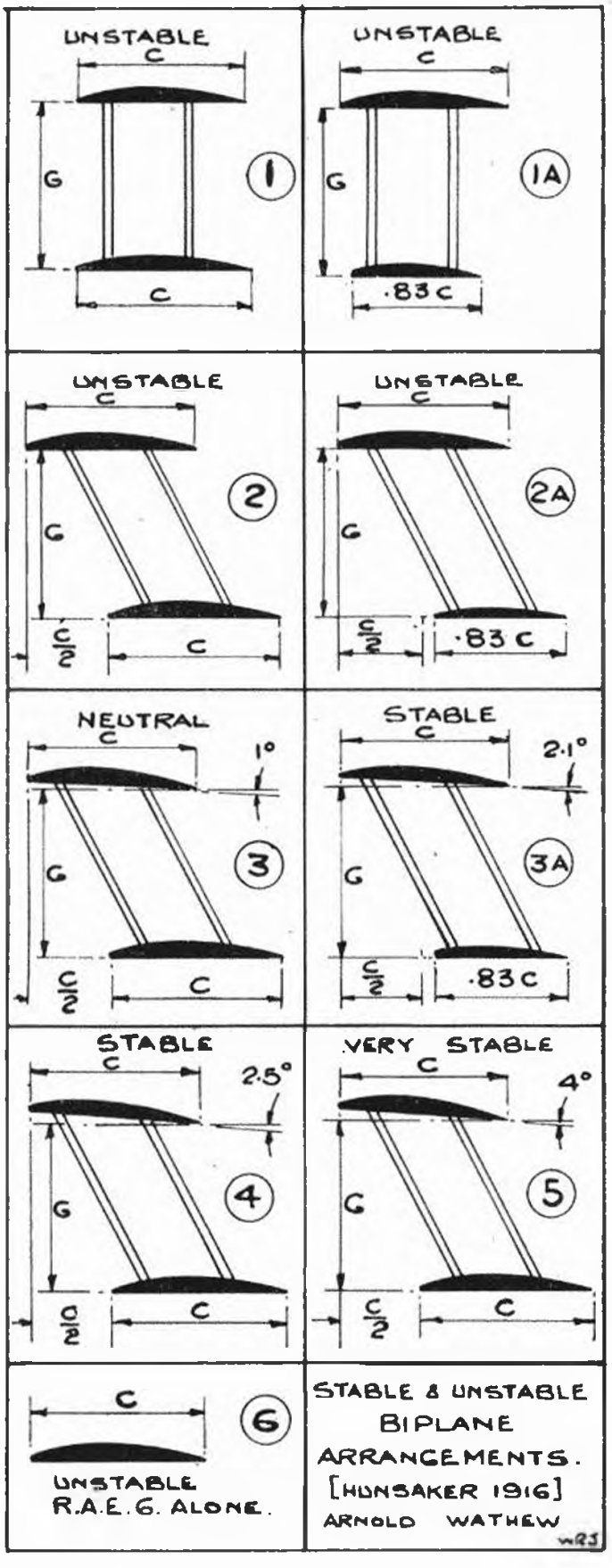
14 swg. is needed to stand loads without external supports, but 18 or 20 swg. may be bound and soldered on at point P, above, the whole encased in a fairing of soft balsa, dimensions as shewn.
The legs are free of the roots which are hard balsa fairings containing a bush for the wire and firmly cemented on to side of fuselage. This part must be fitted before stringers are laid on.





Wing centre section covered beneath 1/32" hard sheet; on top, 1/64" hard. Wing covered as shewn with 1/64" hard sheet. Wing support struts made of 1m.m. Birch Ply sandwiched between 1/16" balsa, faired and cut to exact proportions.

THE HENSCHEL Hs.126



IN SUPPORT OF MY

I WAS delighted to read Mr. V. C. Gracie's most interesting article in THE AERO MODELLER Christmas number answering my "Case for the Biplane Model." It was with the hope of striking just such sparks of interest and controversy that the original article was written. In so far as the model aeroplane world is concerned, it is obviously a subject upon which there are many points of view. It is also, or so it seems to me, a possible field for much useful and instructive experimental work.

Of particular interest is Mr. Gracie's account of his actual experience of building and flying biplane models. Might we have more details of such experiments, both from Mr. Gracie and others? Owing to the war, A.R.P. duties, etc., I have been able to do very little model building myself of late, so have not been able to try out the ideas I am putting forward later in this article.

I did see one rather original biplane model the other day, but it was not doing at all well, largely, I think, because it was too small. It had a deep, narrow body of lightened sheet balsa and all-balsa wings. Owing to the span being only about 20 inches the chord of the wings was very small, making it almost impossible to have any very accurate wing-setting. Lack of fore and aft stability seemed to be its trouble. Had it been made twice the span, and therefore eight times the *bulk*, it would probably have been much more successful. I think a biplane model should be not smaller than 200 square inches wing area, and for preference, built to comply with Wakefield rules.

To return to Mr. Gracie's article. His point *re* propeller torque and span is a very good one. It can be got over in two ways. By keeping the span up to almost normal monoplane span, and reducing the chord by about half. Also by the use of gears and a smaller propeller, say about 10 inches diameter.

In the matter of fuselage length, whilst this is to a certain extent got over by the above-mentioned large span and low aspect ratio, I am rapidly coming round to the belief that gears should be used on any rubber-driven model of approximately Wakefield specification. My reasons for coming to this conclusion—which is only a personal one after all—are not so much that more turns can be got with gears, but that so much weight and head resistance can be saved by building a fuselage both shorter and of smaller cross section, that it quite makes up for the weight of the gears themselves. Further weight is saved by smaller diameter propeller, and consequent shorter chassis legs. Both propeller and chassis have less head resistance on the glide also.

Whilst searching for data *re* longitudinal stability, as applied to the biplane, I came across some most useful information showing the effect of variations of chord, incidence and stagger upon the travel of the centre of pressure. The original figures are by Hunsaker, and appeared in *Engineering*, January 7th and 14th, 1916, and were quoted in Judge's *Handbook of Aeronautics*, 1919, pages 662/3/4, from which I quote them :—

"Figures 1 to 6 show the various arrangements of biplane wings, tested by Hunsaker. The models measured 18 by 3 in., and employed the R.A.F.6 section. Wind speed, 30 m.p.h. The gap of all the models was 3 in. Different decalages of the upper plane were tried, and also different staggers, and lower plane chords. The neutral stability

CASE FOR THE BIPLANE

By ARNOLD WATHEW

position for the C.P. from 0 deg. to 20 deg. was obtained with a forward stagger of ·5 chord, and a decalage of 1 deg. for the top plane. Decalages of 2·5 deg. and 4 deg. gave progressively increasing degrees of stable travel."*

"NOTE.—The arrangements are stable when the C.P. values increase with increase of angle. Arrangements 1, 1A, 2, 2A and 6 are unstable. Arrangements 3A, 4 and 5 are stable. Arrangement 3 is neutrally stable. The biplane arrangement 4 is stable, with loss of maximum L/D of only 4 per cent, while the lift is unaffected. For a tail-biplane 2A is the best from all points of view."

It seems to me that all this is vitally important information to designers of model biplanes. You will note that stagger plays a most important part, and should be equal to half the chord when gap equals chord. Most aero modellists will prefer arrangement 4, using equal chords to 3A, with the smaller chord for lower plane, since difference of angle (decalage) is only 4 deg. Using one of these two arrangements, a moderate sized tail plane should give very good stability fore and aft. Builders of scale and semi-scale models should note that they can use scale tail-planes if they are modelling a biplane which incorporates stagger, by simply altering the incidence of the top plane relative to the bottom one. Practical experience would help here. If my memory is correct, Mr. A. H. Lee's (Bristol) record-holding biplane (1938) incorporated this feature of greater incidence for the top plane. Also, I fancy it was employed in the once famous "Flying Flea"!

Now, you real experimenters who, quite rightly, refuse to accept our theories until you have tried them out in practice, get busy and prove me either right or wrong. I can take it either way! But please make it helpful. Produce evidence for your beliefs and experiments. Just to pull things to pieces without any reasons or proof will not increase our knowledge of the science of model aeronautics, nor will it help to improve the breed.

* Decalage is really difference of angle of incidence.—Arnold Wathew.

VALUES OF LIFT. $K_y = \frac{\text{Lift}}{AV^2}$ lb./sq. ft.—M.P.H.

	Angle of incidence.				
Designation.	0°	4°	8°	12°	16°
1	·00038	·00110	·00166	·00220	·00246
1A	·00052	·00123	·00186	·00241	·00252
2	·00045	·00119	·00180	·00234	·00259
2A	·00074	·00149	·00218	·00255	·00260
3	·00060	·00131	·00195	·00237	·00255
3A	·00060	·00131	·00198	·00259	·00260
4	·00066	·00138	·00200	·00239	·00252
5	·00080	·00146	·00213	·00225	·00246
6	·00056	·00146	·00220	·00285	·00290

Hunsaker. 1916.

VALUES OF LIFT/DRIFT.

	Angle of incidence.				
Designation.	0°	4°	8°	12°	16°
1	5·4	13·4	11·6	9·6	6·6
1A	7·0	13·3	11·9	9·9	5·9
2	6·9	13·2	11·4	9·3	6·2
2A	8·0	13·7	11·7	9·5	5·0
3	8·8	13·0	10·9	9·1	6·1
3A	10·1	12·6	10·9	6·5	4·3
4	9·5	12·8	10·6	6·1	4·4
5	9·9	11·6	9·9	5·0	4·0
6	7·8	15·5	13·1	11·1	7·1

(Maximum L/D values occur at about 4°). Hunsaker. 1916.

VALUES FOR CENTRE OF PRESSURE POSITIONS.
(Expressed as distances from leading edge, in terms of chord.)

	Angle of incidence.				
Designation.	0°	4°	8°	12°	16°
1	·60	·39	·32	·30	·30
1A	·45	·32	·27	·25	·25
2	·40	·32	·30	·30	·34
2A	·36	·28	·25	·22	·26
3	·29	·29	·27	·30	·30
3A	·21	·23	·22	·23	·28
4	·24	·24	·24	·295	·31
5	·15	·21	·24	·29	·32
6	·51	·35	·32	·30	·30

Hunsaker. 1916.

Data from wind tunnel tests. Models 18 in. span × 3 in. chord. Air speed, 30 m.p.h. Section R.A.F.6. English notation.

AERODYNAMIC FORMULA (6)

By A. H. SMITH

Airscrew Performance.

THE airscrew was shown in our last article to be composed of a number of airfoil strips, each rotating round the airscrew axis and moving forward in a helical path; then, if a circle at the commencement and completion of one revolution represents the disc or area swept by the airscrew blades, the pitch, or distance moved forward, will be the length of an imaginary cylinder of air affected by the forward movement of the airscrew.

The volume of a cylinder is the area of the circular end multiplied by the length of the cylinder, so that the volume of air affected will be π (3·142) × radius² × pitch, and if one cubic foot of air weighs ·076 lb. the static thrust developed per second will depend on the number of revolutions per second (n) that our airscrew revolves, then, at 100 per cent airscrew efficiency—

$$\text{Thrust in lb.} = 3{\cdot}142 \times V^2 \times n \times {\cdot}076 \qquad (29)$$

where radius and pitch are given in feet.

As the thrust of an airscrew is usually greatest when there is no forward speed, that is, when the aircraft is stationary, the efficiency will be zero and no useful work will be done, but, as the forward velocity increases, so does the value of J (i.e. $\frac{V}{nD}$), until, as stated in Article 5, the value of J is ·5, and the airscrew is working at its maximum efficiency.

Any increase in forward velocity will affect, due to the fixed pitch, the angle of attack of the blades, and the thrust will be reduced, and as a basis for calculations it can be assumed that a metal airscrew for power work will develop about 70 per cent of the theoretical value, as determined by means of formula (29).

For full-size practice an empirical formula developed by W. S. Diehl, states that static thrust—

$$T = 6{,}000\left[18{\cdot}7 - 9{\cdot}5\left(\frac{P}{D}\right)\right]\frac{B.H.P.}{r.p.m. \times D} \quad (30)$$

where airscrew pitch and dimeter are given in feet. From a series of experiments it has been found that, for model work, to express brake horse power (provided $\frac{P}{D} = {\cdot}5$), a correction must be made and formula (30) can be rewritten

$$B.H.P. = 1{\cdot}15\left(\frac{T \times r.p.m. \times D}{6{,}000\left[18{\cdot}7 - 9{\cdot}5\left(\frac{P}{D}\right)\right]}\right) \quad (31)$$

Each engine, of course, will have its own particular power curve, and when calculations have been made using formula (31) reference must be made to the power curve relating to the engine it is proposed to use to ensure that the required power will be delivered at the specified number of airscrew revolutions. If this is not available then to maintain the output and number of revolutions a new value for D can be found from

$$D = \frac{6{,}000\left[18{\cdot}7 - 9{\cdot}5\left(\frac{P}{D}\right)\right]}{1{\cdot}5\ T \times r.p.m.} \times B.H.P.$$

And to maintain the designed forward speed the pitch diameter ratio may also have to be revised.

Rubber-driven Models.

The foregoing formulæ for airscrew design can only be applied to power model work, and when a rubber-driven model is considered we at once realise that the power output is not constant, but is at its maximum as soon as the airscrew is allowed to revolve, decreasing very rapidly at first, then gradually becoming less as the motor unwinds.

Now the work done per revolution is $2\pi \times$ torque, and this will vary both with rubber size (the area of the rubber cross section) and the number of strands used, and it is only by testing a number of combinations that the aero-modellist can decide which one is the most suitable to use. For those readers who have not the time or inclination to do their own testing, the writer advises that they study the article by Messrs. McBean and Powdrill in the September issue, and the article by A. F. Houlberg, in the October issue of this journal, where a series of rubber motor tests are described, together with the Torque Turn and Efficiency/Turn curves of their results are given.

It has been found that about 3,500 ft. lb. of energy can be stored in one pound of rubber, and for safe working, if the motor is only wound to 80 per cent of the maximum turns, the energy will be 2,000 ft. lb. per pound weight, or 125 ft. lb. per 1 oz. weight of rubber.

If we know the weight of rubber to be used the horse-power developed can be found from

$$\frac{125 \times \text{Weight of rubber in oz.}}{33{,}000}$$

The distance a model will travel under power will depend on the degree of streamlining employed, and is given as—

$$D \text{ in feet} = \frac{K \times WR}{W} \quad (33)$$

where WR = Weight of rubber motor in oz.
W = Total weight of model and motor in oz.
K = A coefficient approximately 3,000 for non-streamlined models, and 4,000—5,000 for streamlined designs.

From a series of experiments carried out by R. M. Glass a formula developed to give the number of turns a rubber motor will stand is given as—

$$N = \frac{K \times L \times \sqrt{L}}{\sqrt{W}} \text{ or } \frac{K\ L^{1{\cdot}5}}{\sqrt{W}} \quad (34)$$

where K = 5 for lubricated and stretched rubber.
L = Untensioned length of motor, in inches.
W = Weight of motor in oz.

It has been found from experience that after a motor has been "run in" considerably more turns can be put in, but the torque at breaking point is reduced after each winding. Lubrication, however, restores some of the properties lost in the initial flights, and maximum energy is usually developed on the third winding.

When designing an airscrew for rubber models we have not a constant r.p.m. or power output to form a basis for calculation, but must arrange our airscrew to match the performance of the rubber motor, and the pitch, allowing for 25 per cent slip, can be determined from

$$P = \frac{\text{distance flown}}{\text{Number of turns} \times R \times {\cdot}75 \text{ ft.}} \quad (35)$$

where R = gear ratio = 1 if airscrew is driven direct.

It is usual, in rubber model work, to make the airscrew pitch between 1 and 1·5 times the diameter, and the blade area must always be sufficient to create a thrust equal to the drag of the model on the airscrew when climbing at the desired ratio.

The thrust, therefore, is proportional to the blade area used, and for modern streamlined models a value of 10 per cent to 12 per cent of the wing area is the average practice, the larger blade area for a given diameter and pitch will give increased thrust, and there will be less slip.

From the foregoing it will be seen that the number of strands used, weight of the model, and airscrew design, are all related, and a formula to determine the approximate number of strands of rubber developed by C. H. Grant is

$$N = K\left(\frac{WP}{A}\right)\sqrt{\frac{D^2}{a}} \quad (36)$$

where
N = Number of strands of $\frac{1}{8} \times 1{\cdot}30$ in. rubber.
W = Total weight of model in oz.
P = Airscrew pitch in inches.
D = Airscrew diameter in inches.
a = Area of airscrew blades in sq. inches.
A = Area of wings in sq. inches.
K = 1·1 for a medium high rate of climb
K = 1·3 for a high rate of climb.

