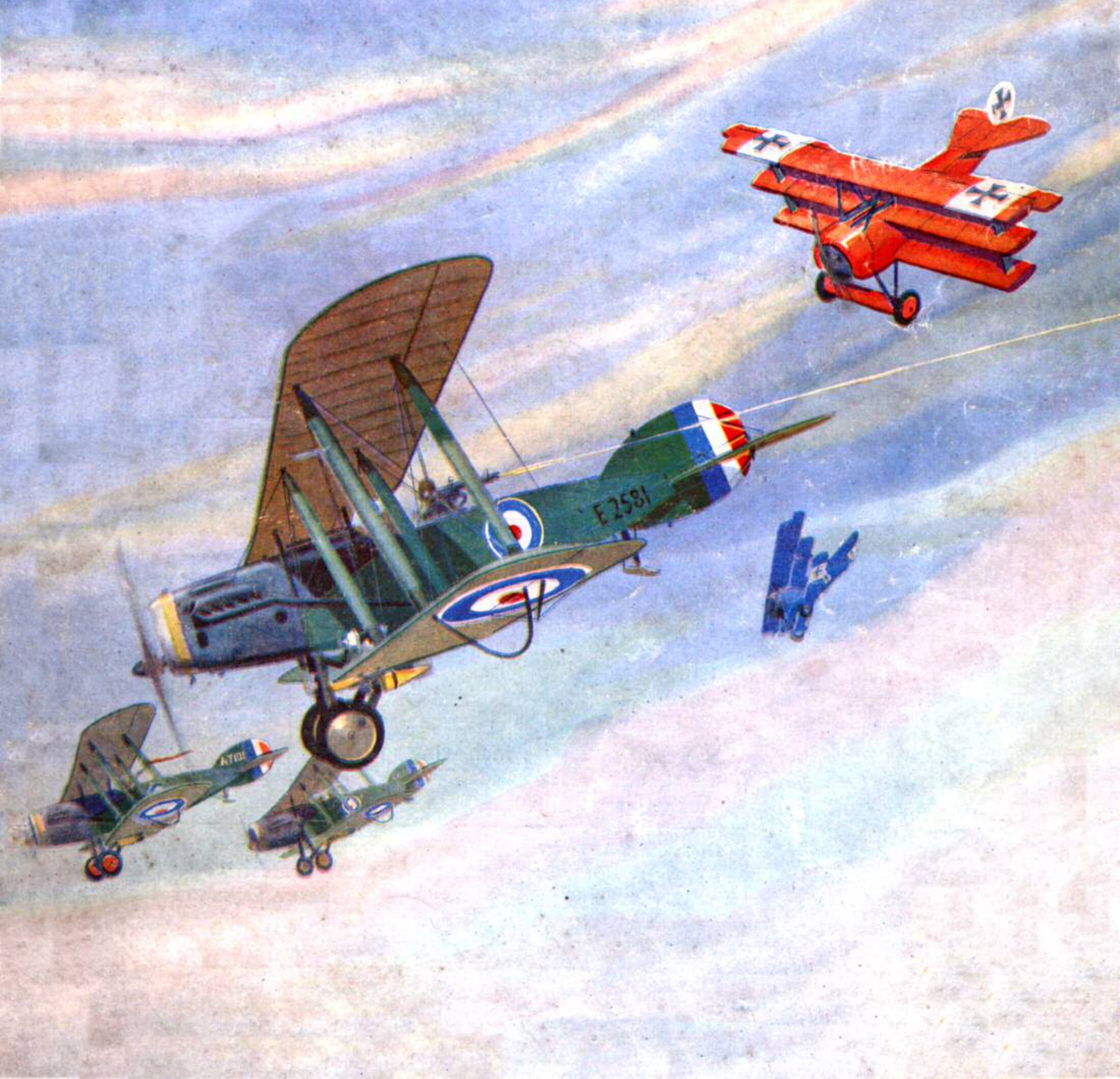
AERO MODELLER

NOV. - 1942
VOL. 7. No. 84
ONE SHILLING



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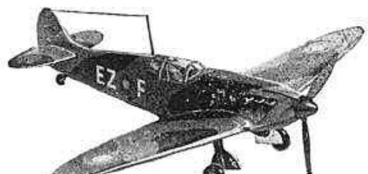
SCALE ¼ in.—1 ft.

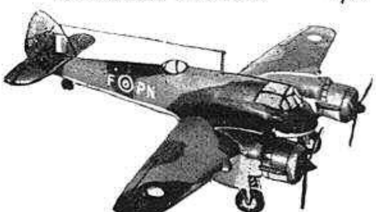
Kits contain all parts cut to shape, seats, cement, correct transfer insignia, three bottles of dope, sandpaper, fully detailed blue-print, and complete instructions.

DOUGLAS BOSTON 8/3



SUPERMARINE SPITFIRE. 5/3

WESTLAND WHIRLWIND 6/6

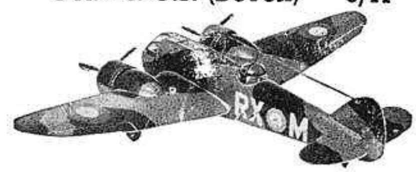


BEAUFIGHTER. 7/11

FOKKER G.1. (DUTCH) 8/11

MODELS NOT ILLUSTRATED

S.E.5	4/11
PFALZ D.12	4/11
MESSERSCHMITT B.F.109	4/11
MORANE SAULNIER 405	5/3
BRISTOL FIGHTER	5/3
HAWKER HURRICANE	5/3
D. H. DRAGONFLY	5/6
FAIREY BATTLE	5/6
BELL AIRACOBRA	6/3



BRISTOL BLENHEIM. 6/11

LOCKHEED P.38. 8/9

CURTISS P.37 6/3

MESSERSCHMITT M.E.110. 6/11

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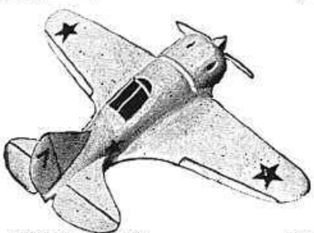
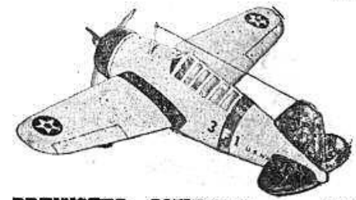
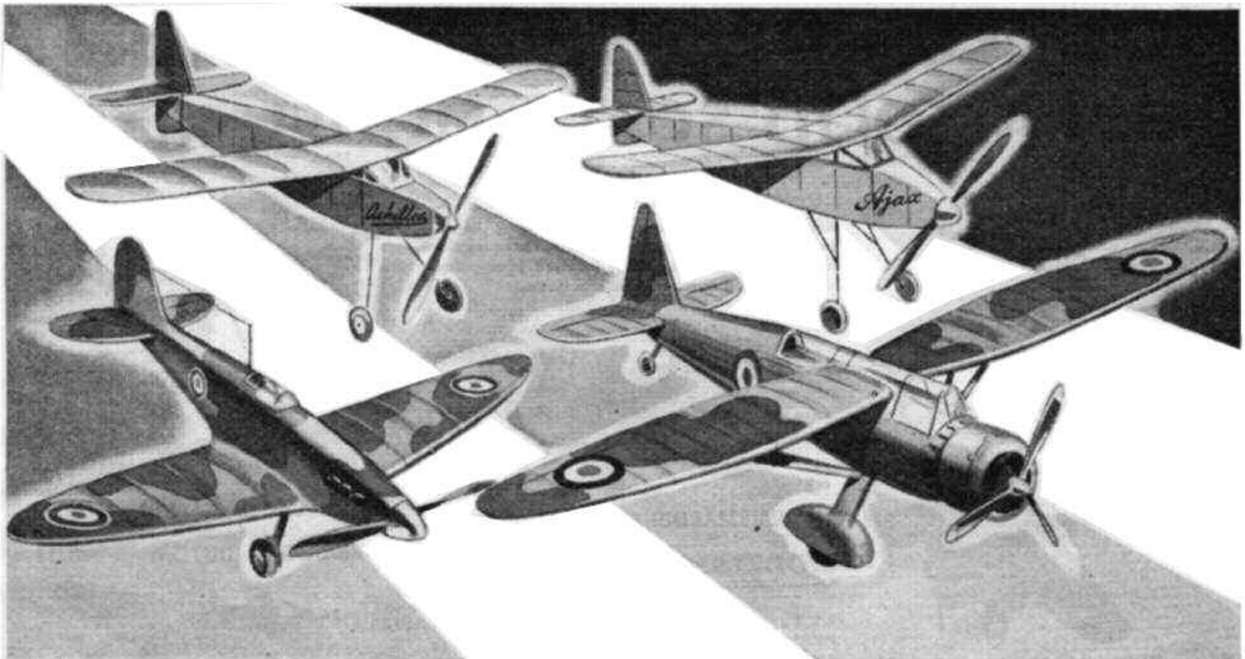


RATA 1—16 5/3



BREWSTER BUFFALO. 6/9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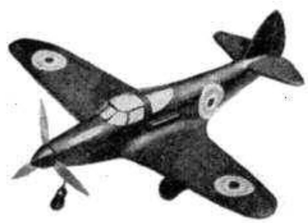
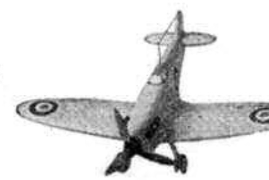
Wellington Price 3/4

Boulton Paul Defiant Price 1/10



Airacobra Price 1/10



Spitfire Price 1/10

Hawker Hurricane Price 1/10

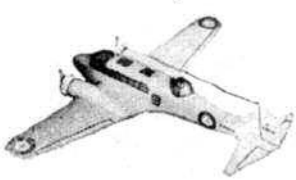
All KITS contain fuselage cut to outline shape, wings cut to shape, tail-plane, rudder, and where necessary nacelles printed on balsa, hardwood cowls and wheels, metal propellers, transfer insignia, cement. Also full-size detailed plan.

Messerschmitt 110 Price 2/5

Westland Lysander Price 2/5

Whirlwind Price 2/5

Blenheim Price 2/5



Avro Anson Price 2/5

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Tomahawk Price 1/10

Buffalo Price 1/10

Messerschmitt 109 Price 1/10

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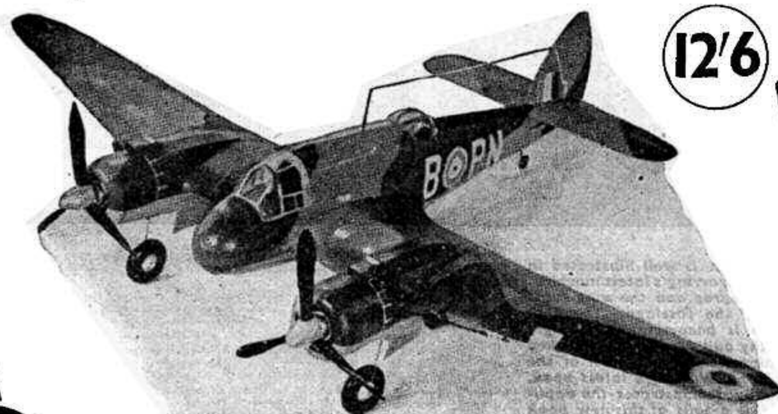
12/6



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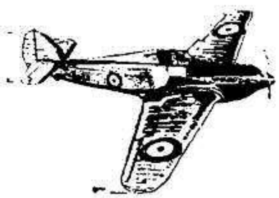

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„ 14-cyl. „	**6d.** „
COWLS, 3/4-in. dia.	**3d.** „
„ 7/8-in. „	**4d.** „

TAILWHEEL UNITS, PITOT TUBES, JOY-STICKS, FIGHTER UNDERCARRIAGES, BALLOON WHEELS 1/4", 3/8", 1/2", 5/8", 3/4", 7/8", CONTRA ROTATING PROPELLERS, GUNS, BOMBS, PILOTS, HAMPDEN TYPE UNDERCARRIAGE, STIRLING TYPE UNDERCARRIAGE.

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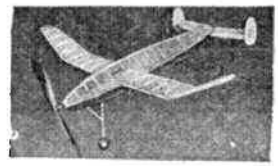

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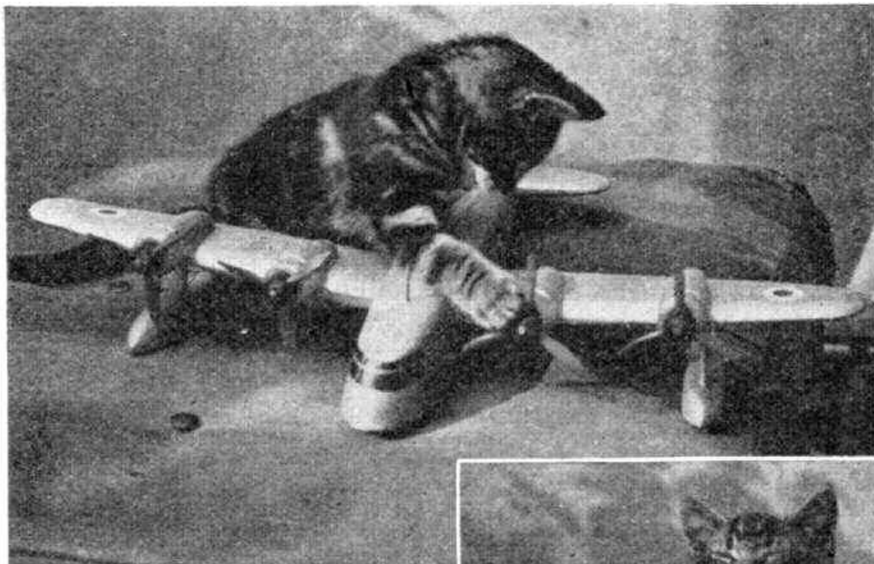
STARTING TROUBLE . . .



"Contact!"

"Help! a backfire!"

Photos by W. J. Snook of Harrow.

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

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

Vol. VII - No. 84 NOVEMBER, 1942

ALLEN HOUSE, NEWARKE ST., LEICESTER

EDITORIAL

ON account of limited paper supplies, resulting in our inability to print surplus copies of THE AERO-MODELLER for "occasional" orders, or for the benefit of those who do not place orders for *regular delivery*, we consider it advisable to warn readers that our *next issue* will be the *Annual Christmas Double Number*, that it will be on sale about 25th–27th of November, and that no responsibility will be accepted by ourselves if readers fail to get their copies on account of not having a firm order placed with their bookseller, newsagent, or model shop!

In other words "You have been warned."

