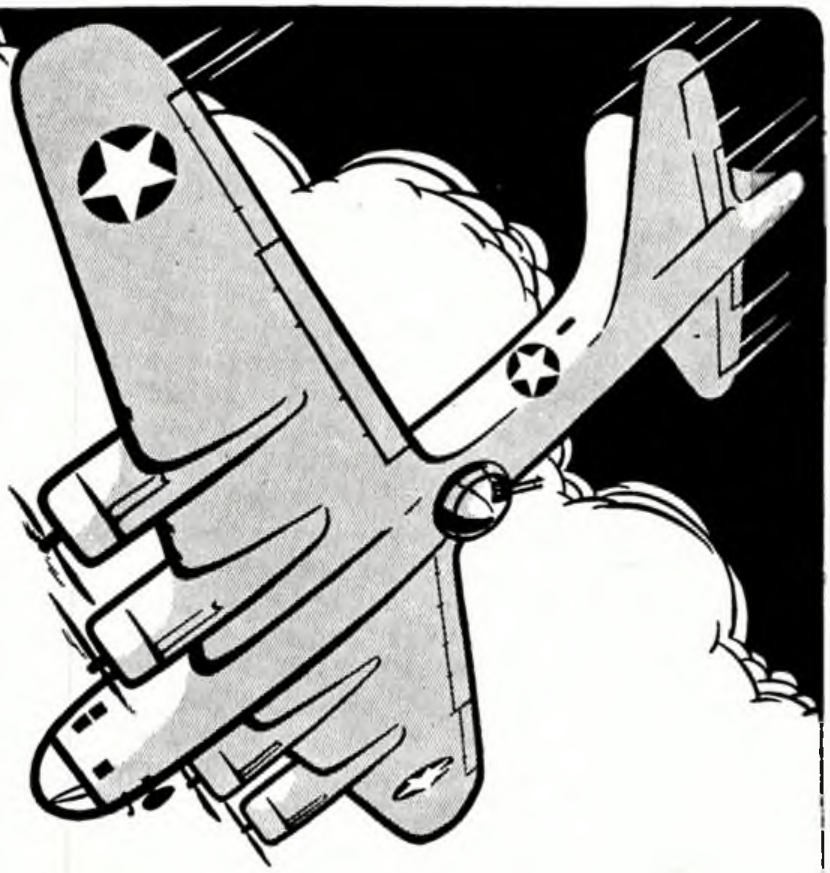
VOL.8 No.87 ONE SHILLING FEBRUARY 1943

AERO MODELLER

ONLY A MAGICIAN CAN GET A QUART OUT OF A PINT POT

or ten models out of one kit . . . .



WE wish to convey our very sincere regret and apologies to all readers who have experienced difficulty in obtaining SKYLEADA and SKYROVA kits. The excellent value and ease of construction of these kits have created an enormous demand, and whilst we do assure everybody that what small stocks we have had have been distributed as widely and as fairly as possible, and in date rotation, the fact remains that supplies have been quite inadequate and we cannot perform impossibilities.

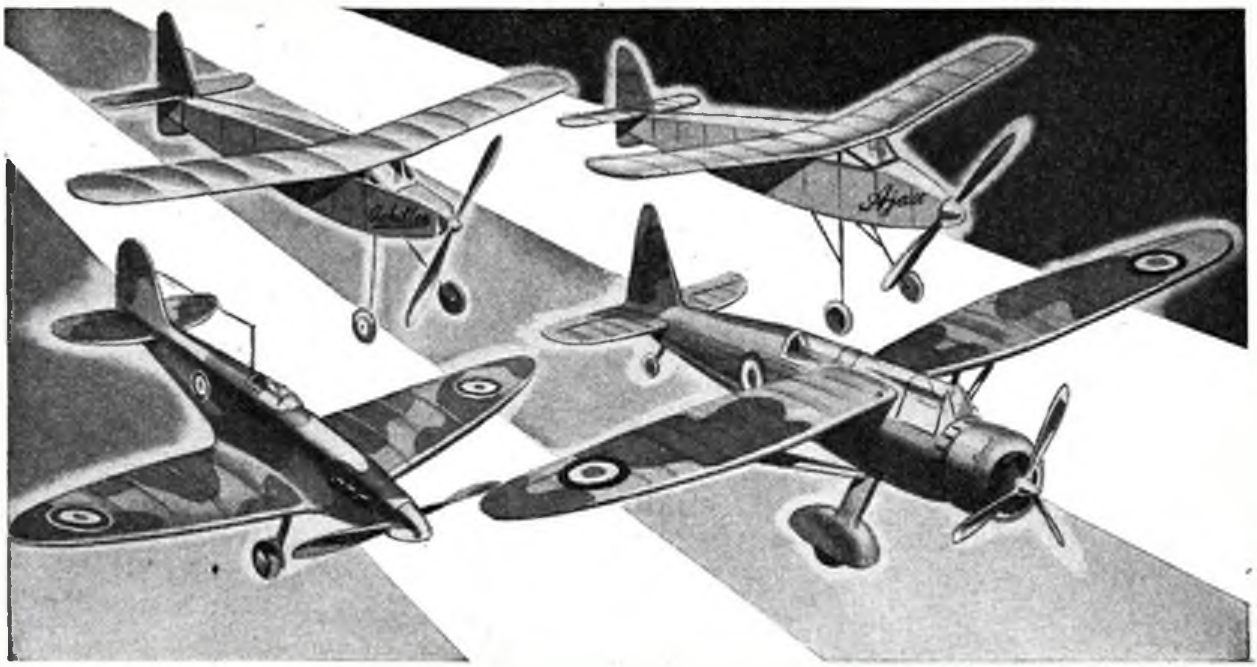
SKYROVA solid scale kits, average span 8¾ inches, for Lancaster, Halifax, Liberator, Boeing Fortress, Stirling, Manchester, Catalina, Focke-W. Kurier. **3/-**

SKYLEADA solid scale kits, 1/72nd scale, for Spitfire, Hurricane, Blackburn Skua, Westland Lysander, Airacobra, Defiant, Heinkel 113, Messerschmitt 109 F. **1/9**

WALLETS OF PLANS containing drawings and building instructions for eighteen popular types of 1/72nd solid scale models. **1/6**

In spite of short supplies please try first to obtain locally and only send to us if you have no near stockist. Alternative kits should be stated and 4d. extra for postage must be included. Wallets of plans are post free.

A. HUNT (CROYDON), LTD., 5 & 7 SOUTH END, CROYDON.



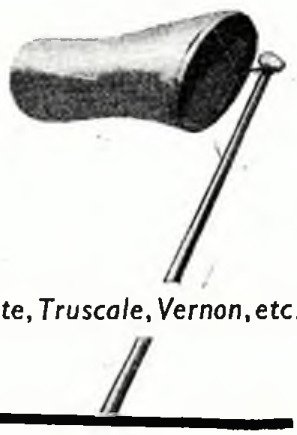
Quality not Quantity

As we can now obtain only very little of the high-quality materials used in the production of Keil Kraft Kits, we prefer to limit our output accordingly rather than endeavour to meet all our orders by using inferior materials.

When the necessary materials are again available we will do our best to supply the great demand.

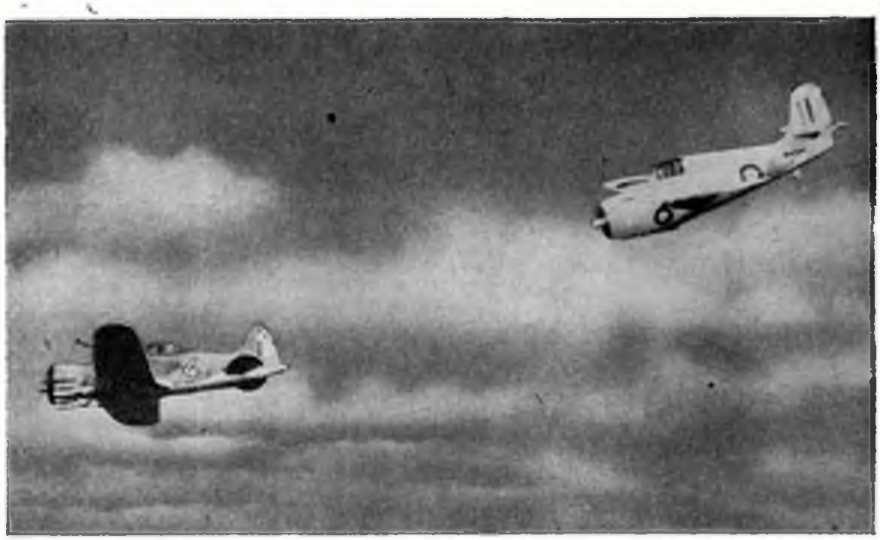
KEIL KRAFT KITS

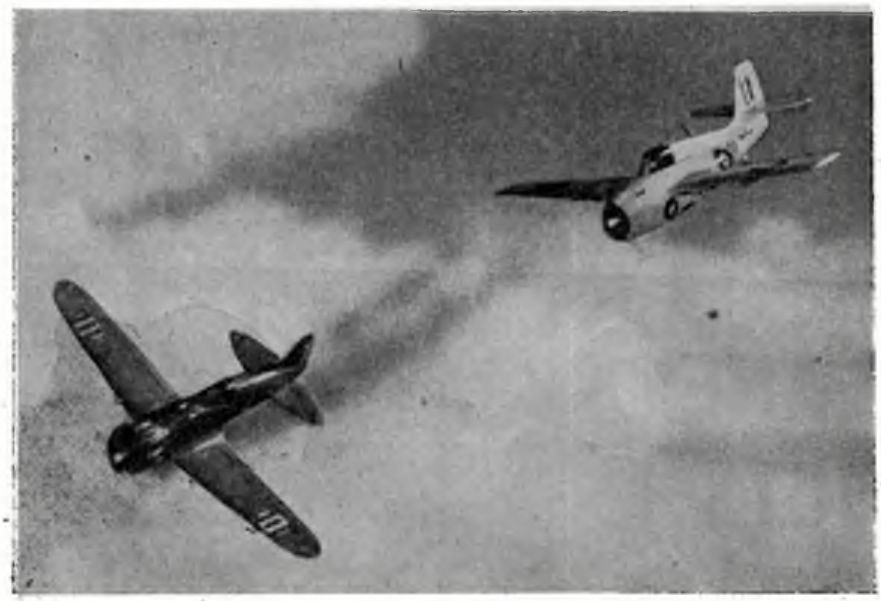
DURATION AND FLYING SCALE MODELS



E. KEIL & Co., Ltd., LONDON, E.2. Also distributors for Skyleada, Drome, Studiette, Truscale, Vernon, etc.

"MIDDLE EAST ACTIVITIES"





An Italian "Saetta" gets the worst of an encounter with one of our Middle East "Martlets." The models were built, posed and photographed by R. G. Moulton of Loughton, Essex.

Contents of this issue.

THE AERO MODELLER

(INCORPORATING "THE MODEL AEROPLANE CONSTRUCTOR") Established in 1936

(Proprietors : Model Aeronautical Press, Ltd.)

THE MODEL AERONAUTICAL JOURNAL OF THE BRITISH EMPIRE

Vol. VIII - No. 87 FEBRUARY, 1943

Editor : C. S. Rushbrooke.

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

Technical Editor : R. H. Warring.

ALLEN HOUSE, NEWARKE ST., LEICESTER

EDITORIAL

ONCE again we send our usual "reminder" message to the thousands of members of the National Guild of Aeromodellists, reminding them that their present third-party insurance is up on January 31st, 1943; and that, to continue to be insured in the year just commenced, they should renew their subscriptions immediately.

At the bottom of the back inside cover page of this issue are printed two membership forms, one for members who fly rubber-driven model aircraft and gliders, and the other for petrol engine enthusiasts. Of course, with the existing Air Ministry ban on the flying of petrol planes, this class of insurance is, for the time being, suspended; but, as has been announced in recent issues, the insurance has been extended to cover the use of petrol engines in model race cars.

Once again we are pleased to report a year free from any serious accidents and claims, undoubtedly due in many cases to the sense of responsibility introduced into the minds of those of our readers who are sensible enough to make use of this valuable insurance protection.

We pride ourselves on the fact that THE AERO-MODELLER was the first journal in the world to introduce such a comprehensive third-party scheme, available to all readers, for a matter of a few pence per annum. We regret that we cannot yet say that *all* of our readers have availed themselves of this insurance. Why not? The cost is so little, the work involved in completing the forms so negligible, that we cannot understand why there should still be exceptions; and we hope that this "reminder" and further appeal will be heeded, and that for the next few weeks our local postman will be overwhelmed with many thousands of application forms to be delivered to our offices at Leicester.

Petrol engine driven race cars.

A fair number of entry forms have now been received and some interesting times are showing up. It seems that anything between 30 and 40 miles an hour is easily being obtained with 5 c.c. engines, i.e., models in Class A. We would remind race car enthusiasts that the closing date for the competition has been extended to February 29th and we look forward to a really representative list of entries for the two competitions which we announced some two or three months ago. There is no entrance fee and entry forms will be sent to interested enthusiasts on receipt of a P.C. with their names and addresses.

The Bristol "Blenheim."

Lest there should be some confusion in regard to the camouflage and colour markings of the Bristol "Blenheim," we would draw attention to the fact that the plane depicted on last month's cover of THE AERO-MODELLER (the Christmas double-number) was of pre-war vintage. These are the markings which Mr. Moore had painted on his own model.

Of course, at the present time, Blenheim Mark IV A's have a light sky shade finish on the underside of the wings and no serial numbers are shown, these having been abandoned before the war broke out. Two other minor points are that there would now be a "flash" on the fin, and the fuselage cockades would carry the narrow white and yellow section.

The Short "Scion."

Our "centrespread" this month is a set of illustrations by Mr. Moore showing the details of his patent twin-drive, and elsewhere in the journal is a full description of a 1 in. flying scale of the Short "Scion," designed by Mr. Moore, and in which the device is incorporated. Two models have been built, the first weighing some 17 oz., and having a performance of some 30 to 35 seconds hand-launched. A second model, recently completed, and embodying an improved method of mounting the wings, has an all-up weight of something over 12 oz. and a performance which under fair conditions exceeds the 60-second mark hand-launched.

The drive is amazingly simple and quite easy to build, and we have pleasure in announcing that a set of full-size working drawings is now available for the "Scion," price 4s. post free, from THE AERO-MODELLER Plans Service. At a later date we shall put out plans of the "Blenheim," but this is a more advanced model and we feel that those who are interested in building a twin drive should first "get their hand in" on a simpler model.

Plagiarism . . . what's the great idea?

On page 589 of the Christmas issue we published plans for building a small all-balsa model called "The Flying Wishbone," ostensibly designed by E. H. Clark.

Shortly after publication of these plans, we received a letter from Mr. H. Wells, Hon. Sec. of the Boston Flying Modelling Club, enclosing pages taken from the American magazine "Mechanix Illustrated," for April, 1939, in which "The Flying Wishbone" is fully described, as designed by Mr. Alan Orthof.

Comparison of the plans in "Mechanix Illustrated", and the drawings sent us by Mr. Clark, reveals that they were traced straight off the pages of the American magazine.

We are indebted to Mr. Wells for bringing this crude example of plagiarism to our attention, and congratulate him and the members of his club on the library they have built up, and from which they draw their reference to the original model designed by Mr. Alan Orthof. To this gentleman, and to the proprietors of Mechanix, Ltd., we tender our apologies for the unwitting reproduction of their plans. To Mr. Clark we are *not* sending any fees . . .

D. A. R.

Reproduced from Model Airplane News.

MICROFILM *minus* MISERY!

By R. S. WELFORD

THE indoor-model field of aviation has a great charm of its own, but unfortunately this field is not fully explored by many otherwise ardent modellers because a certain section of it is devoted to dragon-fly-like flimsies, whose building instructions generally terminate with the words " Cover with microfilm."

To a lot of people, including the " A.M's." mentioned above, these words simply convey the message " Easier said than done." These are the unfortunates who have had experience, or have heard lurid tales, of what a sloppy, mess-provoking, curse-producing job is the preparation of microfilm. So it is, I agree, *in inexperienced hands and provided it is not gone about in the right way.* What a lot of interesting amusement such people are missing through not having found out that there are no terrors about " mike " if the right system is employed in its preparation and one is prepared to exercise a little patience, care and common sense!

Now, I have made a considerable number of " mike " models in the past—and certainly intend to make more! The experience I have gained will, I think, be of assistance to other modellers, particularly beginners, and will also, I hope, help them to avert the wrath of the household " powers that be " by eliminating some of the mess and lack of success from their first attempts.

Proverbially speaking, before covering our model with microfilm we must " first catch our hare." Here are two recipes for " hare soup," either of which will give excellent results :—

Six parts banana oil.	Twelve parts dope.
Three parts amyl acetate.	Four parts collodian.
One part castor oil.	Two parts amyl acetate.
	One part castor oil.

If either of these formulæ sound too bothersome or complicated for you, try adding a drop or two of castor oil to about one ounce of heavy dope. I'm told that this makes quite a good film, but have never tried it myself.

All of the ingredients mentioned above can be obtained at your chemist's and/or model shop. An ounce bottle of any one ingredient costs only a few pence and an ounce of each will make up sufficient solution to cover many, many models.

When compounding your microfilm solution exercise care and adhere carefully to the stated quantities. This is the more particularly necessary where the castor oil is concerned as it is my experience that a great excess of this toothsome and sweet-scented ingredient prevents the setting of the film which, in such cases, lies as a soft and sticky mess on the surface of the water and cannot possibly be lifted.

If you wish only to mix a small quantity of the solution you will find, as I have done, that a fountain-pen filler is quite a handy instrument to use—filling it six times with banana oil, three times with acetate and once with castor oil, if it is formula No. 1 you are compounding. Of course, such a small quantity would be sufficient only to cover the smallest class of model. For larger quantities a graduated test-tube is very useful and convenient.

The next essentials after a good " mike " solution are a few good wire frames to remove the film from the surface of the water. These frames, whilst being flexible, must also be stiff, as a frame of too-flexible wire is very liable to cause the film, once it has been transferred to the frame, to split owing to flexion of the wire during handling.

It is also necessary that the frames should be adjustable for size, as if they are fixed in that respect it will sometimes occur that the film deposited on the water cannot be lifted as it is just too small for the lifting frame. Sometimes, too, one's efforts will result in the film being considerably larger than intended and should such a film be lifted with a small frame the surplus microfilm will overlap and result in a double surface for whatever part of your model you are covering (undesirable on the grounds of weight) or in the ragged edges of the film, where the overlap has occurred, being visible as an unsightly line in the covering of the finished model. The latter point, though, need only concern those who are very particular about their workmanship and pride themselves on perfect results. Adjustable frames, therefore, are very desirable and, if they are fitted with handles, so much the better.

For small films I find that cotton-covered bell wire of the thicker gauges is very suitable, being easily bent to any required shape. However, on the grounds of too-great flexibility I find it useless for large films. Used within its capabilities it has one most useful trait, which is that the film readily adheres to its surface and it is rare that a film is broken owing to its slipping off the frame. Larger films require something stiffer and here I find ordinary stranded copper aerial wire very suitable. The film, again, readily adheres to it. One thing of importance about whatever kind of wire is used is that it must have no projections or sharp loose strands, else you will find your delicate film ruined. A hole once made in microfilm quickly extends to a tear right across the frame. See, therefore, that your frame has nothing which will cause that initial hole.

The only other piece of equipment we require in addition to the frames is an ordinary spoon (*not* one of the best silver ones) for pouring the " mike " solution on to the surface of the water.

Well now, let's hie ourselves up to the bathroom with our paraphernalia and try our hand at producing microfilm.

Before we start, let me say that it is no use trying to produce even the smallest film in the wash-hand basin. Try it if you like, but I warn you that as it is almost impossible to control the size of the film you make and as the capilliary attraction of the water in such a small space is also to be contended with, the result will be that the film will be too large for the basin, will adhere to the sides and make lifting it a matter of tug-of-war, with ruinous results. Use the bath and save your language!

Run an inch or two of clean water into the bath, after having made sure that the bath itself is free from all traces of soapiness. Test the water for temperature. It should be between sixty and seventy degrees Fahrenheit for best results, i.e., with little more than the chill off. My experience is that using water at a temperature much in excess of this causes the film to spread out too much when dropped into the water, giving an excessively fragile result. As a final preliminary, stop up both taps with rags if they are at all inclined to drip and disturb the surface of the water, which must be allowed to become, and remain, absolutely still.

Take your microfilm solution and about half fill the teaspoon. Then, holding the spoon about an inch above the water, pour the solution steadily on to the surface, drawing the spoon along for a few inches as you do so. The solution will spread out over the water and in a few moments it will be observed that it is beginning to crinkle. The film is forming! Leave it for two or three minutes more to set thoroughly, when it will be ready for lifting.

Before describing the lifting process there are one or two details upon which I would like to touch for the sake of clarity. The first refers to the drawing of the spoon over the surface of the water whilst pouring the solution. The reason why this is done is that it helps the " mike " solution to spread over the water. Simply pouring solution on to one spot will result in the production of a film comparatively thick and also small in size.

The second point is that there must be no break or interruption of the pouring as this latter fault causes a line to appear in the finished film. This line results from the fact that if you interrupt the pouring *once* you are in effect depositing *two* films, which eventually converge, and the line referred to above is really the visible join between them. This join is weak and unsightly and every effort should be made to avoid its cause.

Now to lift the film. Adjust your frame (lifting, not manly !) till it is somewhat smaller than the film you intend to lift and slide it gently into the water at one end of the bath. Move it along under the film and lift it gently and carefully until contact between frame and film is complete. Commence to tilt the frame with a sideways movement, all motions being carefully and gradually executed, till finally the frame is practically on edge and it is possible to lift the film free of the water.

It will have been gathered from the above description, I hope, that the film is slid rather than lifted from the water surface. Much care is necessary because water generally gathers on top of the film and if the latter were just lifted quickly the weight of the water would burst it, or at least drag it off the frame. The reason for tilting the frame is to get rid of this water carefully.

Another method of lifting, or rather, variation of the foregoing method, is to place the frame *on top* of the film and then dip each side alternately under the water until the surplus film overlaps the edge of the frame onto the top surface of the film. The free hand is used to gather the surplus film and deposit it where it is wanted. Then lifting is carried out as before.

Having lifted the frame clear of the water, hang it and its attached film out of harm's way to drain. Handle it as little as possible and so avoid the chance of any minute holes being turned to rents by vibration or accidental jarring of the frame. Remember that microfilm is more fragile for some time after it is made than it is later. It has to set, or mature, if you prefer that term, and prior to this occurring rents are easily caused.

Prepare sufficient frames of " mike " to cover your model, which latter operation is carried out as follows.

Moisten the framework of your wing—or whatever part it is you are dealing with—by means of a brush and water or the good old tongue-and-saliva method. Place it on your building board and apply a frame of microfilm to the top of it, blowing down upon the " mike " to make it adhere to the model part receiving treatment. The film should adhere easily.

Trimming can be effected by a fine brush dipped in acetate, or a hot wire (not at red heat). Either is kept about quarter of an inch from the wing, etc., during this operation, after which any unsightly overlapping film can be turned on to the underside, in the case of a wing, by judicious moistening and smoothing with the tongue.

A tip about the covering of wings may be of assistance to first-timers. It is this—see that the frame of " mike " you intend to use for this purpose is very ample in size. Indoor model wings have such a high camber that should your film be somewhat on the small side, necessitating the " mike " adjacent to the frame edge being utilised, you will find it most difficult to do the covering without tearing the film. You see, the centre of a film is fairly flexible and can very easily be made to conform to the wing camber, but where the frame holds it firmly at the edge there is not sufficient slack, or play, in the film to enable it to conform.

Wings are best covered all in one piece, not in two halves as is usual with outdoor models. The dihedral is obtained after covering by cracking the spars and cementing them at the correct angle, the slack in the covering being taken up by holding it over a very low gas jet. Any other slack places in the covering of any part of your model can be tightened by similar action.

ROAMER 1942 GAMAGE CUP WINNER

DESIGNED BY S. COLLINS

SOME NOTES BY C. A. RIPPON.