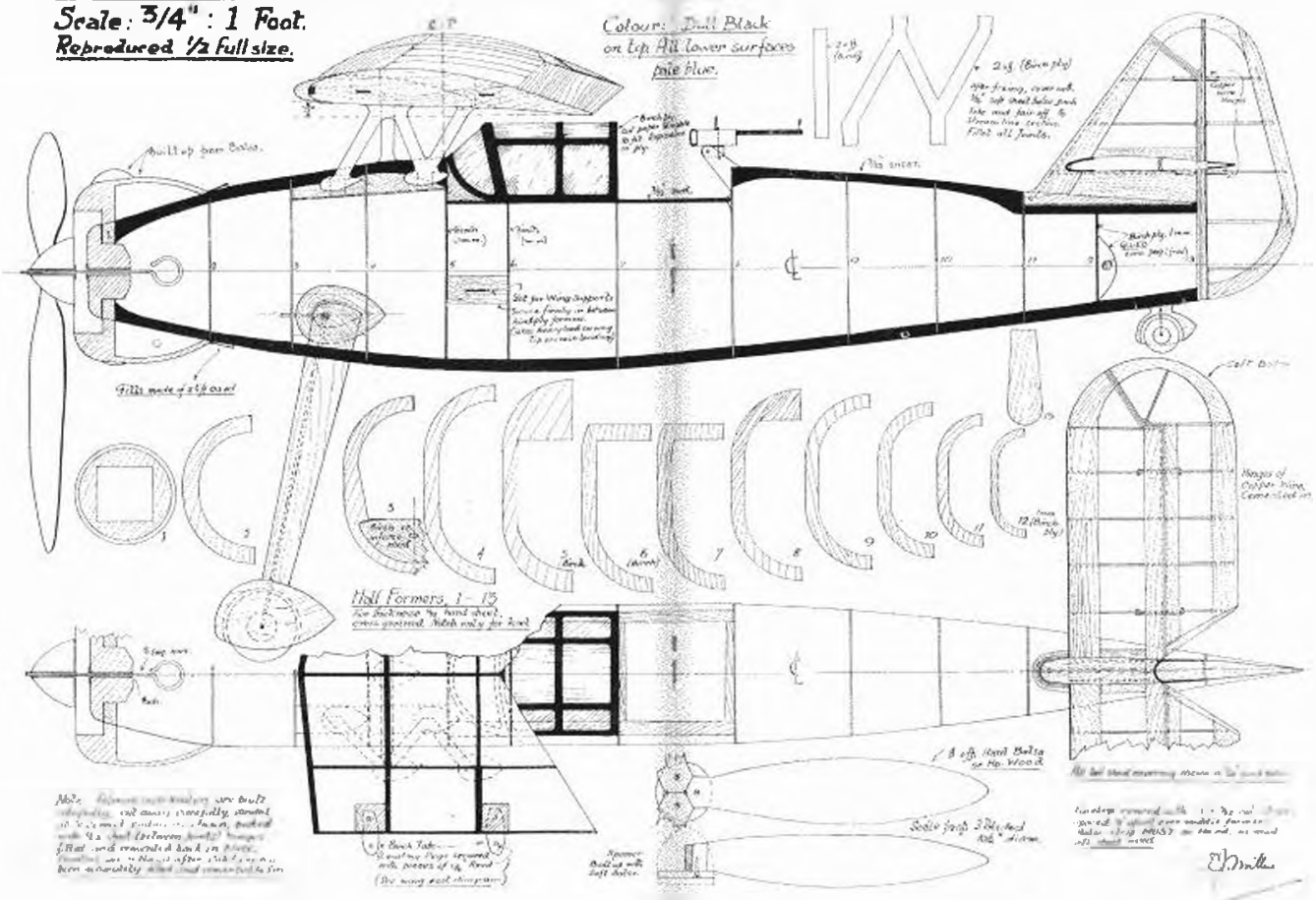
If $\frac{3}{16} \times 1{\cdot}30$ in. rubber is used, the result should be multiplied by ·66, and for $\frac{1}{4} \times 1{\cdot}30$ in. rubber the number of strands will be ·5 N.

The approximate weight of rubber is as follows:—
12 yards of $\frac{1}{8} \times 1{\cdot}30$ = 1 ounce.
9 yards of $\frac{3}{16} \times 1{\cdot}30$ = 1 ounce.
6 yards of $\frac{1}{4} \times 1{\cdot}30$ = 1 ounce.

In conclusion the writer hopes that this series of articles will enable aero-modellists to put aside the "trial and error" method and apply the formula given to scientific and mathematical design, and make their models "fly from the drawing board."

FLYING SCALE MODEL OF THE HENSCHEL Hs. 126.

Scale: 3/4" : 1 Foot.
Reproduced ½ full size.



WING UNDERNEATH

A Plea for a Neglected Type of Model

By M. R. KNIGHT

In the glad days when a model could be flown over London's open spaces without the retrieving process calling for the agility of a kangaroo or mountain goat, there was held a certain Gala, Grand Rally, Modellers' Muster, or What Have You. Spectators, mainly vociferous youth were embarrassingly numerous.

One of the writer's models caught the attention of an observant laddie, who proceeded to draw his pal's attention thereto in the following terms: "Gorblimey, 'ere's a funny 'un. Come an 'ave a dekko." Replied Lancelot, "Wh'y's it funny?" Said Sigismund, "Cos why? Cos e's hunged the wing underneaf."

At this point in the dialogue the "funny 'un" took off and sailed into the blue, drawing from Lancelot the comment, "Kee, goes all right!" "And why not, young feller-me-lad?" the perpetrator ventured to enquire. "Dunno," replied Sigismund, "but no one else does it."

THIS final observation was, of course, something of an exaggeration, but only just, for then and now low-wing models were, and are, as rare as good flying days. And the episode is recorded as exemplifying, albeit somewhat crudely, the average reaction to the sight of a low wing model, such a choice of lay out being widely regarded either as courageous or cranky.

The neglect of this type of machine is regrettable for several reasons. For one thing, something of the interest attaching to model flying is lost, and development hindered, when design gets into a groove. And the high-wing groove is indeed a deep one, so deep, in fact, that at times one almost feels called upon to apologise for building anything else.

How much more interesting our incomparable hobby would be if one encountered more biplanes, mid-wing monoplanes, tail-less models, composite aircraft, tricycle undercarriages, finless tails, instead of an almost unbroken line of high-wing endurance types.

Then, too, the low-wing lay out lends itself particularly well to the production of a realistic "semi-scale" type of model. And, let me hasten to add, before someone mutters, "Pretty models that won't fly," that such machines are far from being indifferent performers. Soundly designed they are a pleasure to fly, and are as happy in bad weather as in fine.

High-wing Plenitude—and Why.

But, since so many modellers are interested solely in the competition aspect, what of the low-wing model in this respect?

Well, it has to be admitted that folk who judge a model entirely by its "cup lifting" propensities, have mostly formed the opinion that in this respect the high wing model and the parasol possess an inherent superiority. And the fact that nearly every contest ever held has been won by one or other of those types would appear to support that view. But it is not incontrovertible evidence. Rather is it an exemplification of the dictum that "nothing succeeds like success."

High wing successes are the outcome, not of inherent superiority, but of the vast volume of experience obtained with this type of model. And the basic reason for this line of development is the simple fact that the coupling of a wing to the top of the fuselage constitutes the most obvious way of arranging these components. The high-wing model, therefore, forms the natural starting-point of nearly every modeller's experiments, and his line of progression consists of refining this initial design by tapering the wing, streamlining the fuselage, retracting the airscrew, and so on. But throughout the high-wing lay-out is employed.

Presently, our enthusiast knows a thing or two about models, but his experience is restricted to the one type. Consequently, if and when he essays a low wing experiment, it is almost inevitable that he will devise it on high wing principles, with which he is by now thoroughly familiar, and will use his customary line-up, with the result that the performance is disappointing. He then regards himself as fully entitled to denounce low-wing models as tricky, unstable, and inefficient!

It is not true that the low-wing lay-out has been well tried and found wanting. It has been dabbled with and hurriedly damned by a few, and entirely neglected by nearly everyone else.

Now, the stabilising of a low wing model presents no great difficulty, while the possession of, or lack of, a soaring capacity—another quality in which such machines are alleged to be defective—is largely determined by the line-up. The ideal line-up for a low wing model differs radically from that best suited to a high wing type. Therein lies the explanation of much low-wing ineffectiveness.

It Won the "Wakefield."

Years ago, at Parliament Hill, Hampstead, a low-wing model was timed for over seven minutes "out of sight." Its motor run did not exceed 25 seconds. The rest of the time it was soaring in a manner that is commonly associated with high wing light weights. Another machine of the same type was timed at Hackney Marshes for 4½ minutes "out of sight." Neither machine was ever found.

Is it conceivable that what was possible with a model built of hardwood and steel wire—and plenty of it—and with a single surfaced wing of nondescript section, could not be repeated with the aid of modern technique?

Further, a low wing model has won the Wakefield Cup, and there would appear to be no reason why this should not occur again. The question is: Who will build the model? For the high wing expert, with sundry trophies to

his credit, and with a reputation to maintain, can scarcely afford to turn his serious attention to the unfamiliar low-wing lay-out, and begin again to amass knowledge and experience, lest in the meantime the honours go elsewhere. Few care to try it, and fewer still resist for long the temptation to hasten back to the security of the well trodden high-wing track.

Since, then, it appears that reluctance to build low wing models, where it is not merely slavish following of fashion, is due to misgivings anent the performance obtainable, let us consider in some detail this question of efficiency.

A Question of Efficiency.

One has repeatedly heard and read that the low-wing position of the lifting surfaces is the least efficient of the possible arrangements. The parasol and the high-wing monoplane are declared to gain through the fact that the upper surface of the wing is unbroken from tip to tip. Dividing the wing and attaching the halves to the fuselage in the shoulder wing position lowers the efficiency, partly through the dividing process and partly through disturbance of the air flow at the points of junction. The mid-wing position is declared to reduce the efficiency still further, and the low wing position to be the least efficient of any. Wind-tunnel investigation is sometimes quoted in support of these contentions.

Personally, one finds the arguments difficult of acceptance for two reasons.

In the first place, they would seem to be vitiated by the case of the Fairey Long-range Monoplane, which at one time held a world distance record. When this design was projected, wind-tunnel tests indicated that in this particular case the low-wing lay-out was slightly superior to the high wing. As a matter of fact, the difference being negligible, the machine was made a high-wing type, in order to take advantage of the convenience and reliability of gravity feed to the engine from a tank in the centre-section.

Secondly, it seems most unlikely that the low-wing lay out would have been adopted for so many modern service aeroplanes, despite the convenience of being able to retract the wheels into the wing, were an appreciable loss of efficiency the price to be paid. After all, the high-wing Flamingo and the mid-wing Buffalo effectively emphasise that the problems of retraction do not necessitate the low wing lay-out.

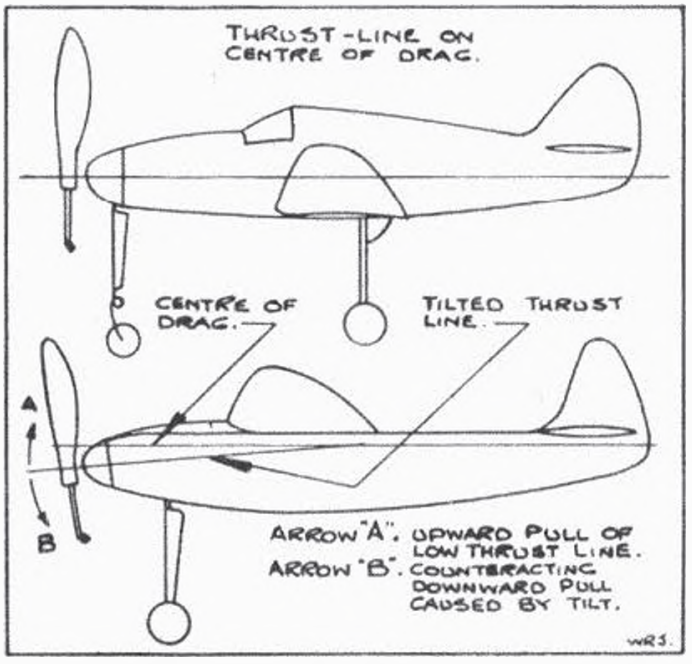
Whatever be the truth about this matter, the position of the wing is only one potential cause of reduced efficiency. Another, and much more likely cause, is misapplication of the power through an unavoidable non-ideal placing of the thrust-line, and this is a problem peculiar to parasols and high-wing monoplanes.

One is referring at the moment to rubber driven models with non lifting tail line-up. In such cases it is desirable that the thrust line shall pass through the centre of drag, so that the varying power output of the rubber, and the eventual cessation of power when the motor is fully unwound, shall not disturb the longitudinal balance.

Now with the high-wing machine the centre of drag is to be found in the region of the top longerons. Obviously, the rubber cannot function in this position, and it is necessary to lower the skein until it clears the fuselage structure. This means, unless one is prepared to employ a system of gearing in which the airscrew is mounted on an idling shaft, that the thrust-line, represented by the airscrew shaft, is lower than the ideal position, and imparts to the model a pronounced stalling tendency.

Tilting the Axis.

One way out of this difficulty is to make use of a tail of lifting section, to which subject we shall return presently. An alternative procedure is to tilt the thrust-line downwards from the horizontal sufficiently to establish a downward pull of the thrust powerful enough to counteract the upward pull due to the low thrust line. (See diagram). This tilting



of the thrust-line is a convenient and effective expedient, and is our old friend "down-thrust" under another name.

But model aircraft design is a conglomeration of "buts"—an airscrew pulling at an angle to the line of flight means lowered efficiency. And one may perhaps be forgiven for smiling as one recalls that lowered efficiency is precisely the charge brought against the low-wing model! In respect of the low-wing there is the alleged inefficiency of the wing position, and with the high wing the inefficiency of the tilted thrust line. Veritably a case of swings and roundabouts!

And this is not the whole of the story. Ideally, the degree of thrust line tilt should be varied during flight to keep step with the varying power output of the rubber motor. This being impracticable, some compromise must be effected. Consequently, if the initial surge of power (and with a Wakefield model it can be hefty) be adequately held in check, the downward pull may be too pronounced during the later stages of the flight, thereby ruining the climb. Alternatively, if the tilt be reduced to cure the latter trouble, the danger of stalling at the commencement of the flight will be increased.

One often sees a high-wing model fly magnificently on three-quarters of the possible number of turns on the motor, but stall badly on full turns. And the fear of this contingency has been the undoing of many a competitor when, at the take-off board, he plays for safety by slipping a strip of wood between nose-piece and fuselage, and in so doing spoils the flight. In short, there is often a fine line—or shall we say half a degree?—between maximum climb and a bad stall, and even experienced modellers, in the heat of the moment, have been known to miscalculate.

With the low-wing lay-out this sad state of affairs does

not arise, for the centre of drag being just below the centre of the fuselage, the thrust-line can be placed in the ideal position, and there is no stalling tendency to need a tilted axis. As a matter of fact, there is a slight tendency to top-heaviness which, if not overcome, will tend to react badly to side gusts. This is probably the weak point in sundry low wing experiments. But it can easily be overcome, as will be explained in the article on low-wing design which is to follow this one.

Nice Manners.

The ideal positioning of the thrust-line not only enables the airscrew to work at its most efficient angle, but makes the low-wing model delightfully docile. Design it soundly, and it will, so to speak, eat out of one's hand. Should the rubber bunch in the rear end of the fuselage (mine does, and, thank you very much, it is not due to making the fuselage too shallow), or should one replace a skein by another which differs slightly in weight or power, nothing worse than a switchback flight will usually result. In an extreme case the model will stall, but recovery will be so rapid that there will be little fear of a crash.

A typical example of low-wing mannerliness was afforded by the writer's 1939 Wakefield model. With 850 turns on the motor it was inadvertently launched with a thick rubber band caught between the nose-piece and the bottom of the fuselage, thereby imparting several degrees of "up-thrust." There ensued a series of mild stalls, recovery with little loss of height, and eventually a landing without damage.

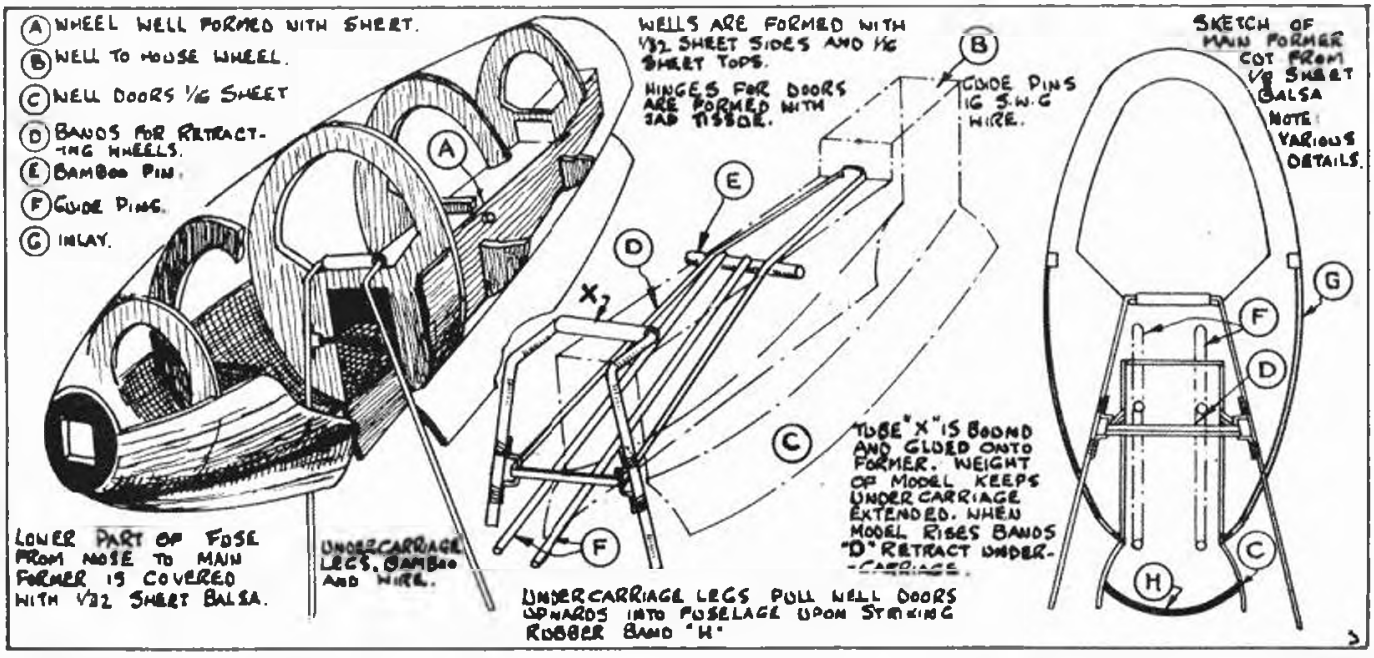
Incidentally, this machine had a tail of lifting section, but not set positive to the line of flight, and it would fly quite well with the centre of gravity anywhere between 40 and 75 per cent across the wing-chord, the latter position for duration flying, and the forward position when used as the lower component of a composite model. This should dispose of the idea that a low-wing model will not function satisfactorily with a lifting tail. Though it certainly has no need of a "lifter" as an anti-stall device, the lowering of the wing-loading, securing the effect of greater area without the transgressing of any contest rule, can be exploited by the low-wing machine as well as by other types. But, as when a non-lifting tail is used, the line-up commonly employed for high-wing models just will not do.