As to the contents of this Special Number, we will whet the appetite of our readers by saying that it bids fair to surpass any previous Xmas Number.

Feature number one will be a fully illustrated description of C. R. Moore's latest model, a 1 in. Flying Scale Model of the Bristol "Blenheim", complete with fully automatic retracting and detracting undercarriage, and incorporating a new patented form of twin drives. Feature number two will be a full description of a 1/5 full-size scale model of a 100 m.p.h. racing car, designed and built by D. A. Russell. This model is 26 in. long, and is powered with a 10 c.c. engine.

Next will be a further "Interim Report" on the 1/5 full-size "Lysander," whose main wings have at last taken shape!

An article of interest to glider fans will be a full description of *Pulley Launching*—a method employed extensively by Continental model builders and now finding favour in this country. Launching is *still* the biggest "trouble spot" with model gliders and R. H. Warring's article should prove helpful. The author has recently been experimenting with many forms of towline launch with a view to greater consistency and a further summary is promised at a later date—including a really simple form of "automatic pilot" for slope soaring. Glider fans can confidently look forward to a good year!

For the rubber enthusiasts there are two exceptionally good models. The first is a very successful Wakefield credited with a most consistent high performance; and the other a model of one square foot wing area which is ideal for duration competition work and may also be flown under Flight Cup rules with a modified motor.

Petrol Topics is again featured—a special Christmas "Topics" that will start "petroleers'" fingers itching to "get going" again—even if they cannot actually *fly* their models under the present ban.

Finally, we shall offer our usual "Plans Service" coupons, whereby from the date of publication of the Xmas Number until January 31st, substantial reductions will be offered on all retail "Plans Service" purchases.

Now anyone can draw a wing section!

We would particularly draw the attention of all readers to this month's Technical Topics on page 518. This explains how the N.A.C.A. series of wing sections can be simply reproduced merely by knowing their number. Not only will this appeal to the flying enthusiast, but the solid modeller will find that he will be able to draw out quickly and accurately any given section of the N.A.C.A. series without reference to any table of ordinates. For example, the wing section of the Miles Master III is N.A.C.A. 23024. Knowing this, the actual section may be drawn with sufficient accuracy for the solid modeller in less than a minute without reference to tables. The flying enthusiast can, by using the generalised ordinates given in the article, actually draw out this section with perfect accuracy.

Old warplanes never die . . .

We recently heard of a S.E.5 machine flying up to the outbreak of war! The whole range of these magnificent little craft is once more brought to light with the introduction of our range of 1914–18 plans. There is something about a bestrutted, multi-wire braced biplane in old war paint that appeals to the scale modeller—very much after the same feeling that exists towards the old sailing ships of "Clipper" or "Galleon" days.

What we really mean to say is that these plans have been in great demand, exceeding our expectations in fact, so much so, that this month we have replaced the usual "Fighting Aircraft of the Present War" with two of the "old-timers"—the famous Bristol Fighter and the notorious Fokker Triplane.

This brings us to the opportune moment to announce that *photographs* of all the last war 'planes covered in our range of plans are now available, similar in size to those of the modern machines. A full announcement of this is given on page 536.

No need to hire the Albert Hall . . .

Microfilm models *can* be flown in restricted spaces, but they have to be designed for this purpose. The little model featured on page 512 is the outcome of much development and research on small space flying and will turn in some excellent flights in an ordinary-sized room. Its best time to date is 108·6 seconds, set up in the Glasgow M.A.C. clubroom which is a room 12 ft. by 12 ft. by 11 ft. high with a hanging light in the centre.

This should be great news for indoor fans—but we have better news still, in that the latest Harborough publication, "Indoor Models" will shortly be available. This is really two books in one—Separate sections for

R.T.P. flying, and microfilm models. In addition we are preparing a whole range of Indoor Model Plans of all types. Orders for copies of "Indoor Models" may be placed with our Leicester office now—the delay in delivery will not be long, but the demand will be tremendous.

Petrol engines for sale?

We have been literally overwhelmed with requests which start, "Where can I get a petrol engine?" . . . We regret to say that the only answer we can give is, "We do not know." Since the outbreak of war and the necessity for conserving vital materials for urgent war needs the manufacture of these miniature engines has ceased. Such stocks that dealers may have held at this date have now completely disappeared—and we would emphasise this—*it is no good writing to the dealers.* We do what we can to assist. Whenever we hear that a model engine is for sale, it is announced in Club News—*but*, the "wants" are many, and the "For Sale's" practically negligible. It must be remembered that when we introduced the Race Car we *did* state that its primary function was to provide an outlet for those mechanical enthusiasts *with* engines who wished to keep them running—it was certainly *not* a scheme to boost the sales of petrol engines!!! D.A.R.

HIGHLIGHTS OF THE AEROMODELLER CHRISTMAS DOUBLE NUMBER

A super 1 inch to the foot FLYING SCALE BLENHEIM by C. Rupert Moore.
"WATTIE," a fine model for the duration fans by Flt./Lt. Watson.
PETROL TOPICS by Dr. J. F. P. Forster.
PULLEY LAUNCH, full details of several novel systems of tow launching gliders by R. H. Warring.
LOFTY VI. A highly successful Wakefield by D. Lofts.
McGILLICUDDY returns in an even more humorous story by Robert Jamieson.
A scale 100 m.p.h. RACE CAR by D. A. Russell.
DOWNTHRUST. An enlightening article by A. F. Houlberg.
FEATURES FOR THE "SOLID" FANS. MANY FLYING MODEL PLANS, ETC., ETC.,
AND ANOTHER MODERN AIRCRAFT PLAN by H. J. Cooper.

AEROMODELLER ENGINE CAPACITY BALLOT

With another Petrol Topics on pages 506 and 507 of this issue, we are endeavouring to run a ballot in conjunction with Dr. Forster to determine the most popular engine capacity amongst petrol model enthusiasts. Interested readers are invited to fill in the form at the bottom of the page and forward same to these offices in an unsealed envelope with a penny stamp. Results will be announced in a future Petrol Topics. Some notes by Dr. Forster are appended for guidance.

For those without any definite ideas, may I submit the following considerations, which may help them to arrive at a decision?

(*a*) Are we to have an international engine size classification some day?

(*b*) How many of us, for some years to come, are likely to be able to run motor cars in which to transport large and unwieldy models?

(*c*) Apart from radio control enthusiasts, is there likely to be a big demand for engines of more than 10 c.c's.?

(*d*) The hitherto popular 6 c.c. sizes are really a little too heavy for the small model (under 6 ft. span) and unnecessarily powerful except for thermal hunting freaks?

(*e*) May not balsa continue to be scarce and anyway expensive for some years after the war?

Regarding (*a*) I have already discussed this with one or two Petroleers, and while we feel that an internationally accepted classification may become desirable, none of us were satisfied with the present American classification. I think we all felt that Class B is too restricted at present, leaving Class C too big. Class A (up to ·2 cu. in.) seems all right. Class B might with advantage extend from 0·2 to 0·4 cu. in. (i.e., from about 3·5 c.c. to 6 c.c.) while Class C might extend from 6 to 11 c.c's. or up to 0·65 cu. in. Anything over and above this will chiefly be used for radio control and should be classified as Open with no upper limit!! (At present Class C includes anything from 0·3 cu. in. (i.e., about 5 c.c. upwards).)

If post-war British engines are successful, we shall ultimately want representatives of at least the three main classes. The point on which you are asked to vote is to choose what, in your opinion, is likely to be the most popular capacity to begin with. Allowing for specialists in certain types of model, a second choice is allowed for your own personal preference, and if you like, this can be the same capacity as the first (a chance for twin motor fiends!!).

AEROMODELLER ENGINE CAPACITY BALLOT

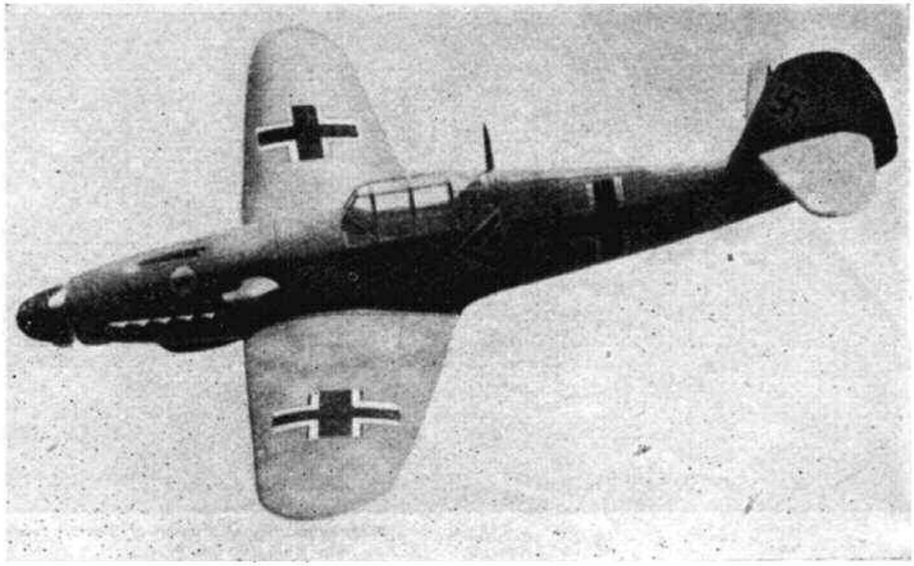
I consider that the most popular engine capacity will be ....c.c. If I wanted two engines the capacity of the second one would be..............c.c.

Name..

Address..

....

Send in unsealed envelope with 1d. stamp:—
AEROMODELLER BALLOT,
ALLEN HOUSE, NEWARKE STREET, LEICESTER.



A 1" TO THE FOOT FLYING SCALE MESSERSCHMITT Me 109 F

By A. S. ROSENFELD

In response to popular request we present this fine flying scale model of Willy Messerschmitt's fighter creation. Superb attention to detail makes this a model fit to grace any collection. Readers are referred to the article by the author in last month's issue on the use of stencils for duplicating the insignias.

AFTER building many scale models, both of the flying and solid types, the writer has every confidence in saying that this particular model was by far the most interesting on which to work. The shape of fuselage, particularly in the region of the nose, lends itself admirably to planking and sheeting in soft balsa—methods without equal for obtaining sleek appearance.

The refinements incorporated in the 109 F result in a model far more attractive in both appearance and performance than the old 109 E.

Now for construction details.

Fuselage.

The half former outlines are shown on the plan. On the original they were cut from plywood although laminated balsa could be used provided the sections are increased.

Reinforce former 6 to form wing fixing stub.

Roll strong paper tube round ¼ in. dowel and fix to former 4 in position shown.

Cut two of former 12 to allow of subsequent parting.

No. 14 is cut from hard ⅛ in. sheet balsa.

Mount all formers on cardboard and cut square holes exactly on the C.L shown on side elevation, which is also marked on former outlines.

Mark the position of the formers on a length of square hardwood—½ in. square is convenient for this size of model.

Former 14 will pin directly to the carefully squared end of the rod.

Cement the cardboard lightly to the rod after locating the formers on the marks.

Fix stringers to formers along C.Ls in elevation and plan. These main stringers, four in number, are of ⅛ in. by 1/16 in. hardwood. Fill in the spaces between the main stringers with 1/16 in. square balsa stringers spaced approximately ⅜ in. apart where the curves are gentle at the sides, and ¼ in. or less where the curves are sharp at top and bottom. Stringers should be cut where the wing fillets will later be. The formers are not marked for stringers. The writer prefers to fix them front and rear and sight them for alignment in their turn.

When the cement has set fill in the space at the nose, and rearward to where shown, with very soft 1/16 in. balsa sheet.

Cut the sheet away to form slots for the gun snouts, curve a piece of 1/32 in. balsa sheet to fit notch on former 3 and cement in place. Round out the rear of the trough so formed with plastic wood and insert a short length of 16 gauge aluminium tube while the plastic wood is still soft.

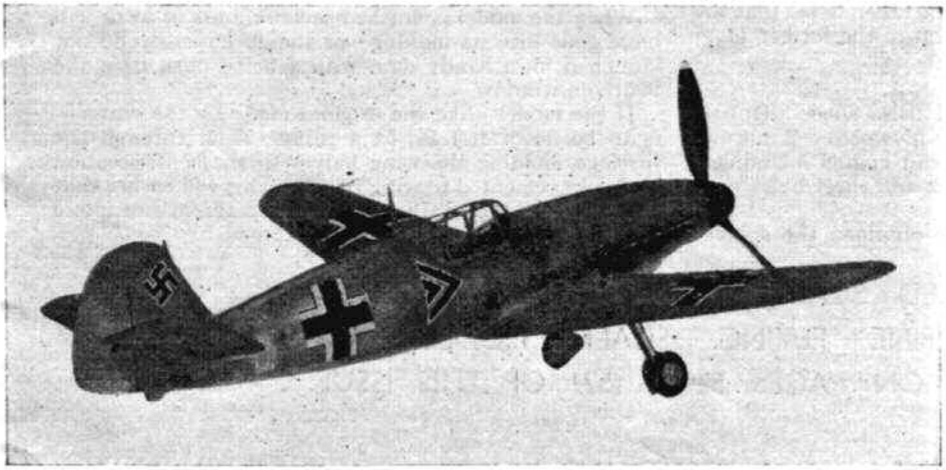
Cement the fin as shown and fair in to the dotted line on plan. Fit the tailplane adjusting mechanism made from scraps of sheet balsa.

Fix W1 to centre-section spars and fix U/C paper tubes.

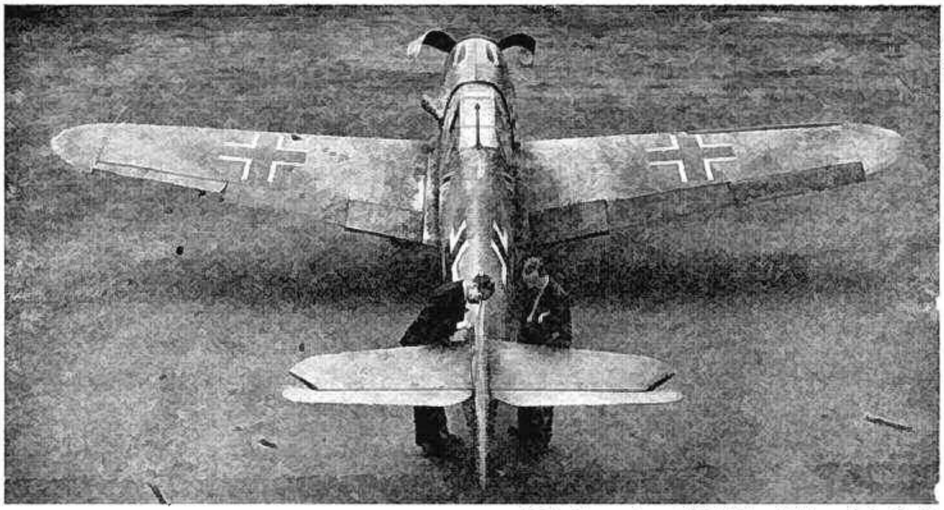
Sheet in the whole centre-section above and below and fillet to the line shown; all with 1/32 in. soft balsa sheet. The sheet may best be curved by immersing in hot water and fixing with seccotine. Cellulose cement will not work on wet wood.