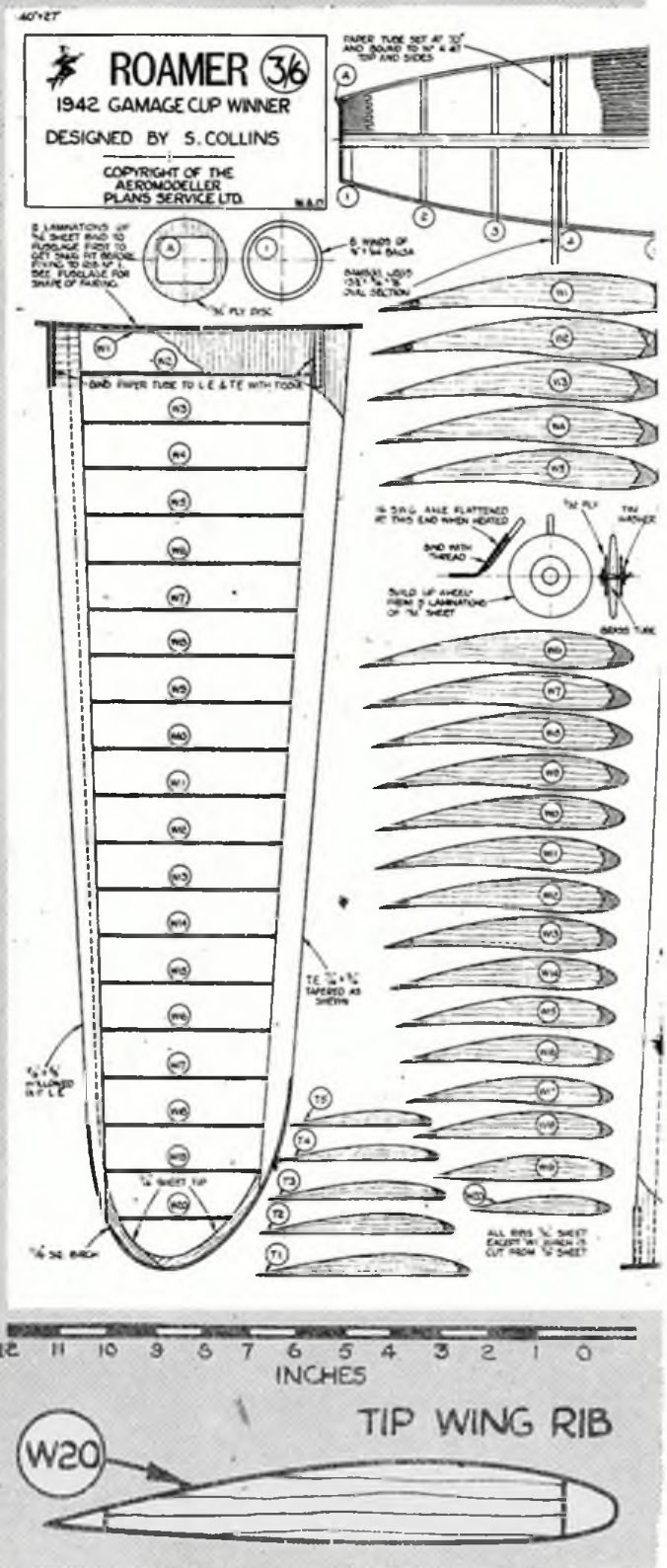
INTRODUCING SAM !

EVERYONE in Northern Heights knows Sam ; he's a sort of tradition now, and the younger members when discussing problems of models talk of him with bated breath : his is a name to be conjured with. And yet it is not many years since Sam was as green as the greenest of our present beginners.

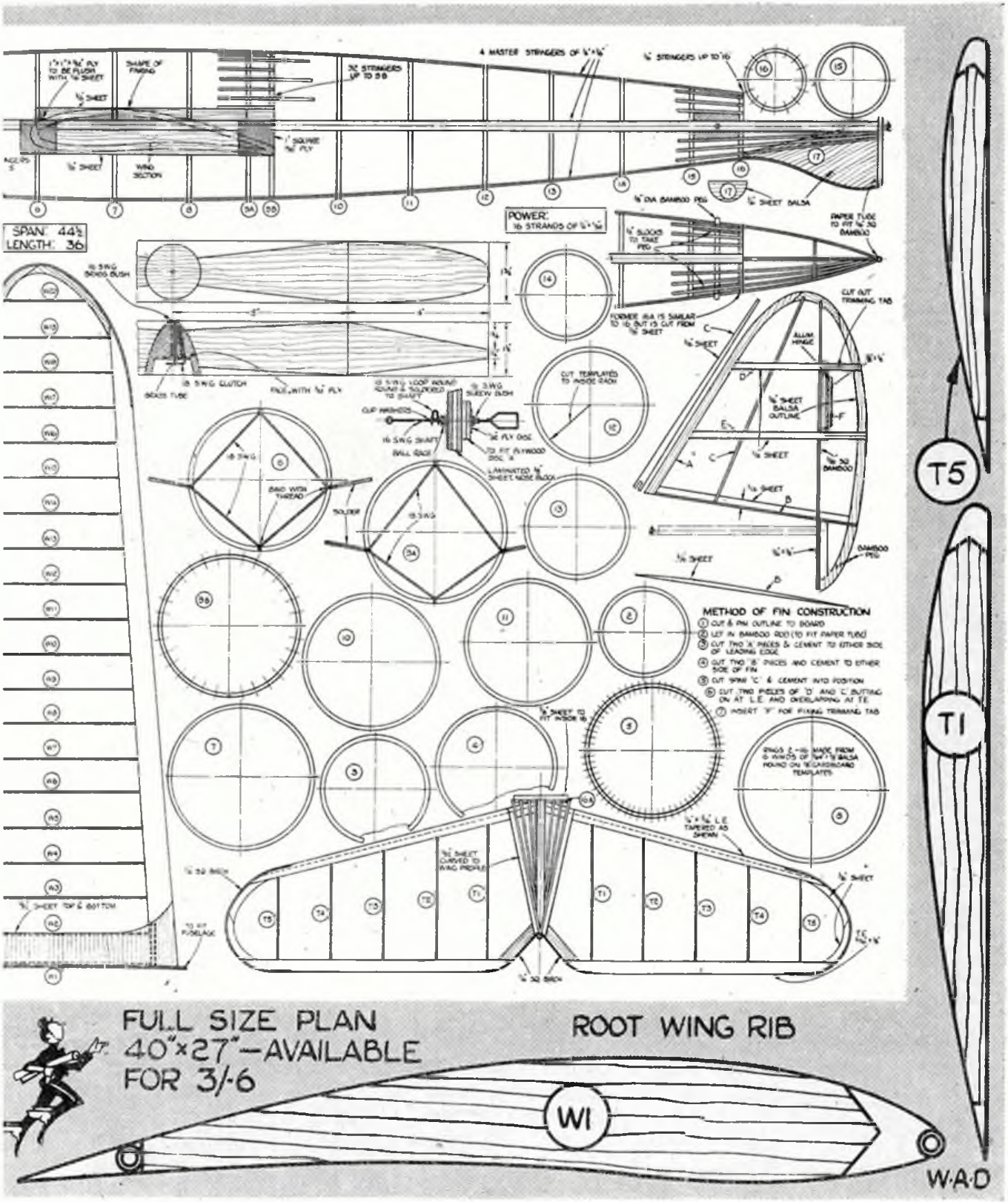
When I first met him he was building a " model of his own design ;" he's that sort of bloke, and measured by the usual standard it was a weird and wonderful contraption, and I very diplomatically suggested certain amendments to the design that I hoped would enable him to get some sort of flight. The cream of the job was the wing and the section was such that I promptly christened it the Banana section. This was in September, 1938, and I straightaway persuaded him to join the club : this he did and, strange though it seems to me now, he did get some flying from his " Banana crate," but after seeing such models as Coplands, Bells and Ivor Hall's, he realised that he had got a great deal to learn both in the practice of building and flying, and he got down to it.

His next venture was a Chasteneuf Wakefield, and he introduced " improvements " of his own which fortunately did not prevent it flying and flying well. By this time he was beginning to pick up a few tips, and while still preserving his independence of action, he began to make progress and it was soon apparent to us all that for workmanship he wanted some beating. Then he went in for our Winter Construction and Finish Contest and won quite easily The Freshman Cup, following this with winning our Freshman's Flying Championship Cup. By this time he had settled down to Wakefield designs and from then onwards he has concentrated almost all his energies on this type and has probably built and flown with marked success more Wakefield type models than any other person in the country. At the moment he has literally a stack of five or six streamliners and sundry others are in evidence in pieces. His practical knowledge is of great help to all members and he is accepted as one of the resident members of the N.H. Brain's Trust. If there is a problem of construction or design that needs working out, Sam will do it. For instance, discussion has waxed hot and furious over the merits or demerits of wing position and I—a voice in the wilderness—suggested there might be something in mid-wings, Sam soon settled the argument by building a string of mid-wing Wakefield jobs and within a little while we knew the good and bad features. That's the sort of bloke he is : " to-day, not tomorrow ", or even sooner, and with it all he is helpful and a good sport in every way.

Now he is going all out on gliders, and when George Temple and he get together—George the theorist and Sam the essence of practicability—things are likely to happen. However, time will show and the " Wings for Victory " Exhibition may spill the beans. I wonder ? Anyway, I'm quite certain no one has made quicker or better progress in four years, three of them during the war period.



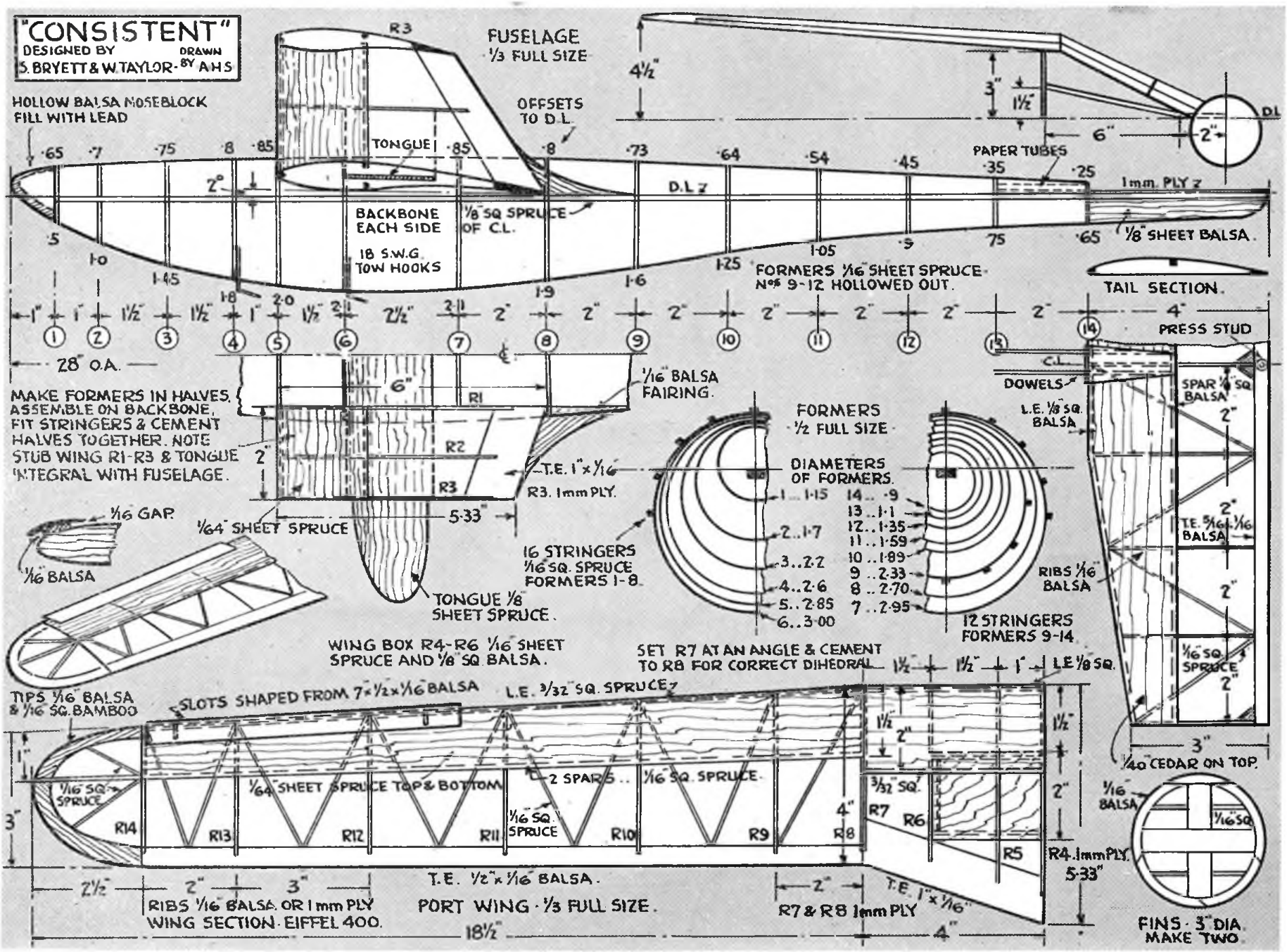
WINNER OF GAMAGE CUP, 1942.
AGGREGATE FOR THREE FLIGHTS 499·06 SECS.
WINNER OF MANY CLUB COMPETITIONS

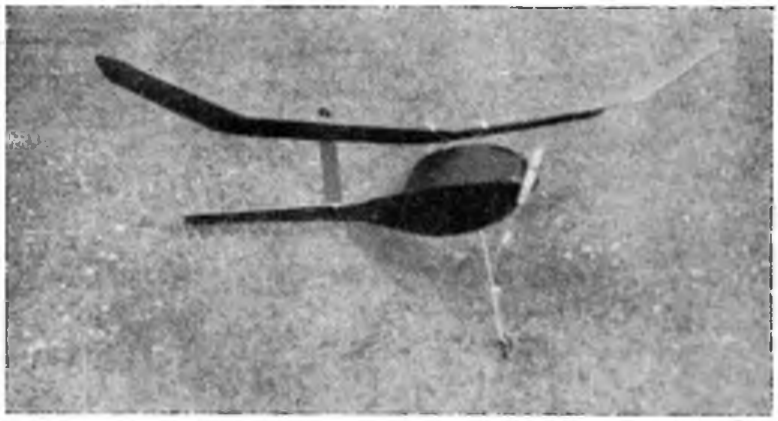


THE ABOVE IS AN EXACT 1/9 SIZE REPRODUCTION OF THE PLANS SERVICE DRAWING
ON WHICH EACH AND EVERY PART IS SHOWN FULL SIZE.
THE ACTUAL SIZE OF THE PLAN IS 40 INS. BY 27 INS.

"CONSISTENT"

DESIGNED BY S. BRYETT & W. TAYLOR · DRAWN BY A.H.S





THIS model was designed early last year (not unhappily early enough for the Gamage Cup) for the purpose of flying in competitions.

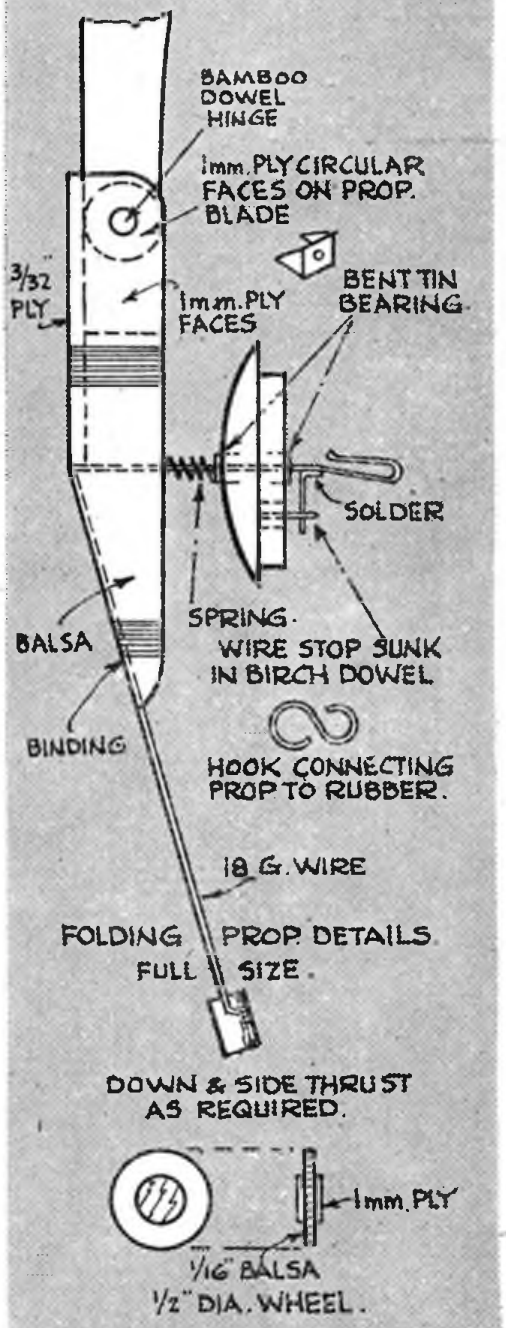
Taking Dick Korda's advice that a simple model well trimmed will stand up to the best in competitions, I made the model simple and light. The original design was a stick model with no parasol, tip dihedral instead of polyhedral and a double bladed folding prop. The whole model was double surfaced but no dope was used, the tissue being only water-sprayed and then only on the mainplane and fuselage.

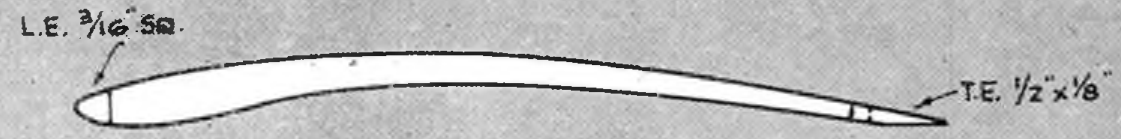
Some people will think that it is crazy to attempt to fly a plane of this type in weather conditions like our own, but the first day I took it out, Whit-Sunday in a howling gale, it clocked 2 minutes on its maiden voyage in the Croydon Gala. It was the lightest model entered in the competition—everybody laughed when they saw me carrying it to the take-off board, clutched close to me and with my back to the wind—it was one of the very few to arrive home in one piece.

I then modified the design incorporating parasol and polyhedral, and I doped the wing and fuselage as the latter tended to twist under full turns in the damp weather. I still left the tail surfaces unsprayed and I brought the model out for the M.E. No. 2 Cup. Its first flight was 6 minutes 1 second O.O.S.

When August approached and the Oxford Gala, I made the machine up again using a diamond fuselage as I heard the models had to be to formula. It totalled, I believe, 424 seconds, winning the open duration competition in the first three flights (apart from tests of 50 or so turns) it ever made. It was definitely underpowered and had no ceiling, but I remedied the defect the next day at the Croydon Gala, and it aggregated 822 seconds, ending up in the clouds, thus winning two open competitions in two days. The model only made six flights, averaging just

ALL DETAILS ON THESE TWO PAGES ARE FULL





FULL SIZE WING SECTION · FARTHING E6 ·
MAKE 15 RIBS FROM 1/16" SHEET.

TAILPLANE & RUDDER RIBS
13 OFF · 1/16" x 3/32"

POWER:
STICK - 6 STR. 1/4" · 30" LONG.
FUSELAGE - 8 STR. 1/4" · 30" LONG.

TWO SUPER-LIGHTWEIGHT DURATION MODELS

By M. FARTHING

OFFICIAL TIMES

Stick 483 sec. agg. (6th M.E. Cup No. 2.)
Fuselage 822 sec. agg.
BEST FLIGHTS (Official)
Stick 6 min. 1 sec. Fuselage 8 min. 44 sec.

under 3½ minutes for them all. I am confident from these times it will easily average 3 minutes without the aid of thermals.

The stick model version was built again for the Chingford Gala, winning with an average of 2–2½ minutes, there being no thermals present.

So much for the history of the models—now for the construction.

Fuselage.

This is built up as usual using 1/16 in. square hard balsa. To prevent the longerons from caving in on doping the tissue, it is covered with the tissue grain running from side to side instead of lengthways.

Wing.

The ribs—section really a modified Marquardt S-2—are cut out, using a ply template. The leading and trailing edges are left unshaped until the ribs are cemented in position. They are then shaped to fit the contours of the ribs. The covering to the high under-camber is simple. The tissue is stuck to the part of deepest camber all along the panel to be covered, then stuck lightly to the whole of all the ribs. finally adhering it to the leading and trailing edges. In this way wrinkles are avoided.

Tail surfaces.

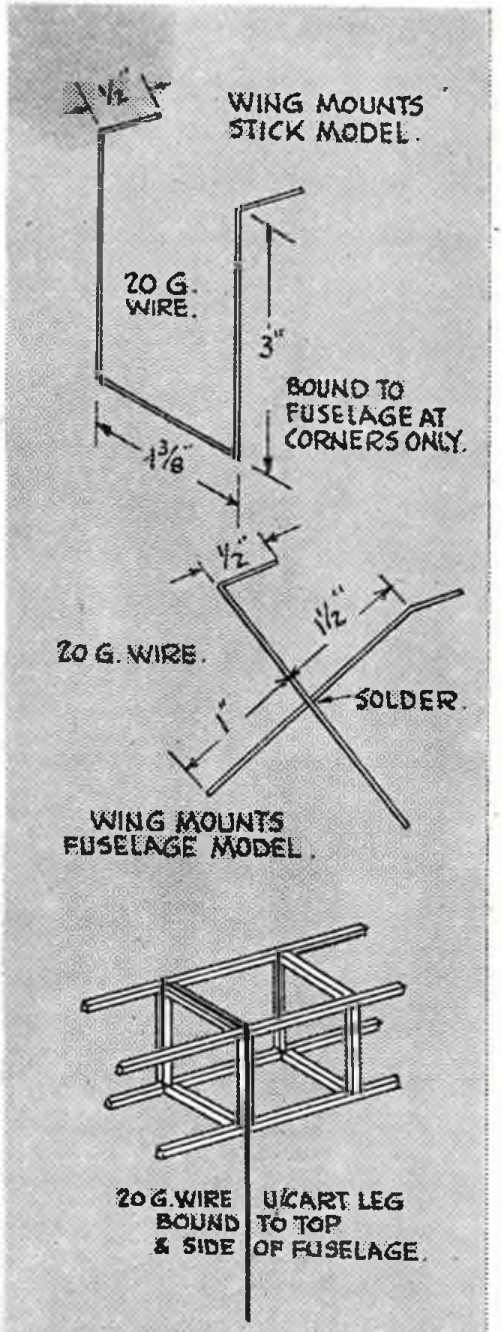
The tips are constructed from 1/16 in. square medium balsa steamed to shape. These tips are surprisingly firm.

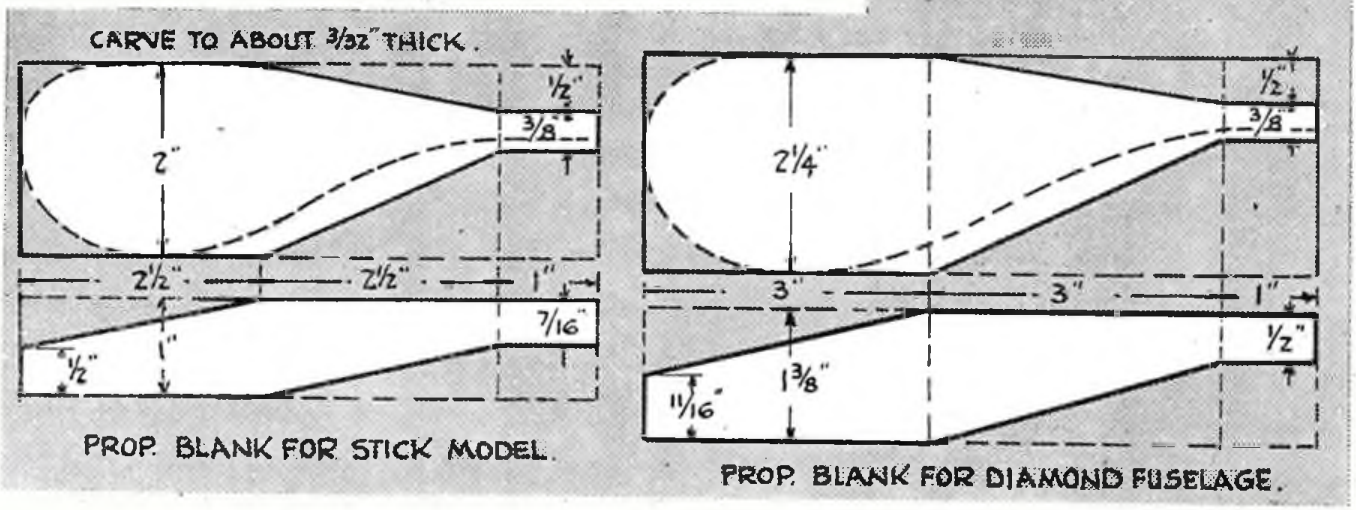
The tailplane and rudder are covered as tightly as possible as they are not even water-sprayed. An aluminium trim tab is cut from a Bondfix tin can be cemented to the rudder to facilitate trimming.

Trimming.

The glide is adjusted by slight movement of the wing and/or use +ve or —ve incidence on the tail surfaces. The glide when perfected, is about the best I've seen on a rubber job. When this has been achieved about 50 turns are put in and down thrust and side thrust added as required.