Now, surely the qualities claimed should be worth practical investigation in the interests of contest flying. Apart from any other consideration, low-wing docility should contribute appreciably to peace of mind and calm judgment at the take-off board, thereby enabling one to secure from one's model the best flight of which it is capable, instead of foozling things in a last minute spasm of anxiety.

Maybe some nasty fellow will enquire how it is, if the foregoing arguments be sound, that the persuasive writer has not come within measurable distance of winning the Wakefield Cup! Well, the answer to that conundrum may transpire in the course of the next article.

A RETRACTING UNDERCART FOR WAKEFIELD AND DURATION MODELS GENERALLY

By M. C. CROOKE



THE drawings are practically self-explanatory, but a few notes on the principle of the action will not be amiss.

The undercarriage is kept in the down position by the weight of the aircraft, and the rubber band which pulls the legs together should be of such a strength that the legs remain apart while the machine is on the ground, but draws the legs together as soon as the model leaves the ground.

The action of retraction takes place in two movements, which are:—

(1) The legs come together until they reach the two guide wires.

(2) The second rubber band pulls them back into the fuselage and the well doors close. The well is formed by cutting a slot in each bulkhead and lining with sheet.

GEOFF'S WAKEFIELD

By SAMUEL HODD

THERE are several types of club members; there is the non-active member who criticises the efforts of all and sundry, the "expert" who makes super models that don't supe, the "plodder" type who builds mediocre models with mediocre performance, but flies them in all weathers with consistency, and, of course, the plain common or garden fathead.

We have one of this latter category in our club, and his name is Geoff. Now Geoff was always doing something silly. He would spend hours putting a fuselage carefully together, so that it was perfectly true, then place a book or two on it to hold it while it was drying, turn round three times, and find his beautiful fuselage crushed. Or perhaps he would painstakingly assemble a scale model—his workmanship was always of the best—and take it, carefully wrapped, to the flying ground on Sunday; then place it on the ground in order photograph it, turn round, and step backward right on the model.

When we heard that he was building a Wakefield model, speculation ran rife as to how long the thing would last. "Geoff," we kept on saying, "How far have you got with it?" Geoff would look sheepish and say, "Well, I *had* built the wings, but I found that they were both right-hand ones," or something similar. Eventually, however, the model was completed, and taken, complete with new coffin, to our Sunday rendezvous.

To give Geoff his due, it was a fine model and well designed. In fact, it seemed to combine all modern features with practical ones as well. We were all admiring this latest creation of his so much that we forgot to poke fun at him.

As the morning was a little gusty, the initial tests were delayed until after midday, and in order to avoid any mishap the model was gently placed in a corner of the field out of harm's way.

After dinner the wind died right down, and the weather was ideal for testing. We pointed this out to Geoff, and he reluctantly put down his stick model and picked up the Wakefield. It was a real beauty, and very nicely finished with white gloss-doped wings. Geoff bent over the model to adjust the wing and the first mishap occurred: A celluloid comb case, complete with comb, gravitated from his top pocket, *through* the wing and on to the ground. A sigh went up from the watchers, and several willing hands came forward with tissue, paste, and all necessary etceteras to repair the damage. Incidentally, the comb and case were flung violently out into the field by Geoff, who later spent an hour looking for them.

This damage having been repaired, and the model well inspected by everybody in the process, it was taken to a convenient elevated spot on the field.

"That's a nice propeller, don't you think," said Geoff, indicating the model's frontispiece. We all agreed on that point, as this particular item was very smoothly finished and highly polished. We asked him where he got it. "Carved it myself," he said modestly, and we all decided that it was a fine piece of work.

Someone asked him what type of freewheel he was using. He looked sheepish again. "Well, I haven't bothered about one as yet, not for the first tests," he said. We suspected that some mishap in building had made him abandon the idea. Perhaps he had made a right-hand freewheel for a left-handed screw—just the sort of thing he would do.

By this time we had reached the launching spot, and Geoff carefully thrust the model into the air in a gliding position. To our amazement the model floated gently down the field and made a perfect landing on the grass.

Geoff started after the model at a gallop, but we grabbed him and hauled him back. We pointed out that if he let himself get too excited he might possibly fall on the thing—and, we added, it would not be the first time he had done that.

One or two more tests were successfully made, and then Geoff announced his intention of trying a powered flight. We all hiked back to the "base," and a winder was procured. There followed an argument as to how many turns should be put on. The "experts" set up a cry right away, and the outcome of that was a majority vote of ½th full winds. Geoff said he had worked out approximate full winds, and made it 1,400. Knowing Geoff, we decided to check this, and after searching for paper and pencil and making feverish calculations, we arrived at the figure 980. 200 winds, we decided, would be all right.

We then checked the ratio of Geoff's winder—he said it was 4 to 1. It was 3½ to 1, but we were used to him by now.

Anyway, 200 winds were given the model, and we prevailed upon its owner to proceed well out into the field away from all trees and obstructions. It was rather strange, but all other flying had ceased. Everyone was apparently astounded at the model's continued existence. After a few brief reminders to "launch into the breeze," "don't throw it up," etc., Geoff released his Wakefield, and we all expected it to execute a shallow climbing turn followed by a smooth glide.

It didn't. It sank to the ground in a rather sloppy power glide and came to rest with the propeller still turning.

"Must be underpowered," said Geoff.

We advised him to try again with 350 turns. The result was exactly the same, only perhaps the glide was worse. Geoff had already decided that he wanted about eight more strands, and I could hear someone behind talking about "black" and "brown."

"Well, it ought to do a slight climb if I give it 600," he said. We didn't think it advisable, but we let him have his own way. On its release the model shuddered like mad and did a 1 in 4 glide, well and truly bouncing the undercart.

"Looks like the propeller isn't balanced," said our secretary, and that worthy approached the model, which was in the hands of Geoff, the airscrew still turning over. He waited until it had stopped, and then tried it for balance. It balanced horizontally in perfect fashion. As our secretary bent closer to have a look at the propeller he suddenly sat down on the grass and burst into fits of uncontrollable laughter. We asked him what the joke was, but it was apparently so great that he could not stop to tell us. We therefore inspected the front of the model for ourselves, and one by one joined in the merriment. Geoff was looking silly all this time, and must have thought we were crackers. We knew we were not—but *he* was.

The propeller blades were carved with opposite pitch!

FIGHTING AIRCRAFT OF THE PRESENT WAR——III

THE ARADO Ar 95-SEE A GERMAN GENERAL PURPOSE SEAPLANE

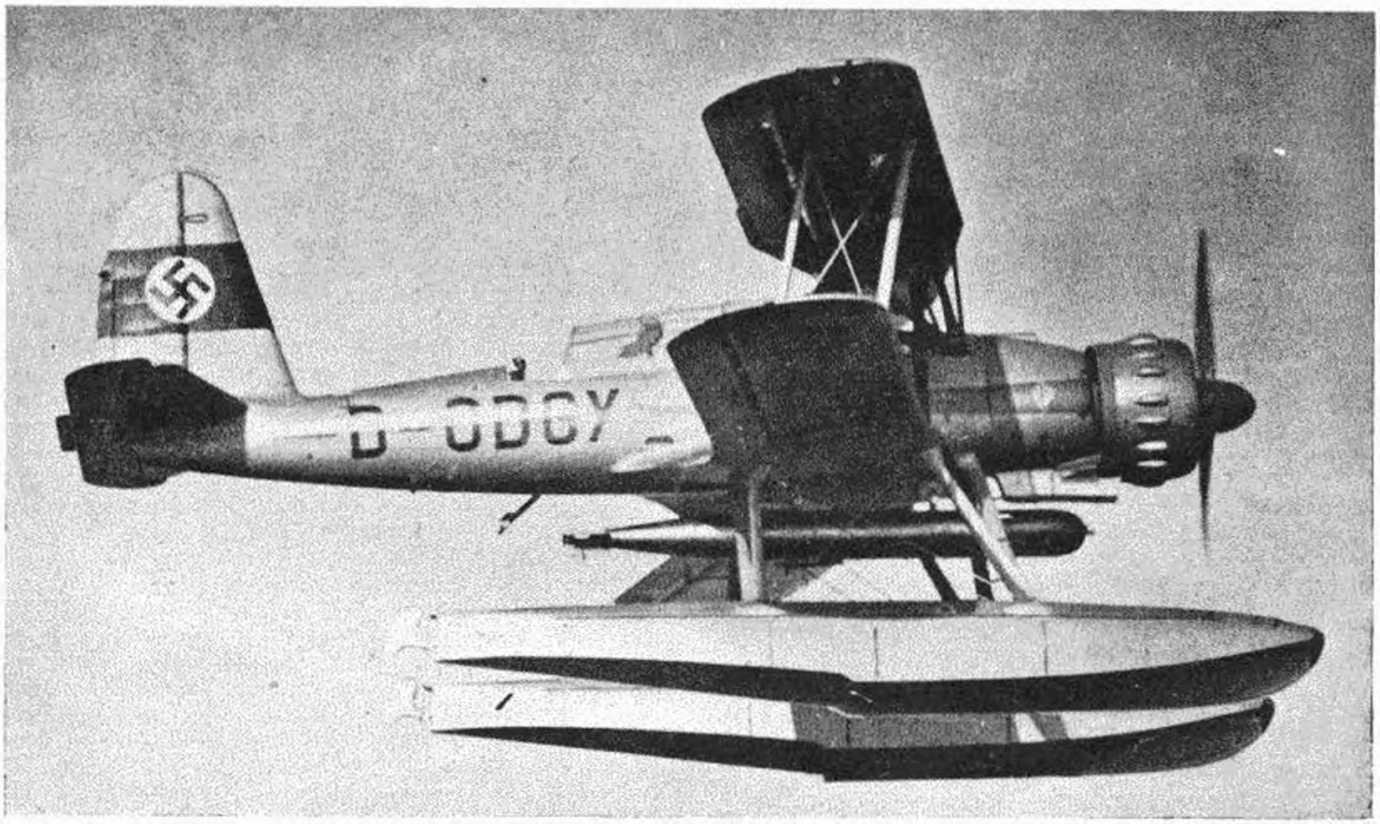


Photo by courtesy of "Flight."

By H. J. COOPER

THE name of Arado appears to have been first mentioned prominently in relation to aeroplanes around 1933 or 1934 when Germany was forming the first squadrons, or *Jagdstaffeln*, of the *Luftwaffe* with Ar68 biplanes, made by the Arado Handelsgesellschaft m.b.H., now known as the Arado Flugzeugwerke G.m.b.H., of Brandenburg and Warnemunde.

These Ar68's were efficient looking single-seat fighters and remained in service for a couple of years, and then, as the *Luftwaffe* grew up with the Royal Air Force, *l'Armee de l'Air* and the *Regia Aeronautica*, were replaced with faster and generally advanced types.

Most of the company's products since the Ar68, and up to the commencement of hostilities, were low-winged monoplanes for civilian and training uses.

One of these, the Ar79, equipped with a 105 h.p. Hirth four-cylinder in line motor, is a remarkable little monoplane, which in 1938 set up five international speed class records, attaining as a single-seater a maximum speed of 142.5 m.p.h.

The Ar96 is another low-wing, similar in appearance but slightly larger, and equipped with a more powerful Argus motor. This aeroplane is used for advanced training.

A development of the Ar96, known as the Ar96b, has been adapted by the *Luftwaffe* (in a similar manner to that in which the British Broadcasting Corporation takes a perfectly good play and *adapts* it to its own requirements—except that the *Luftwaffe* improves its subjects) for general purposes and ground attack work.

The latest Arado product is the Ar196 seaplane, recently reported on active service, which is essentially a low-wing version of the biplane forming the subject of this article.

The Ar95 is produced in two forms: the Ar95 See with floats, and the Ar95 Land, similar except for the undercarriage, which is composed of two trousered legs attached at the ends of the lower wing centre section.

The Ar95 See is a two-seat biplane designed for torpedo bombing and reconnaissance work, and as a catapult seaplane, and is the German counterpart of the Fleet Air Arm's Fairey Swordfish.

The wings are of equal span, staggered and swept back, and are made to fold. They are constructed of duralumin spars and ribs and are covered with fabric underneath and thin sheet metal above. The wings have a rather large gap between them, and this suggests that the machine is some-

what smaller than it actually is. It was the same with the old Vildebeest torpedo bombers. Their large gap and single pair of struts either side always made them look like Gipsy Moths when seen head on at a distance.

The lower wing centre section is thickened and is built integral with the fuselage. On each side of the fuselage there is one pair of struts, wire-braced, with a further strut between the top of the front strut and the lower centre-section. Ailerons are fitted to the upper wings only. Plain-hinged landing flaps are fitted to the trailing edges of the lower wings.

The tail unit is of all-metal cantilever construction with fabric-covered control surfaces, which are fitted with trimming tabs and are statically and aerodynamically balanced. It is worthy of note that the distinctive form of the rudder persists throughout the entire range of Arado aircraft. Similarly until a few years ago one could always name a de Havilland aeroplane from the shape of its rudder; and in fact there is still a family resemblance in the rudders of the Albatross and Hertfordshire monoplanes.

The fuselage of the Arado is of light metal monocoque construction.

The seaplane is fitted with a pair of metal floats, single-step, and wide apart, which are attached to the lower wing centre-section by numerous struts and wires, which, although in apparent confused conglomeration, present but little resistance.

The crew of two are enclosed in a long transparent cover with sliding panels. The pilot is supplied with one fixed forward gun placed in the top of the fuselage just behind the motor cowling, with 500 rounds of ammunition. The observer has a movable gun on an Arado mounting over the rear cockpit with 750 rounds. Full wireless equipment is carried. Below the observer's cockpit is an entry tube for a trailing aerial.

Access to cockpits is by walkways on the lower wing centre section and toe-hole steps in the sides of the fuselage. For engine maintenance there are fixed steps on the front undercarriage struts of the seaplane.

Offensive armament consists of six 110 lb. bombs carried in racks, three below each lower wing, or alternatively a single 1,100 lb. bomb or a 1,760 lb. torpedo carried below the fuselage.

Petrol is carried in two tanks, each of 450 litres, which are placed one in the fuselage between the wings and the other in one float, presumably in the starboard one to counteract airscrew torque. Oil is carried in the engine compartment, with a cooler below.

Power is supplied by a B.M.W. 132Dc nine-cylinder radial engine developing 880 h.p., enclosed in a long-chord "dished" cowling with an exhaust collector ring in front. A three-bladed metal controllable pitch airscrew is fitted.

Although the Ar96 has not been reported in action at the time of writing, it is believed to be in service with the glorious German Navy, and may be used on the new (?) aircraft carrier "Graf Zeppelin" when (and if) it ever gets commissioned. The comparatively low landing speed of 55 m.p.h. for the land-plane makes it suitable for naval duties.

If it should appear there is no reason for thinking it will be confused with any of our own aircraft.

Although similar to the Swordfish, both the wings of the Ar95 being swept back will be a distinctive point in recognition compared with the straight lower wing and the swept-back upper wing of the former aeroplane, which really looks like a hefty Hart, or Horsley, when seen head-on. There is, in fact, more likelihood of the German 'plane being confused with a Shark, which, although a sesquiplane, has both wings swept back. The high tail unit and the lower span-length ratio of the Arado will in any case eliminate mis-identification with either of these types. And we have no similar biplanes with the trousers of the Ar95-Land.

A model of the seaplane should be painted similar to all other German naval aircraft. The upper surfaces of wings and tail and the fuselage should be coloured dark olive green. Under surfaces should be a very light grey-blue, almost white, as are all German aircraft. Plain black crosses, with thin white outlines, are carried on each side of the fuselage just aft of the rear cockpit, and at each wing-tip, where the white outline is slightly wider. A black swastika is painted on the tail, across the fin and rudder, and is also outlined thinly in white. Identification letters and numbers are carried in white or grey on the fuselage and below the lower wings in black.

Specification for the seaplane is as follows:

Dimensions: Span, 41 ft. Length, 36 ft. 5 in. Height, 17 ft. Width folded, 19 ft. Wing area, 488·5 sq. ft.