Build the cockpit cover of 1/16 in. square hardwood.

Where sheeting or planking ends, carefully scallop the edges, as sketch, to avoid hard lines in the covering.



These two first-class photographs illustrate the perfect finish and camouflaging of the model. It is capable of long, fast flights and may also be flown R.T.P. with marked success. Reduced scale, fully detailed working drawings are given on pages 520-1 of this issue.



An actual photograph of the full size machine shot down in this country. It received minor damage and the machine has now been repaired and is flying again with R.A.F. roundel markings.

[*Photo by courtesy of Ministry of Aircraft Production.*

Sand carefully with successively finer grades of paper. Withdraw the stick and cardboard holders.

Gently cut the stringers between the two formers 12.

Face both formers 12 with 1/32 in. plywood to outside of stringers and drill holes for fixing locating pegs of 1/16 in. round bamboo.

Cement the plywood motor blocks in the tail.

Face former 1 with 1/32 in. plywood to outside of sheeting.

Fit paper tube for detachable radio mast and sand the whole fuselage once more.

Cover cockpit with celluloid, after painting all wood which will be visible later, with grey dope.

Make air intake of plastic balsa as explained in my previous article and fit in position on balsa sheeting.

Make and fix exhaust stubs and intakes.

Wings.

On straightforward "Wakefield" lines. The ribs are best made by the sheet-cum-block method between two templates cut to 1 and 14.

The hardwood locating peg on the LE is fixed by splicing to the balsa spar after same has been roughed out to section and the whole sanded together.

The rear boxes should be built up on strips of wood the exact size of the centre-section stubs.

Tailplane.

Similar to wings except for paper tubes to take 3/32 in. dowel through fin.

Rudder.

Similar to above. Care should be taken to see that the bottom exactly coincides in section to the former 14.

Airscrew.

Blades are cut from laminated balsa sheet. Hub is built up from balsa blocks and plywood. A normal freewheel is fitted to avoid "dead engine" landings. The spinner is built up from block and sheet balsa on a short rod similar to the fuselage.

If a soft enough balsa can be obtained the spinner can be built as part of the fuselage. Medium or hard balsa definitely will not take the curves.

The whole should now be covered, first making sure that everything is smooth, with superfine bamboo tissue. Water spray and shrink dope in the usual manner and camouflage. True German mottled camouflage can only be simulated by spraying. The colours used were: green-grey undercoat over top surfaces. Then light blue-grey lightly mottled on. Then duck-egg blue over the whole undersurface gradually fading away on the sides of the fuselage.

The various insignia should now be sprayed through stencils as explained in my article in a previous issue of The Aero-Modeller.

Strips of paper (previously doped grey) are cut 3/32 in. wide to form the outer cockpit cover frame. They are cemented outside the celluloid.

The springs for the tailplane adjustment and undercart should be made by winding 20 s.w.g. wire round rod of the correct diameter.

After reading the instructions it is a good plan to obtain as many photos of the prototype as possible—they have appeared from time to time in The Aero-Modeller and aircraft journals.

The original is powered with one ounce of 3/16 in. rubber, prewound and fitted with run-true bobbins.

The model should balance, when complete, at former 5, or approximately ⅓ the chord from the L.E. Adjustments may be made by adding plasticine in the correct position. Slight adjustments, and they must only be slight, can also be made to the tailplane by varying the thickness of the balsa packing between the rear tailplane dowel and the fixing box top.

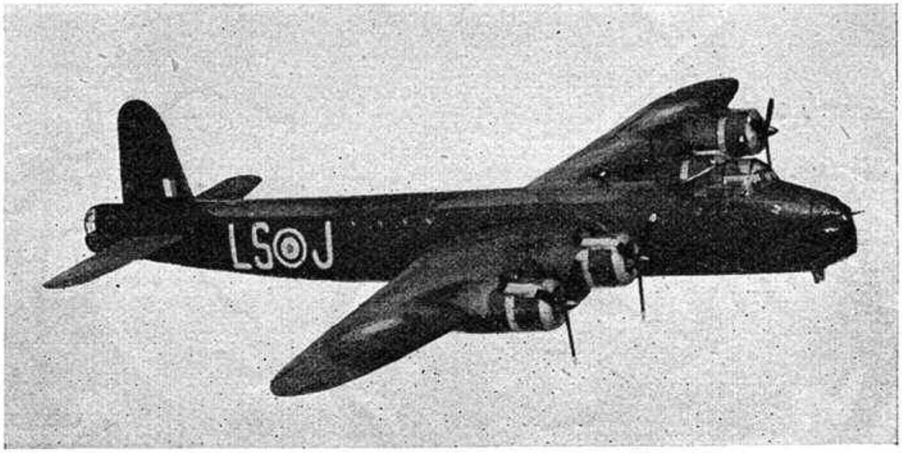
When the model is finished several hours of work will have gone into its making—or should have—so do not launch it on a windy day, with a hefty push from the bedroom window.

If the model—like the original made by the writer—is to be flown R.T.P., fit a rubber band through the fuselage, holding the wing halves to the centre-section by hooks cemented to wing ribs 1. This will ensure that the fuselage and starboard wing remain in one piece with the port wing and tethering thread.

REDUCED SCALE WORKING DRAWINGS OF THIS FINE FLYING SCALE MODEL ARE GIVEN ON PAGES 520 & 521 OF THIS ISSUE.

GRAIN FILLING IS IMPORTANT

By D. SEAGAR



A remarkably fine photograph of a model of the Short Stirling by A. H. Wooler of Finchley. The finish on this model leaves nothing to be desired, and so we recommend this article to other envious modellers!

WHEN the main components of your model have been glued together and the joints properly faired you are ready to tackle what many experienced modellers consider to be the most important part of the work—grain filling.

Before choosing the filler you are going to use you should decide whether you require a matt or a glossy finish. Generally speaking, the two types of finish, matt and glossy, may be said to correspond with the two types of aircraft, military and civil respectively.

There is one exception worth bearing in mind—the military aircraft of America (until her entry into the war) were painted with gloss paints of the most striking shades.

Any self-respecting modeller of experience will have a sample of each of the following four grain fillers in his kit cupboard and being economical he ensures that the bottles are well-stoppered to avoid evaporation :—

Banana Oil. As the name implies this filler is obtained from bananas and, although quite cheap, is likely to become increasingly difficult to procure. It is a very fine oil and tends to soak readily into soft woods which makes its use rather extravagant. Banana oil comes into its element in preparing close-grained woods such as beech and pine.

Oil Filler. You will probably be unable to obtain this at a model shop and the best place to try is a coachmakers' or ship-building yard. Any wood can be treated with this filler and, although it may be necessary to rub down your surface rather severely, you can obtain an extremely fine gloss finish after this preparation.

Cellulose Filler. This is most popular among modellers because it dries and hardens so rapidly and can be obtained from almost any model shop. It is particularly suitable where a matt finish is required. If, however, you prefer a gloss finish, this can be obtained by using the same filler and rubbing down with your glasspaper until you obtain a smoother surface. Cellulose filler is unique in that it provides an excellent base for poster colours, which give an excellent matt finish. It also takes paints very well, but, if applying a dope finish you must use extreme care as the dope and filler tend to mix readily—with disastrous results. To overcome this the dope should be applied quickly and dexterously.

Home-made Filler. Probably this is the filler in most general use among modellers and consists of a mixture of plaster of Paris and very thin clear dope. Its characteristics are the same as those of cellulose filler and it has the advantage of being a quick dryer.

Having chosen the grain filler you intend to use, stir it well with a small stick until completely mixed. This is most important as most cases of unsatisfactory finishing can be traced to using a poorly mixed filler. To obtain the best possible results the filler should be of the consistency of varnish.

Using a thick soft-haired water-colour brush, size 5 or 6, apply the filler as evenly as possible over the whole surface of your model.

The effect of this first application is to create a furry surface on the wood. This is particularly noticeable in the case of balsa. Before attempting your next step this coat must be allowed to dry and harden. This may take anything from two to twenty-four hours, depending upon the type of filler used.

For the preliminary rub down use flour or 00 glass-paper. A three-inch square will be found the most convenient and it should be held flush across the top of the hand between the thumb and fingers. You probably won't like this part of the job much but, to obtain a good surface, you will have to rub away with your glasspaper for at least an hour. Your time will certainly not be wasted even if you spend more time on grain filling than you have taken on the actual carving, because the effectiveness of your model when painted is almost entirely dependant upon the state of the wood surface before painting.

Although you can quite easily spoil your model at this stage it is perhaps some consolation to know that the skilful use of filler can help you to rescue your reputation as a modeller even if your carving has been slightly haphazard. Obviously you cannot build a new tail unit out of grain filler but any accidental chips or incisions can be satisfactorily camouflaged by applying several coats.

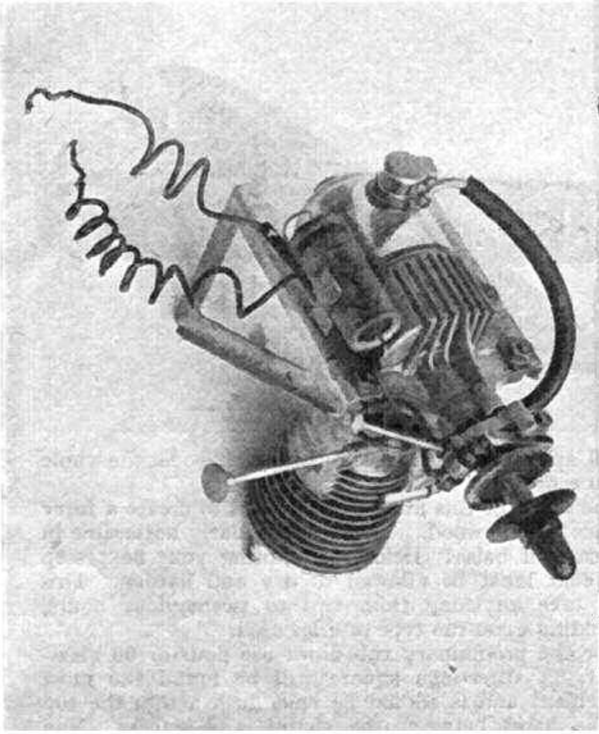
If you do not allow the filler to dry thoroughly before rubbing down with your glasspaper you will very soon appreciate the necessity for doing so. When still tacky the filler will come away with the glasspaper and you will have to commence the whole operation of grain filling afresh.

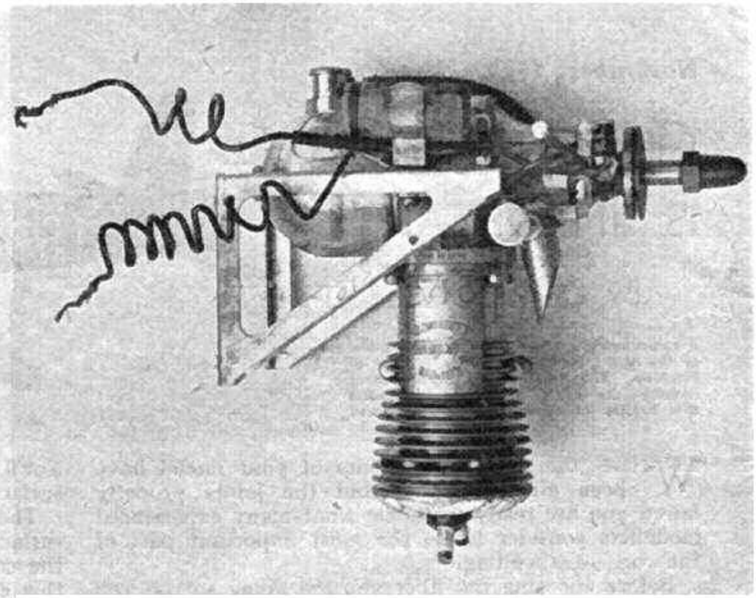
Bearing in mind that glasspaper does its most useful work in the first few minutes of its working life, it is always advisable to take a new sheet when starting to rub down a freshly prepared model. When its rasping effect becomes noticeably less it can be temporarily put on one side for use at a later stage of the smoothing down.

Even if you have applied your filler quite evenly it is possible that you may accidentally rub it away completely at one particular spot leaving the wood bare. A judicious dab with the filler brush will normally retrieve the situation. Any other flaws in the surface, such as grain depressions, should be treated in the same manner and, after allowing the filler to dry, rub down again with your glasspaper.

Unless your wood has an exceptionally coarse grain, three complete coats and the subsequent glasspapering after each should give an excellent surface. If not sufficient this usually indicates that your filler was too thin and this should be remedied.

Here is just one final tip. If you want to put a really mirror-like gloss on your model, use the back of the glasspaper for the final rub down.





PETROL TOPICS

By J. F. P. FORSTER

(Photos of twin ignition Super-Cyclone by J. Burgoyne)

READERS of August "Topics" will recall my request for. first-hand information on the advantages (if any) of dual ignition, and I wondered whether, in fact, anyone had been lucky enough to have obtained any of the American models so equipped, before the import ban had stopped their entry into the country.

How is this for a magnificent and generous response to my query? L. G. Temple (of Glider fame) immediately wrote, not only informing me of his acquisition of a twin ignition Super-Cyclone, but very kindly and trustingly offering to send it along for my own personal trial and observation.

The result of these trials is not only illuminating, but very difficult to express adequately without incurring the Editor's displeasure for advertising or plugging this particular make of engine. However, in an open criticism of this sort, I can only speak as I find, and since the family of Cyclone engines has long been famous and popular in this country, no one can accuse me of boosting a hitherto unknown make of engine. Indeed, any remarks on engines in this feature, in the past, while trying to preserve impartiality, have, if anything had a slight bias towards encouraging the production of better British engines. This, of course, may be taken as a silent acknowledgement that our American friends, with their vast opportunities provided by markets large enough to make mass production a worthwhile proposition, have hitherto produced far and away the most successful Model Aero engines in the world.