SIZE. 1/3rd SCALE G/A DRAWINGS ON PAGE 696



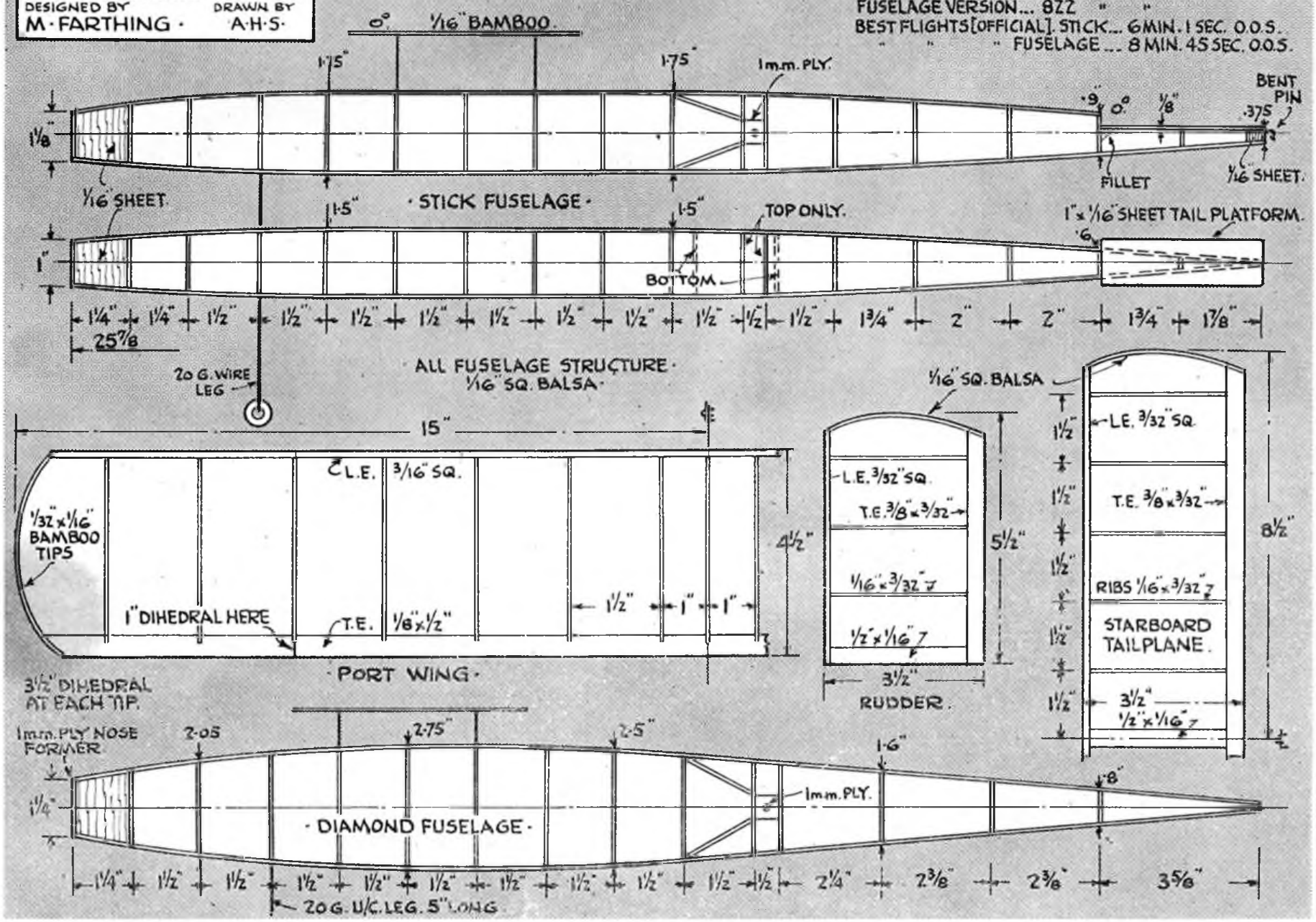


LIGHTWEIGHT MODEL

DESIGNED BY M·FARTHING· DRAWN BY A·H·S·

SCALE: ⅓ FULL SIZE.

OFFICIAL TIMES [S.M.A.E. TIMEKEEPERS].
STICK VERSION ..... 483 SECS. AGG. [6TH M.E.Nº2 CUP]
FUSELAGE VERSION... 822 " "
BEST FLIGHTS [OFFICIAL]. STICK... 6 MIN. 1 SEC. O.O.S.
" " " FUSELAGE ... 8 MIN. 45 SEC. O.O.S.



SHORT POBJOY SCION

1 in. to the foot

FLYING SCALE MODEL

incorporating the "MOORE DRIVE" Patent No. 514974

By C. RUPERT MOORE, A.R.C.A.

Span 42 in. Length 32 in.
Wing area 255 sq. in. Weight 12 oz.
Wing loading 6¾ oz. per sq. ft.

IN order to conserve space I must cut the description of the structure to a minimum and I ask you to study the drawing on the centre pages.

The structure is fairly orthodox, the fuselage sides, wing panels, tail plane and centre-section spar, together with nacelles, are built on flat building boards.

The order of building is as follows :—

(1) Two separate halves of the centre-section main spar and top portion of nacelles, ready for drive.
(2) Shafts D.1, D.2, D.3 and propeller shafts are made and fixed and top of unit completed.
(3) Remove centre-section spars from board and join.
(4) Fuselage assembled without decking.
(5) Main spar and nacelles fixed to fuselage.
(6) Gearbox and driving shafts made and fixed.
(7) Fuselage nose and nacelle noses are cut off.

At this stage the order of building is optional.

The wheels and nose are made of papier mâché. Plasticine is modelled on the actual nose, removed carefully and a mould of Dentac plaster of paris (chemists keep it) is made. Eight layers of newspaper are pressed in, after greasing the mould, the first soaked in water and the other seven in paste. Allow to dry naturally. For further details see Jackdaw II.

The tail and rudder outlines are 1/16 in. birch and are steam bent round cardboard templates. The rubber is integral with the fuselage.

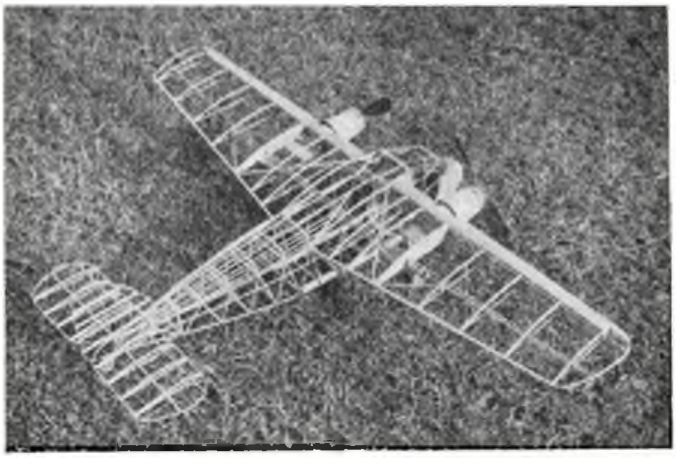
Except for the tail and rudder everything is covered with medium tissue and they are covered with lightweight. Thin cellophane is used for the windows, except the windscrew, where celluloid is used. The cellophane should be put on damp and stuck with Seccotine or Croid. The whole should be given two coats of banana oil (including the cellophane), and two *thin* coats of aluminium dope.

The Moore Drive.

Each joint of the drive is composed of two units, the "fork" and the "stirrup," and relies on the sliding of the "stirrup bar" between the parallel "fork" prongs for its angular motion. The friction is less than two gears for the whole train. When disengaged from the gearbox the whole drive freewheels by air pressure. Two types of "forks" are used, those with the prongs joined and those without the joining piece; closed and open "forks" respectively. Open "forks" are used where disengagement is required. Before making the drive burnish all wire and brass sheet with sandpaper to make sure of good soldering.

Portions D.1, D.2, and D.3 are the first to be made, by bending the wire to shape on the plan. Small round and pointed nosed pliers are essential. The bearing plates are next cut from 22 s.w.g. brass strip and drilled in the centre, two plates to each shaft. Thin 1/64 in. hardwood (spills) is cemented to the back of the brass bearing plates, cut to the same size and drilled. Thin silk is bound tightly round them thus making it possible to cement the brass to the balsa structure. Cement bearings to 1/8 in. by 1/16 in. by 2 in. bearing spars and drill for the shaft. Slide these complete bearings round the stirrups and forks on to the shafts with the brass outwards. Link forks and stirrups together and bind the short end of forks and stirrups to the shafts with copper fuse wire and solder. Make the two plates for each open "fork" together by folding brass strip, drilling and cutting to length. Cut the propeller shaft 1 in. too long, tin one end and push on these plates. Bind between them with fuse wire and 1/16 in. up the shaft to form a collar. Tin the 18 s.w.g. prongs at one end and push in position. Solder thoroughly and shake off surplus solder while hot. Make bearings as before but stick one to the "radiator" instead of bearing spar. The section of drive through the wing is now complete.

Build the centre-section spar in two halves flat on a board, then, again on a board, erect the spar, L—E, engine bearers, front of cowling and formers C.2 and C.3. The bottom segments of the latter are cut off in line with the board. *B.2 and B.3 are not cemented in place.* The shaft D.2 with closed "stirrups" is first to be fixed. Cement the bottom edges of the two bearings and stick to top *edges* of B.2 and B.3. Cement two vertical battens on either side of the shaft at the back and allow to set. Cement B.2 and B.3 in place and while unstuck cut and wedge fairly tightly, distance pieces which are parallel to the shaft. These distance pieces force the bearing plates apart and thus prevent end slap. The rear bearing of the propeller shaft is mounted and battened to the edge of its bearing spar, but in this case the spar is very wide in order that the *propeller shaft is parallel to the building board.* Put shaft in place and pin bearing temporarily. Engage stirrup of D.3 with open fork on propeller shaft. Cut bearing spar at opposite and lower end until it fits at 45 degrees to L.E. and engine bearer. Hold stirrup in open fork with a spring clip in a horizontal position, and line up the opposite stirrup with the closed fork. The bearing spar at the front will be higher than both L.E. and bearing spar. Cut 1/16 in. sheet to fit between this space, cement on



edge and batten. Pin these bearings in place, remove the spring clip and test by turning. *When the "forks" and "stirrups" are aligned, their shafts, if produced, would intersect on a point in the centre of the stirrup bar in every position.* I might add that considerable inaccuracy in line up does not seem to have the result one might expect, but don't do it on purpose! Pack or cut until satisfied, then cement and fix distance pieces. All top riblets are cemented in place and the two halves removed from the board. Stand half units on the spar with nacelles vertical, bring ends together and cement. Add L.E. between units and allow to set. Turn over on its back and align and fit the two shafts D.1, which go below the L.E. Except for the lower central portion, cover L.E. of spar with 1/32 in. sheet, top and bottom. Banana oil both sides and cement while wet.

The gearbox.

The gearbox is orthodox in construction. The balsa bulkhead is reinforced with two kite-shaped pieces of 1/16 in. ply (celluloid or even tin) and a similar shaped piece of 1/8 in. sheet balsa. These are drilled to take six screwed bushes. One of these bushes is long to support the winding spindle. Owing to the small radius the four hooks are made from 18 s.w.g. and bound and soldered to the 1/16 in. shafts. The shafts are fixed in place with a few turns of fuse wire and solder. The winding square is a screwed bush soldered along its whole internal length to the shaft and then filed to a parallel square. Make from 22 s.w.g. brass a box to fit this (a loose fit), bind along its whole length with fuse wire, plug with balsa and solder solid and then lay it aside. A suitable clock key can be used. Before soldering fill gear teeth with dope and fit paper washers on shafts to stop solder from sticking. The bearing spar is drilled to fit shafts and threaded on and the two bearing plates after, but don't stick them together till aligned. The open forks are now made and fixed.

The distance horizontally between the two top gears must be the same as the centres of the stirrup bars at the first joint. Turn these stirrups horizontally, mark the centres of their bars, measure between, turn them over, measure again, and take the average.

The shafts are slid up the fuselage and the whole unit held by pins and clips until aligned. Pack where necessary and cement.

Complete the whole of the fuselage and then cut off nose at former A and nacelles between C.2 and C.3. Celluloid was used only for windscreen, cellophane being used for other windows. This was damped and stuck with Croid or Seccotine. Structure is completed, covered and doped with two coats banana oil. Banana oil cellophane as well. Two thin coats of aluminium, vermilion lettering, and black lining, completes the decoration.

The free wheels are fitted last. These are automatic and consist of double L-shaped pawls in tin hinge plates which are soldered to the airscrew bushes and pinned into the bosses. At the end of each shaft is a brass leg. A square is filed on the shaft and an undersized hole is drilled in the brass and the square is forced into the hole. Bind with fuse wire and solder. One point—make the pawls a very loose fit in the hinge plates.

The starter.

The starter is a wood disc fixed to a brass tube spindle by a tin plate which is bound with fuse wire to make a collar and soldered. In the front end is a wood plug into which is fixed a tin swivel. Attached to this swivel is a 6 in. loop of string. At the opposite end and inside is soldered the brass square. Two holes are drilled in the disc, the diameter of the heads of two round-headed screws. These screws form a clutch for the "starter bar," which is a piece of wood 10 in. by 1 in. by 1/4 in. with a 3/8 in. hole bored in centre to fit over swivel.

Motors.

Four motors of 48 in. long of five strands 3/16 in. by 1/30 in. rubber (or equivalent) are made, given 120 turns, doubled and allowed to twist into ropes. When done they should be 1 in. too short. This gives four ten-strand roped motors. Half inch of 1/4 in. tape motor ends are made and *stitched very firmly*. Make sure all gears, joints and shafts are oiled, take off nose and insert motor in nose. Make only one "tail shackle" of soft wire and hook all motors on to it and fix motors in place. Hang model with string from the marked C.G. and put wings on. Lengthen or shorten wire "tail shackle" until model balances with decking level. Remove motors and make 18 s.w.g. piano wire "tail shackles" (four) the length indicated. Assemble model and cover open panel under the fuselage.

Rigging.

Check tail setting by the plan and try a glide; it should be good and flat. The balsa box packed with loose 1/32 in. sheet like a pack of cards gives delicate adjustment necessary for such a small tail. Make sure the glide is right.

Please don't try power flights until proficient with the starter. Practice this art on the ground. Push the spindle of the starter into the nose, thread the string loop through the hole in the "starter bar" and push screws through the disc. Wind "starter bar" as an ordinary airscrew. When wound, thread *left wrist through the string loop* and grasp the disc. With the right

The completed model is a faithful replica of one of the machines employed by Plymouth Airport airlines, as will be seen from the accompanying photographs. The uncovered photo on the opposite page is of the first of the models and differs in certain details

hand remove the "starter bar." Hold the model with the right hand near the C.G. as usual for launching. Slowly relax the grasp on the disc and allow the power to engage gently. *Leave go of the disc altogether.* The revolving disc is pulled from the nose by throwing the left arm forward when the string loop on the wrist pulls it out. Don't try to get her away too quickly at first.

Always make sure that the open fork prongs are on opposite sides of stirrup bars before launching.

Adjustment.

Left hand airscrews were used, but right hand can be, but remember adjustments will be reversed. Torque though slight, tended to turn the model to starboard. This was cured by 1/16 in. packing on the outside of the starboard nacelle. Upthrust in one and downthrust in the other can be used or a mixture of both. Rather than use downthrust, temporarily weight the nose and add neg. incidence to tail and move motors by lengthening "tail shackles" when you get home.

This is the second Scion, the first was entirely hardwoods and had a wing loading of 13 oz. per sq. ft.! In spite of this she did 25 secs. If you cannot get balsa sheet, build wings and ribs as Jackdaw II. Double number of riblets and double cover the centre-section spar with heavy tissue. Make engine "radiators" of papier mâché (four layers) and use balsa for tail.

(SEE ALSO CENTRE PAGES FOR CUT-AWAY DRAWING)

APART from one or two freak shapes, formers may be divided into three sectional types :—circular, elliptical and pear drop.

The circular type seems to have found most favour with aero-modellers on account of its simplicity to draw out. This shape also happens to be the best for rubber models generally, as more space is available for the rubber than with any other shape of an equal cross-sectional area. But there are often other factors to take into account before deciding on a section. Perhaps the model is to have two separate motors, retractable landing gear, or a very high wing position. If any of these conditions exist, an elliptical or pear-drop section is the shape to use.

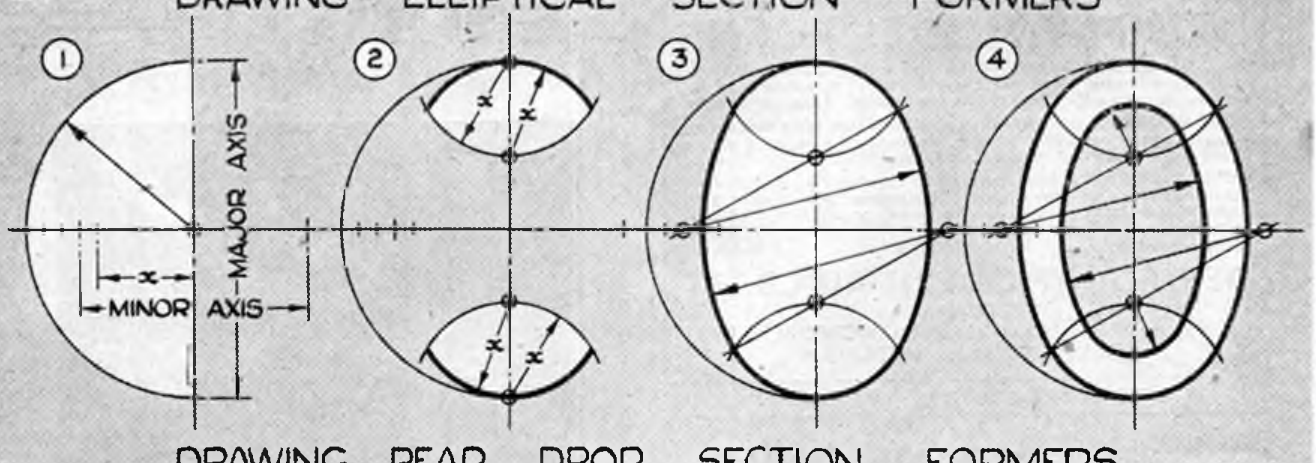
The question of the high wing position arose with regard to the "Streamliner" (see the October issue AERO-MODELLER). Originally this model embodied a circular fuselage with a wire wing saddle fitted on top. In the revised design, the circular formers were replaced by pear drop ones. This cleaned up the wing mounting nicely without having to alter the actual position of the wing.

The method of laying out pear-drop sections is very simple, there being only three radii used in their construction. The height of the pointed portion is equal to approximately $1\frac{3}{4}$ times the lower radius. Knowing this, it is quite an easy matter to decide on a maximum height, and work back to find the lower radius. This lower radius can then be drawn in on the side elevation of the fuselage. Next complete the lower fuselage profile and mark off the position of the remaining formers. The other sections are constructed, using the lower radii as the first stage (see Fig. 1).

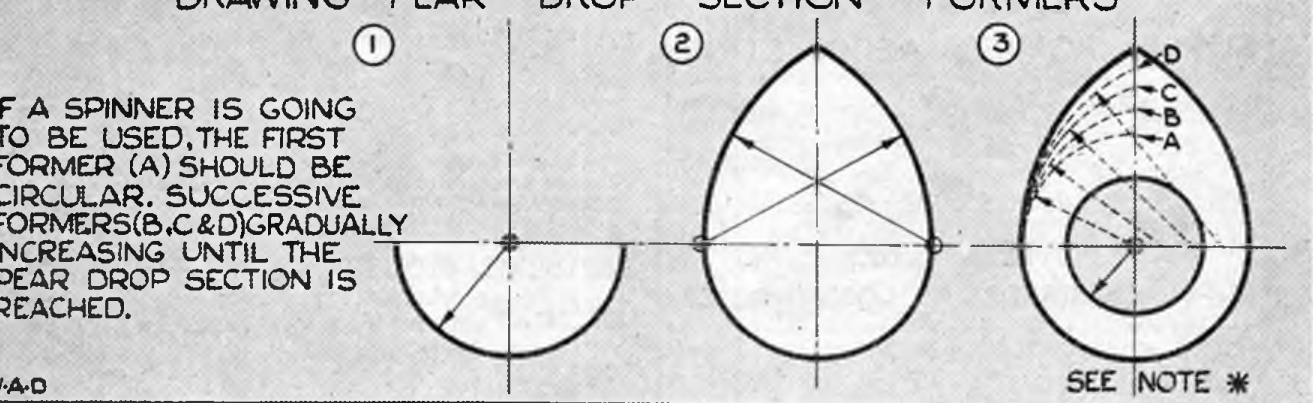
The first few formers may be made flatter if a spinner is going to be used. The nose former will, of course, be circular. The upper radii of the second former should

FIG. 1

DRAWING ELLIPTICAL SECTION FORMERS



DRAWING PEAR DROP SECTION FORMERS



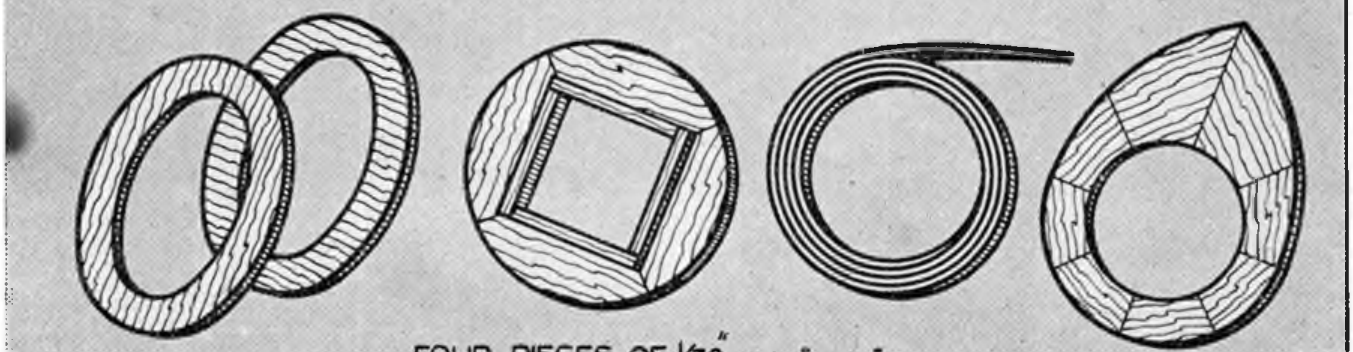
* IF A SPINNER IS GOING TO BE USED, THE FIRST FORMER (A) SHOULD BE CIRCULAR. SUCCESSIVE FORMERS (B, C & D) GRADUALLY INCREASING UNTIL THE PEAR DROP SECTION IS REACHED.

W.A.D

SEE NOTE *

FIG. 3

FOUR METHODS OF MAKING BALSA FORMERS



LAMINATED 1/32" SHEET CROSS GRAIN.

FOUR PIECES OF 1/32" SHEET CEMENTED TO A BOX OF 1/8"x1/8" STRIP.

1/8" x 1/32" STRIP WOUND ROUND A TEMPLATE

EIGHT SEPARATE PIECES OF SHEET CEMENTED TOGETHER.

W.A.D

be equal to 1¼ times the lower radius. The upper radius for the third should be 1½ times and so on, until the maximum of twice the lower radius has been reached.

Lastly comes the elliptical shape, which entails slightly more work to lay out than the other two. Many different methods of drawing ellipses have appeared in THE AERO-MODELLER from time to time. Having tried out most of these myself, I have come to the conclusion that the method illustrated in Fig. 1 is as efficient as any of them. After a few constructional lines, the ellipse can be made up from four radii. I trust the drawings are self explanatory, but just in case the stages are not quite plain, the following will clear up any doubt.

First of all, mark off the major and minor axis. No particular ratio need be kept to. Strike a radius to cut the produced minor axis as indicated. Divide the small portion so formed into three equal parts. The dimension for the top and bottom radii (etc.) is then equal to half the minor axis minus one of these parts. Next draw a line through the intersection of the radii. From where this line cuts the minor axis to the furtherest intersection of the radii, is the dimension for the two remaining side radii. The cut-out portion in the middle is constructed using the same four centres.

Some people only mark off the four main stringers, and guess the position of the intermediate ones. It is far better to set out all the positions on each former right at the start. The only way to do this spacing is in degrees. Decide on the amount of stringers and divide this number into 360, to get the spacing angle between each position (see Fig. 2).

As regards the actual construction of formers, I have chosen four methods which are, in my opinion, the pick of the bunch (see Fig. 3).

First there is the laminated type. This consists of two pieces of sheet cemented together cross grain. This method is not so wasteful as would be expected, as the width of the rings can be kept very small. This means that in most cases another former can be made from the cut-out portion of each of the larger ones.

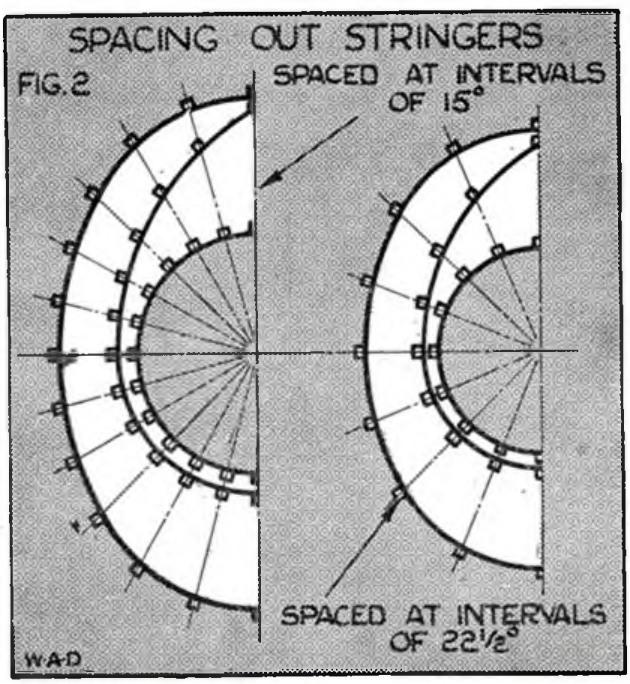
Next, there is one built up from pieces of 1/32 in. sheet cemented to a box of ⅛ in. square strip. This type should be used when only very soft sheet is available, as the box takes most of the strain, the sheet only giving shape to the fuselage.