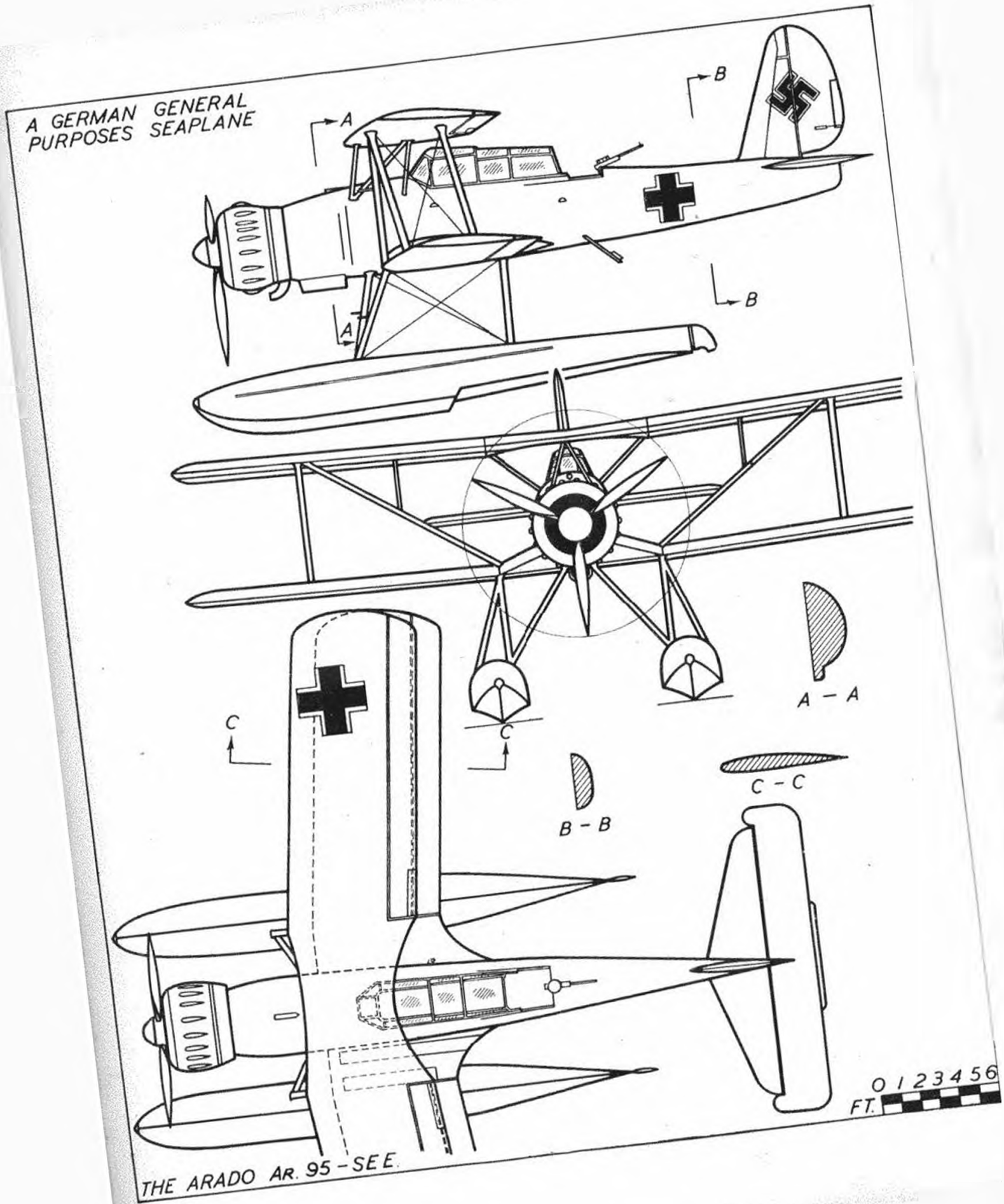
Weights: Tare, 5,588 lb. Disposable load, 2,486 lb. Loaded, 8,074 lb.

Loadings: Wing, 16·56 lb./sq. ft. Power, 9·02 lb./h.p.

Performance: Speed at sea level, 164 m.p.h. Maximum speed at 10,000 ft., 187 m.p.h. Alighting speed, 56·5 m.p.h. Climb to 3,250 ft., 2·5 min. Climb to 6,500 ft., 5·0 min. Climb to 13,200 ft., 11·0 min. Climb to 19,500 ft., 22·0 min. Ceiling, 24,000 ft.

The above figures are approximately the same for the Ar95 Land, but that aeroplane, having a loaded weight of 7,260 lb., has a slightly higher performance all round, the maximum speed being 191 m.p.h.

A GERMAN GENERAL PURPOSES SEAPLANE



THE ARADO AR. 95 – SEE.

BUILD THIS MOST EFFICIENT FLYING MACHINE

By FREDERICK BONTOFF

I'M not going to call it a model aeroplane. Indeed, is any model aeroplane a *model* of anything? Our line up is different.

So, if you don't mind putting into the air all the best principles of flight *in simple form*, you will get consistent flights of 5 –6 minutes. A few well-known materials and a few hours do the trick.

The scheme was first successfully tried-out in 1908 by Fleming Williams. But the present construction is vastly improved, and incorporates a modern wing section, balsa, and carved propellers.

" A " Frame (or Fuselage).

Pin down on to a perfectly flat board on which has been drawn a triangle.

Spars 32 in. × ⅜ in. × 1/16 in. hard balsa.
(1) Base cross-piece, 7 in., birch ¼ in. × 3/32 in.
(2) Ditto, cut to length, ¼ in. × 1/16 in.
(3) Ditto " ¼ in. × 1/16 in.
(4) Ditto " ¼ in. × 1/16 in.

Nos. 1 and 2 *sunk to level;* Nos. 3 and 4 bound and glued *on top.*

Next make nose-hook from 20 s.w.g. wire.

Bind and glue with joint fixing.

Two brass bearings, 3/32 in. × 1/16 in. × ⅜ in.

Bore a hole in each at ⅛ in. from end to take 20 s.w.g. propeller shaft. Bind these on to base.

Now cover with light Jap silk the bay formed by base-cross piece and No. (2) dope. This is your tail-plane.

The " fuselage " is now complete.

Wing.

After using several sizes and sections, the following gave best climb and straightest course.

1 in. sweep back.
Ribs spaced 1 in.
Dihedral 1½ in.
Tips, 1/32 in. reed.
Wing section - full-size :—
L.E. ⅛ sq. in.

Unless you are an old hand don't attempt the propellers: they make such a difference to the behaviour of this type of machine that it is well worth while to have them carved by an expert, perfectly *matched* and balanced.

Motors.

Two skeins of 6 strands of 1/16 in. best strip per side.

A *double* winder can be made from an egg-beater. This winding of both motors from the front *at the same time* ensures accurate number of turns; also one motor is not getting " tired " while the other is being wound. Propellers should turn up and out when viewed from back.

The advantages of this type of machine are :—
(1) Glider effect of undisturbed wing-travel.
(2) Twin propellers rule out the torque factor
(3) No rudders are necessary

The climb of this " arrangement " is great.

Launch by holding propellers at hubs (thumbs supporting machine *under* spar). Lift above head, push forward and slightly upwards.

An " S " hook made from 18 s.w.g. is an advantage for fixing skeins on to winder.

SOME USES OF ALUMINIUM MILK BOTTLE CAPS AND TIN FOIL

By J. SWAIN

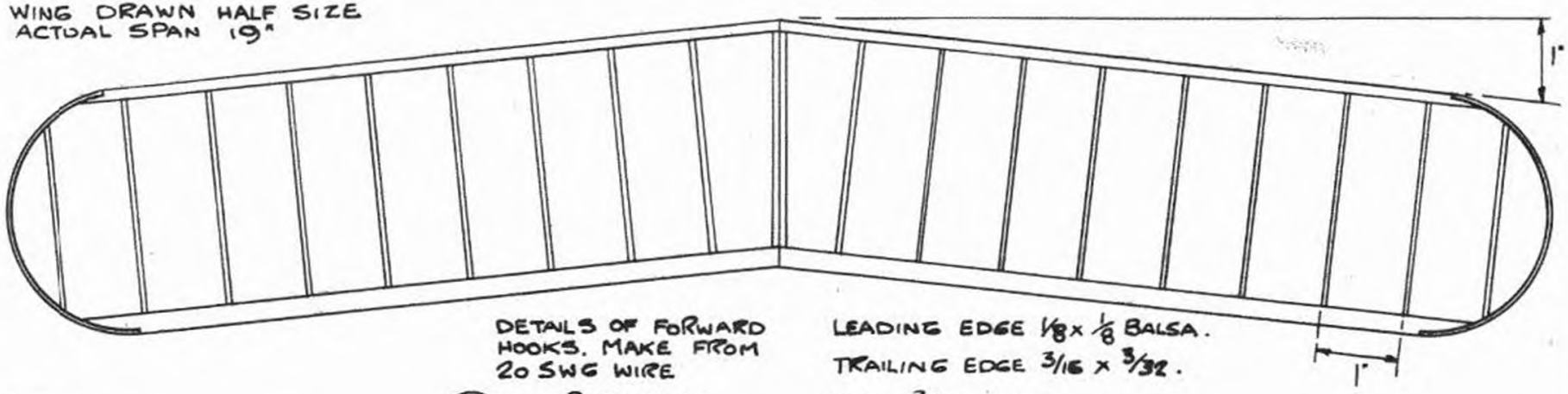
I WAS stuck for a bush for my " Dopey 1," which I was trying to build from the plans published in THE AERO-MODELLER. So I decided to try something I had been thinking of for some time. I took the aluminium cap of a milk bottle, and cut the rim off. The disc which resulted was scraped between the edge of a steel rule and a flat tin. This flattens it and removes the lettering (it also stretches it, by the way). Then I cut a strip 1 in. wide and as long as I could make it, after trimming up. This was rolled tightly round the propeller shaft. Over this was rolled a strip of gummed paper, 2 in. to 2½ in. long. It is kept on the propeller shaft, and when dry is pushed in the nose block. There is one thing to remember when rolling the aluminium: it must be rolled in the same direction, as the propeller will turn when under power. In my experience it has tended to bind when rolled the other way.

Wheels can also be bushed in a similar manner by using a narrower strip. In this case it does not matter about rolling it in a particular direction.

Wheel spats can be made to look very smart indeed if lined with the same material. A strip is cemented to the inside of the wheel recess, then two pieces, each slightly larger than the recess are cut and cemented, each to the inside of one of the *outside* " *slices* " of the spat. These are then cemented to the centre " slice," and the whole faired off as usual. The effect is fine, but can only be applied to small spats. For larger ones use tin foil, but this is not so smart, as it is difficult to get a large piece with no wrinkles in it.

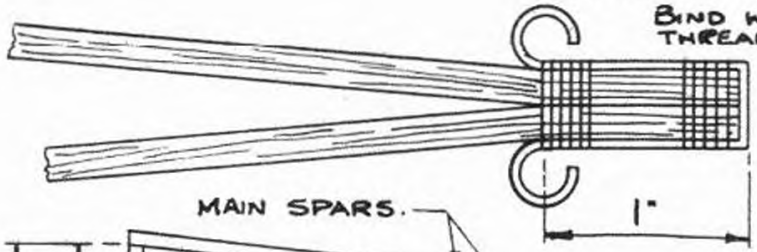
Solid modellers will find the aluminium useful for making the doors for bomb traps and retracting undercarts. While a few short strips and a ⅛ in. or so of fine piano wire can make a neat hinge, a good method of making a small hinge is to take ¾ in. of wire and ½ in. by ¼ in. of aluminium. The wire is bent to form three sides of a square, each ¼ in. long, and the aluminium is folded over the middle side. Attachment is easily carried out by sticking the prongs into the stern post (in the case of a rudder), and the two flaps are pressed together and cemented into a slit in the moving part.

WING DRAWN HALF SIZE
ACTUAL SPAN 19"



DETAILS OF FORWARD HOOKS. MAKE FROM 20 SWG WIRE

BIND WITH THREAD.



LEADING EDGE 1/8 x 1/8 BALSA.

TRAILING EDGE 3/16 x 3/32.

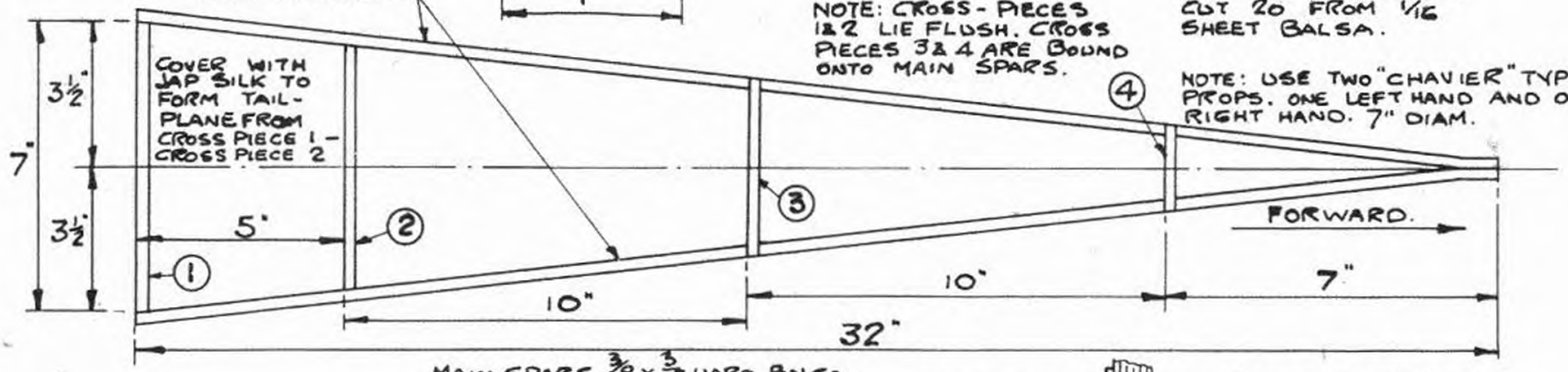
TIPS 3/32 CANE.

FULL SIZE WING RIB. CUT 20 FROM 1/16 SHEET BALSA.

MAIN SPARS.

NOTE: CROSS-PIECES 1 & 2 LIE FLUSH. CROSS PIECES 3 & 4 ARE BOUND ONTO MAIN SPARS.

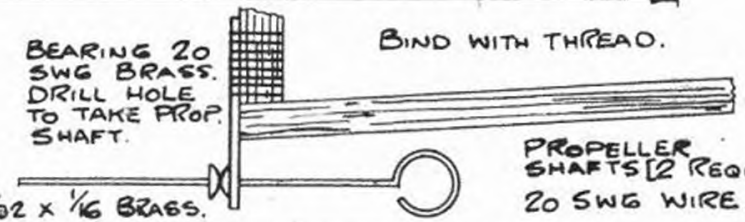
NOTE: USE TWO "CHANIER" TYPE PROPS. ONE LEFT HAND AND ONE RIGHT HAND. 7" DIAM.



MAIN SPARS 3/8 x 3/16 HARD BALSA.
CROSS PIECE No 1 1/4 x 3/32 BIRCH.
CROSS PIECES 2. 3. 4. ARE CUT FROM 1/4 x 1/16 BALSA WOOD.

BIND WITH THREAD.

BEARING 20 SWG BRASS. DRILL HOLE TO TAKE PROP. SHAFT.



BEARING 3/4 x 3/32 x 1/16 BRASS.

PROPELLER SHAFTS [2 REQD] 20 SWG WIRE.

WRS.

A MODERN "OLDTIMER"

A SENSITIVE BEAM SCALE —— By C. F. CROMPTON

IF carefully and correctly made, this scale is sensitive enough to weigh models and parts accurately to the nearest ·005 oz. (nearest half a-thou'). The instrument is sturdily constructed and capable of handling an ultra-light "micro-job" or a "Wakefield," and possibly a petrol model in parts.

To construct: start at the base "A" (see drawing for position of all letters), which is a piece of steel or wood, 6 in. by 4½ in. approximately ¼ in. thick wood, or 1/16 in. metal. To this is fitted four feet, being wireless screw terminals (see drawing "B"). These enable the operator to level the scale.

Above the base is the standard "C," 1¾ in. by ¼ in. by 17 in. high, and "D" is triangular added for strength. Forward from the top of "C" is a piece of the same wood, 1¾ in. by ¼ in. by 1¾ in. long (see "E"). This holds the pivot "J" or "L." Parallel to the beam proper (see plan) is bar "G" (¼ in. by ¼ in. wood), 14 in. long, with the register holder "H" forward from it. Register "I" is white celluloid, or card fitted, as described later.

Bar "G" must be 90 deg. from standard "C," viewed from the front.

The pivot: This can be made from sheet brass, as illustrated in sketch "J" (the pivot holder), "M" the axle, of steel wire, fitted in bearing holes in "J." This axle is soldered to a piece more brass "K" (dry battery spring brass contact). However, a far better job is to use a bearing from a clock (the last one the missus threw)! On the scale illustrated I used the "hair-spring wheel" and bearing, which was a complete unit bolted on to the main frame. This bracket, as sketched at "L," is screwed to "F," which is in turn screwed to "E." The wheel "N" has a piece of spring brass "K" (see above ref.) soldered to it. Each end of "M" is hung in a screwed-in bearing "O," which allows easy dismantling. Take great care to have the pivot well and truly hung.

The beam: closely study the perspective drawing and note very carefully the measurements. Shape beam "P" (14 in. by ¼ in. by ⅛ in.) as shown, mark "Q" with "M" directly above it—this *must* be accurate. Next mark slot "R" 1 in. behind "Q" and "S" marked 1 in. in front of "Q." For the rest of the marks: "X" is 10 in. from "Q"; all intermediate inches and 1/10 in. are then marked in indian ink. The pointer is a needle "T," bound on with thread to beam "P," as shown in drawing. "U" is thread or wire hanging in the slot "R," to "U" is attached a pan "V." An excellent pan may be made from an ordinary single patty pan from the ironmonger (or kitchen), a hook is soldered to base of pan for articles too big to put on it. Fit a hook at "X."

When whole of beam is finished a bolt and two nuts "W" are bound and glued on behind "R." The exact size of bolt must be found by experiment, but on the one in photo it is 2½ in. × 1/16 in. with the head cut off.

To rig: put a small spirit level on bar "G," use adjustable feet "B" to level. When true, and it is very important to make sure it is, level beam with it. The easiest way to do this is to loop some soft wire round "G," make hook, and drop "P" on to it (see small sketch, Fig. 4), place spirit level on "P," bend wire hook until truly level, check and re-check levels of "G" and "P." When satisfied mark position of pointer on register "I"; now remove wire and regain level with movements of nuts on bolt "W."