Nevertheless great credit also goes to them for the creation of those markets in the first instance. There is no real obstacle to a British firm creating a relatively large market, say in Britain and the Dominions, provided it has something to offer which the others haven't already got, and recent "Petrol Topics" have all been coloured by my own and several correspondents' desire, first, to ascertain just what the Petroleering fraternity will want, after the war, and secondly to give every encouragement to would-be designers and manufacturers to get on with the job now or organising production to start immediately after the war, before the home market becomes flooded with foreign products.

Quite apart from actual performance, the one great aspect of engines hitherto seriously neglected on both sides of "the pond," is the designing of engines with a view to their being mounted in scale-type models. Here lies a golden opportunity for British designers, for our American friends are still in the throes of that disease—call it thermal hunting or duration flying—of which as mentioned in August "Topics," we in this country have now, happily been cured.

Short engine runs and "precision flying" must obviously be the order of the day in this country with its small fields and numerous hedges. Our models are therefore well within sight, and for heaven's sake, then, let the sight be a good one and not an eyesore.

Scale-type models, and as nearly as possible scale-type behaviour in the air, will, I feel sure, attract many air-minded chaps "demobbed" from the R.A.F. after the war, as well as the too-young-youngsters now so expert at aircraft recognition, baulked of their ambition to fly or be flown, by the cessation of hostilities. The radio control fiends, too, will assuredly go for the scale model.

Dual v. Single Ignition.

All this "gas" apropos of an American engine which, we are asked to believe, consumes this for fuel ! ! To return to the more general topic of dual v. single ignition, I admit I did not approach the experiments with an entirely open mind, being prejudiced against any advantage to be gained from what I felt was probably just a sales stunt—the use of twin ignition just for the sake of copying full-size aero-engine practice. Indeed, as I wrote in August "Topics," I felt very doubtful whether the additional coil weight could possibly be justified except for model race-car use.

I was therefore very surprised and impressed when I came to test the engine :—Disconnection of the second plug at about two-thirds full revs. resulted in an immediate drop in revs. of about 10 per cent. I could not detect a trace of misfiring—normally I should have said the engine was going perfectly smoothly, yet reconnection of the second plug-lead immediately increased revs. again to where they had been originally. With the ignition retarded, the difference is even greater, and it is astounding just how slowly, using both plugs, it is possible to keep the engine ticking over. I then tried to see how slowly it was possible to get it to tick over on one plug alone. Having let it settle down, I then connected the second plug-lead. The effect was dramatic :—Having no tachometer I cannot give actual figures, but I "guesstimate" that revs. more than doubled immediately, from somewhere around 300 to more than 600. It was then possible to retard the ignition still further and revs. can then be reduced again to considerably less than the single plug minimum of, say, 300 per minute.

Being a new engine, I have not run her for more than 3 or 4 secs. absolutely flat out with both plugs operating, but suffice it to say that in my opinion it is far and away the most powerful 2-stroke engine for its capacity (·647 cu. in. or a fraction over 10 c.c's.) yet put on the market. Incidentally the power/weight ratio is also exceptional if judged on the maker's stated bare engine weight of 7½ oz. Complete on steel bracket mounting with transparent tank and condenser but, without prop., I make it 11⅝ oz.

From the foregoing remarks on its ability to tick over at exceptionally slow speeds, it might be deduced that it should therefore start very easily, and this is certainly borne out in practice. The question is whether this advantage is more than sufficient to compensate for the additional coil weight, and also does this coil require inordinately heavy batteries ?

Here again I embarked on trials feeling convinced that such a coil would drain a dry battery in no time, and that probably extra heavy batteries would be required for reliable operation ; not a bit of it :—

The coil admittedly weighs 4¼ oz. (including ⅜ oz. for the heavy twin H.T. leads) as against 2¼ oz. for the standard single ignition Smith Firecracker, but I was pleasantly surprised to find that the current consumption was almost identical with that of a normal coil. The engine continued to run without any perceptible drop in revs. on changing over successively from a 6 volt booster accumulator to 4 volts of the same accumulator ; then to a standard 4½ volt flashlamp battery, followed by a 3 volt torch battery (of the Ever Ready type 1839) and finally to a single 3 volt Penlite battery (Every Ready type 1915).

The last I consider a real achievement, as my old Cyclone will not function at all reliably on a single Penlite battery. However, I proved that not all of this was due to twin ignition, as the Super-Cyclone will run with only one plug operating, on a Penlite, so that some of the difference is due to the efficient contact-breaker which is of very sound design.

Prospective British designers are thus faced with yet another decision to be made before embarking on production :—Twin ignition definitely "pulls it own weight" on a 10 c.c. engine. Can it be made to do so on an engine of less than 6 c.c. ? ? ? It seems doubtful if a twin coil can be made lighter than that supplied with the Super-Cyclone. Thus even with a single Penlite battery the weight of coil and battery together will probably be heavier than the bare engine. Is this weight worth the increased power and ease of starting ?

Induction Pipes.

Some observations on induction pipes and venturi may interest readers who have been troubled by the mounting of engines with long induction pipes necessitating overhanging engine bearers.

I once mentioned in "Topics" that both Major Bowden and I had overcome this snag in mounting an Ohlsson 23 by cutting off the last ½ in. of pipe without any apparent detriment to the engine's performance. Recently, however, I found on removing the engine from its detachable mounting that there was difficulty in starting it mounted on an ordinary test block, and irregular performance even when it had started.

In the course of investigation a length of piping about 6 in. long was held against the intake and I was delighted to find that engine revs. at once increased by about 20 per cent. and no trace of irregular running persisted. This gave me furiously to think ! ! It is, of course, easily realised that a long pipe helps to keep up a steady flow of air past the needle valve by reason of the momentum of a long column of air helping to overcome the tendency for blow-back which must be inseparable from the use of piston-operated inlet ports. The rotary valve can be timed to close at or very soon after top dead centre, thus being theoretically more efficient than the direct induction system, especially at low speeds and for starting. This was borne out in similar experiments on my Cyclone, the effect of an extension being much less marked, though there is slight improvement here also.

It was then found that the same result was obtained by holding the finger or a flat piece of wood about ⅜ in. away from the open end of the shortened induction pipe. It was then realised that with the engine on the knock-off mounting, the end of the pipe had been within ¼ in. of the backplate of the mounting fitting against the model's front bulkhead. The effect of this was to keep the inflowing air at a constant speed and at slightly less than atmospheric pressure, and was equivalent (almost) to a long induction pipe. My shortening of the original pipe had thus had no ill effect on the engine while the intake was close up to the backplate.

Mounted in any other way, with the intake quite open and away from any obstructions, shortening has a very marked detrimental effect on performance, and I have now to admit there is a reason for the makers' apparent madness in fitting those inconveniently long induction pipes.

Further experiment has shown that even the makers have not dared to fit the optimum length of pipe :—Performance progressively improves with increase of length of pipe before the needle valve up to about 4½ in. ! Over and above this no further improvement is noticeable, and indeed there appears no upper limit where it begins to fall off, as a pipe 3 ft. long was eventually tried, the revs. appearing to remain unaltered from the maximum with 4½ in.

Readers may care to experiment on these lines with their engines, and I should be glad of their confirmation of my results. Personally I have found that my discovery suits me well as I always run my engines inverted. This places the normal straight induction pipe in a most awkward position for choking when starting, and necessitated the fitting of remote control choke as illustrated in the photo of my Ohlsson 23 on a home-made cone mounting in "Petrol Topics" (December, '41). I have now fitted a 4½ in. curved extension to the induction pipe (welded to the shortened original pipe—quite easy with a blowlamp and aluminium solder) and this opens flush with the upper surface of a complete engine cowling, and is thus readily accessible to a finger for choking when starting.

Turn to page 502 for ballot on the most popular engine capacity.

These are actual micro-photographs of various specimens of model aircraft material taken by the author. The actual magnification is about 60 times.

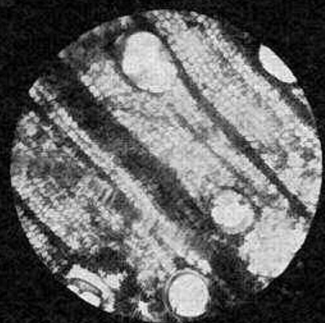


FIG 1 CROSS SECTION OF BALSA

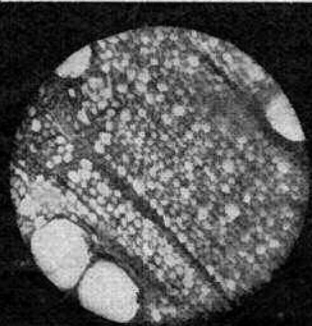


FIG 2 CROSS SECTION OF SOFT BALSA

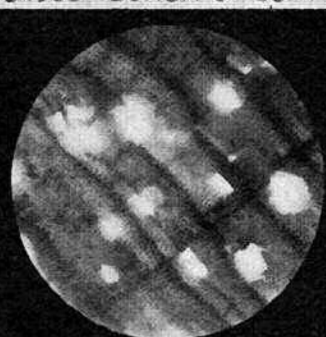


FIG 3 CROSS SECTION OF BIRCH

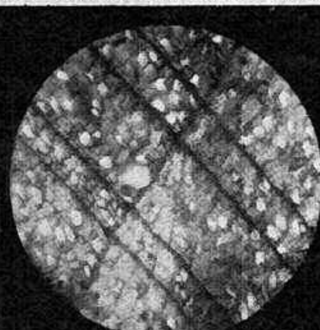


FIG 4 CROSS SECTION OF SPRUCE

"X 100" OR THROUGH THE MICROSCOPE

By L. H. SPAREY

THE growing scarcity of balsa wood for model purposes has made it imperative that some substitute be found which will serve our turn. Apart from the usual rough-and-ready tests for weight, suppleness and strength, it occurred to me that a microscopical inspection of the actual structures of the selected woods might, at least, prove interesting. In accordance, I cut sections from several dozen woods, and viewed them, under various powers, under my microscope. The results proved intriguing enough to warrant a few photographs of the better known aero-modelling woods, which I present, together with a few others of aero-modelling interest, in the hope that other builders may like to view them.

In the first place, all the woods which I inspected, except one, show the same general characteristics, that is, a fine cellular structure, crossed with dark lines and punctured, at intervals, with large holes. Generally speaking, the size of these large holes does not seem to determine a close alliance between the woods, the whole question seeming to rest upon the actual cellular construction. An examination of the pictures will make this point clearer.

The exception to the above remarks is bamboo, which is, when one comes to think of it, a most curious substance when judged from external appearances alone.

Through the microscope the distinctiveness is as great as we might suppose it to be, and, as will be seen, some of its peculiar qualities may be explained.

In passing, I might remark that the black and white photographs do poor justice to the lovely appearance of some of the specimens as seen through the eyepiece of the instrument. The cross-section of bamboo, for instance, is indescribably beautiful. If the photograph, Fig. 6, be held at arms' length, light patches will be seen, in clusters of four, making forms which resemble some four-petalled flower. These appear as a bright yellow when seen by transmitted light through the microscope. I can best liken the appearance of a bamboo section to primrose heads scattered over grey lace, the whole glowingly translucent upon a brilliant field of silver. It is, however, one of the delights of the microscope that it reveals beauty in the most unlikely places.

Taking balsa wood as our basis, an inspection of Fig. 1 shows a large, open arrangement of cells, broken here and there by large holes, and crossed by thick, dark bands. I cannot determine what these dark bands are. They are certainly not growth rings, as we must remember that our pictures show the sections one hundred times larger than actuality, which would make the lines too close together to be the annual growth rings of the tree. I call them "annual growth rings" for want of a better term, as science has now determined that these well-known rings are not formed yearly by the growing tree. Some years no ring appears, while at others two or even three rings may be formed. The old theory, therefore, that the age of a tree may be determined by counting the rings on its cross-section has been exploded.

The picture in Fig. 1 is of medium hard balsa, and it should be compared with Fig. 2, which is of soft balsa. In microscopic work such as this, very spectacular differences are not often met with; in fact, very minute variations in appearance will often indicate a radical divergence of character. Our two pictures, however, do show most clearly the difference between the cellular construction of the two grades of balsa wood; the large cells of the softer wood being in marked contrast to the small cells of the harder. The large holes remain about the same size. It is true that Fig. 2 shows two of these holes in proximity, but as this feature is met with in balsa of all grades it is not a feature exclusive to the softer wood. The cells, on the other hand, always do differ.

Fig. 3 shows a cross-section of birch, which of all the wood commonly used in aero-modelling is, probably (with the exception of bamboo) the most dissimilar in outward characteristics from balsa. Yet we may here note the large holes in the surface, almost as large as those in balsa wood. The cellular construction tells the tale, however. We notice at once the close packing together of the cells, and that they do not consist of a series of small holes, as is the case with balsa, but are themselves filled with " wood." In all the many woods which I inspected this principle holds good; the closer the cells the harder the wood, so that I could tell from a microscopic view alone whether a wood was of the hard or soft variety.

Approaching nearer to balsa in miscroscopic character is spruce (Fig. 4). While the larger holes are diminished in size, the cellular construction is much more open than that of birch. It may, in fact, be considered as a halfway house between birch and balsa. The dark bands may also be noticed; this time running in pairs across the picture.

The most satisfactory substitute for balsa which has yet been found seems to be basswood, and it is with no surprise, therefore, that we find that a microscopical view bears out our other findings. Fig. 5 shows that basswood stands halfway between spruce and balsa so far as construction is concerned, as it possesses the larger-hole construction of spruce coupled with very open cells. The darker portion of the photograph is caused by an unequal cutting of the thickness of the specimen, yet the lighter part of the picture shows well the open character of the cells.

The above photographs are interesting in so far as we may visually confirm the general findings of aero-modellers regarding balsa substitutes. The woods selected may be seen to approach the cellular construction of balsa in direct proportion to the approach of their other characters; an alliance between theory and practice which is comforting if somewhat unusual.