The latest, and by far the best in all respects, is the wound type. In this case, there is no waste at all as the only wood used is in long narrow strips.

The generally accepted method is to employ ⅛ × 1/32 in. balsa wound to three or four layers. The balsa will require soaking in water before attempting to bend, and a cold water glue should be employed when it is possible to work with the wood still wet. Templates are then made ⅜ to 1/16 in. smaller than the overall former size, depending upon the number of layers to be used, and the wood wound onto these. This method has found great favour for former construction for Wakefield machines.

A further variation of this method, employed by R. H. Warring with success, and similar, he tells me, to full size construction, is to wind the formers out of ⅛ × 1/16 in. birch, or slightly larger size for big models, e.g., the Hotspur glider. The birch should be left to soak in water some hours before attempting to bend around the false formers, and the joint should be well lapped. Such a former possesses an amazing strength/weight ratio and is quite easy to make.

Lastly, there is the type which consists of several separate pieces of sheet cemented together, in order to have the grain "flowing" round the former. This method is also very strong and economical with material, and has been used for several years.



A SILHOUETTE GLIDER OF THE AVRO MANCHESTER

By W. J. KAY

A cheap and easy way of building silhouette scale models which do fly. Any design can be so treated, the general description of Avro Manchester given applying to the majority of types. Outline shapes can be traced direct from Aeromodeller Plans Service drawings.

SILHOUETTE gliders, like the Manchester pictured above, can be produced both cheaply and quickly by even the youngest of modellers. Apart from their obvious use as flying models, the value of silhouette fighters and bombers for identification purposes is great. Although a scale solid fuselage is preferable to a " flat " one, the main points for spotters to look out for are usually the flying surfaces and therefore the advantages of the former's mass production possibilities seem to outweigh that of the latter's absolute accuracy.

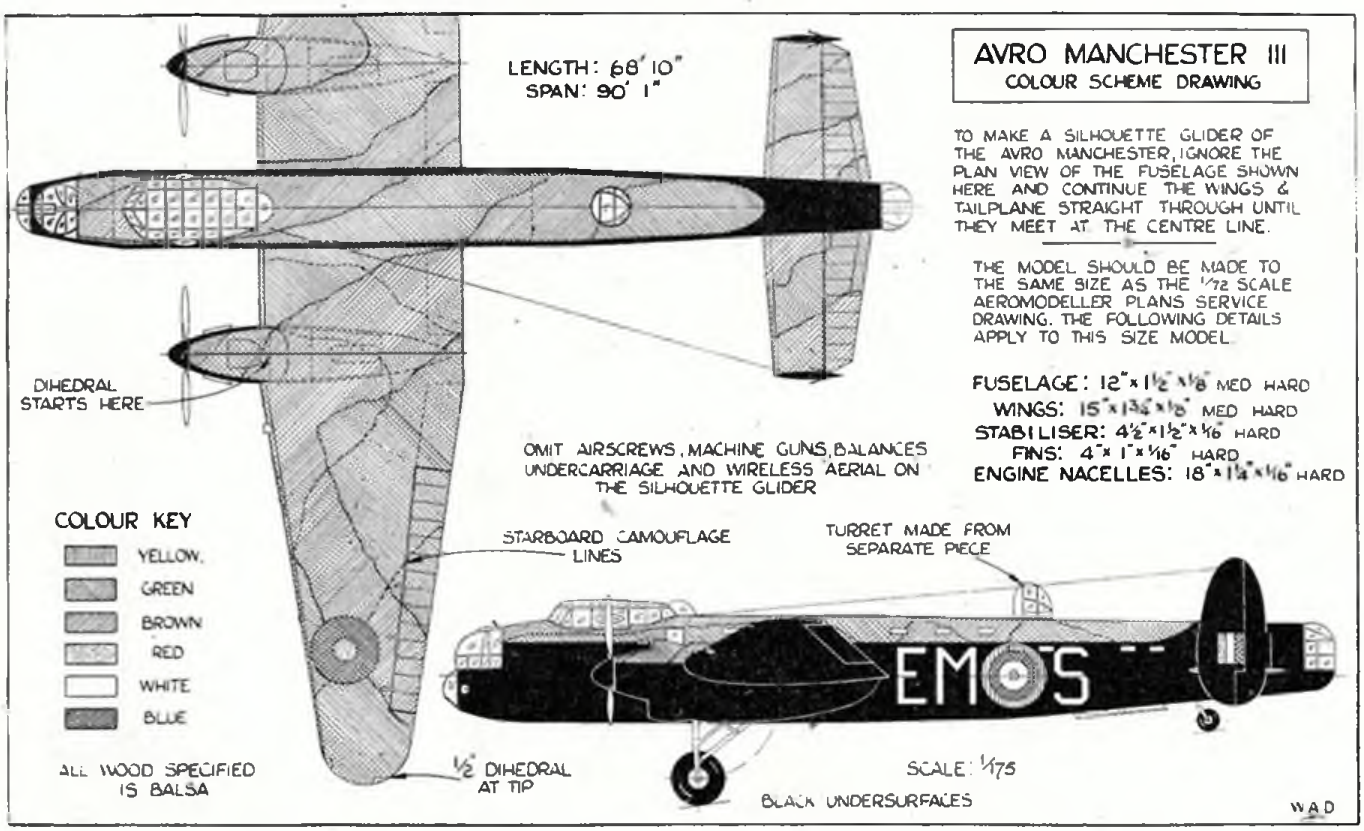
Even aircraft with such unusual layouts as the Lightning, F.W. 189 and the B.V. 141 can be made in a matter of hours or even minutes by the silhouette method.

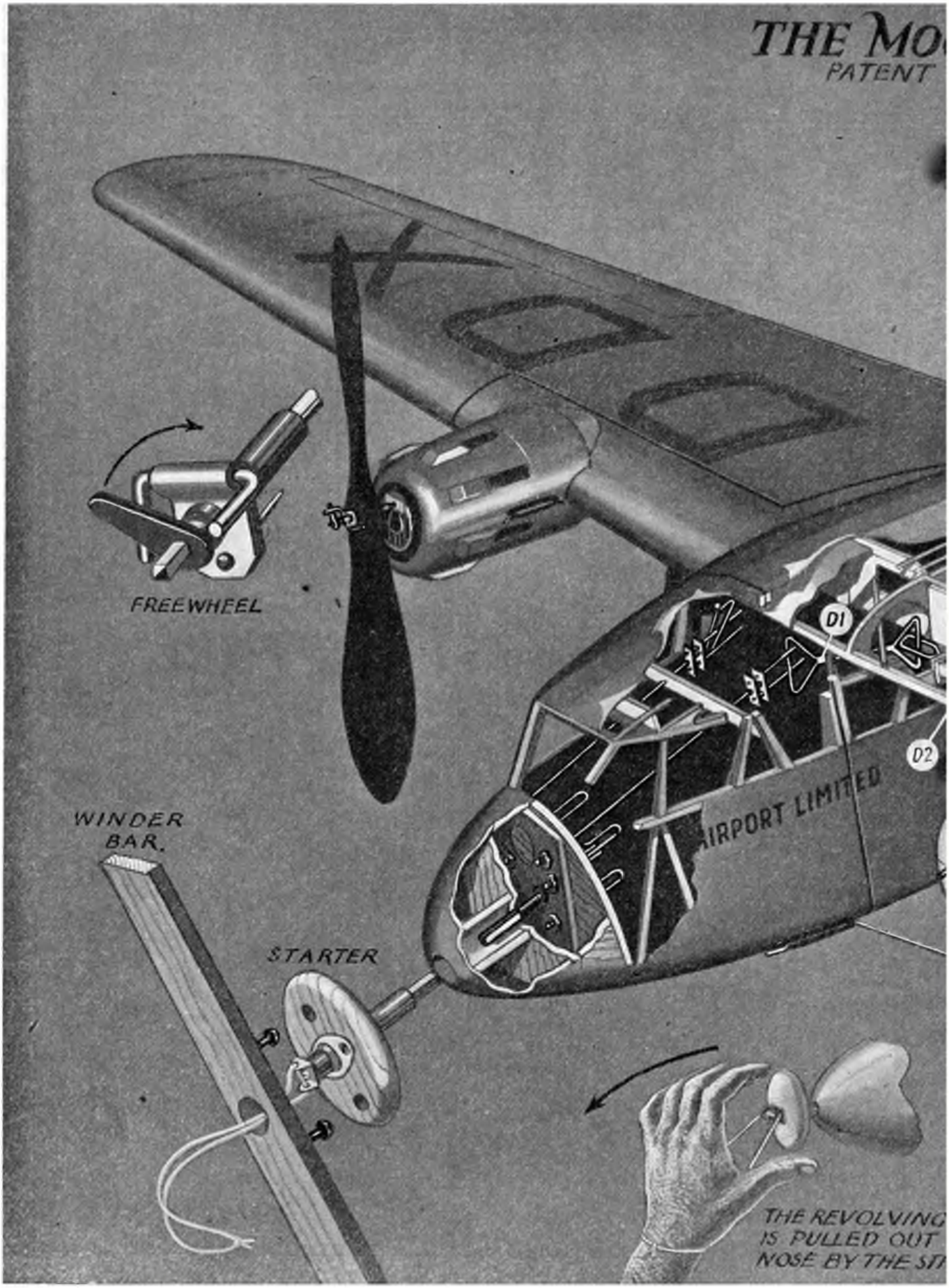
Large bombers of the Manchester and Fortress type are quite big enough for flying models, when made to 1/72 scale—the outlines being traced direct from the Aero-Modeller Plans Service drawings. Fighters should preferably be enlarged two or three times—that is, to approximately 1/30 or 1/20 full size.

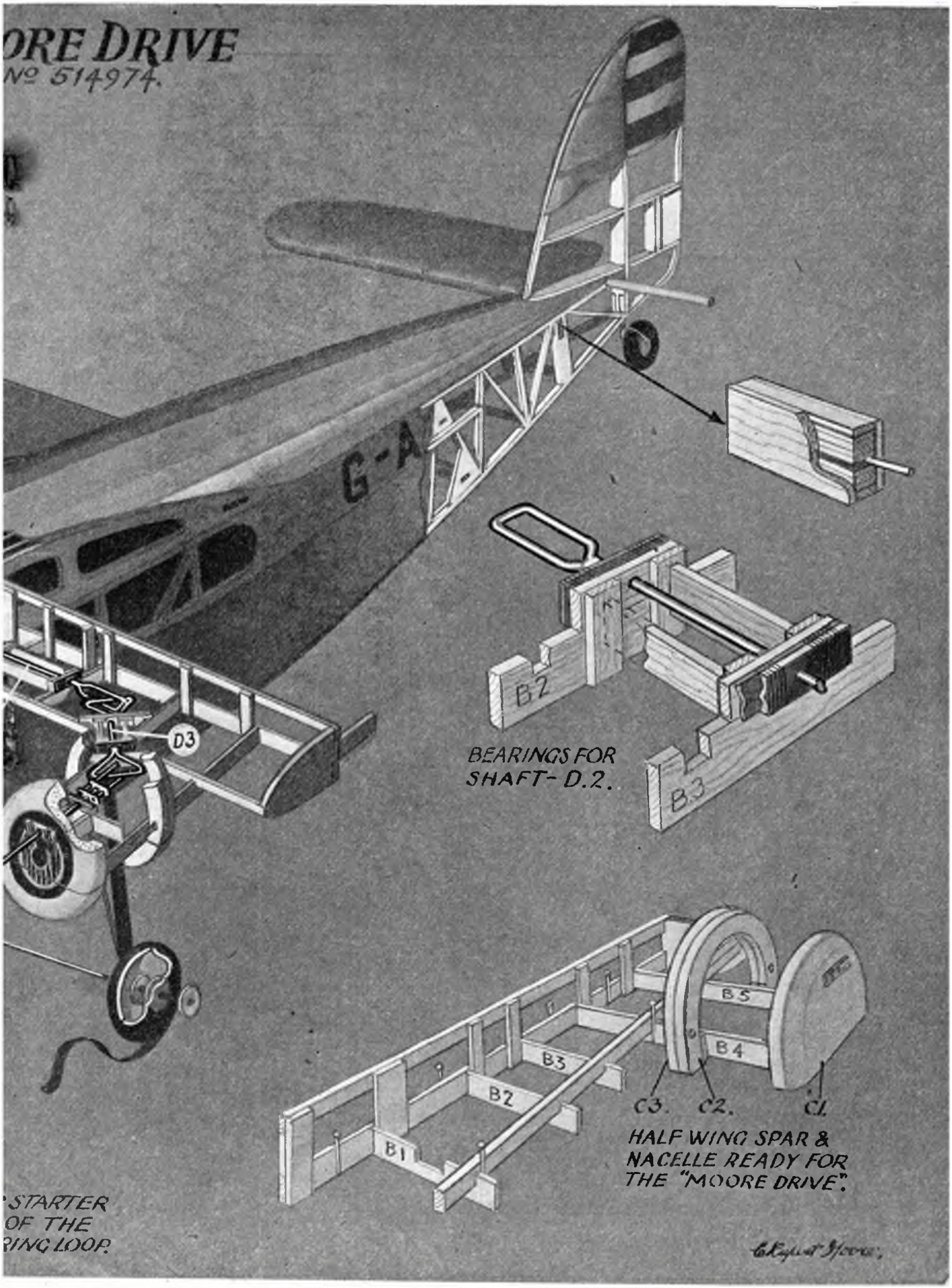
For full details of the construction of this type of model, readers are referred to Mr. Kay's article in the August, 1942 AERO-MODELLER. The Ensign and the J.U. 88 were the models featured in this issue, and the information which was given on catapult hooks and wing attachment is also applicable to the Manchester glider.

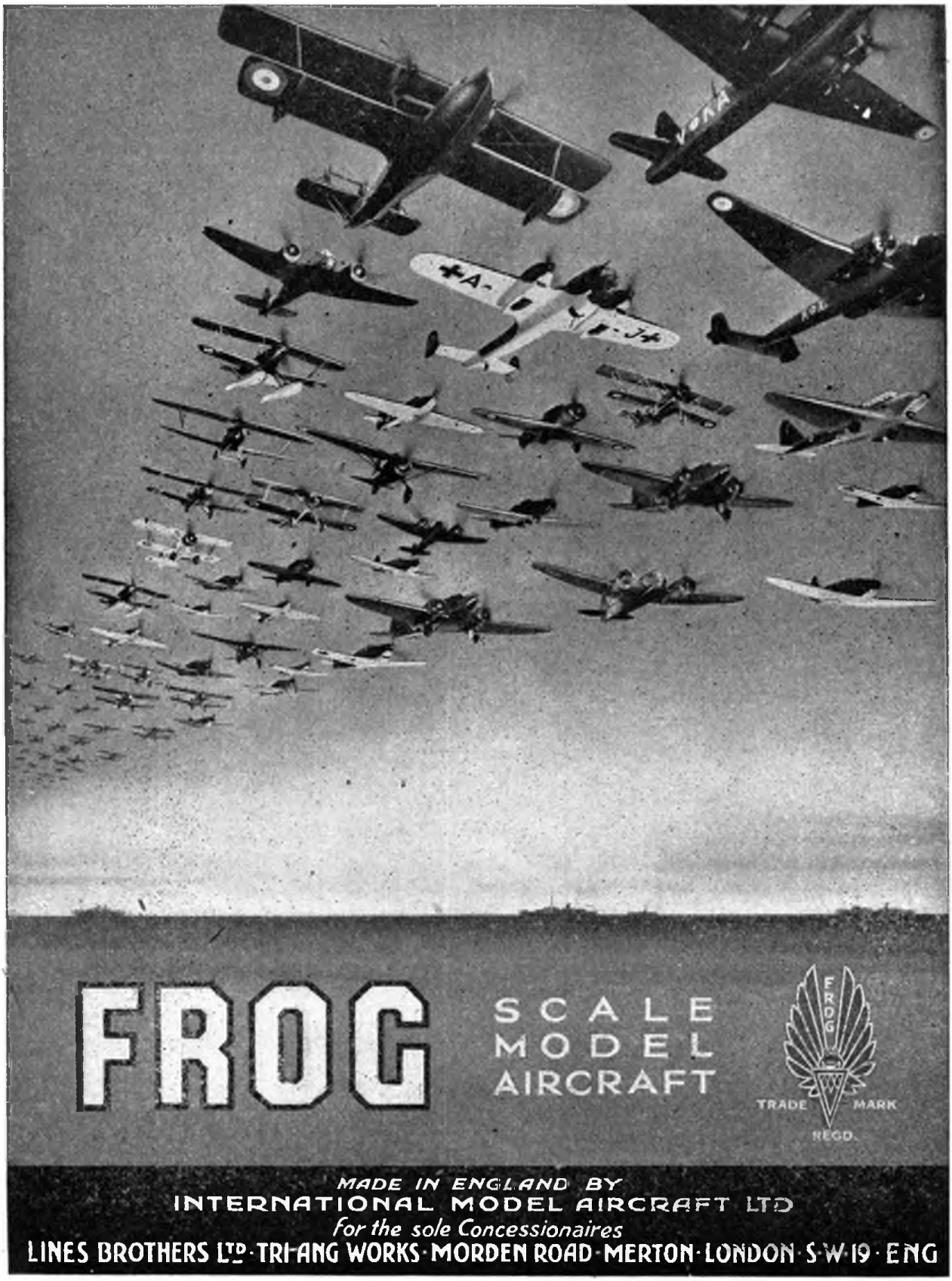
Roundels and lettering are best applied in the form of transfers, coloured dopes or tissues being used for the camouflage. The cabin and turrets should be marked in indian ink.

In the near future we hope to present some small rubber-driven silhouette models, the first of which will be the North American Mustang.









MAKING A PRACTICAL PROPOSITION OF

The SCALE-TYPE LOW

By Dr. J. F. P. FORSTER

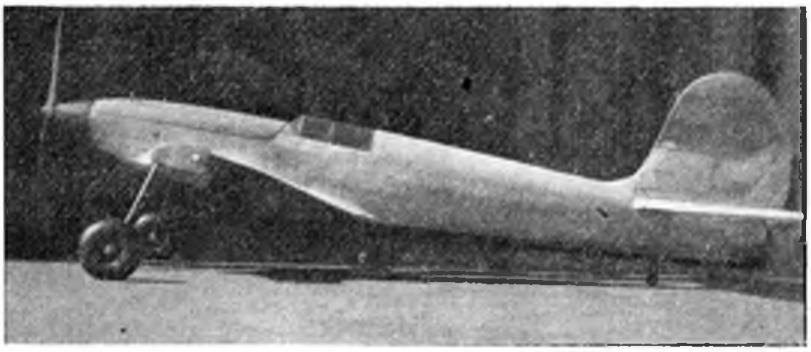


Photo No. 1.

Continued from January "Aeromodeller."

PART I

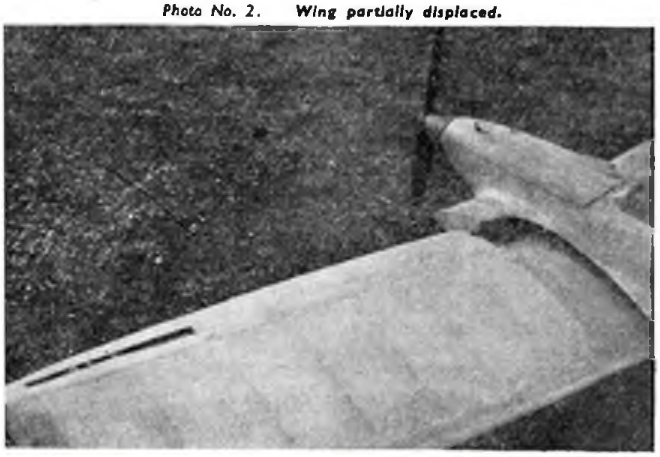
Pursuing the matter further, the writer sought for ways and means of protecting the engine and airscrew now perched out in front. Ever since he started the hobby the writer has, without exception, used "knock-off" engine mountings, and the nearer the approach to the scale model was made, the more difficult became the realistic cowling of engines, when using this type of mounting. The increasing perfection of streamline on full-size machines with liquid-cooled engines such as Spitfire and Hurricane, made the relative shortness of the crankshafts of model aero engines, in relation to their cylinder height, still more apparent, and it was impossible to enclose the cylinders in any cowling however faintly resembling a machine with a liquid-cooled in-line engine. There seem but two possible solutions to this problem :—

Either the cylinder must be allowed to project through the cowling, and ruin the scale effect, or the engine must be placed further back in the deeper part of the cowling, using an extension shaft to the airscrew.

The former method, apart from spoiling appearances, does nothing to protect either engine, airscrew or cowling from inevitable damage sooner or later, perched out in front as it is to be. Furthermore this disposition of the engine weight necessitates the moving of batteries, and perhaps even coil, some distance to the rear of the fuselage with all the attendant electrical and stability disadvantages.

The latter method involved equal risk to the airscrew, and considerable constructional difficulties when considerations of the additional bearings necessary, came to be considered, while bending of the extension shaft seemed more than likely. Furthermore, the engine would have to become more or less of a fixture in the fuselage—always a mistake and a disadvantage from a maintenance and adjustment standpoint—while any alteration of the angle of offset (or downthrust if required), would involve very great movement of the engine and in fact would be impracticable without "structural alterations"!!

Photo No. 2. *Wing partially displaced.*



PART II

IN the first part of this article (the Editor fears it threatens to become another book ! ! ?) the writer endeavoured in the short space allotted him (did I hear Mr. Editor say "Greedy ! "), to review other people's, and particularly his own, difficulties and failures experienced under flying conditions, with earlier experimental scale-type low-wing models.

It is impossible to judge the merits of the solutions of these problems without fully appreciating their magnitude or realising why earlier attempts failed.

Taking them in the order discussed, the writer puts forward his latest solutions in the form of a description of these parts embodied in a model based on, but not a true scale replica of, a Spitfire, which has been put through all possible tests in the field short of actual power flight. (Blast the ban !)

Wing Fairing and Attachment.

To overcome the weakness of the trailing-edge of a fixed centre-section, while retaining the realism and mechanical soundness of a fixed leading-edge and main spar mounting for the undercarriage, the wing was designed in two halves, held together under the centre line of the fuselage with the usual short locating pegs and rubber bands at the designed dihedral. By cutting away the leading-edge of the centre-section as far back as the main spar, it was arranged to fit accurately around the forward part only of a centre-section built integral with the fuselage.

Projecting outwards and backwards in a horizontal plane from the two corners of this fixed centre-section are short tongues of $\frac{1}{8}$ in. 3-ply (see photo 1), which fit into corresponding slots in the inner sides of the ribs and forward sides of the main wing spars. The wing halves thus pivot on these tongues, some 6 in. outboard from the centre line, which is at greater mechanical advantage than the lower sides of the fuselage, and in the event of a wing tip being forcibly knocked upwards prevent damage to the razor edge of the fairing, which is built integral with the fuselage on to a 1 mm. ply sheet bottom conforming to the upper camber of the wing behind the main spar.

This reduces the tension required on rubber bands between the wing-halves, and in order to eliminate all *external* rubber hooks (which in any case prevent the placing of the wing on a flat surface), the flying (and crash) strains are taken instead, by rubber bands stretched forwards and upwards into the fuselage and secured to a hook on the main spar bulkhead. Owing to the dihedral angle there is ample room for projecting

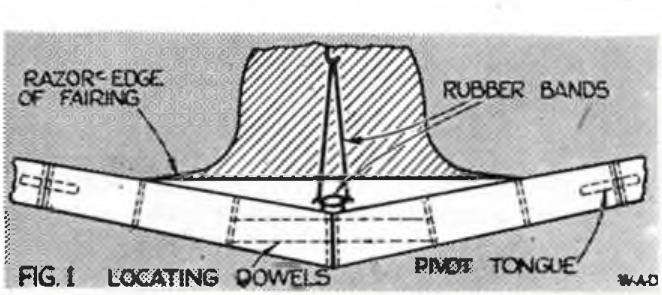


FIG. 1

WING PETROL MODEL

hooks and rubber bands on the *upper* sides of the centre ribs, beneath the flat fuselage bottom, as seen in Fig. 1.

Owing to the diagonal set of the tongues the tension between the wing-halves not only draws the ribs against the outsides of the fixed L.E. centre-section, but also causes them to slide and keep forward so that the main spar lies flat up against the rear surface of the main spar of the fixed centre-section. No rubber bands are required at these points and the main bands keep the trailing-edge held firmly up under the fillets.

A backward blow on the wing tip stretches the bands securing the wing-halves, thus permitting the wing to slide backwards and outwards off the tongue. The usual tendency for this to buckle the trailing-edge is completely eliminated because the other wing-half is free to move outwards and the whole wing slews slightly as one piece.

This has all been proved to work satisfactorily without damage by deliberately gliding the model diagonally into a hedge, and it has also made several wing-tip cartwheels when gliding into the side of rising ground. The model is, in fact, a first-class tow-line glider ! !