When register is marked it is wise to cement end stops at top and bottom to prevent unnecessarily long swings, and also cement on a clear celluloid front (see sketch) to prevent needle doing damage.

Making weights: first make friends with the local shopkeeper, or someone who will loan you an oz. weight. (A set of ¼ oz., ½ oz., 1 oz., unstamped brass weights only cost about a shilling or so, and are very useful for re-checking or to use for models of 2½ oz. or more). Place the one oz. weight in the pan, put a piece of wire on the mark "X" (10 in. from pivot "M"), cut the wire (use a file towards the end), until the pointer is level on its mark.

This weight will weigh from ·005 to 1 oz. in ·005's (half of one-hundredths). If you have got a half and quarter oz. weights recheck with these on the pan, and the weight on the ·5 and ·25 marks respectively. If you measured your inches, etc., correctly and carefully, they will balance. When using this weight (call it No. 1) the 1/10 in. marks are ·01 of an oz., and centre of spaces between each mark are ·005's.

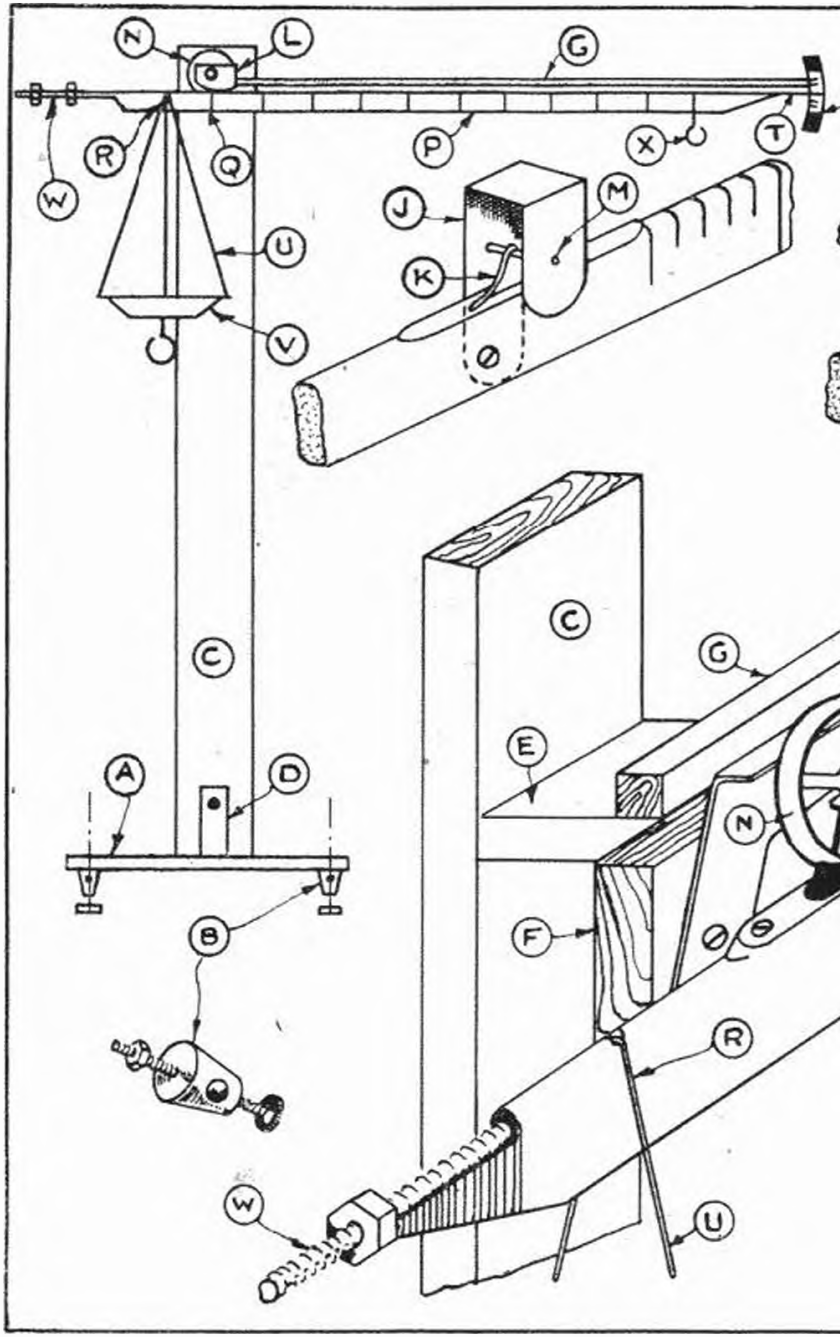
Weight No. 2. Place the weight No. 1 in the pan, cut a piece more wire (use 30 or 40 gauge), and place at "X," cut, file, and balance as before. When using this weight the marks 1/10 in. are ·0001 (thou's of an oz.), and the spaces are ·0005 (half-a thou).

To use scale: Put the level on "G," true up. Level up "P" with it. Now place article to be weighed in pan (or on hook); if it is under 1/10 of an oz. use weight No. 2 only.

If it is over 1/10 oz. and under 1 oz. put weight No. 1 at mark about a 1/20 oz. too light (i.e. balance approximately and shift back *half an inch*. Then put No. 2 weight on (together with No. 1), and use to secure the finest possible balance.

If article is over an oz. put weights on hook at "½." These are 1/10 oz. per oz., i.e. use the ¼ oz. from 2½ oz. to 5 oz., and ½ oz. from 5 to 10, and 1 oz. for over 10 oz.

You can only obtain accurate weights by using care and by putting the No. 2 weight on in conjunction with the others. This alone assures you of accuracy of weights from a half-a-thou. whatever the total weight of the model you weigh.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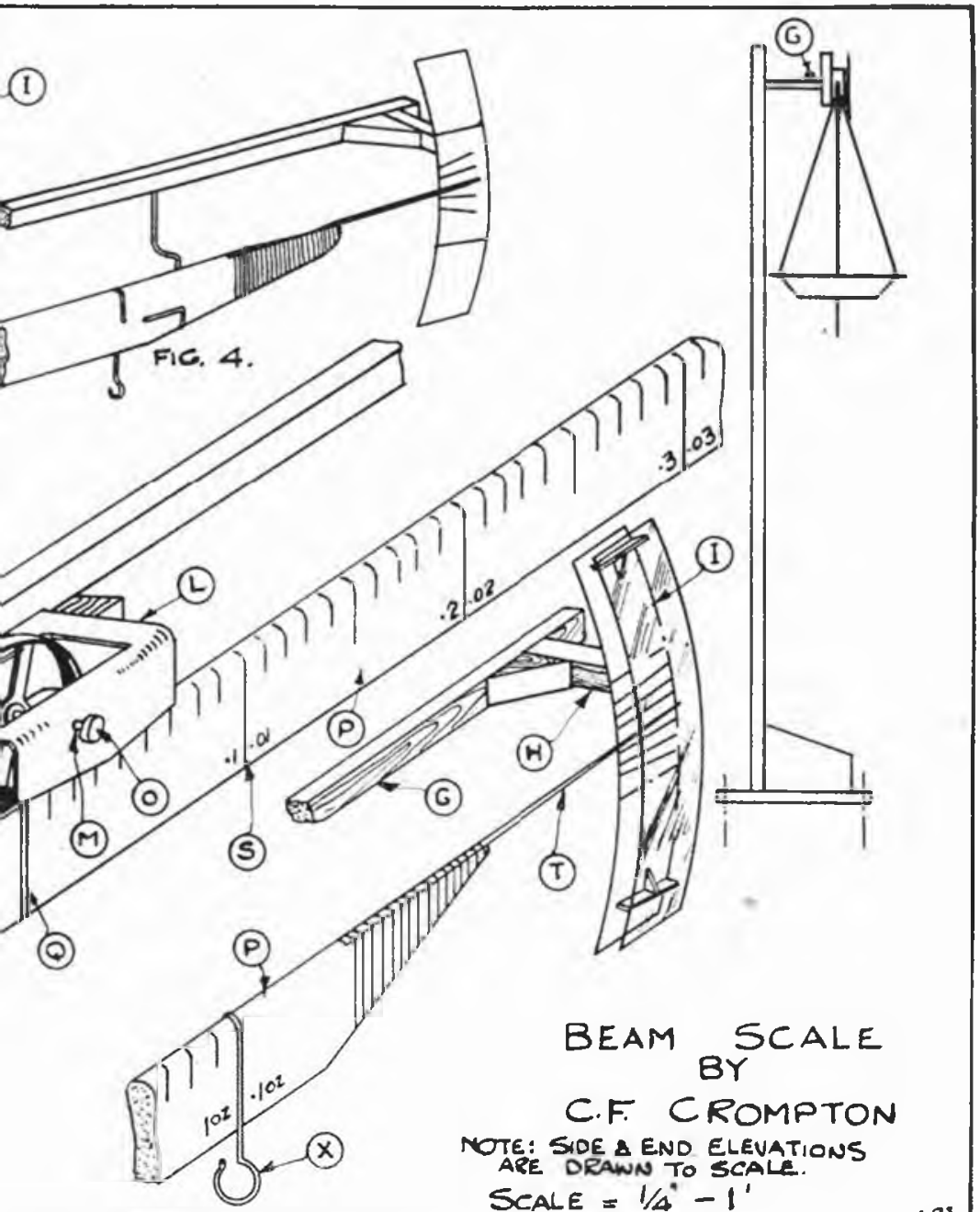


FIG. 4.

BEAM SCALE
BY
C.F. CROMPTON

NOTE: SIDE & END ELEVATIONS ARE DRAWN TO SCALE.

SCALE = 1/4" - 1'

QUESTIONS AND ANSWERS CONDUCTED *By the EDITOR*

Q. *Can you give me any further details of the "De Havilland T.K.4" than those appearing in the February* AERO MODELLER?—(T. S., Lewisham).

A. This aeroplane first flew in August, 1937, and flew in the King's Cup Race the next month, finishing ninth, starting from scratch. Its average speed over the course was 230·5 m.p.h.

It was fitted with D.H. controllable-pitch airscrew, split flaps and wing-tip slots. The undercarriage consisted of two legs which completely retracted inwards.

G.A. drawings are contained in the issue of *The Aeroplane* dated September 8th, 1937, and if you write to the publishers, Messrs. Temple Press Ltd., Bowling Green Lane, London, E.C.1, they may be able to supply you with a copy.

Q. *What is the best way of storing and preserving rubber motors?*—(T. B., Barking).

A. Rubber should be stored in an air and light-proof tin, preferably with a dusting of french chalk.

After use, rubber motors should be washed and dried before storing.

Q. *Can you give me the address of Messrs. Woodasons, and do they sell finished models?*—(C. G. J., Feltham).

A. The address of Messrs. Woodason Aircraft Models is Heston Airport, Hounslow, Middlesex.

Most of their work is executed to order, and I do not think you will be able to purchase any of their models by retail.

Q. *What are the type numbers of the following De Havilland aircraft—Leopard Moth, Fox Moth, Puss Moth and Gipsy Moth?*—(M. H. F., Blackpool).

A. *Moth.*—D.H.60; 60C type has a Cirrus engine, 60G is the Gipsy Moth; the 60M is a Gipsy Moth with a metal fuselage.

Puss Moth.—D.H.80; this was slightly modified in 1937, and the model which became so well known as a private owner's aeroplane was the type 80a.

Fox Moth.—D.H.83.

Leopard Moth.—D.H.85.

Q. *How is a Wellington bomber coloured underneath, and how can I paint straight and even lines on models to represent ailerons, etc.?*—(P. L. G., Northampton).

A. (*a*) Entirely mat black, with no cockades.
(*b*) These are best marked with a mapping pen and Indian ink and a ruler.

Q. *Where are the seats situated in the "Fairey Battle"?*—(M. A. F. G., Totnes).

A. The pilot's seat in a "Fairey Battle" is situated level with the first panel of the cockpit covering.

The observer-gunner sits facing backwards on a seat placed at the rear of the "glasshouse," the cover of which swings upwards and forms a windshield allowing him to use his gun.

Q. *Can you give me the general details and camouflage of the "S.E.5a" in* 1917, *and when was this 'plane obsolete?*—(P. H. M., Southport).

A. Span, 26 ft. 7¼ in.; length, 20 ft. 11 in., chord, 5 ft., stagger, 1 ft. 6 in.; incidence, 5 degrees; dihedral, 5 degrees.

This aeroplane was fitted with a Hispano-Suiza or a Wolseley Viper engine, ranging in power from 150 h.p. to 240 h.p., and the maximum speed varied from 115 m.p.h. to 130 m.p.h., according to the engine fitted.

Most of the last-war aeroplanes were painted dark green or brown on the upper surfaces, and were left the natural colour of the fabric underneath (light cream).

Cockades were carried on wings and fuselage, and the *rudder* (not the fin) bore red, white and blue stripes with the red at the rear.

The "S.E.5a" was not used for long after the Armistice, but a number passed into civil use, and up to declaration of war in September, 1939, some were still in use by a skywriting firm at Hendon.

It is believed that these were the only ones still flying.

Q. *In a twin-engine lay out, is the torque reaction of two propellers rotating in the same direction more than that of the two propellers rotating oppositely?*—(A. J. A., Exeter).

A. In a twin-engined lay-out the torque reaction of two airscrews rotating in the same direction is obviously more than that of two airscrews rotating in opposite directions. In the latter case the reactions cancel themselves out, and the 'plane would fly on a straight forward course, provided the rudder was central. In the former case, with your airscrews both turning the same way, the machine would fly in a circle.

Q. *What is span loading?*—(J. W., Derby).

A. Span loading is the ratio of span to the loading per square foot, e.g. you could have a wing of 10 ft. span with a loading of 1 lb. per square foot, and you could have a wing of the same area, but half the span and double the chord, with the same wing loading of 1 lb. per square foot. In this latter case the span loading would, therefore, be twice that of the former.

Q. *Can you tell me the ranks contained in the Air Transport Auxiliary, and who services their machines?*—(A. B. S., Egham).

A. I am afraid we have no information regarding ranks, stripes, or servicing of the Air Transport Auxiliary, and would suggest that you write to that service, c/o The Air Ministry. If they are unable to help perhaps the Ministry of Information can.

Q. *Could you give me details and colour scheme of D.H. "Flamingo"?*—(K. S., Blackpool).

A. If you intend building a model "Flamingo" it should be painted with civilian registration lettering. The first production "Flamingo" was delivered to Jersey Airways just before war was declared, and was painted silver and carried registration letters G-AFUE in black. These were painted on the wings and on each side of the fuselage.

The "Hertfordshire," which is merely the name given by the R.A.F. to the "Flamingo," is camouflaged according to usual practice, in green and brown on sides and upper surfaces, and coloured silver underneath. Cockades on the fuselage are red, white and blue, with the usual yellow surround, those on the upper surfaces of the wings are red and blue only, while those underneath are red, white and blue. Stripes are painted on both sides of the fins.

A LETTER . . .

. . . TO THE EDITOR

DEAR SIR,

I was very interested in the article by " D.M.H." in your February issue, called " Fundamentals of Model Photography," and while I agree with quite a lot he says, I must say that he is entirely wrong on numerous other points.

It is quite correct when he says it is knowing how to use one's equipment, whether it be a fifteen guinea outfit or a " Box Brownie," and this being so I would take the liberty to comment on the assertions as they occur in his article.

If one possesses a camera with two focusing points called " near objects " and " distant views," then the use of the point called " near objects " will help very little when photographing the usual small aeroplane, as it is usually necessary to photograph them so close to the camera. A much better way of focusing very near objects will be made apparent further in my letter.

A cable release is not at all necessary for " snapshots "; this fitment is of help only when taking " time " or " bulb " exposures, and on this point also I will explain further on how to do without a cable release for " time " exposures.

The smallest possible aperture should be used, and not the " centre one," but even the smallest aperture in the camera may not be small enough, as I will explain later.

On no account should the control " B " for " bulb," or " brief time," be used, unless one has the camera on a tripod or other suitable support, and the shutter controlled with a metal or other flexible release.

With most of his suggestions for a suitable viewpoint, together with suitable backgrounds, I fully agree, but this is mostly a matter of a " seeing eye," and is only fully acquired with practice.

Absolutely clear prints can be obtained without the use of a focusing camera, as I will explain.

The aperture of a lens is the key to all the difficulties, but as we are photographing small aeroplanes at close range it is not how large the aperture, and consequently the expensiveness of the lens, but how small we can make the aperture. If the aperture is made small enough, then the lens of a " Brownie " is in almost as good working condition for our purpose as the lens of an expensive camera.

A very small aperture increases the " depth of focus," and almost does away with the necessity of focusing a definite distance. This depth of focus is exactly what we want when photographing model aeroplanes.

My camera is one of the expensive sort using " Brownie " size film, and focuses down to three feet, but only objects at exactly three feet are in focus at full aperture, and so to photograph models, the nearest point of which may be 2½ feet and the furthest part 5 feet, I have to " stop down " the aperture, but I cannot " stop down " small enough, and so I make use of a supplementary aperture, which I fix temporarily on the front of the lens, and it consists of a small hole one millimetre in diameter made in a piece of thin black celluloid, which in turn is cemented on to a ring-shaped piece of cork ⅛th of an inch thick, and plugged in to the front of the lens or camera body, whichever is most convenient. This fitment is easily made, and works just as well with a cheap camera of the " Brownie " variety. I sometimes use an aperture as small as a needle hole.

A " snapshot " is a quick exposure, usually not slower than 1-25th of a second, and when exposures of 1-10th of a second and longer have to be made, then two other conditions must be complied with. Firstly, the subject must be perfectly still and not moving with the breeze, and secondly the camera must be supported, as no human hands can hold it still enough.

The first condition is complied with by photographing the model indoors in still air, and thereby taking advantage of directional and controlled lighting.