We now come to the curious exception—bamboo, a cross-section of which is given in Fig. 6. Bamboo is a light but hard wood, and is exceedingly strong. Furthermore, its factor of strength remains constant however small the section. In this respect it differs from all other woods not of the cane type, for these other woods lose their strength and usefulness when cut into very thin slivers. Not so bamboo, however; I have, in fact, used extremely thin pieces of it to imitate

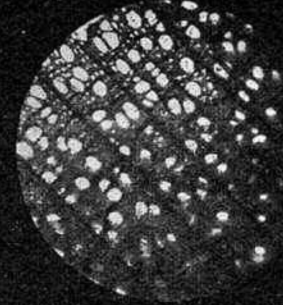


FIG. 5. CROSS SECTION OF BASS WOOD

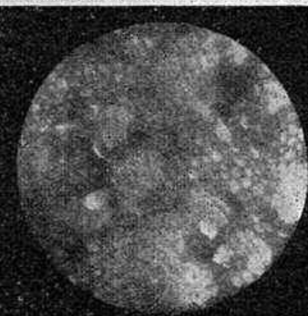


FIG. 6. CROSS SECTION OF BAMBOO

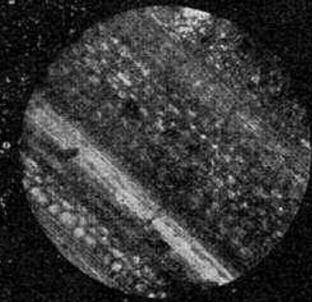


FIG. 7. LONGITUDINAL SECTION OF BAMBOO

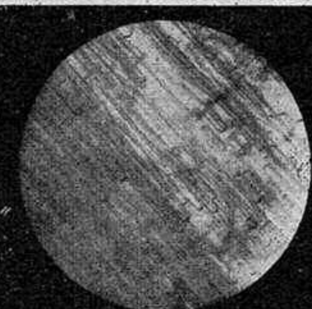


FIG. 8. LONGITUDINAL SECTION OF BALSA

FIG. 9. CROSS SECTION OF MODEL AERO RUBBER

streamlined wires on scale models, with every satisfaction. Our microscope will show us the reason for this.

Although possessing a very open cell formation, the most curious feature is the flower-like markings which I have already mentioned. So far as I can ascertain, these markings correspond to the ends of long fibres which run in groups lengthwise down the wood. I have succeeded in photographing a *longitudinal* section of the wood, which I present in Fig. 7, wherein one of these long fibres may be seen running as a light band across the picture. To check my observations, I did, after much trouble, succeed in planing a section of bamboo almost seven inches long, and, running this beneath the objective of my microscope, I noted that these fibres ran unbroken from end to end of the specimen. The cross-section in Fig. 6 shows that these fibres are themselves composed of a close packing of small cells, embedded in groups, in a surrounding open-cell construction. It would seem, therefore, that bamboo owes its peculiar qualities of lightness and strength to the fact that it is a combination of *light and heavy wood*.

Furthermore, as the closely packed cells run, in the form of fibres, in unbroken lengths longitudinally through the bamboo, it is easy to see why this peculiar substance retains its strength in small sections. The grouping of the fibres in bunches of four is, in itself, a strong formation, and it is rather wonderful, don't you think, how Nature has ensured that this tall and slender tree shall withstand the tropical cyclones and tempests which so often, alas! reduce man's handiwork to ruins.

As a comparison I present a photograph of a *longitudinal* section of balsa. In this may be seen the very short nature of the fibres, some of them not a quarter of an inch in length even in the picture. What the actual length of these may be is a matter for calculation. The absence of any sign of cellular formation such as is visible in the longitudinal section of bamboo, is rather surprising. The appearance of Fig. 8 does, in fact, suggest that the fibres of balsa are really hollow tubes, the ends of which may be seen as cells, but I offer this suggestion with reservation until I have had more opportunity to check it.

While my apparatus was rigged, I took several other photographs, and I present some which may be of general interest. Fig. 9 shows a cross-section of rubber strip as used in our hobby. The dark dots are probably sulphur, or other substances used in the processing. This is from a piece of new rubber, and as a contrast I show a picture, Fig. 10, of rubber which has been fatigued by repeated overstretching, and which has, to some extent perished. Although this specimen is at rest, its appearance is almost exactly similar to that of new rubber when viewed under stretched conditions. The general elongated appearance of the specimen seems to indicate that fatigued rubber does, to some extent, remain in a stretched condition. The uneven tones of the photographs are due to my inability to cut even the smallest piece of rubber to an even thickness without special apparatus.

Pursuing our list of aero-modelling materials, Fig. 11 shows a microscopical view of the finest Jap tissue, wherein the fibres of the paper are visible. By contrast, I submit a similarly enlarged view of ordinary paper. This specimen was torn from a paper bag, and its indistinct appearance is due to the fact that it is rather too thick to pass a great deal of transmitted light. However, the actual view through the microscope gives a better impression of the coarseness than does the photograph, owing to the various colourings of the odd substances of which it is composed. Some idea may be gathered, however, by the statement that the broad dark band which runs across the picture is *one fibre*. Through the eyepiece it presented a red appearance, and looked like nothing so much as a plank of wood.

Finally, in Fig. 13, we see a piece of Jap tissue which has been water-sprayed, and doped with cellulose dope and banana oil. The altered nature is very evident, and it will be noted that all the holes visible in Fig. 11 have been filled up, and that the fibres have shrunk closely together. Here, again, the picture is a little "woolly," from the same cause as before; that is, the thickening of the paper caused by the successive coatings of dope which dries a little opaque, and is quite sufficient to blanket the light.

Thus have we seen some small fraction of the minute world that lies at the end of a microscope tube; yet of the ultimate constitution of the substances which we have viewed we have seen nothing. No microscope such as ours will ever display the spinning "solar systems" of electrons of which—so the scientists say—all matter is composed. We have but seen the form of the walls, the roofs and the gables to which the house is built. Of the bricks, or of the constitution of the bricks themselves, we have had no inkling.

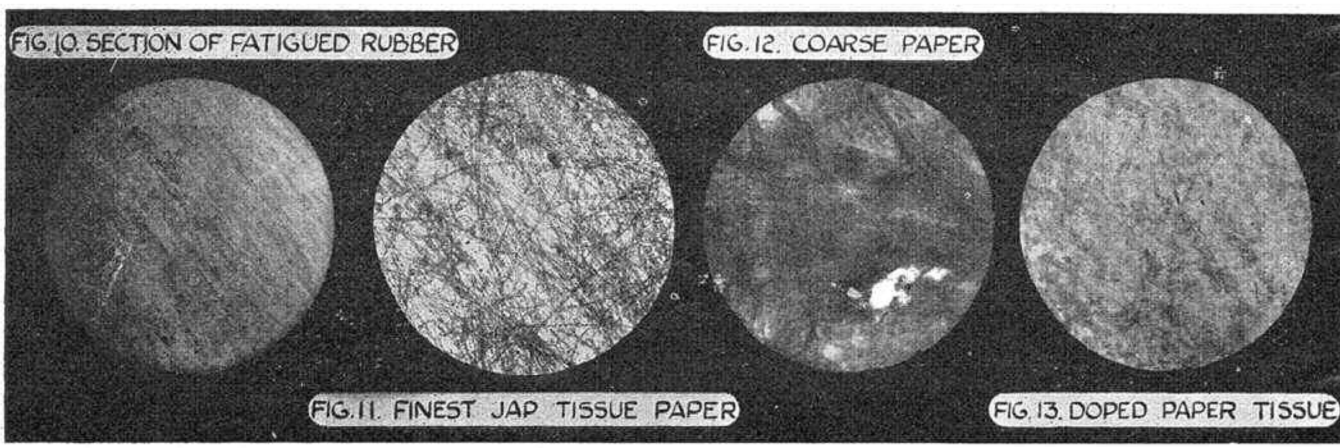
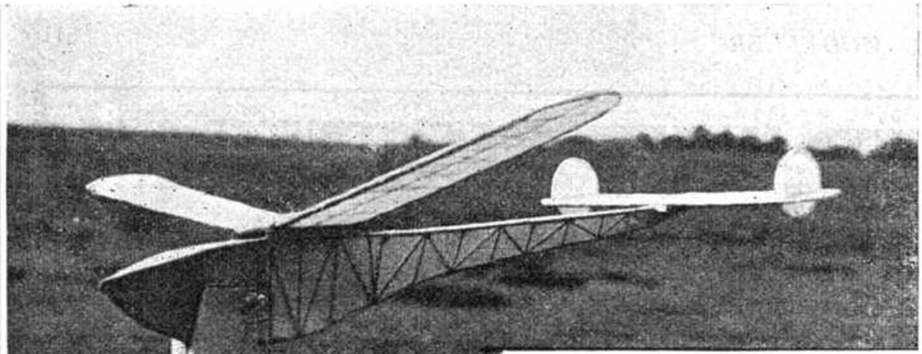
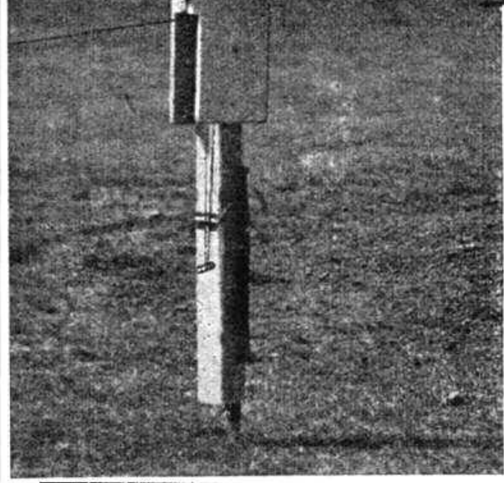


FIG. 10. SECTION OF FATIGUED RUBBER
FIG. 11. FINEST JAP TISSUE PAPER
FIG. 12. COARSE PAPER
FIG. 13. DOPED PAPER TISSUE

ONE MAN GLIDER LAUNCH

By G. FIELDHOUSE

HERE is an apparatus that will winch launch a glider *without the aid of an assistant.* It has been well tested out on the flying field and it is safe, sure, and certain in operation, the writer having made extensive tests with long towline lengths and achieved good duration flights.

The fundamental principal of this design is that the glider is held firmly in position on a stand. On pulling the towline (by winch or other means) the stand itself falls to the ground out of the way and leaves the glider airborne on the towline.

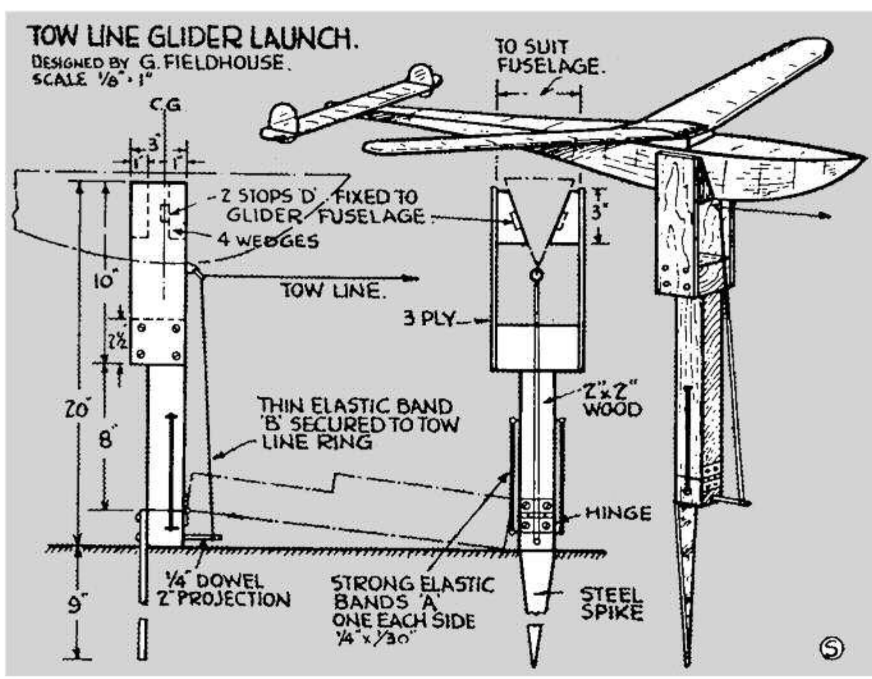
The stand is made of wood in two parts and hinged at base. A steel spike is fitted to stationary part to go into ground. Strong rubber bands A hold fixture in vertical position.

A light rubber band B is permanently attached to ring of towline, and goes up with the line. To fix in position, put ring on towline hook of glider, place in position on fixture, and stretch rubber band B over end of dowel C.

It is important that two stops D are fitted to the glider fuselage, these to project behind the first two wedges. These serve to position the glider correct in fixture, and most important of all make certain that the stand is pulled to the ground when glider is pulled forward.

In operation the pull on towline releases rubber band B from dowel *first*, the glider is then free to go up, while the stand (having now been pulled over to a certain angle) moves through an arc to the ground from the pull of the rubber bands A.

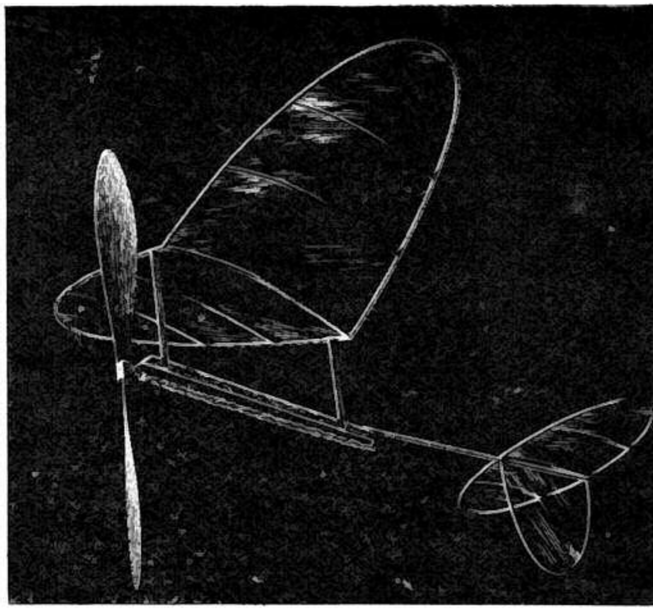
Make sure that these operations are not reversed (*i.e.* stand pulled over C.G. before rubber band B releases), otherwise extensive glider repairs are indicated. Keep dowel C as short as possible. I recommend this apparatus to be used in conjunction with a winch similar to that described by R. H. Warring in the May AERO-MODELLER. Run the line along the ground free from entanglements, and pay out several yards free on the ground by the winch, then wind up rapidly. As soon as glider is observed free, control winding to the strength of the wind.



A BABY MICROFILM MODEL

By J. H. MAXWELL

Fly this Model in the Parlour or Clubroom.