Undercarriage.

Many types of undercarriage for low-wing models have been tried by the writer and some of these have been described and illustrated in this journal in "Petrol Topics." Although the writer has proved that the compound L.E. and main box spar can be made amply strong enough to resist the torque imparted to it through an undercarriage mounted entirely on the outboard portion of the centre-section, it was decided that this could be avoided by the use of an undercart pivoting freely in a dural tube running inside this centre-section (Fig. 2). Shock absorption is provided partly by the resistance to torque of the $\frac{1}{8}$ in. spring steel portion turning freely inside the dural bearing, imparting no torque but only backward and upward pressure on the centre-section, and partly by strong rubber bands holding back the arms bent upwards and backwards inside the fuselage.

Actually there is sufficient absorption in the torque bar for all ordinary landings if the model glides flat, as does the writer's, and only in a dive or if the wheel hits a hidden obstruction or stone, does the rubber become stretched. The writer now adjusts tension of rubber so that the wheel must be forced backwards nearly 2 in. before the arm moves and stretches the rubber. The two legs are entirely independently mounted and sprung and in the writer's experience it is one of the smoothest working and most efficient undercarriages yet seen (see photos 5 and 6).

Photo No. 4. The model nearly complete.

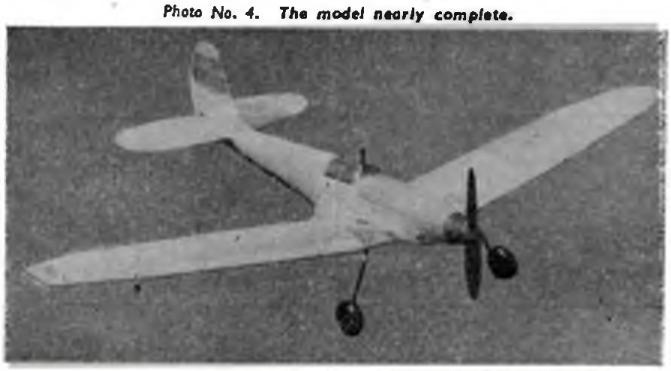


Photo No. 3. Note centre-section bulkhead.

The fixed centre-section is built up on a $\frac{1}{4}$ in. main spar-cum-bulkhead, cut from a single 4 in. sheet of hard balsa, to conform to the dihedral in a gentle curve on its lower edge (photos 5 and 6) and to the lower 2/3 of the fuselage, fairing into the upper surface of the centre-section (photo 3). The leading-edge to preserve strength is carved from a straight $\frac{3}{4}$ in. square balsa spar rotated through 45 degrees and the dural tube for the undercarriage is securely glued and bound with plastic balsa into a recess cut into its lower corner. $\frac{1}{8}$ in. riblets separate it from the main spar except at the outer ends and at the sides of the fuselage where $\frac{1}{4}$ in. is used.

Safety True Scale Engine Cowling.

The writer's final solution is based on rubber modellers' years old practice of using detachable nose-blocks carrying the airscrew shaft in a bearing. The transmission system to be described was arrived at after a great deal of practical experiment over many months, and the writer is now definitely satisfied that it is reliable, smooth in operation and definitely crash-proof.

Instead of the usual knock-off engine mount it was resolved to have a "knock-off" airscrew and shaft. The advantages of the detachable engine mount for purposes of maintenance and adjustment were to be retained by mounting the engine on a detachable bearer block, sliding into position *behind* the front bulkhead.

This position of the engine, apart from its comparative safety as compared with the forward position on a long exposed nose, keeps the weight further back, avoiding the necessity for moving the battery and other components a long distance behind the C.G.

Most successful attempts at using extension shafts on model 'planes, boats and race cars have involved the use of a heavy flywheel, and the writer felt from the outset that this must at all costs be avoided, as the additional dead weight in that position defeats the whole object of keeping the engine-weight far back and at the same time, using an indirect coupling as on Galleota's race car, entails the starting of the engine by cord instead of by the prop. The prop. is a perfectly efficient

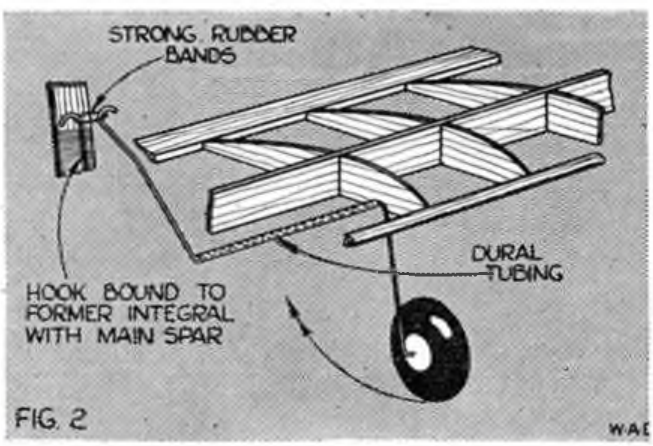


FIG. 2

Photo No. 5. Note centre-section dihedral.

Photo No. 6. Showing undercart shock-travel.

flywheel, but the coupling between it and the engine *must* be free from backlash, as during the compression stroke the prop. drives the engine instead of vice-versa, as in the firing stroke.

The object was to design a coupling which would allow the airscrew shaft to disengage in the event of a nose-over landing, or even a crash under power. If a flywheel were used, the latter accident would result in the engine (relieved of the prop.-load) screaming its heart out until the flight timer cut. Disengagement of the airscrew shaft without a flywheel results in the engine stopping dead and in actual fact this method *can* be used to stop the engine, at the same time giving a "free-wheeling prop.," either with or without cutting the ignition circuit. Unless done smartly, however, with a spring-loaded plunger for example, there is a tendency to "chew up" the edges of the engaging dogs and slots. It is best done a fraction of a second *after* cutting the ignition circuit.

It is obvious that any tendency for the airscrew extension shaft to disengage in other than a forward direction—i.e., straight in line with the crankshaft—would tend to distort the engine crankshaft or its bearing, and so it is arranged that the extension shaft runs in a bush firmly sunk into a light hardwood nose-block located in position by the usual square projection fitting as exactly as possible into a corresponding square cut in the front bulkhead. This nose-block when knocked off pivots at its circumference (usually at the bottom in a nose-over landing if the prop. fouls the ground or long grass) so that if the point of union of the coupling is arranged on or near the plane of the front bulkhead, the extension shaft is pulled forward off the crankshaft as nearly as possible in line with its axis for the first ½ in. or so. This is more than ample for our purpose (see photos 7, 8 and 9).

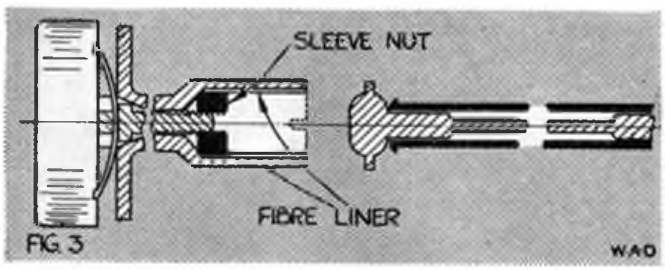
This coupling arrangement, after much experiment, has finally resolved itself into a steel cup or ferrule, enclosing a fibre liner, fitted to the crankshaft. The airscrew shaft has a driving head which is an exact sliding fit inside the fibre liner. A piece of 3/32 in. spring steel undercarriage rod is sweated through the driving head at right angles to the shaft's axis. The cup and fibre lining are slotted so that the pin in the driving head is an exact sliding fit into these slots which are ⅛ in. deep.

A word or two about the actual fitting of the coupling to the crankshaft and on the method of making, and case-hardening it, will probably be of interest. The writer is no sort of an engineer and assumes that most of his readers (if any) are not much more skilled than he is ! ! ! To those more skilled—well, the job is easy and they can "skip it"!

For the benefit of readers like the writer, however, it is hoped to defeat the editor's Blue Pencil by dealing with this fully next month.

The first thing to be remembered is that without the rearward thrust of the prop., there is now no longer forward end thrust on the crankshaft. Gas sealing of the crankcase (and of the crankshaft bearing also in engines such as Ohlssons with tapered shafts and ball-races) depends upon the maintenance of this forward end thrust, and some form of light spring-loaded thrust must be substituted, to keep the crankshaft pressed forward.

Using an Ohlsson 23 this is easily and simply accomplished by turning up a flat flange on the rear of the coupling with its rear surface well polished with fine emery cloth, and after filing small slots in the edge of the cup of the enclosed timer, inserting two bent pieces of watch or clock spring so that their convex surfaces press lightly forwards against the polished surface of the coupling's flange (see Fig. 3).



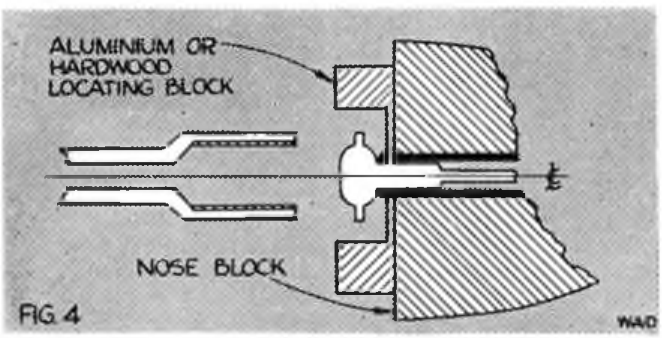
The ends of the springs are bent sharply round the lip of the timer cup to prevent their being dragged out of position by the friction of the revolving flange.

The coupling itself is first drilled ¼ in. or so that it is an exact sliding fit on to the smooth unthreaded portion of the crankshaft, and then the cup is counterbored to one or two "thou" under ½ in. The slots are now filed across the cup with a round file, taking great care that they are exactly opposite one another, to a depth of, say, ⅛ in.

The hole at the engine end must now be carefully filed : in the case of an Ohlsson, 4 slots at opposite sides are required as on the normal airscrew driving washer on these engines. In the case of a Cyclone it is probably better to leave the airscrew driving washer (which on a Cyclone is integral with the cam) and simply to drill 4 small holes in the flange to engage with the 4 spikes on the normal airscrew driving washer. However, whatever make of engine is used, the coupling must be adapted to fit exactly and *with no backlash* on to the driving dogs, flat surface on the shaft, square shaft or, as suggested above, to the original airscrew driving washer, of the particular engine.

The pins in the driving head *must* be left longer than the fibre, so as to be driven by the steel cup—the writer grinds them down to conform to the external diameter of the cup. Earlier attempts to use a fibre to steel driving slot proved quite hopeless. One good backfire and the steel pins just tore the fibre to pieces, even when enclosed in a steel ferrule !

Actually the writer has found no very great advantage in using a fibre liner for, with careful workmanship and accurate fitting, an all-steel drive is just as silent as a fibre-lined drive. The latter is certainly a little tricky to bore out centrally after having removed the coupling from the lathe for case-hardening.



A small nut, fitting the crankshaft, is now ground or filed down to a cylindrical sleeve which slides comfortably inside the driving cup (or fibre liner if used). Slots for a screwdriver are cut, filed or sawn across one end. The coupling is slipped on to the crankshaft, engaging at its rear end either with driving dogs on Ohlssons or the driving washer spikes on Cyclones, etc., etc. The sleeve nut is then inserted through the cup, threaded on to the end of the crankshaft and screwed up tight with a screwdriver of suitable width and the coupling is now, and should remain, securely attached to the crankshaft with no backlash. A spring or fibre washer between the sleeve nut and the bottom of the cup is advisable and prevents the sleeve nut working loose.

The writer is now so satisfied with this extension drive that if he can convince readers of its reliability, and how this system of safety mounting of engines and provision of knock-off (and freewheeling) airscrews *could* become standard practice, he hopes to see these couplings produced commercially in quantity to fit all better known makes of engine, so that they can be got at any petrol model stores as standard accessories by any petrol modeller not having access to a lathe.

Construction of nose-block and extension shaft (Fig. 4) and alignment and mounting of the engine will be dealt with in the next issue.

Photo No. 7. Note upturned extension to induction pipe for easy choking.

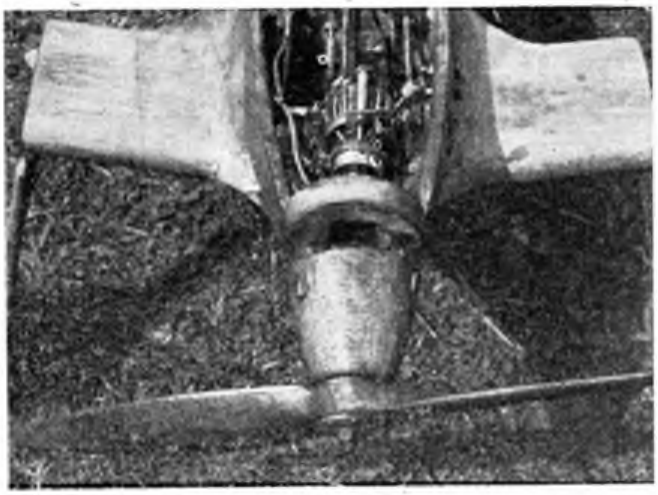


Photo No. 8. Close-up of "the works" Readers note that model in photo 4 is complete except for wing tips, undercart-fairing and paint.

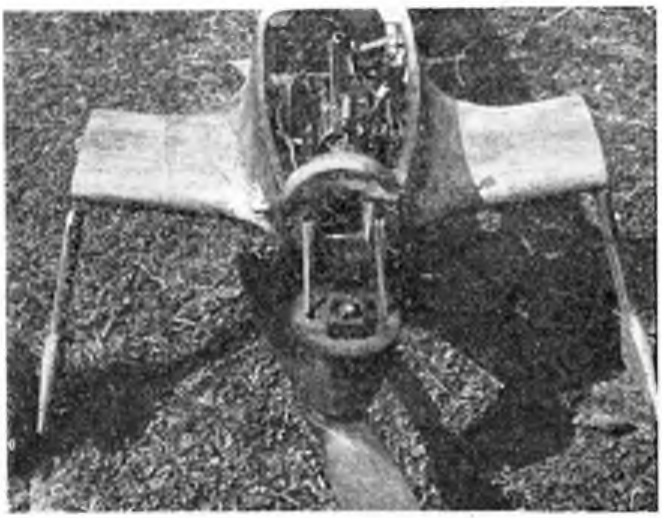


Photo No. 9. Knock-off nose-block showing coupling and driving head of air-screw shaft.

UNDERCARRIAGE

All photos by the author

Fig. 1. Bleriot XI—1909.

Fig. 2. Deperdussin Mono—1911.

COMPARE the complicated mass of steel tubing, wires and odds and ends of metal representing the undercarriage of the 1909 Bleriot type XI shown in Fig. 1 with the single strut leg of the Avro 636 in Fig. 15. These illustrations show both ends of the scale in the design of fixed landing gear as applied to landplanes.

The Bleriot XI, as will be seen in Fig. 1, employed a system of sliders and elastic shock cord braced with a maze of piano wire. Another and simpler example of this period is shown in Fig. 2—the 1911 Deperdussin monoplane, the undercarriage of which consisted, in brief, of two main skids to which the axle was securely bound with elastic cord (" Bunjee ").

The 1914–18 war period saw great strides in aeroplane design, but the front skid was still retained on certain training types, the most common example being the Avro 504. The skid type undercarriage was incorporated in all Avro 504 types, culminating with the 504K of 1917–18 (Fig. 3), and consisted of two simple steel tubular shock legs working in a telescopic fashion, utilising elastic cord for an absorber, the whole being encased in a light metal covering.

Fig. 3. Avro 504K—1917–18.

Fig. 4 shows an S.E.5A single-seater scout of 1918 fitted with a 200 h.p. Wolesley Viper engine. On this type, the axle was free to move up or down a slot in a built-up wooden leg and was bound with elastic shock cord to the junction of the rear legs and spreader bar, the latter being enclosed in neat streamline fairings. A variation in this method is shown in Fig. 5—the D.H.9—in which case wooden legs were also used, the axle being carried in a metal socket encasing the apex formed by the two legs. Shock cord was again used in this design.

Fig. 4. S.E.5A—1918.

After the war, the progress in undercarriage design was practically nil, the old shock cord designs being used on everything from the largest passenger-carrying aeroplane to the smallest light 'plane. In 1924 an interesting little low-wing, strut-braced, two-seater monoplane called the " Pixie " was built by the Parnall Aircraft Company to compete in the Light Aeroplane Competitions at Lympne. The undercarriage of the " Pixie " was simplicity itself, consisting of two rigid legs running right through the fuselage and anchored to both top and bottom longerons. This machine is shown in Fig. 6 and it is interesting to know that this identical machine, G-EBKM was still in service until it was unfortunately destroyed in a crash in Cornwall in 1939.

Fig. 5. D.H.9—1917.

1925 saw the birth of the first D.H.60 or " Moth," incorporating a departure in undercarriage design. The legs on this undercarriage contained rubber blocks interspaced by metal discs, the whole being subjected to compression by a piston which in turn was attached to the axle tube. The rubbers and discs were totally enclosed in a steel cylinder; two wire-braced steel tubular radius rods were used, giving the undercarriage quite a neat appearance (Fig. 7). Later versions of the " Moth " were fitted with Gipsy I, II and Gipsy Major engines, the Tiger Moth and Fox-Moth with an improved type of " split " undercarriage, in which the same type of shock legs was used but the wire bracing and continuous axle were done away with. This type, as adapted to a service D.H. Moth, metal version, is shown in Fig. 8. The split triangulated pattern employed on the Avro Avian Mk. IV (Fig. 9) was similar except that the shock legs were longer and were attached to fittings located on the top longerons, the legs being stabilised by two sets of radius rods.

Fig. 6. Parnall Pixie—1924.

Fig. 7. D.H.60, Moth—1925.

Fig. 8. D.H.60(G) Metal Version.

Fig. 9. Avro Avian, Mk. IV.

Fig. 10. Avro, 504N.

DESIGN

BY E. J. RIDING

Fig. 20. B.A.C. Drone.

Fig. 19. Arpin Pusher Mono.

The Avro 504N (Lynx) was used by the R.A.F. as a trainer to replace the Avro 504K and had an oleo undercarriage, the shock-absorbing qualities of which were extraordinarily good. The leg, consisting of a central cylinder depending on functioning of air and oil compressed by a piston to which the axle was attached and two auxiliary cylinders containing rubber blocks in compression, allowed a large amount of travel, the rebound being damped by a further set of rubber blocks.

The two legs were rigidly supported by a pair of Vee pylon struts cross-braced with streamlined wires and cross tubes (Fig. 10).

Another pattern at this time employed steel springs in compression. The Westland Widgeon with split type undercarriage and the Southern " Martlet " (Fig. 11) both utilised this design.

In 1931 the first production Hawker Harts went into service with the R.A.F. The undercarriage on this type was of the usual Vee pattern with a straight-through axle tube. Oleo-pneumatic shock legs were incorporated, consisting of oil and air under pressure working in conjunction with a form of piston to which the axle was attached. Fig. 12 shows a Hawker Hart of No. 610 (B) squadron.

Around 1933 the R.A.F. departed from its adherence to the non-split axle policy and the split type became universal. An example of the split axle oleo type undercarriage utilising two sets of radius rods is shown in Fig. 13—the Avro 621 Tutor, which replaced the 504N as initial trainer in the R.A.F. in 1933.

The fixed, faired undercarriage became popular about this period and consisting in the main of the usual oleo leg assembly complete with radius rods totally enclosed in a sheet metal leg fairing or " trouser." This pattern appeared on large bombers (Fairey Hendon), passenger aircraft (Spartan Cruiser III) and several light aircraft of Miles design. One of the latter, Miles Merlin, is shown in Fig. 14.

We now reach the peak of refinement in fixed undercarriage designs as incorporated in the now famous Gloster Gladiator single-seater fighter of 1936. On this machine, two purely cantilever legs, internally supported and without external bracing of any kind were fitted with internally sprung streamlined wheels, giving a very neat and tidy appearance. Another aeroplane to adopt this design was the little-known Avro 636, a two-seater fighter trainer of which only six were built and supplied to the Irish Free State Air Force in 1936. One of these machines is shown in Fig. 15.

From 1936 onwards the trend in undercarriage design became all " retractile." Oleo legs used either singly or in pairs retracted forwards (Avro Anson, Fig. 18), backwards (Fairey Battle, Fig. 16) or sideways and inwards (Hawker Hurricane, Fig. 17), into wings or engine nacelles by means of hydraulically or hand-operated mechanisms.

The tendency nowadays is towards the tricycle undercarriage, utilising a steerable nose wheel in conjunction with an orthodox undercarriage placed farther back than usual. Examples of this type can be found in the Douglas Boston and Havoc, the G.A.L. Owlet and Cygnet and the Bell Airacobra. An early example shown in Fig. 19 is the Arpin Pusher, which was a familiar sight at Hanworth before the war.

Finally, it is only fitting to mention a type of landing gear which employed no shock-absorbing medium whatsoever, relying merely on the cushioning effect of a pair of low pressure airwheels. This machine is shown in Fig. 20—the B.A.C. Drone of 1935.

Fig. 18. Avro 652A Anson.

Fig. 17. Hawker Hurricane.

Fig. 16. Fairey Battle.

Fig. 15. Avro 636.

Fig. 14. Miles Merlin.

Fig. 11. Southern Martlet—1929.

Fig. 12. Hawker Hart II.

Fig. 13. Avro 621 Tutor.

LOW SPEED DATA APPLIED TO MODEL DESIGN

BY A. H. SMITH

Scale effect.

Scale effect has been the subject of a number of articles in this magazine, and we know, mostly from experience in flying our models, that the airflow over our small model wings is vastly different to that over the wings of full-size aircraft which are designed from data obtained at conditions which apply to very high speeds.

It is known that airfoil characteristics vary with change in the Reynolds Number, or ratio of speed of flight times chord of airfoil to the viscosity of the air in which it is moving, usually written $\frac{V l}{\nu}$, the International Standard being equal to 6,380 × Velocity, in ft. per sec. × Chord, in feet, at sea level.

Many airfoil characteristics, notably those from the American N.A.C.A. V.D.T. tests, are presented at a Reynolds Number of 3,000,000, whereas the R.N. for a model wing of 4 in. chord at 18 ft. per sec. would only be 38,280.

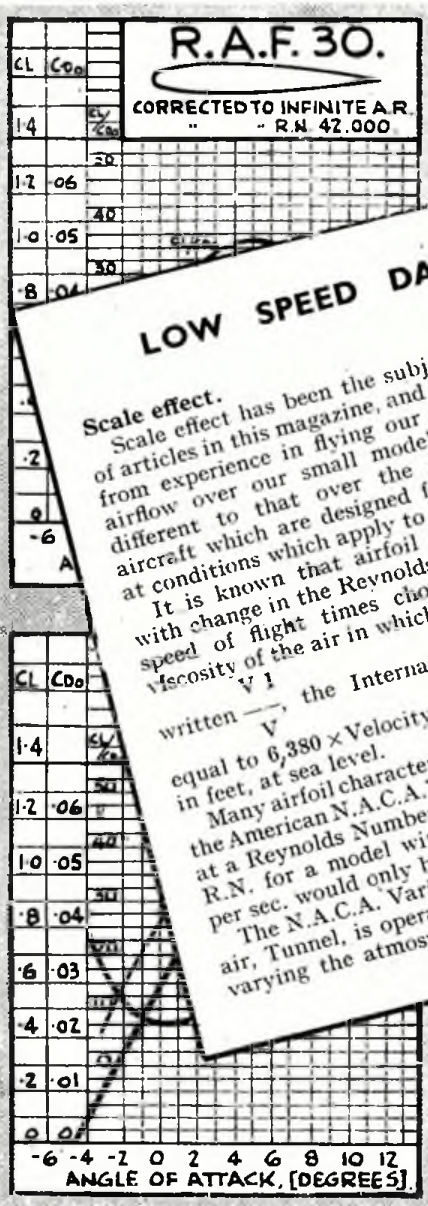
The N.A.C.A. Variable Density, or compressed air, Tunnel, is operated, as its name implies, by varying the atmospheric pressure in the tunnel from the normal 14·69 lbs. per sq. in. so that by keeping the airfoil chord and velocity of flow constant, conditions can be altered to correspond to a range of R.N. values.

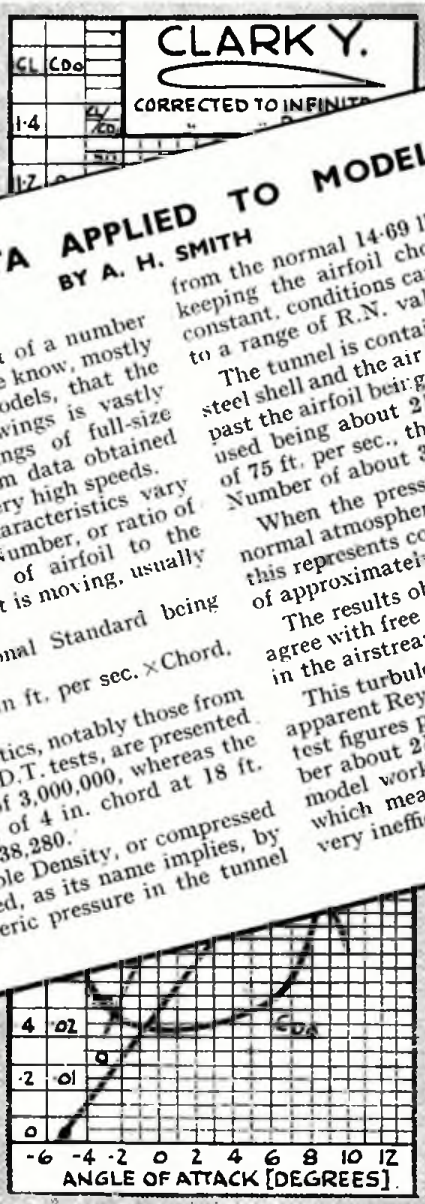
The tunnel is contained in an entirely enclosed steel shell and the air is drawn through the tunnel past the airfoil being tested, the greatest pressure used being about 21 atmospheres, at a velocity of 75 ft. per sec., this gives results at a Reynolds Number of about 3,000,000.