The second condition of a supported camera is bound up with the use, or not, of a flexible release. Use a flexible release by all means if you have one, as its purpose is to control the shutter without transferring the slightest movement to the camera itself. For a support use a tripod if you have one, and if it can be attached to your " Brownie," otherwise support it on a book, etc., but let it come to rest and do not try to hold it in position. If you have no flexible release hold a small dark card or book closely, but not touching the front of the camera, and after having set the shutter adjustment to " T " for time exposure (not " B " for " Brief Time ") operate the shutter release and let go. The shutter and lens will then remain open, and when you are satisfied that both camera and subject are perfectly still slide your card or book away for a few seconds, then carefully slide the card back again when the exposure is complete, and then operate the shutter release to close the shutter. As stated, do not use the " B " for bulb with this method, or the shutter will then only remain open so long as you keep up the pressure on the shutter release, and which will obviously transfer hand tremors to the camera.

If you know what the exposure should be with a "Brownie" at full aperture, then give approximately one hundred times as long with this supplementary aperture, that is if the exposure at full aperture should be 1-25th of a second (snapshot speed), then one hundred times 1-25th of a second is four seconds; and if one second at full aperture then 1½ minutes at supplementary aperture. When using the supplementary aperature leave the longest stop in use in your camera, and take full advantage of the focusing mechanism, if any.

You will be impressed at the marvellous detail in all distances that this method gives with the simplest of cameras, but one more tip, if you think it necessary to take a second photograph (one for luck) then move the camera carefully to left or right a distance of 1½ to 2½ inches and repeat exactly the exposure.

You will then have a " stereoscopic " pair of pictures, which can be studied much more intently than a "one-eyed" picture, for do not forget that most Air Force aerial pictures are made for and studied with a stereoscope. If the Editor will allow me I will describe this more fully in a later article.

In passing, I would like to say that I have only recently resumed model aeroplane making. My first was made in 1911, and my last in 1914. This last was a successful water-plane, and I still have the three original floats.

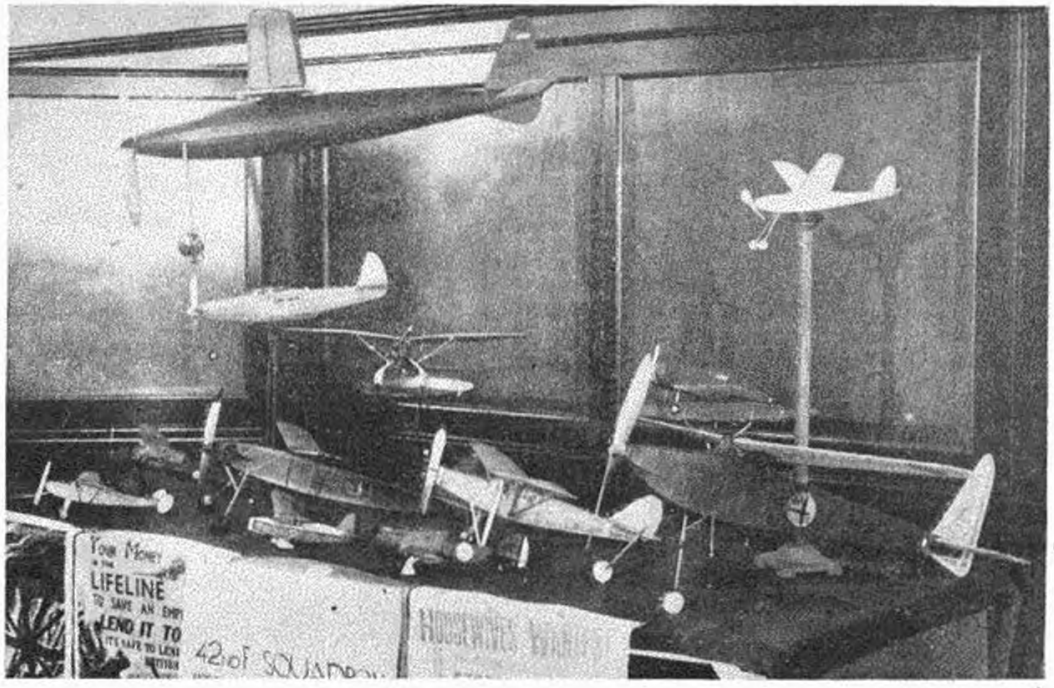
I also attempted helicopters and ornithopters, but my best recollection was with the water plane just previous to joining H.M. Forces in 1914. I had the usual large crowd watching my efforts on an ornamental lake of a large town when a local councillor asked me what the words " *tempus fugit* " meant, which I had painted along the fuselage. I told him " double Dutch for—damit, I'll sink or swim."

Yours faithfully,

" 6 × 18."

CALLING ALL AIR CADETS

By
C. A. RIPPON



An interesting group of models exhibited by the King's Lynn A.T.C. Squadron, in conjunction with King's Lynn War Weapons Week.

EVIDENCE is reaching me, in the shape of many interesting letters, that members of Air Training Squadrons are keenly interested in aero-modelling, and I make no apology for publishing in full one letter which seems to me to represent the problems faced by most pioneers of the movement among A.T.C. Squadrons. The problems are being surmounted in this case by the enthusiasm of Cadet George Whitfield, of the 167th (Blyth and Seaton Delaval) Squadron A.T.C., of Northumberland, and he puts forward some suggestions for the 1941 AERO-MODELLER Trophy Contest. I shall be glad to have comments upon these, for time is rolling on, and before we know where we are we shall be through the summer. So pass on your ideas as quickly as possible.

This question of quick contact has worried me in the past, for letters have reached me very late, due to postal delays, and the fact that all correspondence has had to go to Leicester first. By arrangement with the Editor, letters may now be sent direct, and at the end of my notes you will see my address. This should liven things up and allow me to reply to you by post, where necessary, with a minimum of delay.

Apart from Northumberland, I have heard from Cardiff. Corporal G. Pitts asks me (1) Whether the Modelling Sections will continue to function and publish information through the medium of THE AERO-MODELLER feature, "Calling All Air Cadets"? Of course they will. Progress must continue, and as long as they go on, so will this feature. (2) Whether the competitions announced for Air Cadets will be continued.

I've already given the answer to this second question earlier on. I shall be glad to have comments and suggestions from the 175th (Cardiff High School) Squadron, which is forming an aero-modelling section under the guidance of Mr. Bernard, of the Cardiff Model Aero Club. Thank you, Corporal Pitts, for your news, and Mr. Bernard, too, for your help. Your example could be very well followed by many more experienced aero modellers.

No. 83 Glasgow Squadron is in the news. The members hope to get their aero-modelling section going very soon, but have lost the help of Cadet Flight. Lieut. Arthur on his promotion to Cadet Squadron Leader, No. 67 Glasgow Squadron. This exceedingly popular officer held *model flying records* before the 1914-1918 war. Good luck to him and the lucky No. 67 Squadron who gain his help.

The members of the King's Lynn Squadron have, after all, been able to display their prowess and models, and the accompanying picture proves that their skill is both high and fully representative, and the models were tastefully arranged.

No. 85 Southgate Squadron recently staged an exhibition of models, etc., and the Northern Heights M.F.C. provided about seventy-five models of all types to back it up. The show was opened by the Mayor and Mayoress of Southgate, and during the opening ceremony the Mayor presented to No. 85's winning team THE AERO MODELLER Annual Challenge Trophy, which they won in 1940. He paid tribute to the modellers and stressed the value and importance of aero-modelling in the Corps. He was supported by Mr. D. A. Russell, the Managing Editor of this journal. The Mayor and Mayoress were intensely interested in the models on display, and, as a past member of the Royal Naval Air Service, he had much in common with the President and Chairman of the Northern Heights, who also served with the R.N.A.S.

During the first afternoon over two thousand people passed through the exhibition. A pole-flying competition was won by Mr. K. Young, of Northern Heights (who has since joined No. 85 Squadron), with a flight of 143 seconds. About £8 was collected *during the first afternoon* towards the Southgate Spitfire Fund and A.T.C. Welfare Fund.

Cadet W. A. Gradwell, Press Secretary of the Blackpool Wing of the A.T.C., tells me that, under the guidance of Cadet P./Os. Birtwhistle and Downs, its Model Section has got going with twenty members, the secretary being Cadet/Lance-Corporal J. Goodall. Models under construction are a Fairey "Battle," Westland "Lysander," a

Messerschmitt, a Cloud "Zenith," and a Veron "Hawk," and a number of solid scale jobs.

I can foresee an entry in THE AERO-MODELLER Competition from Blackpool Wing. Oh, by the way, two Cadets are busy producing scale plans from small three-view drawings, and the Section is soon to start operations on the Towner Air Speed "Envoy" from THE AERO-MODELLER plan. Well, good luck, Blackpool; you are certainly enterprising, and a few more Squadrons might study your present programme with advantage.

I've had quite a number of enquiries asking me how to join the A.D.C.C. Well, as you all know, this has been absorbed into the A.T.C., and you have only to apply to your local Town Hall to find out the nearest unit; but a number of enthusiasts are barred by their age. To these I would suggest that they contact the local B.P. Scouts, for I understand they are to form "*Air Scouts*." I shall be glad to learn from Scout Patrols how this scheme is going, so that I can help enquirers. Just one word to those who contemplate writing to me. *Print* your name, rank, unit and *fullest possible* address at the top of your letter, and don't forget the date. Quite a number of people have written for information as to their nearest unit, and although I am fairly well up in my geography of Great Britain, I cannot be expected to know the nearest large town, say, to "Little Puddle on the Wallop," so please tell me your nearest large town when writing!

A publication which will be a great help to Squadrons who are organising model aeroplane sections is the *Journal of the Society of Model Aeronautical Engineers*, of which I have been appointed Editor. The current issue, No. 8, contains the general competition rules, rules for timing duration flights and records, and a complete programme and rules for the whole of the 1941 season, including pole flying, "A" and "B" Classes.

There is nothing like starting in the way in which one means to go on, and if those stout fellows responsible for organising model sections send to me for a copy of the *S.M.A.E. Journal*, they will receive information which will save them a lot of worry and enable them to arrange their competitions on the right lines, for all national aero-modelling is controlled by the S.M.A.E. The price of the *Journal* is 4d. *per copy, post paid*, and ALL AERO MODELLERS should take it regularly as a matter of course.

Note my address for all correspondence connected with this feature, *and* the *S.M.A.E. Journal*:

C. A. RIPPON,
58 Hampden Way,
Southgate, London, N.14.

And don't forget the stamps for return postage.

AN INTERESTING LETTER

DEAR MR. RIPPON,

May I begin by congratulating you on your very interesting feature, "Calling All Air Cadets." I thoroughly enjoy reading it each month, and I wish you every success.

I am a member of No. 167 (Blyth and Seaton Delaval) Squadron, A.T.C. (formerly A.D.C.C.), and am pleased and proud to say that I am in charge of our modelling section. I joined the Cadets shortly after the war began. I was formerly a member of the Newcastle-upon-Tyne M.A.C., and I have had four or five years' modelling experience in all sections—solid, rubber, petrol and gliding.

Although our Squadron has about 100 members, I am sorry to say that we modellers only number five. This may sound disappointing, and many may say, "Why don't you pack up modelling if the response is so poor?" Well, the answer is that the majority of the cadets have never seen a real model flying, and regarded the subject as a bit "babyish." Another reason for the lack of interest is that the greater majority don't get much pocket money, and for some unexplained reason regard modelling as a rich man's hobby. This, as you will see, is a great drawback. But, although very small in numbers, we modellers are all very keen, and I consider a few real enthusiasts ten times better than a lot of lukewarm ones.

I have explained to you our drawbacks. Now for our advantages. We possess for our headquarters one of the best halls in the district, and, needless to say, we have utilised this for round the pole flying. We can obtain a line six feet in radius with ease, and have had some grand times with it. Our second great advantage is that our Commanding Officer, Squadron Leader Wareup, shows great interest in our activities, and gives us all the support he can, both with regard to facilities and cash. So you see we have everything we could wish for for the running of a successful model section except the members, and as far as I can see it is up to me to try and promote sufficient interest. I have personally offered to teach new members how to build models, both solid and flying, and I hope that my offer will be accepted. We are also giving weekly displays of R.T.P. flying to anyone who wishes to watch, and so far these have been very successful, and I think that it is only a matter of time before we shall get a few recruits. However, we are going to spare nothing in our efforts to put No. 167 Squadron on the "model map," so to speak, and we hope in time to be able to arrange some R.T.P. competitions with other nearby Squadrons.

You asked in the Christmas Number of THE AERO-MODELLER for views concerning this year's "Challenge Trophy," and the lines it could be run on. May I suggest that the competition should be run on lines similar to last year, only that the machines may be designed by the owners, and that certain limits should be laid down concerning this design. In other words, run it on lines similar to the "Wakefield," only make it decentralised and do not specify how many cadets should form a team. I mean, the number of members in the team does not matter so long as the average duration of the team as a whole is taken. In this way Squadrons should have no excuse for not entering at least one machine.

Well, these are my personal views, and I should like to read yours and other cadets' criticisms of them, for it is only by such criticism that we shall make any headway.

I hope that I have not bored you, but you asked for modelling news, and I have given you ours. I shall be writing to you again soon, and shall endeavour to keep you informed of our progress (if any) and activities. I hope that the next time I write I shall be able to send a more interesting report regarding the model interest in our Squadron. Our motto is "Never say die," so we'll keep hoping.

I am, Sir,

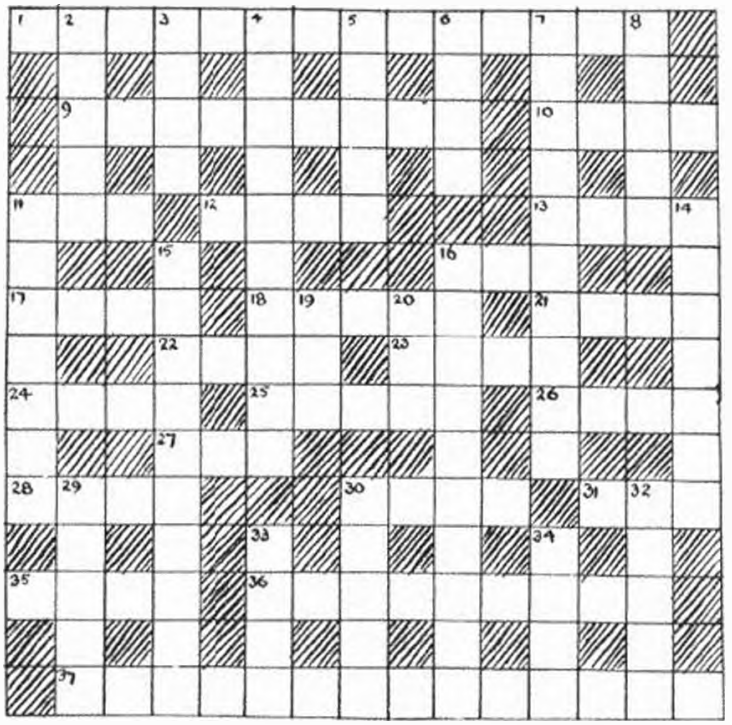
Yours truly,
CADET GEORGE WHITFIELD,
167th (Blyth and Seaton Delaval)
Squadron, A.T.C.

***Next Month*: FURTHER SQUADRON NEWS AND AN ARTICLE ON "CHOOSING A KIT"**

THE AERO-MODELLERS' X-WORD — No. 6

ACROSS

1. Time in prison makes breath come short when preparing a model for flight (2 words, 7 and 7).
9. Suggested alteration suggests a repair intended (9).
10. Vide a machine after a stall (4).
11. The limit of climb (3).
12. World place now held by Dick Korda (4).
13. With the wind as a picture (4).
16. Mound for sphere (3).
17. A barrel join? (4).
18. Animal warmer without head (5).
21. The negatives in front? (4).
22. It is few and far between (4).
23. The beginning of our hobby is to be found amongst those ancient ones, Athena, Eros and Venus (4).
24. Otherwise eels (4).
25. It sticks but not thee in France (5).
26. Basis of all measures (4)
27. The fool! (3).
28. It is a join all the same (4).
30. It was always father who was called thus (4).
31. Plus dad (3).
35. In Lethe ministrations you will find half (4).
36. No life in a team in here (9).
37. Do certain worthies use reel-less method? (2 words, 5 and 9).



DOWN.

2. Path of the model's wheels (5).
3. This chord on lots of 'planes (4).
4. Body nearly dead at the end of its training? (2 words, 5 and 5).
5. The young —! (5).
6. Buy the tent strictly at cost (4).
7. Native (10).
8. Clue presented to you (5).
11. Used in construction of models, with highest point in the middle (7).
14. Put forth the power (7).
15. Design for ships in small rivers used by many aero-modellers.
16. Will not this rite jester a 'plane which tries to be one of these (2 words, 4 and 6).
19. This will tan (3).
20. Anagram of 19 (3).
29. The upright building of a model (5).
30. Soft wire (5).
32. It is dismal in verse (5).
33. Not used with a rod for gliders (4).
34. Story told of one's record flight? (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, April 4th, 1941.***

The prize of 10/6 offered in connection with Crossword Competition No. 5 has been awarded to J. S. Ball, 19 Barrow Hedges Way, Carshalton, Surrey.