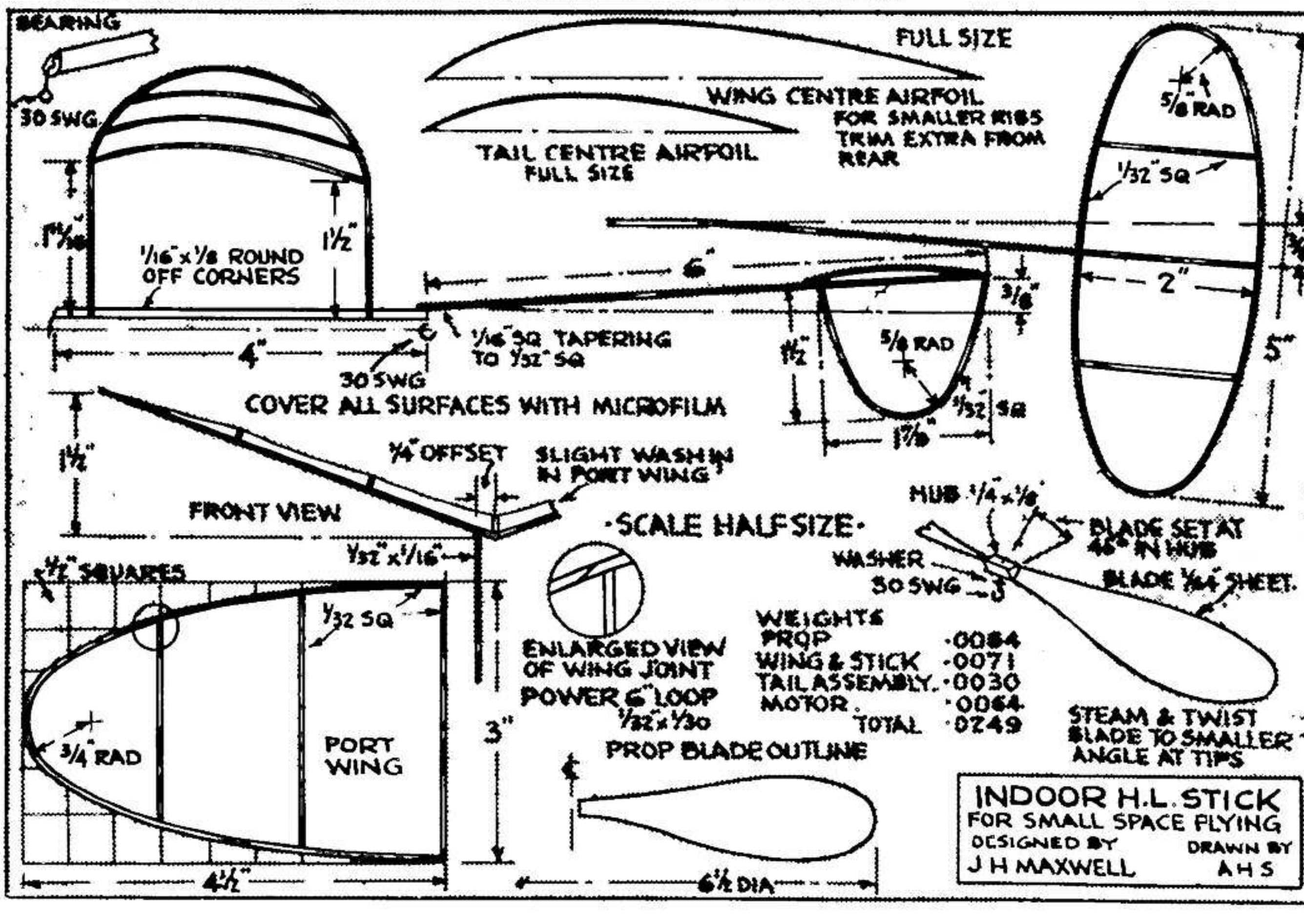
The wing outline consists of four parts; tips, leading edge spar and trailing edge spar. To make the tips, first cut to the proper outline a form of 1/8 in. sheet balsa or similar and then bend a strip round this while being held in the steam from a kettle. When dry, lay them on the plan, holding them in place with pins. The spars are cut to length and held on the plan in a similar manner. It is a good idea to moisten the spars so that they will retain their shape. A scarf joint is used to give more gluing area, but apply the cement sparingly. Make a rib template of cardboard and cut the ribs by placing this on a piece of 1/32 in. sheet and slicing round the camber with a razor blade. The front of each rib is cemented to the leading edge spar, then the excess length is cut off and the trailing edge stuck. When all the joints are dry the wing is covered with microfilm, then the spars are cracked at the centre, and the dihedral set with a touch of cement. The slack which this causes in the microfilm is taken up by passing a hot wire back and forth underneath.

The tail and rudder are constructed in a similar manner. Bend the rudder outline, cement this to the tail boom and cover. The tail outline is made of two parts joined at the centre and has three ribs. Cement the tail frame on top of the boom before covering.

Stick the bearing and rear hook to either end of the motor stick using several coats of cement, then cement the tail boom in position making sure that the settings are according to the drawing.

The sketch of the propeller is self explanatory. The propeller shaft is pushed through the hub, bent over and cemented.

Put 200 turns on the motor and launch gently. The model should just maintain its height and then come down slowly flying in circles of about 5 feet diameter. If it does not, make adjustments by bending the tail boom. Gradually work up to full turns, about 1,000, at which the model should spend most of its time "scraping the ceiling."



FOLLOWING full size practice, this small model is a flying scale model of a Wakefield class model. The small model distinguished itself by having a very good performance, a particularly flat glide, very robust construction (the only damage to date has been a broken propeller blade when the model fell out of a tree onto a road), and above all a really neat appearance. The larger Wakefield was eventually built, and was similar in layout but with an octagonal section fuselage, folding propeller, and internal wing and tail fittings, which were not thought worth while on the smaller machine. The construction is straightforward, and should present no difficulty to anybody who has built up one of the ordinary slap-sided, high-wing models so popular to-day. The drawings are pretty well complete, but here is a summary of the building and trimming operations for the newcomers

Fuselage.

First of all, build up two flat sides of 3/32 in. square balsa on the plan. Then cut out the formers and the three card templates and, slipping the latter into the positions shown on the plan, join the nose and tail of the two sides together. Now add the formers and cross members, taking care to cement the latter thoroughly, as they come in for a fair amount of rough use. Now add the top and bottom stringers, which are also 3/32 in. square, and put on diamond fashion, both being in one piece. The outer sides of the stringers must now be sanded down so that they lie in the same plane as their respective formers. The stringers could be put on flat, but this does not give such a sharp, clean edge to the apex. Now add the paper tubes for the undercarriage legs, making sure these are symmetrical, and then the various gussets and the fixed under-fin. Finally, plank in the nose as shown on the drawing, and make sure there are no projections to spoil the surface of the tissue.

Wing.

This is best made in one piece and built on the plan. The leading edge and trailing edge and the bottom spar are then cracked and the wing tips lifted up to give the correct dihedral. The 1/32 in. sheet spar joining webs are now cemented in place, and also the 1/16 in. sheet gussets. The centre section formers are now fitted. The top of the centre section is now sheeted in. After a final sandpapering the wing is finished.

Tail Unit.

This follows normal construction and should present little difficulty. The fin is cemented to the tailplane, and anchored more securely by two thin strips of balsa cemented round the outside. No trimming tab is used on the fin, as it is sufficient to move the whole unit, the model not being unduly sensitive to this. The tail unit is attached to the rear fuselage by the usual rubber band.

Undercarriage.

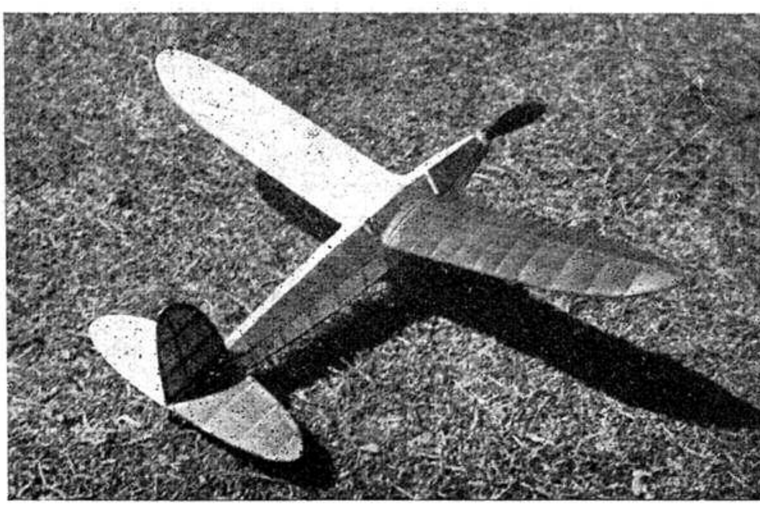
This merely consists of two bamboo legs, tapered as shown on the drawing, with the wheels on short stub axles which are bound on the bottom of the legs, the leg simply plugging into the paper tubes in the fuselage.

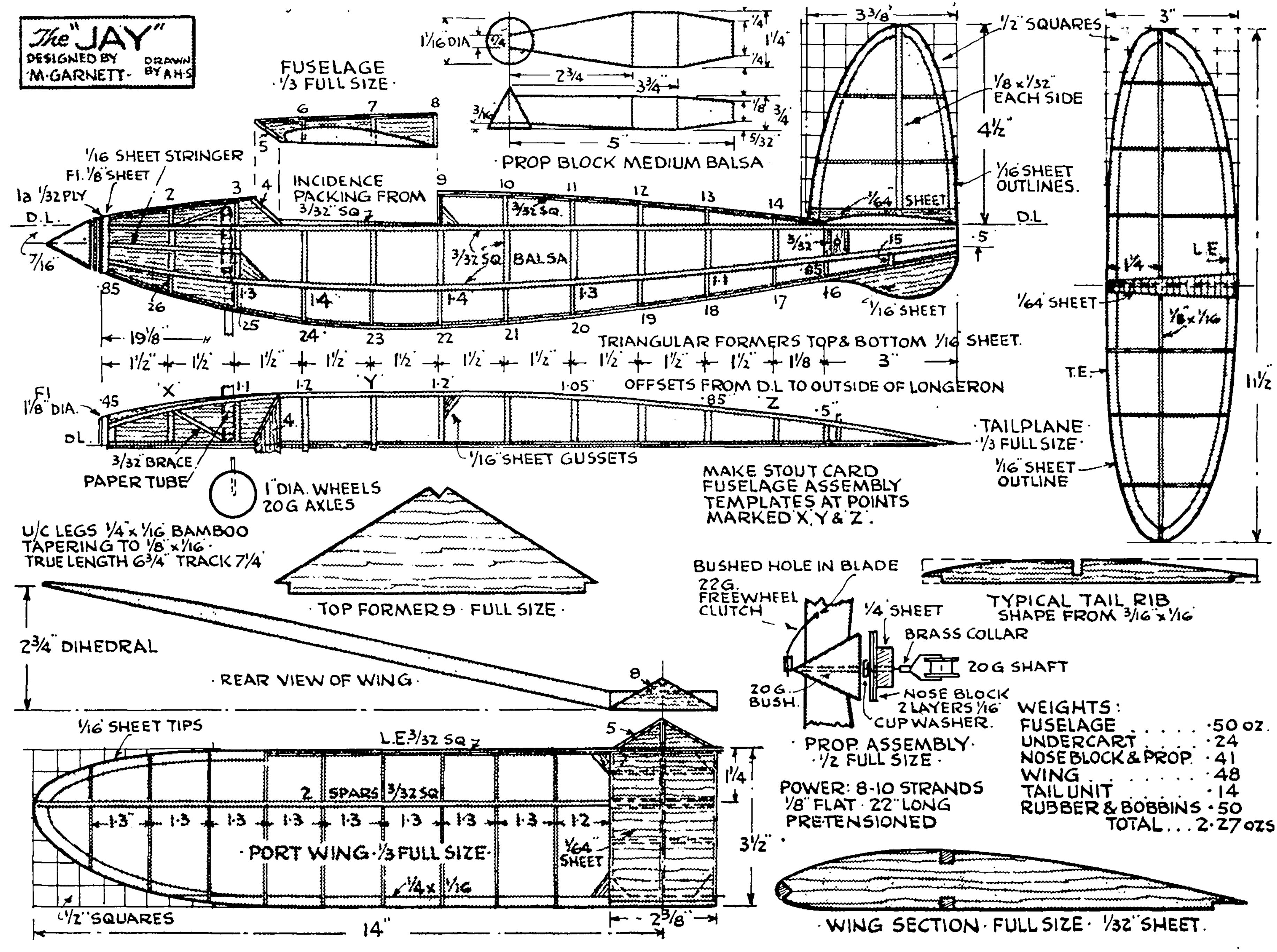
Propeller and Nose-block.

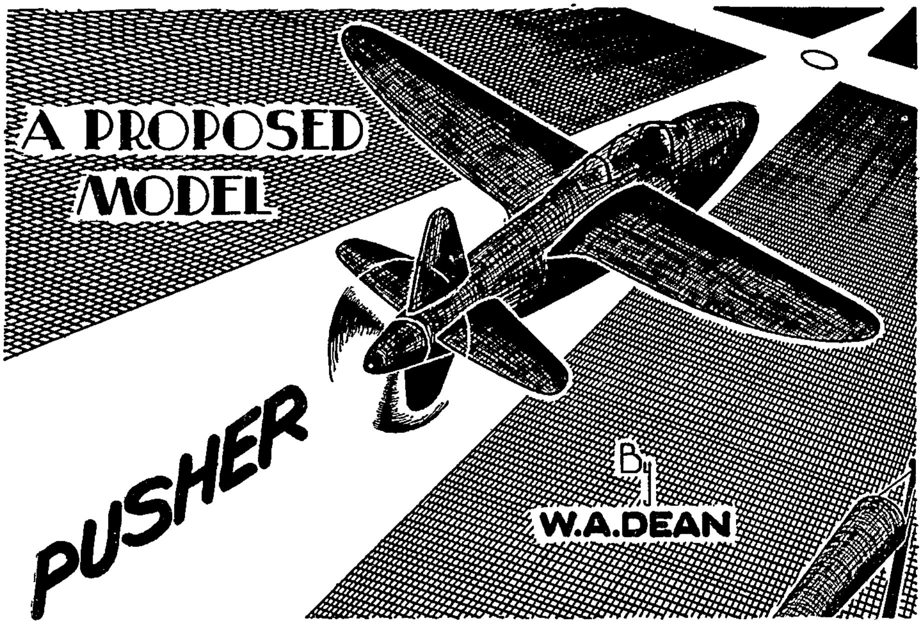
The nose-block is simply a flat disc of laminated balsa, with a square locating piece which plugs into the nose former on the fuselage. A 20 s.w.g. bush is cemented into the centre of the block. The propeller can be carved from the block shown on the drawing, which gives a small diameter type with fairly narrow blades. The finished propeller should be covered with tissue and doped to give a glossy finish and increased shock resistance. For those who feel unable to carve their own propellers, a standard 10-in., 1·4 pitch Ho-wood type is satisfactory, but the spinner should be built up from thin sheet to avoid undue weight. A simple type free wheel, as used by Mr. Rippon, was used on the model, while the propeller shaft is bent up from a length of 20 s.w.g. wire.