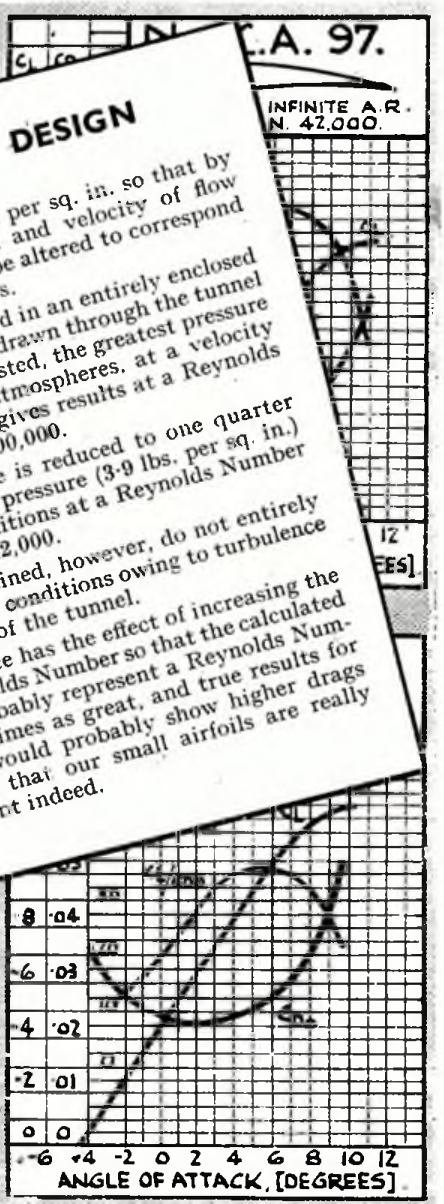
When the pressure is reduced to one quarter normal atmospheric pressure (3·9 lbs. per sq. in.) this represents conditions at a Reynolds Number of approximately 42,000.

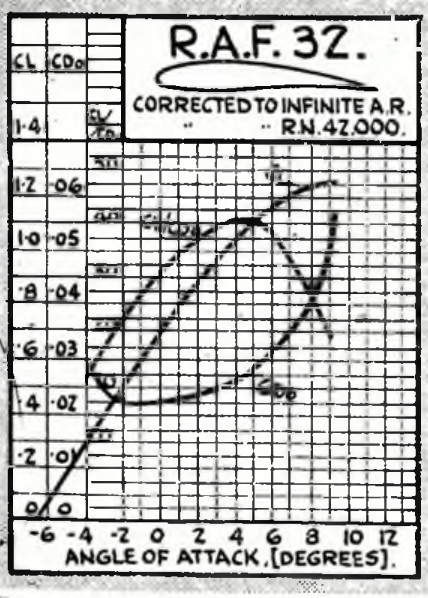
The results obtained, however, do not entirely agree with free air conditions owing to turbulence in the airstream of the tunnel.

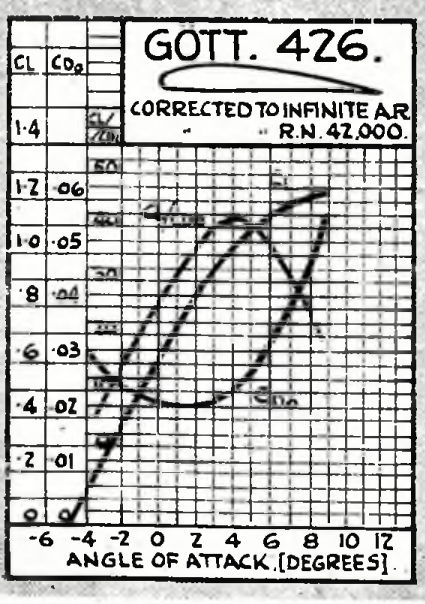
This turbulence has the effect of increasing the apparent Reynolds Number so that the calculated test figures probably represent a Reynolds Number about 2½ times as great, and true results for model work would probably show higher drags which means that our small airfoils are really very inefficient indeed.

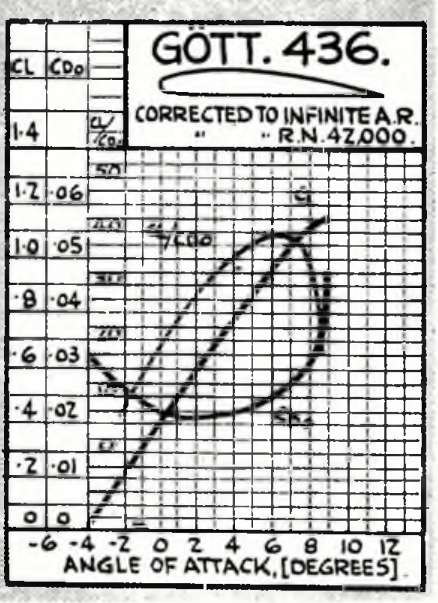


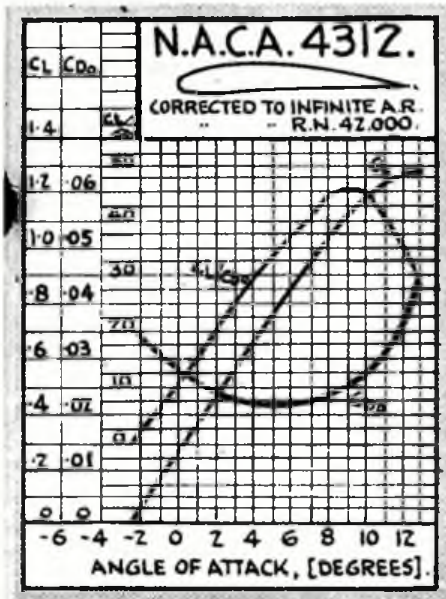


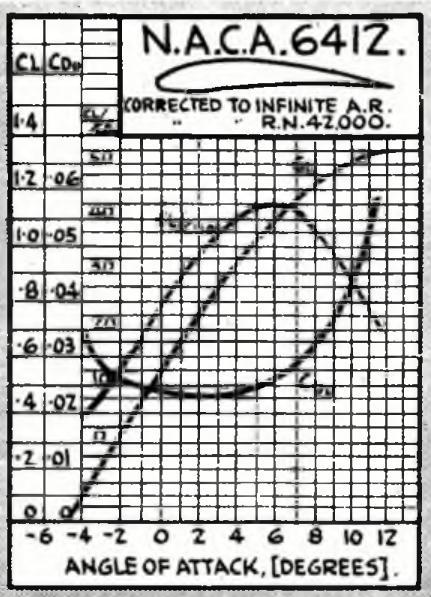


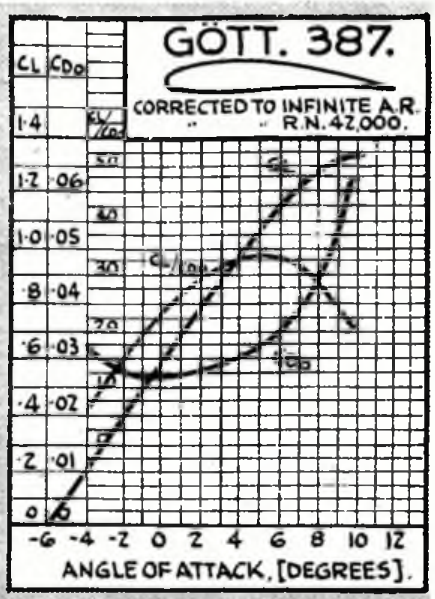


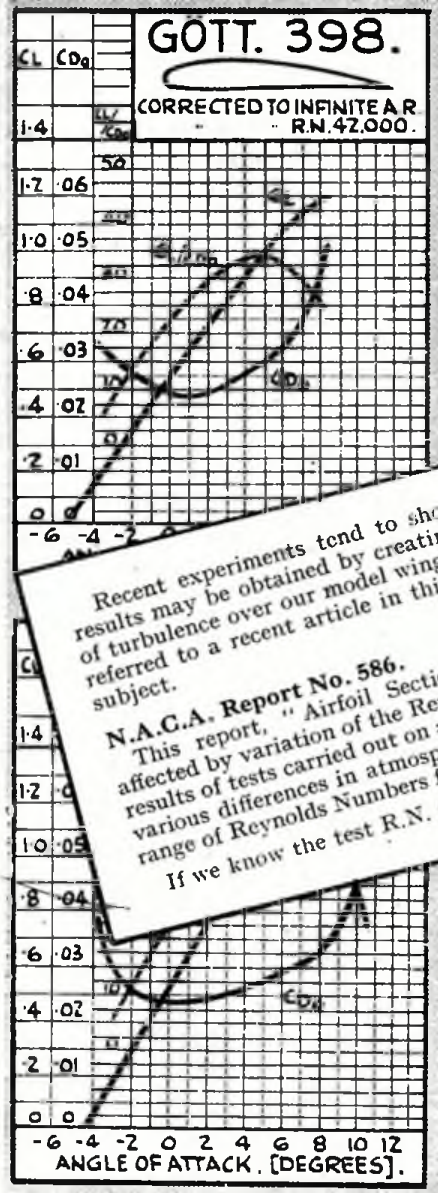


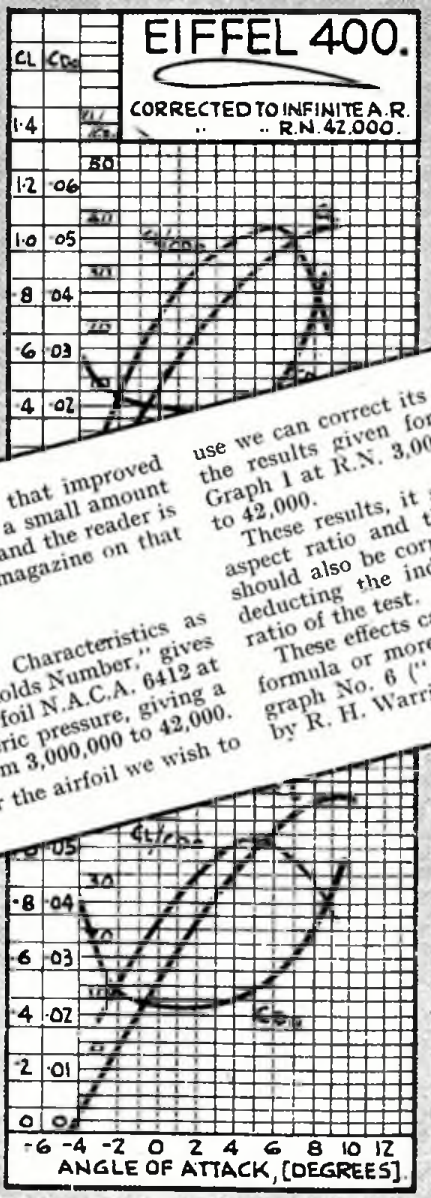


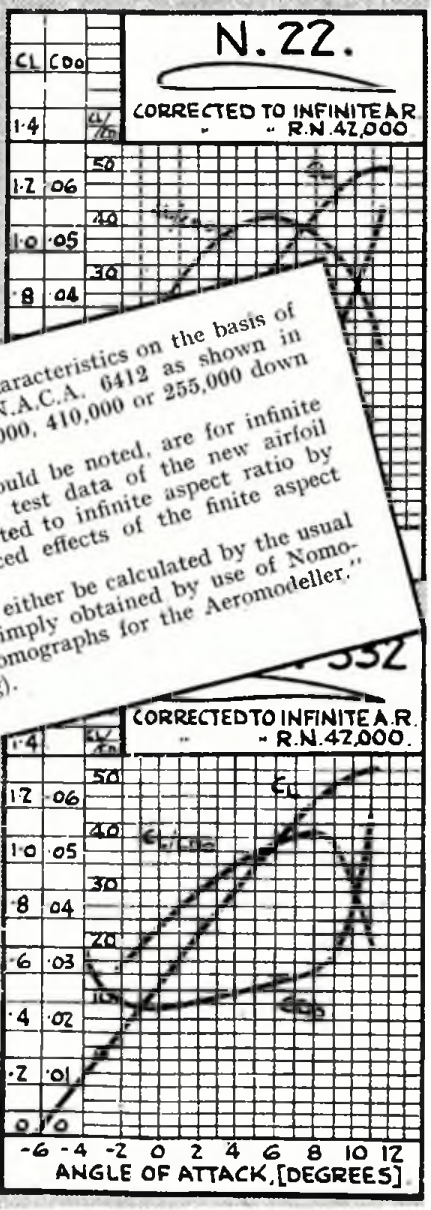












Recent experiments tend to show that improved results may be obtained by creating a small amount of turbulence over our model wings and the reader is referred to a recent article in this magazine on that subject.

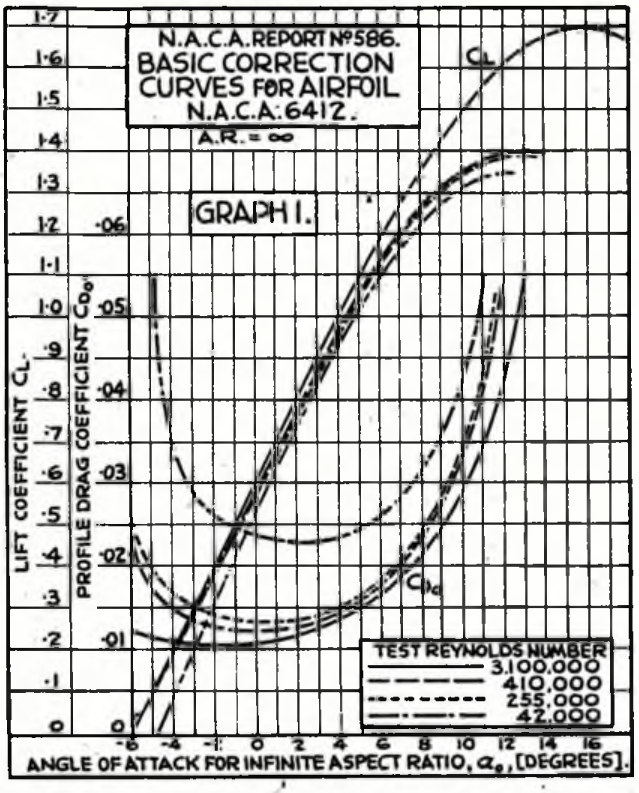
N.A.C.A. Report No. 586.

This report, "Airfoil Section Characteristics as affected by variation of the Reynolds Number," gives results of tests carried out on airfoil N.A.C.A. 6412 at various differences in atmospheric pressure, giving a range of Reynolds Numbers from 3,000,000 to 42,000.

If we know the test R.N. for the airfoil we wish to use we can correct its characteristics on the basis of the results given for N.A.C.A. 6412 as shown in Graph 1 at R.N. 3,000,000, 410,000 or 255,000 down to 42,000.

These results, it should be noted, are for infinite aspect ratio and the test data of the new airfoil should also be corrected to infinite aspect ratio by deducting the induced effects of the finite aspect ratio of the test.

These effects can either be calculated by the usual formula or more simply obtained by use of Nomograph No. 6 ("Nomographs for the Aeromodeller," by R. H. Warring).



The lift and profile drag coefficients, CL and CDO, should be plotted against the angle of attack for infinite aspect ratio and the curves very carefully "faired.".

Percentage corrections for CL max., angle of attack for CL max., slope of lift curve angle of attack for zero lift, and profile drag should be calculated and new curves of characteristics drawn for R.N. 42,000 on the basis of the results from Report No. 586.

CORRECTIONS FOR R.N. 42,000.

Referring to Graph 1 we find that CL max. reduces from a value of 1·7 at R.N. 3,000,000 to 1·35 at R.N. 42,000, a reduction of 20·6 per cent. The angle for CL max. is reduced 4 degrees, or 18·2 per cent. of the range from zero lift to stalling angle.

At ·7 CL max. the lift coefficient is reduced from 1·19 to 1·09, or 91·6 of the higher R.N. value. We also find that the angle for zero lift is moved from —6 degrees to —4·8 degrees or 5·5 per cent. of the range from zero lift to stalling angle.

Percentage corrections can also be taken at other fractions of CL max. and the new lift coefficient curve drawn in for R.N. 42,000. Differences in the profile drag coefficient are found at increments of CL equals - and the percentage increases above R.N. 3,000,000 calculated and added to the test CDO figures, *at the same CL value*, for the new airfoil.

The following table shows the increase in profile drag for airfoil N.A.C.A. 6412 at R.N. 42,000.

CL [R.N. 3,000,000	·4	·6	·7	·8	·9	1·0
R.N. 3,000,000 ..	·0100	·0105	·0110	·0115	·0126	·0137
R.N. 42,000 ..	·0259	·0235	·0230	·0230	·0231	·0235
% Increase ..	159	124	109	100	83·4	71·5

CL R.N. 3,000,000	1·1	1·2	1·3	1·4	1·5	
R.N. 3,000,000 ..	·0150	·0171	·0198	·0235	·0290	
R.N. 42,000 ..	·0245	·0263	·0295	·0350	·0400	
% Increase ..	63·3	53·8	49	49	38	

If the test R.N. of our new airfoil is, say 410,000, as in the case of the majority of the Göttingen series, then the corrections will be based on the difference between the results for N.A.C.A. 6412 at R.N. 410,000 and R.N. 42,000.

Characteristics for the R.A.F. series 30 to 33, given in R. & M. 928, are from tests at a Reynolds Number of approximately 255,000, and Graph 1 shows the V.D.T. results for N.A.C.A. 6412 at this value. The French Eiffel and St. Cyr series of airfoils have been tested at various Reynolds Numbers, and if Graph 1 does not give approximate curves then they should be interpolated and the appropriate corrections taken.

In this way we can prepare characterstic curves for any section giving figures at a Reynolds Number approaching that applicable to model speeds.

Corrected data for R.N. 42,000 is given, at the bottom of the page, for eight airfoils, and it will be noted that the optimum points for CL/CDO and CL 1·5/CDO occur very close to each other and at fairly high angles of attack.

As our data is for infinite aspect ratio we can add the extra wing drag due to induced effects for any finite aspect ration we wish to use *without any complicated calculations or use of formula.*

All we need is a copy of "Nomographs," the energy to do a few simple divisions, and we have data for finding the optimum angles for best glide and minimum sinking speed well inside ten minutes, since we only need con-

AIRFOIL CHARACTERISTICS AT R.N. 42,000.

GÖTTINGEN 398					GÖTTINGEN 426					GÖTTINGEN 436					GÖTTINGEN 532				
CL	Ao	CDO	CL/CDO	CL1·5/CDO	CL	Ao	CDO	CL/CDO	CL1·5/CDO	CL	Ao	CDO	CL/CDO	CL1·5/CDO	CL	Ao	CDO	CL/CDO	CL1·5/CDO
0	—5·4	·0363	—	—	0	—5·0	·0390	—	—	·0	—4·2	·0304	—	—	0	—6·3	·0862	—	—
·1	—4·4	·0341	—	—	·1	—4·3	·0346	—	—	·1	—3·2	·0290	—	—	·1	—5·0	·0450	—	—
·2	—3·4	·0320	6·3	—	·2	—3·6	·0313	6·4	—	·2	—2·1	·0278	7·2	—	·2	—4·0	·0356	5·6	—
·3	—2·4	·0290	10·3	—	·3	—2·8	·0282	10·6	—	·3	—1·2	·0250	12·0	—	·3	—3·0	·0270	11·1	—
·4	—1·3	·0268	14·8	9·6	·4	—2·0	·0261	15·3	9·7	·4	—·5	·0227	17·5	11·1	·4	—1·8	·0243	16·5	10·4
·5	—·3	·0247	20·2	14·3	·5	—1·2	·0244	20·5	14·5	·5	+1·0	·0208	24·0	17·0	·5	—·6	·0240	20·8	14·7
·6	+·7	·0239	25·1	19·4	·6	—·4	·0234	25·7	19·8	·6	2·0	·0205	29·3	22·6	·6	+·5	·0241	24·8	19·2
·7	1·8	·0242	28·9	24·2	·7	+·5	·0225	31·1	26·0	·7	3·0	·0208	33·7	28·2	·7	1·6	·0244	28·7	24·1
·8	2·8	·0250	32·0	28·7	·8	1·4	·0220	36·4	32·5	·8	4·1	·0217	36·9	33·0	·8	2·8	·0254	31·5	28·2
·9	3·8	·0275	32·7	31·0	·9	2·5	·0221	40·6	38·6	·9	5·1	·0230	39·2	37·0	·9	4·0	·0264	34·1	32·3
1·0	5·0	·0300	33·3	33·3	1·0	3·6	·0238	42·0	42·0	1·0	6·3	·0253	39·5	39·5	1·0	5·1	·0272	36·8	36·8
1·05	5·6	·0318	33·0	33·9	1·05	4·2	·0255	41·1	42·4	1·05	7·0	·0270	39·0	39·8	1·05	5·6	·0277	38·0	38·9
1·1	6·4	·0346	31·8	33·4	1·1	5·0	·0282	39·0	41·0	1·1	7·6	·0288	38·2	40·2	1·1	6·2	·0281	39·2	41·1
1·15	7·2	·0380	30·3	32·5	1·15	5·8	·0322	35·7	38·3	1·15	8·8	·0345	33·2	35·8	1·15	6·8	·0289	39·8	42·8
1·2	8·6	·0500	24·0	26·2	1·2	7·1	·0400	30·0	32·9	1·16	9·0	·0567	20·4	22·1	1·2	7·4	·0205	40·7	44·6
					1·235	9·0	·0615	20·1	22·4						1·25	8·0	·0305	41·0	46·0
															1·3	9·0	·0366	38·8	44·2
															1·35	11·3	·0650	20·8	24·1

sider sufficient values to show where the optimum points will occur for our particular design.

Application to Model design.

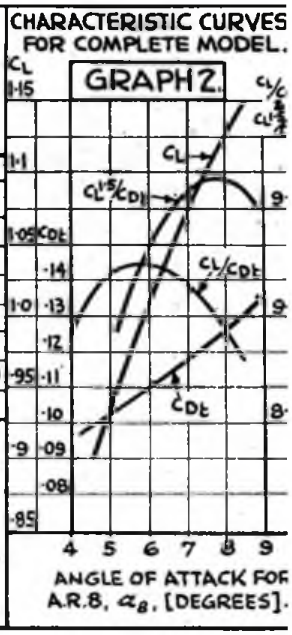
Graph 2 shows the characteristic curves for a complete model to Wakefield specification plotted from the figures in the table accompanying the graph. As the data for the airfoil Gottingen 426 at infinite aspect ration shows C_L/C_{Do} max. at C_L equals 1·0., we can set our table out for say three values of C_L equals ·05 above and below this value. Notes showing how the various figures are obtained for each column are given under the table, simple additions for columns 4 and 7 and simple divisions for columns 8, 9 and 11, are all the calculations necessary, the remaining figures being obtained either from the airfoil data or from the various Nomographs indicated.

DESIGN DATA FOR WAKEFIELD MODEL.

WING AREA... 210 SQ.INS. • ASPECT RATIO... 8.
AVERAGE CHORD OF WING ... 4·66 INS.
WING SECTION... GÖTTINGEN 426.
WEIGHT... 8 OZS.
ESTIMATED PARASITE DRAG COEF. C_{Dp}...·045

1	2	3	4	5	6	7	8	9	10	11	12
C_L	a_o	a_i	a_s	C_{Do}	C_{Di}	C_{Dt}	C_L/C_{Dt}	$C_L^{1.5}/C_{Dt}$	V. Ft/Sec	Vs. Ft/Sec	R.N.
·85	2·0	1·94	3·94	·0220	·0288	·0958	8·87	8·18			
·90	2·5	2·05	4·55	·0221	·0322	·0993	9·06	8·6			
·95	3·0	2·2	5·2	·0226	·0360	·1036	9·17	8·94			
1·0	3·6	2·3	5·9	·0238	·0400	·1088	9·19	9·19	17·0	1·85	41,700
1·05	4·2	2·4	6·6	·0255	·0440	·1145	9·17	9·4			
1·1	5·0	2·5	7·5	·0282	·0482	·1214	9·06	9·51	16·2	1·79	39,500
1·15	5·8	2·63	8·43	·0322	·0530	·1302	8·83	9·47			

COLUMNS 1, 2 & 5 FROM CHARACTERISTIC CURVES AT R.N. 42,000.
COLUMN 3... INDUCED ANGLE FOR A.R.8 FROM NOMOGRAPH 6.
" 4... COL. 2 + COL. 3.
" 6... INDUCED DRAG COEF. FROM NOMOGRAPH 6.
" 7... COL. 5 + COL. 6 + ·045
" 10... VELOCITY, FT/SEC., FROM NOMOGRAPHS 3 & 3A.
" 11... SINKING SPEED, FT/SEC ... COL. 10 ÷ COL. 8.
" 12... REYNOLDS NUMBER OF WING FROM NOMOGRAPH 11.