1 S	E	2 A	P	3 L	A	4 N	E		5 C	6 E	M	7 E	N	8 T
T		C		A		O		9 P		A		M		E
10 A	M	E	N	D		11 S	K	I	D	S		12 A	S	P
B		T		Y		E		L		I		N		I
13 I	C	O	N		14 S		15 F	O	R	E	H	A	N	D
L		N		16 S	P	L	I	T		R		T		
17 I	T	E	M		A		G		18 A		19 A	E	R	20 O
T				21 H	I	G	H	E	S	T				V
22 Y	A	23 R	D		N		T		S		24 A	25 C	M	E
		E		26 A		27 S	E	V	E	R		O		R
28 L	Y	S	A	N	D	E	R		T		29 S	P	I	T
I		P		S		R		30 A		31 E		L		O
32 F	O	E		33 W	O	V	E	N		34 P	L	A	I	N
T		C		E		E		N		I		N		E
35 S	A	T	U	R	N		36 C	A	S	C	A	D	E	S

Solution to No. 5 X-Word

REMEMBER!

"SOLID" MODELLERS PLEASE NOTE!

The Entry Form below must be used, and have attached to it the two coupons printed in the February and March issues.

CLOSING DATE, APRIL 15th, 1941

To "The Aero-Modeller,"

I submit entries with two coupons for your Photographic Competition of Solid Models.

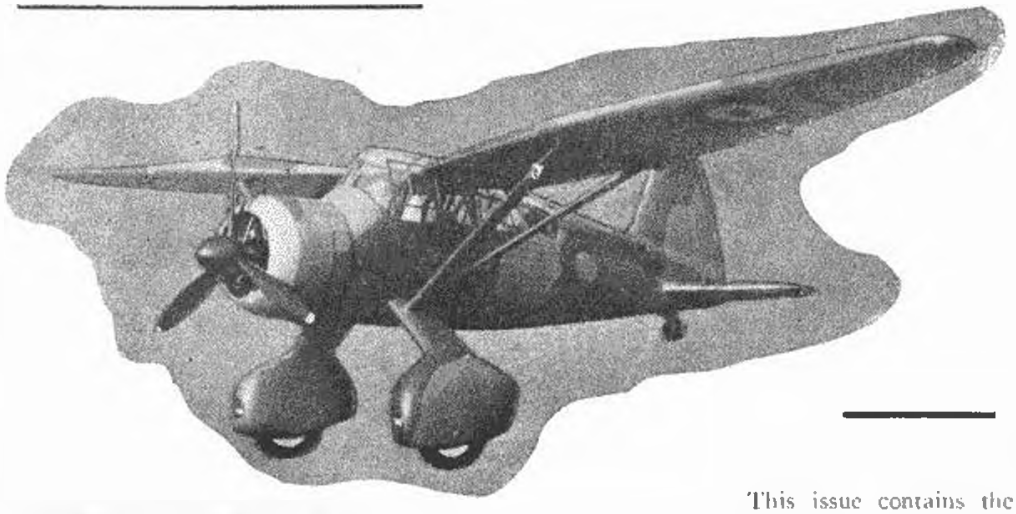
Name .....

Address .....

I AM * NOT A MEMBER OF THE AIR TRAINING CORPS.

* *Strike out this word if you are a member of the A.T.C.*

CLUB NEWS



Once again Mr. Harris wins our 5s. prize with this fine view of a Lysander. I think we can claim that this "shot" would be hard to distinguish from the the full-size machine.

By THE "CLUBMAN"

FRIEND FURNEAUX'S letter has certainly brought plenty of replies—a few for and a very large majority against—but having expressed my own views last month, I am not offering any further criticisms now. The thing I am pleased to see is the way it has stirred some of the "sleepers" out of their winter coma, and I understand the Editor has received quite a number of very useful criticisms and suggestions, and am sure we shall see THE AERO MODELLER putting one or two of these into practice in the very near future.

Together with some of the more experienced chaps, I know there is a large number of fellows who do not mind going to the trouble of scaling up small drawings, and I am given to understand that there are one or two really hot jobs coming along in the very near future. Fortunately for those who are unable—or unwilling—to do the necessary enlarging, full size prints will also be available, so I think in this instance we shall be able to claim that all tastes are catered for.

Petrol models will receive their share of attention, I understand, but obviously under the existing ban the majority of efforts will be devoted to rubber type models, and these will receive most attention.

I am disturbed to note from various correspondence that there are still a number of modellers who do not know of the ban on petrol model flying, and seem quite surprised when told that they are breaking the law. I should think there has been enough publicity given to the matter by now for everyone to know, but I would ask all aero-modellers, whether clubmen or lone hands, to keep an eye open for any delinquents who may put "the fat in the fire" for the rest of us. I am afraid I cannot see the "cleverness" of some flyers who think it quite fun to go against the rules, and I hope any of you who come across such contravention of the rules will make it your duty to take proper action.

One of the surprising things that the present conditions have brought about is the phenomenal increase in solid model building. Obviously this is largely due to this type of model being so useful for recognition purposes, and I know of a number of old hands who turned their noses up at this type of model in the past who have now found quite a bit of enjoyment in turning out "super super" reproductions that they could never manage with flying stuff! Also flying scale models are becoming more and more popular, and I hear of increasingly better times put up with this class.

This issue contains the second portion of the Aircraft Identification Competition, and I am just wondering how many are going to get anywhere near full marks. I swotted for hours over the first list, giving myself a lovely headache, and filled in about 50 per cent, most of which I suppose are wrong! (Of course, I'm not entitled to enter for this competition, but thought I would like to see what I could manage. I have a beautiful excuse for gracefully retiring, taking refuge behind Rule No. 3). Believe me, any bloke who scores 100 per cent in this event is going to well earn his money, but it is surprising just what knowledge some chaps can accumulate, and I have been stumped many a time by a mere youngster who could run rings round me when quoting aircraft types, performance, power units, etc. I'm afraid I must be getting addled in my old age.

Another point I must stress this month is the advisability of undertaking S.M.A.E. membership and insuring cover against third party risks. (You'd be surprised at my commission rate for mentioning this sort of thing!) With the advent of the outdoor flying season, risks to the general public, small as they are, are nevertheless greatly increased as against winter activities, and I cannot speak too strongly of the advisability of being covered against any liability. Flyers will, of course, understand that the insurance under present conditions only applies to rubber-driven types and gliders, petrol models no longer being insurable while the ban exists. I mention this in case there are any others like one bright lad who thought he could ignore the ban and use his S.M.A.E. insurance to cover any possible action by the authorities. What a hope!

You will gather from another part of the journal the results of the Annual General Meeting of the S.M.A.E. Various changes have taken place, and being present at this meeting, I have only one observation to pass on to the many clubs in the country. Owing either to lack of interest, or more possibly, inability to travel or attend, there was only a very small gathering of around about a couple of dozen people, mainly from the London clubs, two in particular being very well represented. The trouble is, when such a state of affairs exists, we cannot be said to get either a truly representative opinion or voting, and while, of course, those present at the meeting were fully entitled to vote, etc., I think they will be the first to agree that they could not possibly represent the clubs as a whole. Therefore, we are in the dangerous position of getting back to an "area" council instead of truly "national," which you will

remember was one of the main features behind the area scheme, which was hard fought for in the past. That this position has come about is, of course, purely dependent upon the clubs themselves, though I fully realise that present-day conditions and circumstances are mainly responsible for the way things are going. I do feel, however, that clubs in the various areas previously specified are not making the most of their opportunities, and have very badly slacked off since the war began, and are losing their advantages in consequence. Whether they are content to carry on like this I am, of course, unable to state, but I do trust that some far-seeing persons will realise that it is time they woke up. I quite expect criticisms over my statements here, but I trust I shall still be allowed to voice my opinions as I have done in the past without fear or favour.

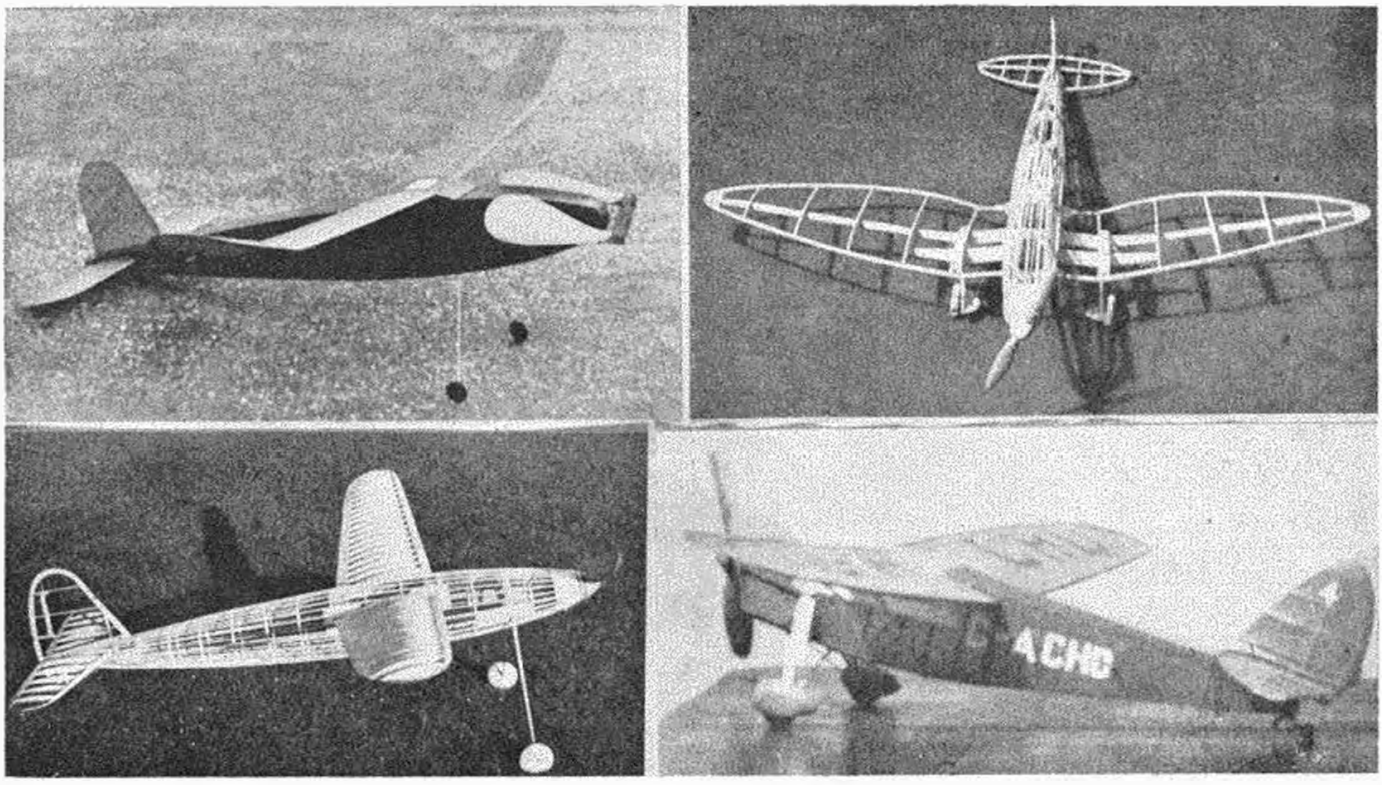
I was pleased to see the meeting accept our Managing Editor's offer to maintain the *S.M.A.E. Bulletin* for the war period, as my experience proves that the club able to keep its members constantly in touch with current happenings is the one that makes out best, and this applies to the S.M.A.E. particularly under present conditions where regular meetings both on the flying field and elsewhere are no longer able to take place.

A number of club reports are still not quite up to standard, but I expect we shall hear more as the season progresses, and more and more clubs come out of their winter quarters. It is surprising to me the number of clubs who actually pack up during the winter months, as I am sure they could learn a heck of a lot by indoor flying and lectures, which would stand them in great stead during the summer and competition season.

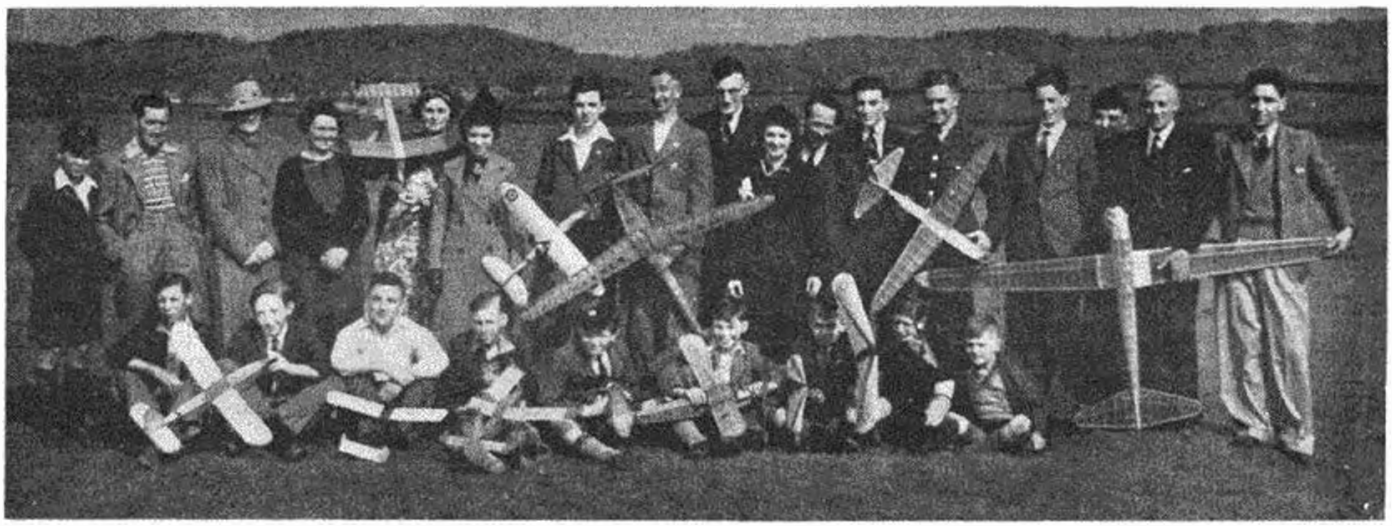
I was pleased to see the good support that has been given to the S.M.A.E. events during 1940, and as an almost identical programme is to be carried out this year I look forward to seeing even better support. Most clubs have got used to war-time conditions by now, and realise the fact that it takes more than a little war and Adolf to put the tin hat on all their activities or aspirations. I have been called over the coals more than once for advocating continuity during the war period, but I still maintain that we can carry on with our modelling as well as national duties, and a little relaxation on the flying field makes for better work at other duties.

I regret the passing of the S.M.A.E. Fighter Fund (announced elsewhere), but I suppose the Council were correct in thinking people would be more inclined to invest their money in savings, etc. and after all, if a venture is not receiving 100 per cent support, it might as well fold up now as later. While some clubs have pulled their weight with good effect, others are very much in my black books for their lack of support in what I really thought would have been an ideal means of conveying their enthusiasm. Still, we live and learn, and I trust we shall be able to do better than this at such time as we may need to collect for the "Wakefield Cup Hunt" again.

The Press Secretary of the DARLINGTON M.A.C. suggests that reports be treated in alphabetical order, but I'm afraid this cannot be done while you continue to send in your epistles at the last minute—and far too many after the stipulated date. Just think of my job holding everything up till the last report is in—and then sweating away the midnight oil "slashing" the lot! An exhibition staged



(Top left) A 1940 Wakefield model built by D. Piggott (T.M.A.C.), which averaged over 3 min. in the "Gutteridge" Trophy.
(Top right) An "H.E.170" constructed by J. Durrant, of Croxley Green.
(Bottom left) Nice constructional work on a "Copland's Wakefield" by J. L. Motley, of Manchester.
(Bottom right) A 1 in. scale "Leopard Moth" built by A. C. Baker, of Brentwood, which has a remarkable flight performance, averaging 55 sec. per flight, with best time of 3 min. 7 sec.



Members of the Lancaster Model Aeronautical Society at a meeting held in the summer of 1940.

by these fellows raised the nice sum of £12 for the local "Spitfire" effort, and gave the club a nice spot of publicity. There are not many people in the Darlington area now who do not know that the club exists. Members of the Forces are welcome any time at the club meeting room at Grange House, Grange Road, and the secretary would be obliged if other clubs who have tried R.T.P. flying in small rooms will get in touch with him.

Indoor flying under difficulties was carried out by the KINGSTON-UPON HULL M.A.C. at an exhibition, and greatly intrigued the spectators. R. Baines caused a sensation by flying a 30 in. outdoor model on an 8 ft. line and obtained consistent flights. This chap and another member, H. Cansell, have been getting two minute flights in spite of windy weather—or is it because of same breeziness?

The Correspondence Scheme of the BLACKHEATH M.F.C. has proved successful and brought about quite good contact with scattered members. Three members have constructed similar type gliders, and are to conduct tests with various wing loadings, etc. Wakefield jobs are also well on the move and show keenness for the coming season's activities. H. Baines has successfully "flapped" an ornithopter, built from the A.M. plans, and is now engaged on plans for a helicopter.

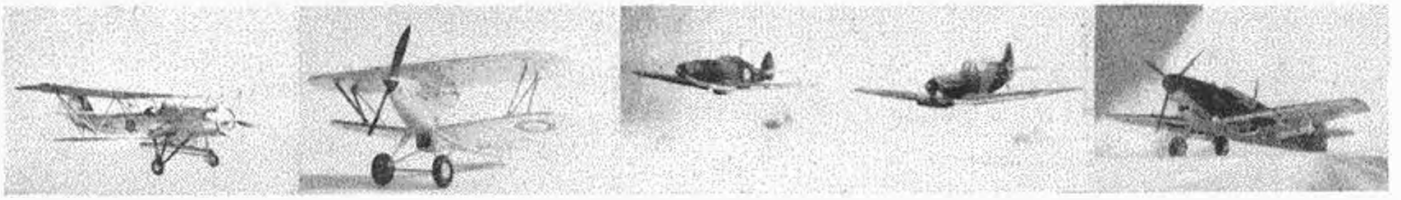
The IMPINGTON VILLAGE COLLEGE M.A.C. has well increased its membership since its inception last September, and now has 25 members on the books. This club's record stands at 2½ min. outdoor and 72·6 sec. indoor, both times being set up by Mr. Clary.