Motor.

On a small model it is not possible to use the 100 per cent. power airframe weight ratio favoured for Wakefields, as the smaller structure is less efficient than the larger one. The power, therefore, consists of eight strands of 1/8 in. flat rubber, made up into a skein 22 in. long, and pre-tensioned. This power seemed ample on the original machine, but ten strands of 1/8 in. give a really impressive climb although a smaller duration.




The "JAY"
DESIGNED BY M·GARNETT·
DRAWN BY A.H.S
FUSELAGE ·1/3 FULL SIZE·
PROP BLOCK MEDIUM BALSA
1/2" SQUARES
1/8 x 1/32" EACH SIDE
1/16 SHEET OUTLINES.
1/64 SHEET
1/16 SHEET STRINGER
FI. 1/8 SHEET
1a 1/32 PLY
INCIDENCE PACKING FROM 3/32" SQ
3/32 SQ BALSA
1/16 SHEET
TRIANGULAR FORMERS TOP & BOTTOM 1/16 SHEET.
OFFSETS FROM D.L TO OUTSIDE OF LONGERON
TAILPLANE ·1/3 FULL SIZE·
1/16 SHEET OUTLINE
1/16 SHEET GUSSETS
3/32 BRACE
PAPER TUBE
1" DIA. WHEELS 20G AXLES
MAKE STOUT CARD FUSELAGE ASSEMBLY TEMPLATES AT POINTS MARKED X, Y & Z.
U/C LEGS 1/4" x 1/16 BAMBOO TAPERING TO 1/8" x 1/16 · TRUE LENGTH 6 3/4" TRACK 7 1/4
·TOP FORMER 9 · FULL SIZE·
2 3/4" DIHEDRAL
·REAR VIEW OF WING·
BUSHED HOLE IN BLADE
22G. FREEWHEEL CLUTCH
1/4 SHEET
BRASS COLLAR
20G SHAFT
20G BUSH.
NOSE BLOCK 2 LAYERS 1/16"
CUP WASHER.
TYPICAL TAIL RIB SHAPE FROM 3/16" x 1/16
· PROP ASSEMBLY · 1/2 FULL SIZE ·
POWER: 8-10 STRANDS 1/8" FLAT 22" LONG PRETENSIONED
WEIGHTS:
FUSELAGE .... ·50 oz.
UNDERCART ·24
NOSEBLOCK & PROP. ·41
WING ·48
TAIL UNIT ·14
RUBBER & BOBBINS ·50
TOTAL ... 2·27 ozs
1/16" SHEET TIPS
L.E. 3/32 SQ
2 SPARS 3/32 SQ
·PORT WING·1/3 FULL SIZE·
1/4 x 1/16
1/2" SQUARES
·WING SECTION· FULL SIZE· 1/32" SHEET.



An escape from the orthodox or—to the old-timers—a return to the layout that was once considerably favoured. Pushers present many interesting possibilities and we hope that this article will induce many readers to try their hand at such a model. The type designation under the new system of National Records is 0—I—I—P.

FROM time to time, some very unconventional models have been suggested in THE AERO-MODELLER, but no attempt has so far been made to deal with a " Pusher " of any kind. Considering the interesting possibilities of a model of this type, the writer feels that it is about time something was done regarding the matter. Although, to outward appearances, Pushers are rather unorthodox, their construction can follow much the same lines as the usual tractor type.

The main aerodynamic reason for using a Pusher Airscrew is that turbulent air over the entire aeroplane is avoided, therefore increasing the efficiency of the flying surfaces. In the case of a full size, single-engined machine, there is also the advantage of an unrestricted field of fire and vision. The engine would almost certainly be placed on, or a little forward of the centre of gravity, and the general design apart from the undercarriage and position of the airscrew, resembles that of the existing " Bell Airacobra." But in designing a model, the usual layout will have to undergo several sweeping changes. As we intend to use rubber, in place of an engine driving a long shaft to the airscrew, the weight of the motive power is going to be distributed out over the entire length of the fuselage.

This means that if we just place an airscrew on the rear of a " Wakefield," over half the rubber, plus the weight of this assembly is going to be concentrated aft of the wing. It would need a very hefty undercarriage to bring the C.G. back to anything like a reasonable position.

The obvious thing to do then, is to make the front portion of the fuselage longer and move back the wing slightly. If a heavy airscrew was used, the fuselage would have to be lengthened an alarming amount, but as the airscrew is unlikely to take any shocks on landing or in crashes, an ultra-light assembly can be made. In addition, a long shaft carried forward of the tailplane would avoid having the weight of any rubber in the extreme rear and also allow the fuselage to be tapered off at this point in the usual manner.

After considering these simple factors, an approximate C.G. position would appear to be about 55 per cent. back of the total fuselage length, the leading edge of the wing having 33 per cent. of its chord in front of this point. The former position will undoubtedly vary according to the construction used, so a good plan would be to have the undercarriage movable and thus obtain the final balance through this member.

As the object of this article is only to put forth a few ideas around which the reader can design his own " Pusher," no detailed plans of the general construction have been made. Instead, the following brief notes will give a rough idea of just how the writer intends to build the model shown in the adjoining drawing.

Fuselage.

About twelve formers of 1/32 in. sheet, slotted to receive eight stringers, sheet covered back to C.G.

Wing.

Two halves attached to the fuselage by means of dowels. Twenty-four 1/32 in. sheet ribs cemented to a 1/8 in. by 1/4 in. main spar. 1/64 in. sheet covered leading edge.

Tail Surfaces.

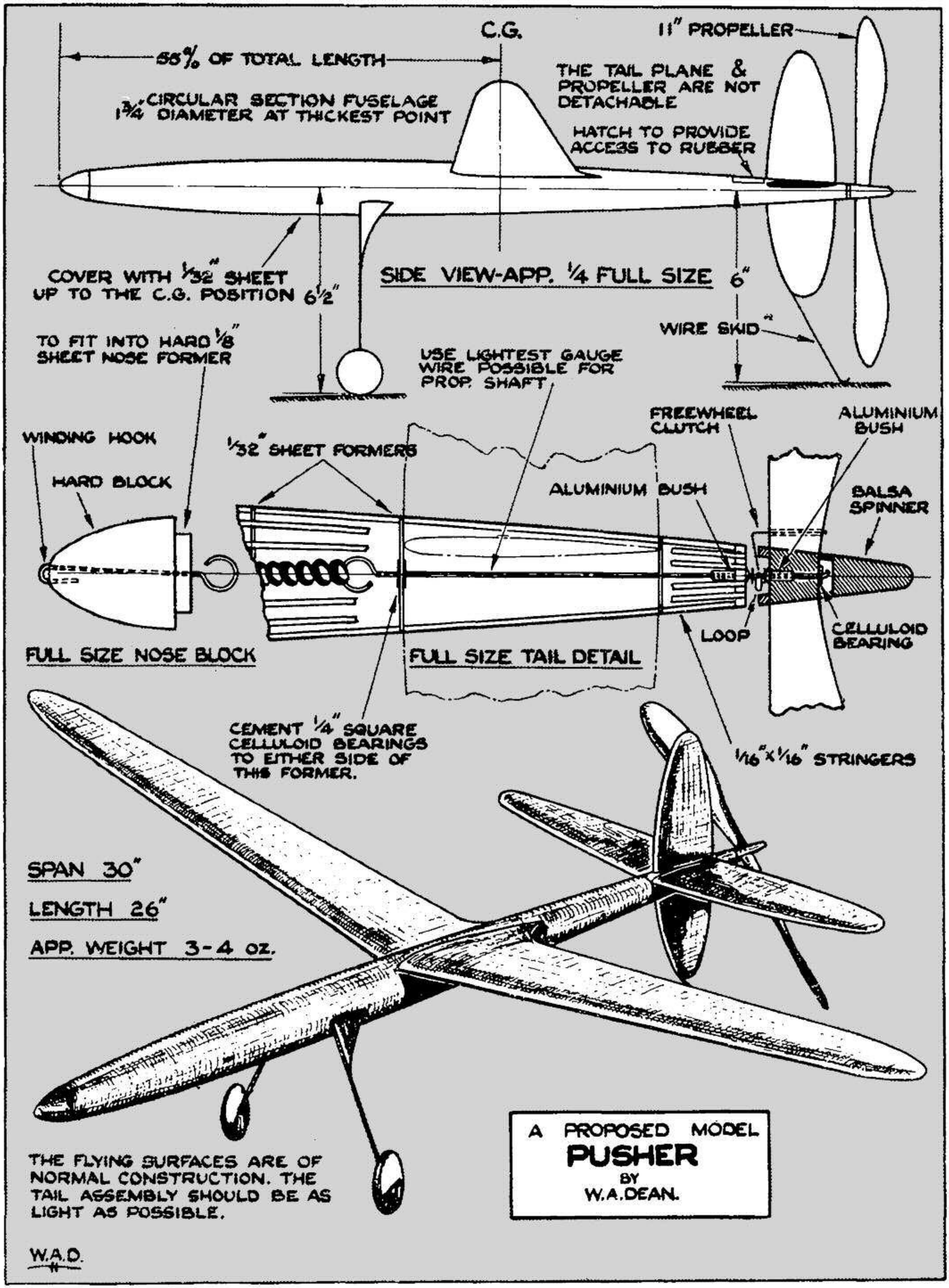
Very light outlines of 1/16 in. sheet with 1/32 in. ribs, cemented to the fuselage.

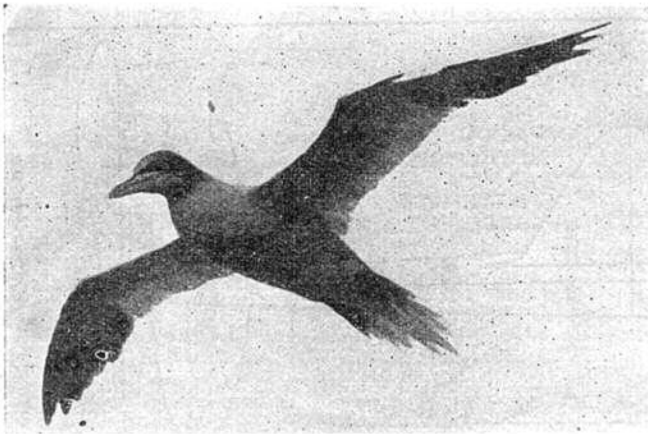
Propeller Assembly.

Preferably built up with ribs, and then sheet covered (see article by Mr. Day in the November, 1941, issue) or else carved from very soft balsa block. The free-wheel is fully detailed on the plan. If desired, the propeller may be removable, although this is not really necessary —apart from the point of view of transport—as the rubber is intended to be wound from the front, by the loop on the nose block.

So much for the construction. As regards flying the model, it would seem that the usual methods of trimming would still hold good.

In conclusion, here's wishing all modellers who have a go at this project, the best of luck. Who knows—in time, this type may even prove its superiority over the old tractor.


C.G.
55% OF TOTAL LENGTH
11" PROPELLER
THE TAIL PLANE & PROPELLER ARE NOT DETACHABLE
3/4 CIRCULAR SECTION FUSELAGE 1 3/4 DIAMETER AT THICKEST POINT
HATCH TO PROVIDE ACCESS TO RUBBER
COVER WITH 1/32" SHEET UP TO THE C.G. POSITION
6 1/2"
SIDE VIEW-APP. 1/4 FULL SIZE
6"
WIRE SKID
TO FIT INTO HARD 1/8" SHEET NOSE FORMER
USE LIGHTEST GAUGE WIRE POSSIBLE FOR PROP. SHAFT
FREEWHEEL CLUTCH
ALUMINIUM BUSH
WINDING HOOK
1/32" SHEET FORMERS
HARD BLOCK
ALUMINIUM BUSH
BALSA SPINNER
LOOP
CELLULOID BEARING
FULL SIZE NOSE BLOCK
FULL SIZE TAIL DETAIL
CEMENT 1/4" SQUARE CELLULOID BEARINGS TO EITHER SIDE OF THIS FORMER.
1/16" x 1/16" STRINGERS
SPAN 30"
LENGTH 26"
APP. WEIGHT 3-4 oz.
THE FLYING SURFACES ARE OF NORMAL CONSTRUCTION. THE TAIL ASSEMBLY SHOULD BE AS LIGHT AS POSSIBLE.
A PROPOSED MODEL
PUSHER
BY
W.A.DEAN.
W.A.D.



TECHNICAL TOPICS

By R. H. WARRING

(Photo shows a "natural" airfoil.)

I MUST apologise for once again embarking upon the subject of airfoils, but at a recent lecture an interesting point was raised, the answer to which should be of assistance to all branches of the aero-modelling world. It concerns the numbering of the N.A.C.A. series of airfoils and I was asked whether these were mere serial numbers or conveyed more than this. Actually, all the numbers of the N.A.C.A. series of related airfoils do express the main profile form in quite a simple manner. This means that given the number of the airfoil it is possible to construct a fair copy of the actual airfoil without knowing the exact ordinates. Further, knowing the basic equation giving the ordinates for the whole series, expressed in empirical form and embracing all thickness/chord ratios, any airfoil of the series may be constructed once the number is known.

The first point should appeal particularly to the solid modellers. Often they may know the particular N.A.C.A. wing section employed on a certain type, but have not the references to draw it out. The following explanation then, should enable them to quickly draw out a fair copy without resort to tables of ordinates.

Briefly, an airfoil is completely defined when the following criteria are known :—

(*a*) The equation of the mean camber line given by
  (i) Value of maximum camber
  (ii) Location of maximum mean camber.

(*b*) The equation of the profile.

In the N.A.C.A. series we are considering each airfoil is represented by a four figure number.

(i) The first digit gives the maximum value of the mean camber expressed as a percentage of the chord.

(ii) the second digit gives the location of the maximum mean camber in one tenths of the chord.

Thus the first two digits give both criteria of definition (*a*) above.

(iii) The last two digits give the thickness of the section expressed as a percentage of the chord.

Taking N.A.C.A. 2415 as an example we can read off right away that the mean camber line has a maximum camber of 2 per cent. of the chord and is situated at four tenths, i.e. .40 per cent. of the chord from the leading edge. The actual section is formed by adding a symmetrical fairing about this mean camber line whose thickness is 15 per cent. of the chord.

For the person desirous of accurately reproducing the section condition (*b*) above, i.e. the equation of the profile or symmetrical fairing must also be known, it is not sufficient to just know its thickness.