The complete results for this model show that the angle of attack giving the flattest glide occurs at 5·9 degrees, and the angle for minimum sinking speed is 7·5 degrees. By rigging this particular model at an angle of attack of 6·7 degrees we compromise between the two optimum points of efficiency, and so give our airfoil a chance to react near conditions under which it can do its best work.

The following table will be found useful when computing column 9 :—

C_L ..	·8000	·8500	·9000	·9500	1·000	1·150	1·100	1·150
$C_L 1·5$ ..	·7155	·7836	·8537	·9260	1·000	1·078	1·154	1·233

C_L ..	1·200	1·250	1·300	1·350	1·400	1·450	1·500	
$C_L 1·5$ ..	1·315	1·400	1·482	1·567	1·657	1·746	1·837	

The data presented for R.N. 42,000 seems to indicate that fairly high angles of attack are essential for model work and, due to the high lift coefficient used, the average downwash behind the wing will also be fairly large, for the design given it is approximately 4·8 degrees, and tail settings should be adjusted to suit this effect.

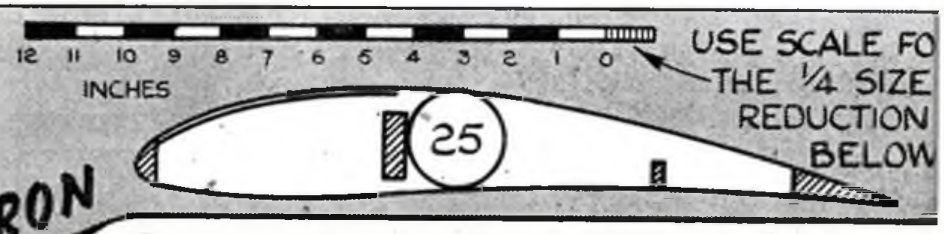
AIRFOIL CHARACTERISTICS AT R.N. 42,000.

R.A.F. 32					N.A.C.A. 4312					N.A.C.A. 6412					GOTTINGEN 387				
C_L	Ao	C_{Do}	C_L/C_{Do}	$C_L 1·5/C_{Do}$	C_L	Ao	C_{Do}	C_L/C_{Do}	$C_L 1·5/C_{Do}$	C_L	Ao	C_{Do}	C_L/C_{Do}	$C_L 1·5/C_{Do}$	C_L	Ao	C_{Do}	C_L/C_{Do}	$C_L 1·5/C_{Do}$
0	—6·6	—	—	—	0	—2·5	·0350	—	—	0	—4·8	·0550	—	—	0	—6·0	·0425	—	—
1	—5·7	·0435	—	—	·1	—1·5	·0313	—	—	·1	—4·0	·0352	—	—	·1	—5·0	·0364	—	—
2	—4·8	·0340	5·9	—	·2	—·6	·0283	7·1	—	·2	—3·0	·0287	7·0	—	·2	—4·0	·0319	6·3	—
3	—3·9	·0281	10·6	—	·3	+·3	·0264	11·4	—	·3	—2·2	·0265	11·3	—	·3	—3·0	·0290	10·3	—
4	—3·0	·0243	16·5	10·4	·4	1·3	·0250	16·0	10·0	·4	—1·4	·0249	16·1	10·2	·4	—2·0	·0270	14·8	9·4
5	—2·1	·0220	22·7	16·0	·5	2·1	·0238	21·0	14·8	·5	—·6	·0240	20·8	14·8	·5	—1·0	·0262	19·1	13·5
6	—1·0	·0221	27·1	21·0	·6	3·0	·0230	26·1	20·0	·6	+·5	·0231	26·0	20·0	·6	0	·0263	22·8	17·7
7	0	·0225	31·1	26·1	·7	4·1	·0224	31·2	26·2	·7	1·4	·0230	30·4	25·5	·7	+1·0	·0269	26·0	21·8
8	+1·0	·0230	34·8	31·1	·8	5·1	·0221	36·2	32·4	·8	2·6	·0230	34·8	31·1	·8	1·9	·0276	28·9	26·0
9	2·0	·0238	37·8	36·0	·9	6·4	·0224	38·7	38·0	·9	3·6	·0232	38·7	36·9	·9	2·9	·0285	31·6	30·0
1·0	3·4	·0249	40·2	40·2	1·0	7·5	·0230	42·5	42·5	1·0	4·8	·0241	41·5	41·5	1·0	4·1	·0300	33·3	33·3
1·05	4·0	·0257	41·0	42·0	1·05	8·0	·0237	44·4	45·5	1·05	5·6	·0250	42·0	43·3	1·05	4·7	·0310	33·9	34·8
1·1	4·7	·0270	40·7	42·8	1·1	8·6	·0244	45·1	47·4	1·1	6·1	·0260	42·3	44·5	1·1	5·4	·0325	33·0	35·6
1·15	5·2	·0295	39·1	41·8	1·15	9·4	·0258	44·6	47·2	1·15	6·8	·0278	41·4	43·8	1·15	6·1	·0344	33·4	35·6
1·2	6·8	·0345	34·8	38·0	1·2	10·3	·0270	44·3	48·7	1·2	7·6	·0300	40·0	43·0	1·2	6·8	·0372	32·3	35·4
1·25	8·6	·0420	29·8	33·5	1·25	11·2	·0312	40·0	45·0	1·25	8·6	·0340	36·8	41·3	1·25	7·5	·0404	31·0	34·7
1·265	9·6	·0620	20·5	20·0	1·28	12·4	·0450	28·4	32·5	1·3	9·6	·0400	32·5	37·2	1·3	8·7	·0486	26·7	32·3
										1·35	12·0	·0670	20·0	23·5	1·33	10·0	·0670	19·8	23·0

ELMIRA I

BY

I. S. CAMERON



FULL SIZE ROOT RIB

FULL SIZE PLAN AVAILABLE FOR

3/6

Fuselage.

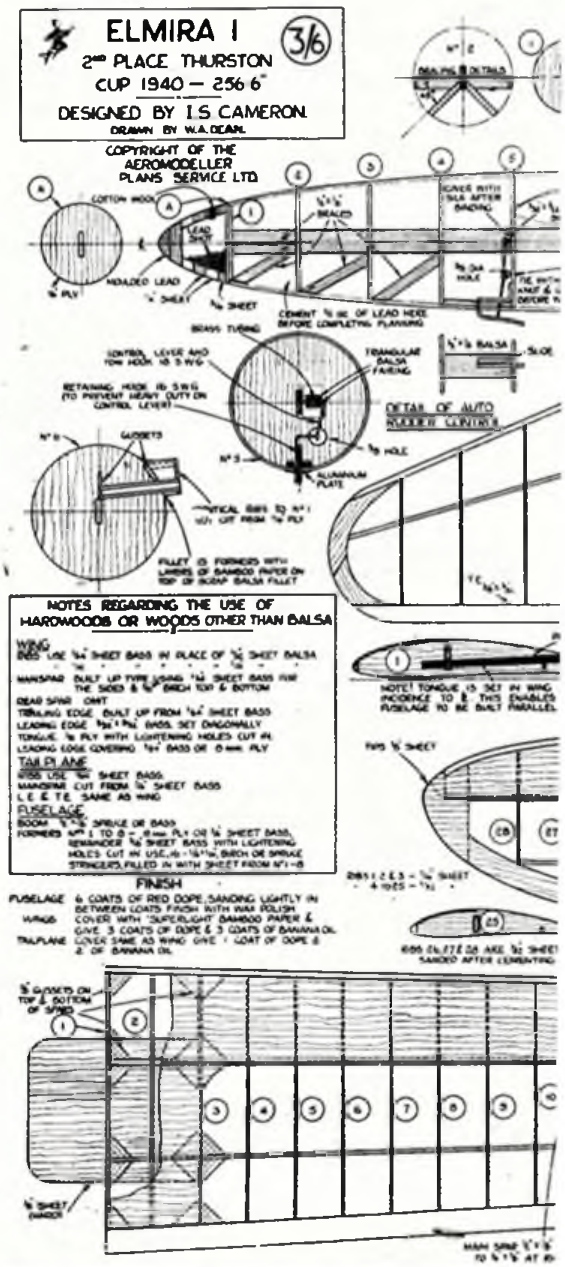
Cut the formers from 1/16 in. sheet, using a hard grade up to former No. 8. Nos. 6, 7 and 8 are laminated cross-grain. The centres of the formers are cut to receive a 1/2 in. by 1/8 in. balsa boom. Cut or drill the holes for the control cable. Mark the former positions on to the boom, which should be a hard grade, then glue them on to it. Note from the drawings that the box formers are cut into two separate pieces to accommodate the box itself. The box is constructed as shown, and cemented into position carefully, the top part of the formers are then glued on top of it. The gussets are glued in place at this stage. The horizontal brace " D " is slotted on to the boom and glued in place, former No. 15 is slotted into this and glued. The triangular braces are glued in place now. The rudder control mechanism is now made and assembled into place, taking care to make a firm job. Attach the control cable and thread through the holes in the formers.

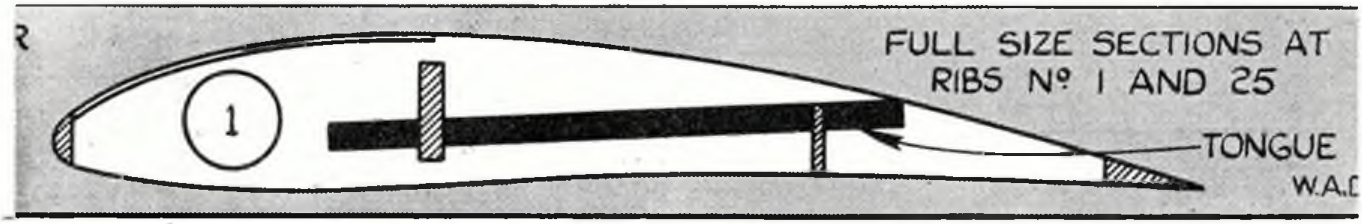
The fin and rudder are made next and the wire lever fastened to the base of the 1/8 in. diameter rudder dowel. The control cable is secured to the left side (looking from the rear) and the band secured to the other side. Fix a 22 S.W.G. hook at a convenient distance, to give the band a certain amount of tension, into the brace, and fasten the other end of the band over it. Glue two small balsa cubes into place so as to restrict the amount of rudder movement to the amount shown.

Before planking is begun, test the control so as to ensure perfect working order. Make the shells for the fuselage rear and glue into place. Using soft balsa plank with strips of 3/8 in. wide, glue in place alternately to prevent distortion, using a water glue. Plenty of small pins and elastic bands will help here. Cut the extreme nose laminations and taking the centres out glue in place, allow a little oversize and sand down when dry, together with the whole fuselage, taking care to prevent any excessive local sanding, as sagging will occur. The boxes will be extending outside the fuselage contour 1/2 in. No. 1 rib is made and slotted on to the end of the box and glued flush. The space between is filled in with scrap.

Wings.

Cut rib No. 1 and 22 from thin metal and drill a few fine holes in them for the pins. Sandwich the correct number of balsa rectangles between them; push pins through and cut and sand down. Repeat this for the other wing. Mark the spar positions before separating as much greater accuracy is ensured than marking the positions individually. Separate now and cut out the slots to receive the spars. Cut out the tongue from very hard 1/8 in. sheet and cut out the slot in ribs 1, 2 and 3 to accommodate it. Care should be taken that these ribs are absolutely accurate. Pare off a 1/32 in. wide strip from the front of each rib, on top, to locate the sheet L.E. covering. Thread the ribs on to the main spar, cement in the correct positions and when dry add the auxiliary spar. Ribs Nos. 23 to 28 are glued in place as rectangles and are sanded

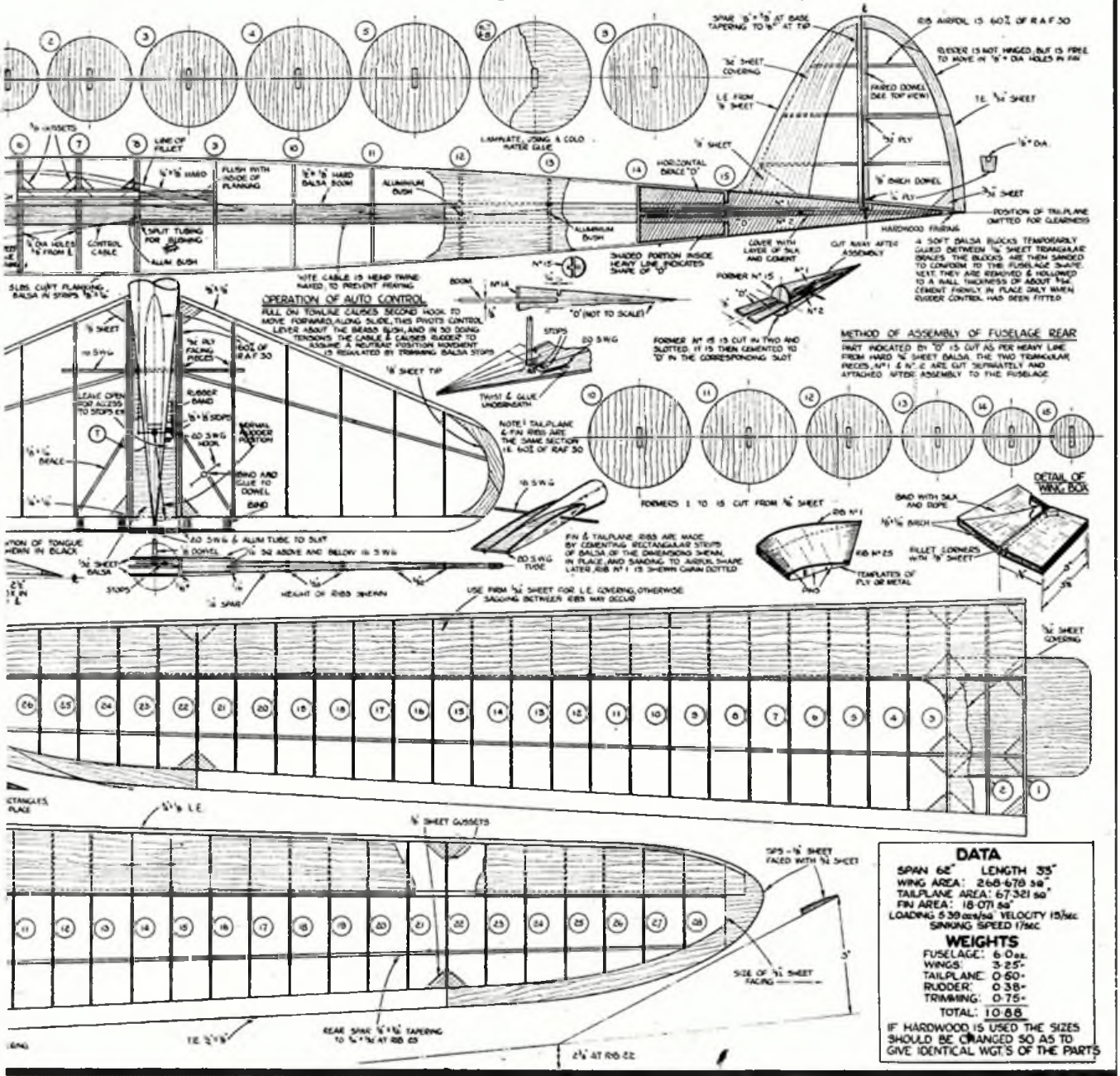




to shape. later Attach the L.E. and T.E., sand the L.E. to shape, glue in the gussets around the tongue at the top and bottom of the spars. Crack the spars at rib. No. 22 and raise the tips 3 in., gluing well and gusseting (before adding the L.E. 1/32 in. sheet covering.) Then glue the 1/32 in. sheeting on to each rib, doing about 6 in. at a time, and pin, removing the pins when the glue has dried. Remove from the plan and sand down the six rectangles. Repeat for the other panel. Before covering re-cement all the joints, using plenty of cement around the tongue and gussets.

Tailplane.

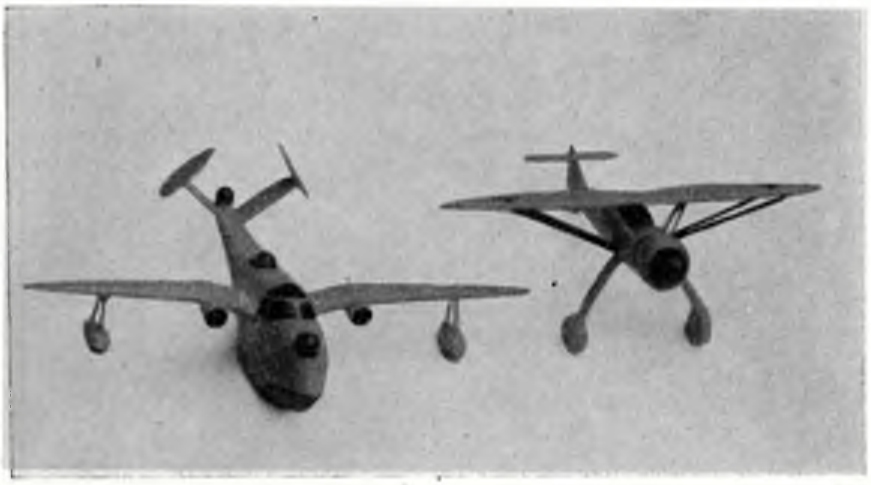
This unit is made in two halves and is connected to the fuselage by means of the wire-tube method. Pin the leading and trailing edges on to the plan. Cut the rectangles for the ribs from the sizes given on the plan and cut the slots for the spar. Enter the spar into the slots, pin down on to the plan and cement all the joints. Cut out the tips and cement into place, then add the gussets and the braces. Drill the holes in ribs 1 and 2 for the steel wire and bush on each side. Sand the rectangles to the correct airfoil shape.



MONTHLY MEMORANDA

No. 12 of series.

By O. G. THETFORD



Two "Oddentification" models, the Martin "Mariner" and the Henschel Hs 126, built by D. S. Larner of Twickenham.

THE general colour scheme adopted by the U.S. Navy Department for heavier-than-air machines prior to March, 1941, was grey and silver with yellow ochre upper wings and upper tail surfaces. All fabric-covered parts of the aircraft other than the top of the upper wing and the upper surface of the horizontal tail surfaces were painted silver. Metal-covered portions were painted light grey. This colour scheme applied to tactical (operational) aeroplanes only; training types were chrome yellow all over.

The old-type national insignia, i.e., five-pointed white star on a blue background with a red centre, was painted above the upper wings and beneath the lower but not on the fuselage. It was a rule that all insignia should be painted inboard from the wing tip a distance equal to the chord of the wing and should not overlap any movable surfaces such as ailerons or slots. Navy aeroplanes carried no markings on the tail assembly but Marines aircraft had vertical red, white and blue stripes on the rudder. The name of the service was painted in black on the rear fuselage and beneath the wings with the tops of the letters towards the leading edge.

Naval aeroplanes based on aircraft carriers were given special markings indicative of their particular carrier and these were painted on the machines in a special manner to distinguish section-leaders from other machines within the squadron, etc. Each carrier was assigned a particular colour and aeroplanes attached to these carriers had their tail surfaces repainted this special colour. USS Langley was red; USS Saratoga, white; USS Enterprise, blue; USS Yorktown, black; USS Ranger, green; and USS Lexington, yellow. Land-based machines had a longitudinal band of a distinctive colour painted across the fin and rudder and across the mid-point of each tailplane and elevator instead of having the entire tail assembly coloured.

A typical Navy squadron was comprised of eighteen aircraft, divided into six sections of three. All aeroplanes had the section-colour painted on the motor cowlings. Section-leaders also had a band in the section-colour encircling the fuselage amidships. A chevron in the section-colour was also painted above the centre-section of the upper wing. Section colours were the same in each squadron and were as follows:—1st Section—red; 2nd Section—white; 3rd Section—true blue; 4th Section—black; 5th Section—willow green; and 6th Section—lemon yellow.

Section-leaders had their entire cowling ring painted in the section colour. The other two aeroplanes in the section had the upper half and the lower half of the cowlings painted in the section-colour respectively. Aeroplanes within a squadron were numbered from "1" to "18," "1" being the leader of the 1st Section. White leader was No. 4; true blue leader No. 7; black leader No. 10; willow green leader No. 13; and lemon yellow leader No. 16. Machines with numbers—3, 6, 9, 12, 15 and 18 had the lower half of the cowling coloured and Nos. 2, 5, 8, 11, 14 and 17 the upper half coloured. The individual number of an aircraft was preceded by the mission (purpose) letter and the squadron number. Thus Fighting Squadron Three had the marking "3–F" on the fuselage sides followed by the individual machine number. In the case of section-leader's machines with a 'midships band the mission letter was painted in white against this (except on the white and yellow—yellow sections which had the squadron letter in black). The individual machine-in-squadron number was painted above the centre-section between the arms of the chevron. Individual insignia were carried by all squadrons and were painted beneath the pilot's cockpit. Factory and designation markings were painted on the fin and rudder respectively. For a detailed explanation of this lettering and numbering system the reader is referred to the "Monthly Memoranda" in the May, 1942, issue of THE AERO-MODELLER.

With the exception of trainers, all Navy aeroplanes were painted light grey all over after March, 1941. The same insignia changes were carried out as was the case with the Army machines. The stars were added to the sides of the fuselage and only one was used on each wing; the upper port and lower starboard. Float-planes and flying-boats were camouflaged in grey and green with light grey undersurfaces. By the end of 1941 all operational aircraft were camouflaged in grey and green and light grey beneath.

In December, 1941, a new tail stripe was introduced. It consisted of thirteen alternate red and white horizontal bands on the rudder similar to the original Army marking but without the vertical blue stripe. This marking did not have a long life for it was abandoned in May, 1942, at the same time as the deletion of the red centre in the wing insignia. Flying-boats (patrol-bombers) carry the national insignia on the bows.

AEROPLANES DESCRIBED—I

BY H. J. COOPER

THE GRUMMAN TBF-1 AVENGER

Photo: Rudy Arnold.

The article this month constitutes a slight change from the previous series. Hitherto only aeroplanes which are playing an active part in the execution of the War, whether on operational or communicatory duties, have been described. Although many new types are being developed both by the Allies and the Axis (we can mention the Typhoon, the Bisley, the York, and on the other side, the Heinkel He 177, the Henschel Hs 129 and the Messerschmitt Me 210, and others), it is often impossible to obtain sufficient information to allow of accurate drawings being prepared—a point which, judging from letters we receive, many of our readers fail to appreciate !

The prior series was restricted to drawings which were not already available through the AERO-MODELLER *Plans Service, and because of lack of material it was necessary to explore the archives of British civilian or obsolete aircraft to allow the series to continue. The new series will include all types of aeroplanes which, while adhering to the 1/72nd scale, can be comfortably fitted on to a single page of* THE AERO-MODELLER, *and of which drawings are not already obtainable. The range will be extended to cover new and experimental machines, and also elderly types of military and civil aircraft which have been promoted to popularity by readers' requests.*

IN painful contrast to the lines of the newly-released De Havilland Mosquito, the Grumman Avenger, one of the newest U.S. airplanes about which some information is forthcoming, incorporates all the angular features of unmitigated ease-of-production plainness. A deformed crudity, efficaciously inartistic, but in large-scale production and already in service with the United States Navy. In the Midway battle Avengers successfully torpedoed several Japanese aircraft-carriers and transports.

The Avenger, or TBF-1, is a three-seat mid-wing torpedo-bomber, designed for operating from carriers, and ranks as the fastest aircraft in its class. A 22 in. torpedo is carried internally, which accounts for the deep forward section of the fuselage. Alternatively, a bomb load of 2,000 lbs. may be carried.

Power is supplied by a 1,600 h.p. Wright Double-Row Cyclone radial motor, and the Avenger is credited with a maximum speed of around 270 m.p.h. at 7,500 ft. and a range of 1,400 miles at an operating speed of 215 m.p.h. The ceiling is above 20,000 ft. The Avenger is a large aircraft, with an all-up weight of about 12,000 lbs. No authentic dimensions are available but they are approximately : span, 53 ft. 0 in., length, 37 ft., and have been regarded in the accompanying general arrangement drawing.

The armament of the Avenger appears to consist of a single fixed gun mounted on the starboard side of the motor cowling, a single movable gun in the " bubble " turret amidships, and a further movable gun underneath the fuselage firing aft.

Avengers with the U.S. Navy are camouflaged on the sides and upper surfaces with dark battleship grey, and underneath are light grey. The blue and white star markings are painted on each side of the fuselage, and usually above the port wing and below the starboard wing, but in some cases are painted above and below both wings.