The Secretary of the ALDERSHOT M.A.C. writes: "We feel you may like to know of at least one club that has been formed since the war as distinct from those who by force of circumstances have had to curtail their activities.

"This club was formed in October last with a membership of eleven. On December 1st we took over premises at above address as a workshop; from that time we have made considerable progress, our membership now exceeding fifty.

"On January 31st we held our first R.T.P. meeting, and we have now booked the hall for three months every Friday evening. At the inauguration of our indoor flying our President announced that he would give the sum of £10 10s. for a Competitions Prize Fund, together with a trophy (the details governing this will be worked out later, as we are keeping this in hand for summer activity). We have arranged a programme of eight competitions for R.T.P. contests, the first of which was held on February 7th. There was the usual bursting of motors as desperate efforts were made to beat the other chap, and after this contest one of our members (Mr. Standing) offered three prizes for a quick nearest to 30 sec. competition. There was much amusement from this contest, as one entrant actually raised the club's duration record to 90⅘ sec., whilst other flights recorded times ranging down to 6⅘ sec.

An Avro "Anson" 13¼ in. span solid model, with fully retractable undercarriage, built by A. J. Groom, of the Luton Club.



(Left to right) Scale model of the Blackburn "Shark," built by T. A. Lewis, of Tolgarth. A fine Hawker "Fury" by G. Crosley, of Selsdon. Two trim models built by D. Sargent, Swindon. A "grounded" Me.109, constructed by T. R. Gwyther, of Woking.

We are now arranging for an inter-schools contest in the town, and this will probably still further increase our membership.

"The club record now stands at 101 sec. R.T.P., while P. Dolittle won a recent event staged for juniors only."

Many of the members of the LOUGHBOROUGH COLLEGE SCHOOL M.A.C. having tested their models, it was decided to hold a competition, but the wind thought otherwise, and many are now wiser and sadder. A good entry fought the wind, and quite a number of jobs were rendered "unserviceable" during the course of the day, while much cussing was levelled at breaking motors. Winners were L. Sullivan, with an average of 22·6 sec., and O. Catting, who average 5·7 sec. As the secretary says—"Pathetic, ain't it?"

Clubs in the Liverpool area are asked to communicate with the secretary of the newly-formed ALLERTON AND D.M.F.C., Mr. P. D. Kelly, of 25 Cleveley Road, Allerton, Liverpool 18. This chap holds the club record for the "Under 150 sq. in. class" with a time of 98 sec. O.O.S., while F. Irving has flown a "Victrace" for 145 sec. A good flying field is provided, and a comprehensive competition programme has been arranged. Application has been made for affiliation to the S.M.A.E.

The valiant efforts of the OXFORD M.F.C. secretary have been rewarded, and a new clubroom has been acquired, and R.T.P. flying can now be indulged in. It is also hoped that the old flying ground may become available, poles or no poles, so will members not at the last meeting please note?

The FIFE M.A.C. has taken on a new lease of life and things are beginning to hum in Kirkcaldy. Fortnightly meetings are held in the clubrooms. Indoor flying competitions are held regularly. The club record of 80 sec. is held by Harry Ford, and they are hoping that this figure will go by the board in the near future. All local aero-model fans are asked to rally round and become members of the club in view of a series of lectures on matters of general interest having been arranged. The club's first outdoor meeting was held in Ravenscraig Park, when a very successful all-solid glider competition was held.

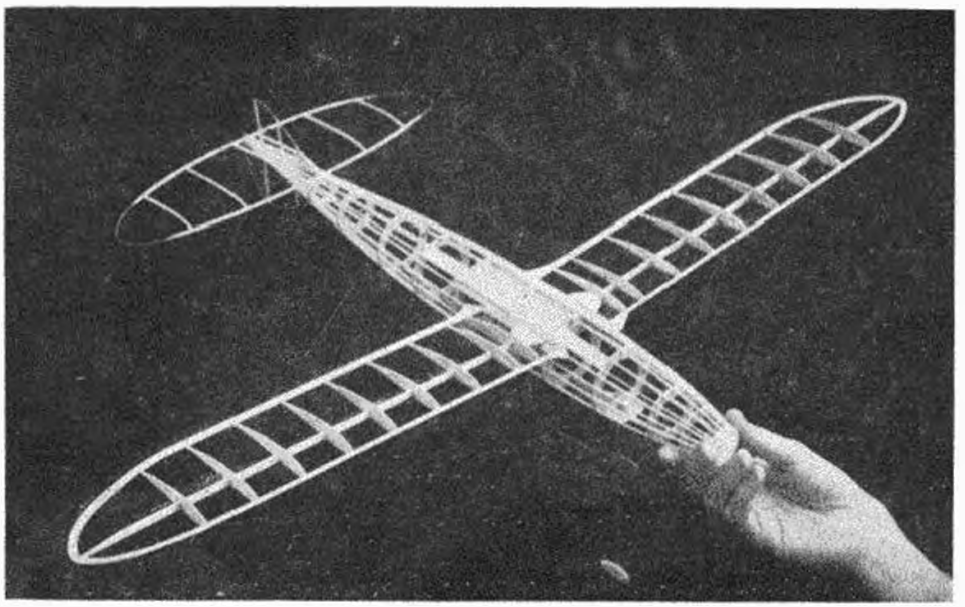
The members of the WALTON AND D.M.F.C. have been dashing hither and thither staging model exhibitions in aid of various war efforts, and to very good purpose. The word has gone around the district that these lads have "got something," and they hardly get time to sleep nowadays. On the opening of a new clubroom at 1 Bridge Street, Walton, six new members were enrolled, and fortnightly meetings will be held from now onwards. Indoor flying and the fitting up of individual workers' benches are now "on the board."

The recently formed MOLESEY M.A.C. are to start a club magazine, and have staged a solid model contest, winner being S. Pitch. Membership now stands at 21, nine new members being roped in during the past month. (Incidentally, I shall be obliged if any club running its own magazine will keep me supplied with copies, as I find these very interesting and helpful in preparing this monthly chatter).

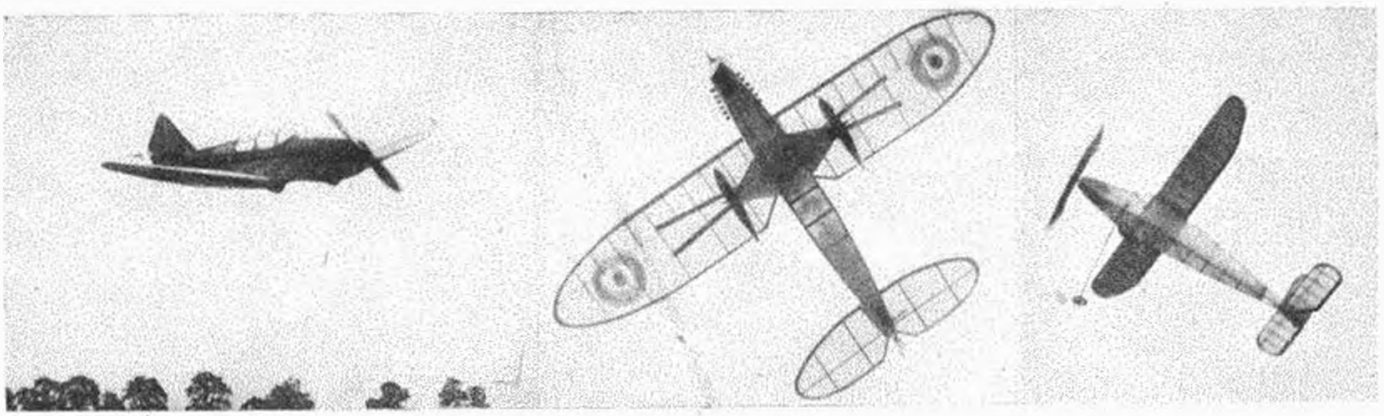
Mr. J. A. Orpwood, of 295 Ashcroft Road, Stopsley, Luton, would like interested fellows to get in touch with him regarding the formation of a club.

The NORTHERN HEIGHTS M.F.C. report for this month reads: "On the occasion of the official inauguration of the Air Training Scheme we recently held an exhibition of model aircraft in conjunction with No. 85 (Southgate) Squadron of the Air Defence Cadet Corps. Over seventy models were provided by members of the Northern Heights at only a week's notice, a total which included almost every conceivable type of model. A prize was offered by the club for the most interesting exhibit, and this was divided between Mr. Coote, our president, and Mr. E. Downs, the former with a fine, fully detailed scale model of a Westland Lysander, and the latter with the skeleton of a C.W.7. Both gained full marks in their class.

"An exhibition was also given of pole flying, with a prize for the best flight made during the week. This was won by Mr. K. Young with a flight of 143 sec.



An indoor model built by F. S. Hains, of the Warwickshire Club. The model has clocked 99 sec. R.T.P.



(Left to right) A 30 in. span "Miles Magister" in flight: builder, M. P. Lloyd, of Winchmore Hill. . . . An unusual view of a scale "Renard 21," built by H. T. Pettifor. . . . A modified "Korda" starting on a flight, the builder being H. Camsell, of Hull.

F. A. Walker	31·4 sec.	Miss Collins	258·65 sec. agg.
K. Young	30·2 ,,	B. Halliwell	218·45 ,,
A. F. Bond ...	29·4 ,,	R. Dymock	101 ,,

Well, what do you think of that—a girl putting it across some of the lads! But you will remember this is the club where a lady member holds certain of the club records, so it seems they know how to train 'em right up in Lancaster.

Following a request from the Youth Advisory Committee, a demonstration was held, this being attended by the Mayor and other notabilities. An outstanding feature was the model "Airspeed Envoy," constructed by a junior member, R. Dymock, from A.M. plans. A notable feature of this club is the rule that N.C.A. insurance cover must be effected by all members.

In view of current conditions, it was agreed by the BRADFORD M.A.C. to include junior members on the Committee, and I feel that this is always a worthwhile step in any society—gives the youngsters a sense of responsibility, and assures them that their requirements are considered. A trophy for "Wakefield" models has been presented to the junior section by Mr. Driver.

And, last but not least, the report from the ILKLEY M.A.C. for this month, which contains quite a lot of interesting announcements, and is given here in full:

"The club and S.M.A.E. fixtures have been synchronised and an inter-club contest arranged with the Keighley M.A.C. for April 20th, and we would like to arrange fixtures also with other neighbouring clubs. It is our experience that secretaries are continually changing nowadays, as we have written to several clubs and received no reply. We therefore ask neighbouring secretaries to communicate with E. J. S. Townsend, 18 Crossbeck Road, Ilkley. Fixtures will then be arranged. Will Mr. G. Brown, secretary of the Crosshills M.F.C., please send us his address, as it has been mislaid during recent changes? Thank you!

"The club sent twenty models to be exhibited at Otley as part of the Otley and Wharfedale War Weapons Week Exhibition. Space was somewhat cramped, but quite a good show was staged, causing much interest. Fortunately all models came through intact, although members lost a lot of sleep during the week, due to visions of betrodden wing tips and tail surfaces.

"The Open Rally of the Ilkley M.A.C. will be held on Ilkley Moor on Sunday, May 25th, 1941. Contests will be run under S.M.A.E. rules. Entry fee will be 1s. first event, 6d. subsequent ones. Profits to S.M.A.F. Fighter Fund.

"The following contests will be held:

1. R.O.G. open duration	Total three flights
2. Nearest 40 sec.	Best of two flights
3. Winch-launched gliders	Total three flights
4. R.O.G. Wakefield models	Total three flights

"We appeal to all clubs who possibly can to support this rally, and suggest that one or two members bring fellow members' models and fly them proxy in cases where Sunday work makes attendance impossible or travelling is difficult.

"What about it, Crosshills, Keighley, Bradford, Leeds, Halifax, Huddersfield, Batley, South Bradford, Harrogate and Lone Hands? Also anyone else who can reach the appointed place at the ditto hour on the ditto day!"

RESULTS OF POLE FLYING, S.M.A.E. contest, February, 1941.

1. K. Anning	Best flight 114·8 sec.
2. J. Townsend	,, 85·6 ,,
3. J. Watson	,, 27·0 ,,

And so for the present I leave you, and let's hear some more activity from now on. The weather should improve almost immediately, and I look forward to receiving news of many new records set up all over the place. Cheerio, and may your motors never bust.

THE CLUBMAN.

Notes on the Annual General Meeting of the Society held at the Royal Aero Club, 119 Piccadilly, W.1, on Sunday, February 9th, 1941, at 10.30 a.m.

Mr. A. F. Houlberg was in the chair.

Mr. H. York, the Acting Hon. Secretary, read the minutes of the last Annual General Meeting, which were confirmed and signed. The Chairman then asked Mr. York to give the annual report on the work of the Society. This report was duly accepted and Mr. York was given a vote of thanks.

At this juncture it was suggested that those present at the meeting should rise and stand in silence for one minute in memory of our patron, Lord Wakefield of Hythe, and other members of the Society who have passed away. The suggestion met with the approval of the meeting, and the silence was duly observed.

Mr. L. J. Hawkins, the Hon. Treasurer, then presented the statement of accounts and gave his annual report. After the balance sheet had been passed round for inspection it was accepted, and Mr. Hawkins was accorded a very hearty vote of thanks for his work on behalf of the Society.

While the balance sheet was being handed round, Mr. Houlberg announced that Mr. D. A. Russell had offered to print and provide paper for the *S.M.A.E. Bulletin*. He proposed that the bulletin should be issued monthly and that Mr. C. S. Rushbrooke should do the necessary lay-out on receipt of the material from the Editor of the bulletin. This offer was entirely free of cost to the Society. The meeting warmly thanked Mr. Russell and had very much pleasure in accepting his generous offer.

Mr. J. C. Smith, the Hon. Competition Secretary, gave his annual report on the 1940 competition programme, which was duly accepted, and Mr. Smith was given a hearty vote of thanks.

The meeting then discussed the proposed constitutional rules and Mr. Houlberg read out the individual items for the meeting to vote on. One or two slight alterations were made and the rules were then accepted. Mr. Bell was accorded a vote of thanks for his work.

The officers of the Society then retired and the meeting adjourned at 1.45 p.m. for lunch.

The meeting reopened at 2.30 p.m., with Mr. Houlberg in the chair.

The first business to come before the second half of the meeting was the election of the officers of the Society.

It was decided that the office of President should remain open *pro tem.*

The following gentlemen were then elected:

Vice Presidents.—Lieut.-Col. C. E. Bowden, Mr. C. R. Fairey, Col. Moore-Brabazon, Capt. Pritchard

Chairman	Mr. A. F. Houlberg.
Vice Chairman	Mr. C. A. Rippon.
General Secretary	Mr. A. G. Bell and Mr. H. York were both proposed as General Secretary. A ballot was taken, which resulted in favour of Mr. Bell by 15 votes to 11

It was proposed that Mr. H. York should be made a Fellow of the Society in recognition of his past work. Mr. Houlberg coupled his name with this proposition, which was carried unanimously.

Hon. Treasurer	Mr. L. J. Hawkins
Hon. Competition Secretary	Mr. J. C. Smith.
Hon. Press Secretary	Mr. H. York.
Hon. Records Officer	Mr. C. R. Clarke.
Hon. Technical Secretary	Mr. A. F. Houlberg and Mr. M. R. Knight were both proposed as Technical Secretary. A ballot was taken, which resulted in favour of Mr. Houlberg.

A vote of thanks was accorded Mr. R. N. Bullock for his past work in this position.

It was decided that the auditors of the Society should be drawn from amongst its members, and Mr. D. A. Russell and Mr. E. H. Keil were elected to this position.

It was proposed that Messrs. L. J. Hawkins, M. R. Knight and D. A. Russell be made Fellows of the Society. These three proposals were carried unanimously, and the gentlemen were duly elected.

By virtue of their office, the following gentlemen automatically become members of the Council: Messrs. Houlberg, Rippon, Bell, Hawkins, Smith, York and Clarke. The following gentlemen were then elected to the Council to bring the number up to the desired twelve: Messrs. F. A. Briggs, H. P. Costenbarder, H. W. Hills, M. R. Knight and Flying Officer P. R. S. Gutteridge.

At this juncture Mr. N. Blacklock handed to Mr. Houlberg the Gutteridge Trophy which he had won during 1940. Flying Officer Gutteridge took over the trophy for photographic purposes.

A claim for an indoor Round the Pole record with a Class A model of 2 min. 57·5 sec. made by Mr. Clarke was granted.

Mr. Briggs asked that the S.M.A.E. recognise spar model records.

It was proposed that the S.M.A.E. should set up standard record classes for all types of models. This proposal was carried.

Mr. C. S. Rushbrooke announced that the Fighter Fund stood at £219 10s. 2d., and after some discussion it was finally decided to close the fund.

Mr. H. York and Flying Officer Gutteridge announced that they had been in communication with the Air Ministry *re* the Air Training Corps. Correspondence was still in progress.

The meeting closed at 4.55 p.m. with a vote of thanks to Mr. Houlberg, who had occupied the chair.

H. YORK, *Hon. Press Secretary.*

DAGENHAM.—V. Cowing Ltd., 157 Broad Street, for Flying Scale, Duration and Solid Kits, by Keil Kraft, Cloud, Skyleada, Studiette, Veronite, Chingford, etc. Balsa strip-wood, Joy-plane dopes, cements, Japanese tissue, ball races, etc., also Ship Kits. Fresh stocks now in.

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40.	52.	65. .....
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42.	54.	67. .....
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44.	56.	69. .....
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46.	58.	71. .....
47.	59.	72. .....
48.	60.	73. .....
49.	61.	74. .....
	62.	75. .....

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Signed .....

Address .....

.....

All entries on this form, and the entrant's name and address must be written in ink, or typewritten.

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