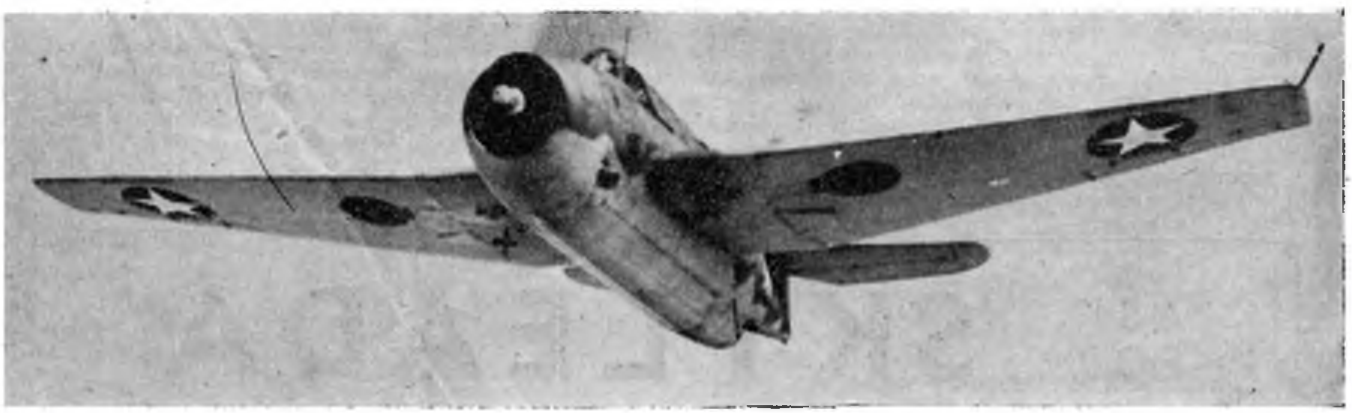
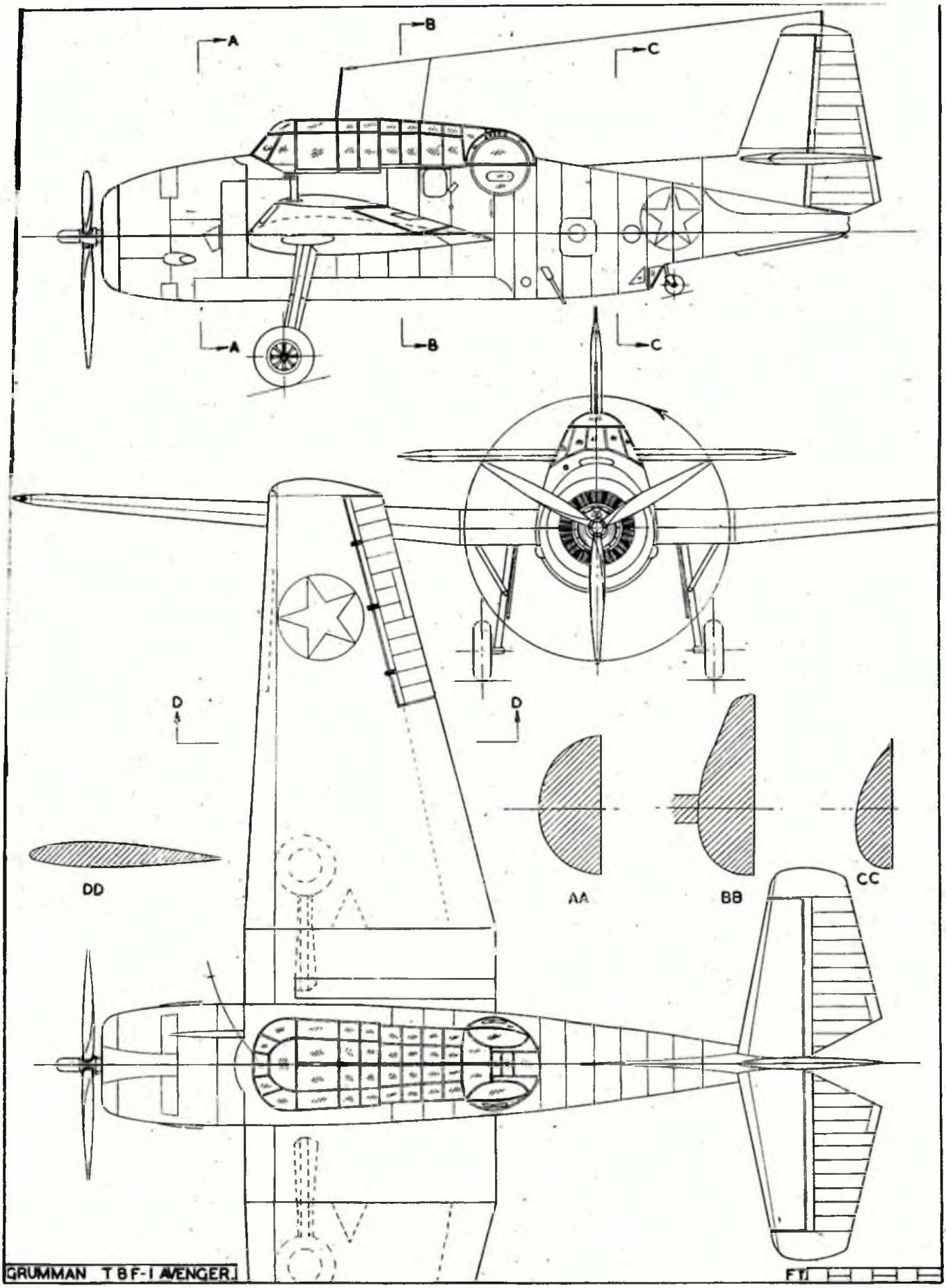


Photo: New York Times Photos.



Above : Flt./Lt. J. L. Bayliss has a busman's holiday !

Club News

By CLUBMAN

WELL, well, 1943 seems to be bringing a revolution in the aero-modelling world and no error ! ! I have already mentioned the "Wings for Victory" exhibitions, and now the S.M.A.E. have instituted a revised system of membership. This is the direct outcome of representations made by Rushy (sorry—the Editor !) who some months back formulated a new basis of future membership, and, following detailed consideration by the Council, this has now come into operation—or at any rate will do so after confirmation at the A.G.M.

Briefly, membership will now be available in three forms. The previous method of membership by association with an affiliated club still stands as the basis membership, with fees paid by the club at the rate of 1s. per head of paid membership. One new form of membership is the "Country Member," created to encourage those aero-modellers at present not belonging to a club owing to geographical or other reasons, with an annual fee of 7s. 6d. This type of membership carries voting power, and members compete in S.M.A.E. events at the usual entrance fee. (It is, of course, necessary for such intending competitors to make suitable arrangements with an affiliated club to time their entries, as only official timekeepers can conduct such events.) This, I am sure, will stimulate club memberships, as undoubtedly country members will find it to their advantage to obtain membership via a club, and everyone benefits.

Associate Membership is the other new type of membership, and aims mainly at catering for the many thousands of solid modellers all over the country. A fee of 1s. per annum will entitle members to compete for two new trophies on a National basis, and will, I am certain, bring about a general increase in aero-modelling generally, also fill a long-standing gap in the activities of the Society. The present conflict has brought about a big increase in solid model craft, and it is high time this phase of the hobby was brought under official recognition.

I am sure you will regret with me that Mr. J. C. Smith has had to relinquish his post of Competition Secretary to the S.M.A.E. owing to the call of other duties. For many years now he has carried out this difficult task, and earned for himself a reputation as a stout wielder of the microphone ! Who first called him "Silver Voice" ? Mr. H. J. Towner has been co-opted to carry on until the A.G.M., and I wish him success in what is by no means a sinecure of a job.

I regret to learn that R. W. M. (Ron) Mackenzie of the Blackheath M.F.C. met his death in a flying accident on active service on November 19th, 1942, due, it is understood, to a mid-air collision.

"Mac" joined the Blackheath M.F.C. at the age of 14, and until joining the Royal Air Force, was a most active and enthusiastic modeller.

Nine months after joining the Club, he pushed the junior Club record up from 45 sec. to 84 sec., that record standing for some time.

He also held five British records : the Seaplane R.O.W., 8 : 16·3 ; O.1. P.1. R.O.G., 1 : 54·4 ; Indoor Stick, 8 : 48·2 ; Indoor Helicopter H.L., 1 : 32 ; and Indoor Helicopter R.O.G., 1 : 38.

He represented the Club in many contests and was always to the fore in the final results. He was the winner of the Gutteridge Trophy, 1941.

His greatest achievement was at the N.H. Gala Day, 1939, when he carried off three 1st prizes, the duration contest, flying semi-scale contest and pusher-type contest, also earning the "Aero-modeller Cup" for the best performance of the day.

He was a versatile modeller as his record shows.

Educated at Roan and Dulwich Colleges, he entered the R.A.F. and went abroad for training as a pilot. All exams. passed with flying colours, he was promoted pilot officer, and selected for an advanced course as flying instructor. This he passed, and received American pilot wings. Thus he held both British and American pilot wings.

His death has robbed the modelling movement of a great stalwart, and a great friend of those who knew him.

Deepest sympathy is extended to his parents at their sad bereavement.

A R.A.F. reader in far away Gibraltar would be obliged if any of my readers would care to forward any old AERO-MODELLERS they have finished with. He and his co-enthusiasts would be very pleased to receive any copies sent along to 1144713 A.C.1. E. Tweedale, Band Quarters, 3, Chatham Cottages, New Camp, R.A.F., Gibraltar. Well, what about it chaps ? Turn out those old numbers that you know off by heart, and send 'em along as soon as you can.

Club reports are still noticeable by their absence, and I hope that we shall see a decided improvement in the near future. One thing to always keep in mind, of course, is the date by which said reports must reach these offices, namely the 20th of the month preceding publication. And please try and keep in mind the fact

that such reports are not printed until the 22nd of the next month, so don't give details of events that will be past history by the time you get your AERO-MODELLER!

S. Sutherland of the WALTHAMSTOW M.A.S. has raised the club R.T.P. figure to 1 : 55, while "Tunf Taylor" won the identification contest, getting 100 per cent. marks. The latest model to appear in this club is a 36 in. flying-boat bearing the cryptic message on its fuselage . . . "Will any diver finding this model please return . . ."

The STEWARTON M.A.C. have been conducting Recognition Bees, these proving very popular among the members. An innovation comes at the end of each session when the victims have their own back on the Question Master, and fire questions back at him! During a party held in December, the "Phillips Trophy" was handed over to the 1942 winner, John Howat, after which the crowd proceeded to play Murder!! I have recollections of playing that game once, when . . . (Tch, tch, none of your murky past here, please.—Ed.)

Another Scottish club still making good progress is the MOTHERWELL & D.M.A.C., who have been putting in plenty of time at R.T.P. work. Times are low at the moment, best time to date being 72 secs. but there's plenty of time to improve. Solid models are being manufactured and sold to raise club funds—an idea I can recommend to other clubs who likewise need to raise the wind. A number of individuals and groups are willing to purchase well built models, but it behoves the clubs to see that only worth-while articles are disseminated, otherwise the reputation of the aero-modellers goes down. Unfortunately, I have seen some really shocking examples of so-called aero-modelling put up for sale to the unknowing public, and that sort of thing doesn't do us any good.

S.M.A.E. WINTER PROGRAMME.

This will be run on the same lines as last season, the operative months being Feb., March & April. Rules as in the December 1941 issue of the S.M.A.E. Journal.

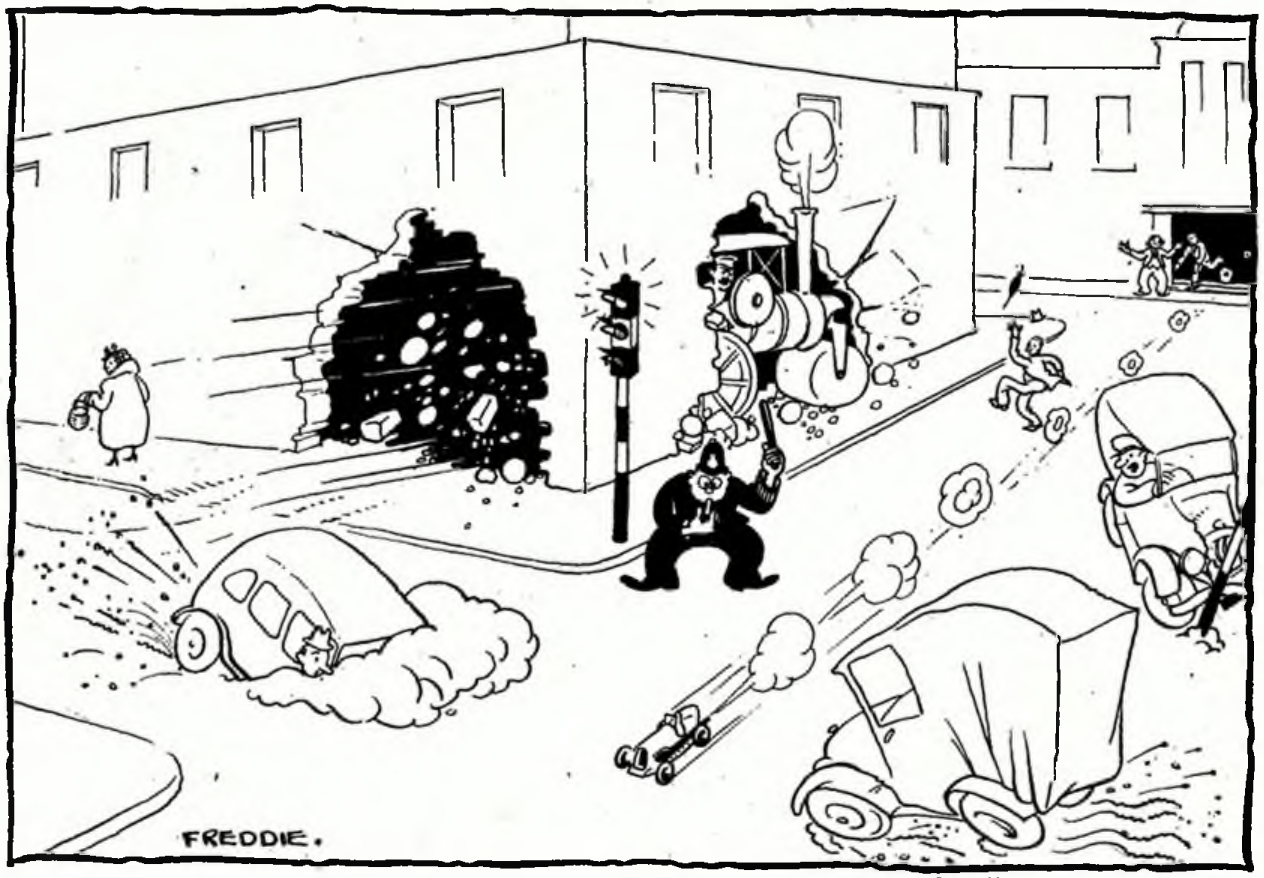
All enquiries and results should be forwarded to:

H. J. TOWNER, Esq.,
"Trencrom," King's Drive, Eastbourne.

The "Temple Development Contest" scheduled by the BLACKHEATH M.F.C. has had to be postponed indefinitely owing to continued bad weather, but intensive indoor activities are under way.

The WEST YORKSHIRE M.A.S. are another group going in for indoor flying, and anyone interested is invited to attend the indoor meetings held at the Victoria Street Boys' School, Wellington Road, Dewsbury, on Sundays, commencing at 2.30 p.m. An exhibition held in December resulted in over 100 models being on show.

The newly-formed CHESHUNT A.C. is to hold an open indoor meeting on the 21st February, with competitions for R.T.P. and solid scale models. Full details can be obtained from the secretary, A. H. Salmon, of 3, Hillview Gardens, Cheshunt.



"GEORGE! JUST DROP A LINE TO THE N.G.A."

Frank Davies, of the Leicester M.A.C., with a high performance Wakefield model of his own design. This chap has just about all the club records in his pocket, and has had an exceptional season.

The LEICESTER M.A.C. started the ball rolling for the forthcoming " Wings for Victory " shows by calling a general meeting of the neighbouring clubs, and it was agreed to pool all resources in an effort to make the most of the opportunity. Further meetings will be held periodically, and in this way a good show should result. They say that Unity is Strength, but certainly co-operation lessens the work by a heck of a lot! R.T.P. flying is popular in this club also, and F. Davies holds the record at the moment with 2 : 02.

A new Services club has been formed, known as the R.A.F. LYNHAM M.A.C., and the secretary, Sgt. Marshall, c/o Sergeants' Mess, R.A.F., Lynham, Wilts., would be pleased to hear from other clubs in the district with a view to organising competitions. Other Service clubs are asked to get in touch and exchange ideas. (If any reader has copies of the AERO-MODELLER for 1941 and 1942 for disposal, this group wish to purchase.)

The COCKERMOUTH M.A.C. is another new venture, and came into being owing to the enterprise of two enthusiastic youngsters, H. Bowman and S. Bell. To encourage the 20-30 members, a special contest was arranged, this being won by M. Sumpton, a lad of 15 who had never made models before! All communications should be made to the secretary, H. Bowman, 9, Main Street, Cockermouth.

The DOWNHAM & D.M.A.C. wish to contradict our infamous contributor, R. Jamieson, on the subject of the return to Auchengargle of the old maestro—Macgillicuddy. It is stated that this high (whew) personage arrived at the inauguration of the Downham club and, in spite of his insistence that he is called John Poston, gave himself away by stating that he used hydrogen in the tips of his model!! He actually made a flip of 49 secs. with an " Ajax " on a five-foot line, which incidentally is the club record. A sharp look-out has been kept for Drambuie, but there are so many seagulls that the conclusion has been reached that he has reverted to the wild, and dropped his kilt and tammie on some poor unsuspecting aero-modeller in another clime.

At an indoor meeting of the BIRMINGHAM M.A.C. in the early part of December the r.t.p. record was raised to 1 : 47 by R. Tyler, while E. Kendrick put up the untethered spar record to 38·5 r.o.g. News is given of a real hush-hush job by Secretary Hassall—a r.t.p. model weighing six ounces, which has done regular 10 minute flights!!!! Takes some believing doesn't it. We await more details with interest.

The old Prestatyn club has been renamed the RHYL & PRESTATYN M.F.C. and is now enjoying a period of successful activities. Construction of a wind tunnel has commenced, and it is hoped to stage a North Wales Rally next year.

S. McArdle, of 17, Prospect Avenue, High Farm, Wallsend-on-Tyne, wishes to correspond with other readers in any part of the country (15–17 years).

R. Horne, Meddins Lane, Kinver, Staffs., wishes to buy the June and November, 1940, and June, 1941, issues of the AERO-MODELLER; L. Walton, of 163, Burnage Lane, Manchester, 19, has the complete Vol. 7 to dispose of; J. Hobbs, of 55, Ashley Drive, Loughborough, wishes to obtain a copy of the February, 1942, issue; and E. Winter, 2, Bridge Terrace, Nether Compton, Near Sherborne, Dorset, has a 3·5 c.c. Greyson Gnome for sale, minus coil and condenser.

Chaps wishing to form clubs in their districts have written in, and I hope numbers of my readers will rally round and help to form yet more active groups of aero-modellers. Please get in touch with the following: B. Couch, 38, Tatton Road, South, Heaton Moor, Stockport; A. Robson, 522, Denton Road, Newcastle-on-Tyne.

And so, that's that again for this month, and I close wishing you the best of flying during the coming season, and no crashes! Trouble with crackups nowadays is the parting with hard won materials, but we'll just keep keeping on. Cheerio, chaps, and keep that rubber well sealed.

The CLUBMAN.

NEW CLUBS

COCKERMOUTH M.A.C.
H. Bowman, 9, Main Street, Cockermouth.

SECRETARIAL CHANGES

BRANDON COLLIERY M.A.C.
J. Smurthwaite, 17, Albert Street, Brandon Colliery, Co. Durham.

BRENTWOOD SCHOOL M.A.C.
D. E. Chandler, 35, Little Gaynes Lane, Upminster.

SOUTH BIRMINGHAM M.F.C.
R. H. Greaves, 47, Moorpark Road, Turves Green, Birmingham.

EDINBURGH M.F.C.
J. H. Young, 4, Delhaig, Gorgie.

S.M.A.E.

Minutes of the Extra-ordinary General Meeting, held at The Royal Aero Club on November 15th, 1942.

In the Chair :—Mr. A. F. Houlberg.

The Chairman opened the meeting by informing those present that negotiations had taken place between representatives of the Society and the National Savings Committee. The officials acting on behalf of the Society were Mr. A. G. Bell and himself. Pointing out to the meeting that the Hon. Sec. had been in attendance during further discussions he would invite Mr. A. G. Bell to give his report. The Secretary thereupon arose and gave a full report.

" Wings for Victory " Exhibitions.

He commenced by saying that the actions of Mr. A. F. Houlberg and himself had been endorsed by the Council. All support would be given by the Society, to a series of exhibitions covering the whole country under the title of " Wings for Victory," during the months of March, April, May and June, 1943. The country would be divided into twelve regions and the exhibitions will be held in the principal towns in each region. The three best models in each region would receive prizes, and the winner from each region would go into the final. From these twelve, the judges (S.M.A.E.) would declare the " Wings for Victory " winner. There would be a special prize for the National Winner. The question of supplies has been decided to the Council's satisfaction, and the Hon. Sec. coming to this part of the speech said that the Council realizing, that while every member would like to take part in the displays, there were members, some rather young who could not meet the cost of materials necessary for exhibition models, and to assist them the Council would, at its discretion, allow for re-imbursement to any such member of a sum not exceeding 10s. for each model accepted for exhibition. He went on " I have designed two boxes, one for flying models and one for solids of very strong construction and materials. These boxes will be used for the transport of all models, but those members wishing to use their own boxes will, of course, be able to do so." His final words were " these series of National Exhibitions offers the Society the golden opportunity to make the art of aero-modelling National Hobby No. 1. Here you have the chance to answer the insult levelled at us for too long, ' but these things are only toys.' North, south, east and west we can display our craftsmanship, its design and beauty in the best possible setting. If we fail to make the most of the advantages offered we shall have proved ourselves to be unworthy of being called a society of national standing."

Following the report Mr. D. A. Russell moved, seconded by Mr. R. Copland, " That the actions of the Chairman and Secretary be endorsed, and relative details be discussed by the Council."

This was carried.

Brochure.

The proposed terms for the Brochure were read by the Hon. Sec. and the debate resulted in the adoption of two new types of membership.

The adoption of the terms of the Brochure was moved by Mr. C. A. Rippon, seconded by Mr. Jackson (Edgware M.A.C.), and carried.

Fifty Guineas Gift.

At this point of the meeting Mr. D. A. Russell, of THE AEROMODELLER, offered 50 guineas to be used for prizes in the Solids Competitions. This generous offer was accepted by the Chairman on behalf of the Society, who expressed the pleasure of all present.

Competition Matters.

The Chairman informed the meeting that Mr. J. C. Smith, because of the call of other duties, would not be able to accept the office of Competition Secretary at the coming Annual General Meeting. Meanwhile Mr. Smith would carry on. The Society regrets the loss of an officer with many years of fine service with the S.M.A.E. to his credit.

Winter Programme.

The meeting voted in favour of a winter programme and elected Mr. H. J. Towner (Eastbourne) as a co-opted member of the Council to assist in this matter.

Club Membership.

Discussing ordinary membership (that is through the affiliated clubs), brought forward the following resolution moved by Mr. D. A. Russell, and seconded by Mr. A. G. Bell, " That all applications for affiliation and re-affiliation by all clubs shall require 1s. per member each club, with a £1. 1s. 0d. minimum : This was carried.

This overflow meeting came to an end at 2.20 p.m.

H. W. HILLS,
Hon. Press Secretary, S.M.A.E.

N.G.A. MEMBERSHIP FOR 1943

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TO BE SENT TO THE ADDRESS BELOW

Name (in full).....

Address.....

..... *Date*.....

*(a) Herewith 6d. for enrolment as rubber-driven and glider modellist.

*(b) Herewith 2/6 for enrolment as petrol-driven race car modellist.

*(c) Herewith.....pence for transfers at rate of *2 a 1d. (small) *1d. each (large).

Enclosed *P.O./Cheque No..... .....value.....
*Cross out items not applicable.

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To.....

.....

Please *reserve/deliver one copy of the "Aeromodeller" each month commencing with the March 1943 issue, to:

Name.....

Address.....

..... *Date*.....

Hon. Sec.: N.G.A., ALLEN HOUSE, NEWARKE STREET, LEICES

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Appendix - Links to the plans

Roamer by S. Collins
44 1/2" Rubber duration 1942 Gamage Cup Winner
Document Page: 12

Consistent by S. Bryett; W. Taylor
Gull Wing Sailplane with Slots
Document Page: 15

Two Lightweight Duration Models by M. Farthing
Fuselage in two versions (Stick and Diamond)
https://outerzone.co.uk/plan_details.asp?ID=10997 ...
Document Page: 16

Short Pobjoy Scion by Rupert Moore
42" Rubber scale 1" to 1ft twin (using Moore drive)
https://outerzone.co.uk/plan_details.asp?ID=9352 ...
Document Page: 19

Avro Manchester Silhouette Glider by W.J. Kay
Document Page: 24

Elmira I by I.S. Cameron
62" Glider
Document Page: 40

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