The ordinates for any thickness may be determined from the equation.

$$\pm\, y = 5t\,(0{\cdot}2969\,\sqrt{x} - {\cdot}126x - {\cdot}3516x^2 + {\cdot}2843x^3 - {\cdot}10150x^4)$$

where y is the ordinate, t is the thickness and x taken as fractions of the chord length. The leading edge radius is given by

$$r = 1.1\ t^2$$

A further supplementary series of N.A.C.A. airfoils was subsequently developed, characterised by five figures in the serial number. These sections were actually prepared to study the effect of moving the maximum mean camber point forward. Five positions were taken in all, at 5, 10, 15, 20 and 25 per cent. of the chord. The corresponding "serial numbers" were designated 10, 20, 30, 40 and 50 respectively. Thus, taking the maximum mean camber at 15 per cent. of the chord, the serial number is 30 and, combined with an actual maximum camber of, say, 2 per cent., the series 230 . . was originated. The actual thickness of the section is given by the last two figures as before. Thus 23012 means a section with a thickness of 12 per cent. of the chord having a maximum mean camber of 2 per cent. of the chord situated at 15 per cent. of the chord from the leading edge.

Thus it is possible to visualise the physical shape of each of the sections in these related series and thus make quick superficial comparisons. As a further example, it is obvious that a purely symmetrical section has a mean camber line which is linear, i.e. a straight line, and that the maximum camber of this line must therefore be zero. The series of symmetrical sections thus start 00. ., the remaining two figures giving the thickness, e.g. 0009, 9 per cent. of the chord thickness; 0015, 15 per cent of the chord thickness, etc.

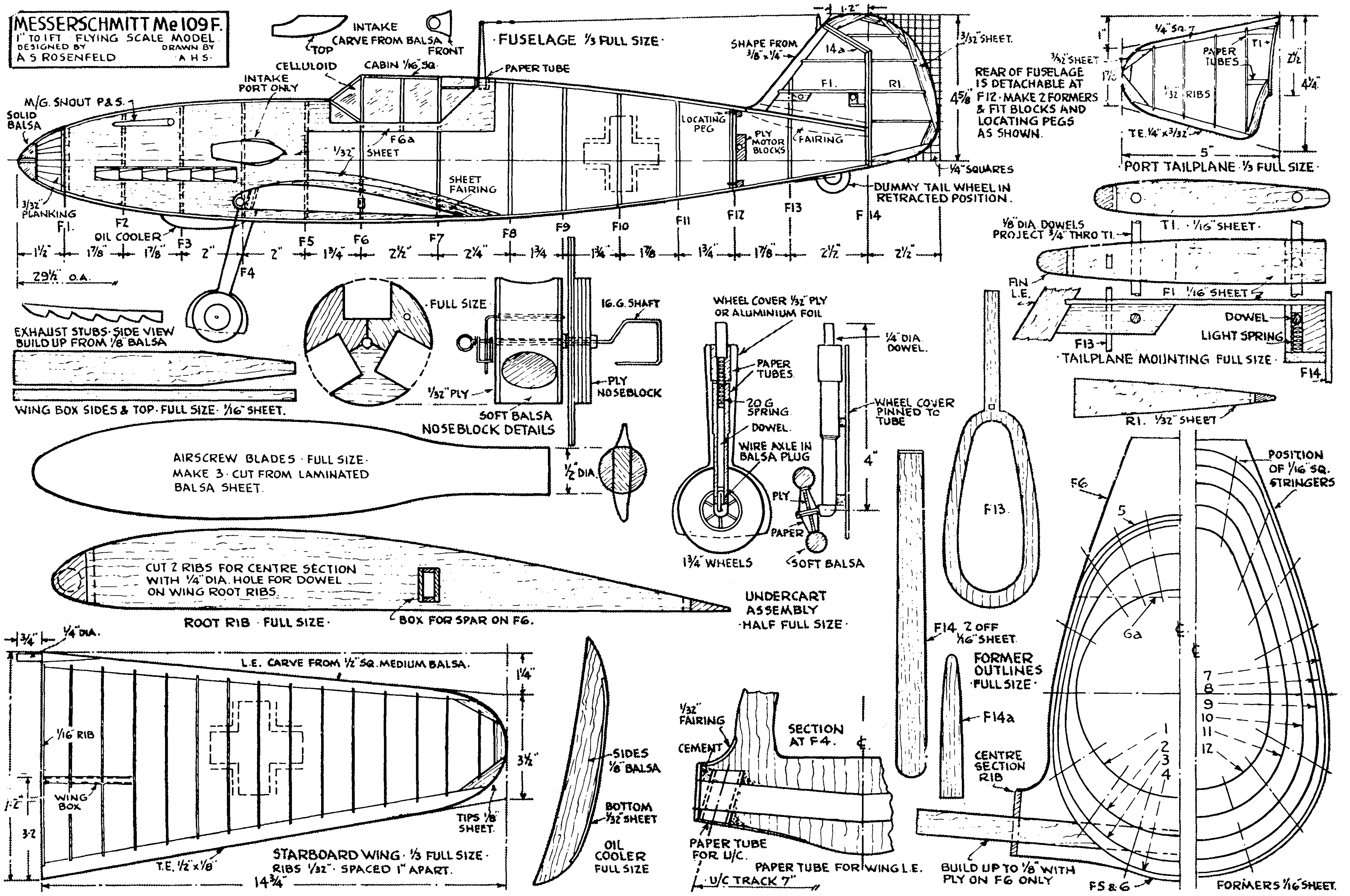
Such a comprehensive series, of course, must "encroach" upon other standard sections and the following list of familiar airfoils and the nearest N.A.C.A. series equivalent may be of interest.

Clark Y	N.A.C.A. 4412
M.6	N.A.C.A. 2312
Gottingen 398	N.A.C.A. 4412
U.S.A. 35b	N.A.C.A. 5412
Clark Y.H.	N.A.C.A. 3312
M.12	N.A.C.A. 2312
U.S.A. 27	N.A.C.A. 6311
C.72	N.A.C.A. 4512

The "M" series of airfoils were amongst the first to be thoroughly tested and the subject of development made one of scientific and practical effort as opposed to "cut and try" methods. These sections were designed by Max M. Munk, and were tested in the variable density wind tunnel in U.S.A. in 1924. Their basis was the combination of a single profile shape in three thicknesses with a number of systematically varied camber lines. None of the 27 sections evolved were particularly outstanding, with the possible exception of the M.6.

The R.A.F. series 30 to 33 are a further example of a familiar family of related airfoils. The basis section, R.A.F. 30 was a form of Joukowski mathematically derived airfoil and is symmetrical. R.A F. 31 was obtained by giving the centre line of R.A.F. 30 a camber of 2 per cent. R.A.F. 32, designed with the object of obtaining a high value of C_L max., was basically the same with a camber of 4 per cent. This section has rather a large centre of pressure travel and, to overcome this, R.A.F. 33 followed on the same lines but with a reflexed trailing edge.


FROG
SCALE MODEL AIRCRAFT
FROG
TRADE MARK REGD.
MADE IN ENGLAND BY
INTERNATIONAL MODEL AIRCRAFT LTD
For the sole Concessionaires
LINES BROTHERS LTD · TRI-ANG WORKS · MORDEN ROAD · MERTON · LONDON · S·W·19 · ENG



MESSERSCHMITT Me 109 F.
1" TO 1 FT. FLYING SCALE MODEL
DESIGNED BY A S ROSENFELD
DRAWN BY A H S
INTAKE CARVE FROM BALSA
TOP
FRONT
FUSELAGE 1/3 FULL SIZE
CELLULOID
CABIN 1/16" SQ.
PAPER TUBE
INTAKE PORT ONLY
M/G. SNOUT P & S.
SOLID BALSA
F6a
1/32" SHEET
SHEET FAIRING
3/32" PLANKING
OIL COOLER
SHAPE FROM 3/8" x 1/4"
14a
F1.
R1.
3/32" SHEET.
LOCATING PEG
PLY MOTOR BLOCKS
FAIRING
4 5/8"
REAR OF FUSELAGE IS DETACHABLE AT F12 · MAKE 2 FORMERS & FIT BLOCKS AND LOCATING PEGS AS SHOWN.
1/4" SQUARES
DUMMY TAIL WHEEL IN RETRACTED POSITION.
F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12 F13 F14
1 1/2" 1 7/8" 1 7/8" 2" 2" 1 3/4" 2 1/2" 2 1/4" 1 3/4 1 3/4" 1 7/8 1 3/4" 1 7/8" 2 1/2" 2 1/2"
29 1/2" O.A.
1/4" SQ.
3/32" SHEET
PAPER TUBES
T1
1/32" RIBS
T.E. 1/4" x 3/32"
2 1/2"
4 1/4"
5"
PORT TAILPLANE 1/3 FULL SIZE
1/8" DIA. DOWELS PROJECT 3/4" THRO T1.
T1. 1/16" SHEET
FIN L.E.
F1 1/16" SHEET
DOWEL
LIGHT SPRING
F13
TAILPLANE MOUNTING FULL SIZE
F14
R1. 1/32" SHEET
EXHAUST STUBS · SIDE VIEW BUILD UP FROM 1/8" BALSA
WING BOX SIDES & TOP · FULL SIZE · 1/16" SHEET.
FULL SIZE
16 G. SHAFT
1/32" PLY
PLY NOSEBLOCK
SOFT BALSA
NOSEBLOCK DETAILS
1/2" DIA.
AIRSCREW BLADES · FULL SIZE · MAKE 3 · CUT FROM LAMINATED BALSA SHEET.
WHEEL COVER 1/32" PLY OR ALUMINIUM FOIL
PAPER TUBES
20 G SPRING
DOWEL
WIRE AXLE IN BALSA PLUG
1 3/4" WHEELS
1/4" DIA. DOWEL.
WHEEL COVER PINNED TO TUBE
4"
PLY
PAPER
SOFT BALSA
UNDERCART ASSEMBLY · HALF FULL SIZE ·
F13.
CUT 2 RIBS FOR CENTRE SECTION WITH 1/4" DIA. HOLE FOR DOWEL ON WING ROOT RIBS.
ROOT RIB · FULL SIZE ·
BOX FOR SPAR ON F6.
3/4" 1/4" DIA.
L.E. CARVE FROM 1/2" SQ. MEDIUM BALSA.
1 1/4"
1/16" RIB
3 1/2"
WING BOX
TIPS 1/8" SHEET.
STARBOARD WING · 1/3 FULL SIZE ·
RIBS 1/32" · SPACED 1" APART.
T.E. 1/2" x 1/8"
14 3/4"
SIDES 1/8" BALSA
BOTTOM 1/32" SHEET
OIL COOLER FULL SIZE
1/32" FAIRING
CEMENT
SECTION AT F4.
PAPER TUBE FOR U/C.
PAPER TUBE FOR WING L.E.
U/C TRACK 7"
F14 2 OFF 1/16" SHEET.
F14a
FORMER OUTLINES FULL SIZE
CENTRE SECTION RIB
BUILD UP TO 1/8" WITH PLY ON F6 ONLY
F6
5
6a
POSITION OF 1/16" SQ. STRINGERS
7 8 9 10 11 12
1 2 3 4
F5 & 6
FORMERS 1/16" SHEET.

HALIFAX,
Yorks.,
October, 1942

Miss Blandish,
Orchid Villa,
N.E.22

Dear Miss Blandish,

Balsa wood being a thing of the past, supplies of our duration kits are, for the time being, suspended.

All raw materials are difficult to obtain, especially wood of a suitable nature for inclusion in our kits. We are doing everything we possibly can to let you have delivery of your orders.

We have hundreds of customers waiting for deliveries of solids, so please be patient, your turn will come.

Your glowing tribute to our past services is gratefully acknowledged.

Assuring you of our best attention,

Yours faithfully,

MODEL AERO SUPPLIES, and
YORKSHIRE MODEL SUPPLY CO., LTD.

ARMAND'S WAKEFIELD

THE general structural features of this design have already been tested in a shoulder-wing Wakefield class model that I recently constructed, and the proportions, etc., are partly taken from experience gained therein.

Fuselage.

In form the fuselage is streamlined both in fore and aft and vertical directions. The formers are ellipses constructed as follows:—the joins are, of course, found by taking as radius the semi-major axis and as centre the end of the minor: arcs are drawn to cut the major axis: pins are then driven in at these points of intersection and at the end of the minor axis: a loop of thin string is tied tightly round the bases of these pins: the pin at the end of the minor axis is then removed, a pencil inserted in the loop, and drawn round. Nos. 4 and 5 are slightly modified, but these are shown in the drawings, as is also the material required together with a table of the axis. The maximum cross-section has axis 4 in. by 3 in.; this gives a cross-section of 9·42 sq. in., ample for a fuselage of length 30 in. Sixteen equidistant stringers of ⅛ in. square balsa are notched into each former (except for the last bay); because of their closeness it is hardly necessary to cut away the edge of the former between each pair to prevent ridges in the covering, but this might be done if desired. The front former is circular and made up of three plys of 1/16 in. sheet; the portion cut from the centre should be retained and fixed to the back of the nose-block which is a similar disc. The tail portion of the fuselage consists of one former, No. 13, one bay having eight stringers, and a solid block carved to end off the fuselage. The attachment is shown in the drawings.

The construction of the centre-section should be sufficiently clear from the drawings.

All these features have, as I have said, been tried out and found sufficiently strong.

Undergear.

The undercarriage is fully cantilever: it is of wire faired with balsa: the construction should be clear from the plans: this design was chosen for cleanness and simplicity of construction. Note.—The "lever arm" portion is not held in any way except by the rubber; this rubber should be made sufficiently strong to absorb shocks efficiently and when at rest the lever and the rubber should be in line as shown.

A small wheel has been fitted at the rear: this seems to me necessary with such heavy models for efficient take-off. It is carried in a simple fork of thin wire as shown. There should be sufficient spring in this to absorb any shock which may come its way.

Propeller and Nose-block.

The propeller is an American type; actually it is modelled on that used by Mr. Fish on his American Wakefield entry (1937), and has proved its efficiency. I would have recommended a V.P. prop. if one could be designed sufficiently strong and reliable, but such a unit has yet to be evolved.

The nose-block is, as I have said before, of 3 plys of 1/10 in. sheet backed with a position piece of the same cut from the front former; through it runs a screwed bush and a normal motor tensioner catch is secured to the rear. The free-wheel and motor tensioner are of a tested design; a ball-bearing washer is used for efficiency, and the prop. is faired to the fuselage with a spinner (which might be carved or built of plastic balsa) for the same reason.

Motor and Rear Hook.

The motor is about 20 or 22 strands of 3/16 in. by 1/30 in.; this should give plenty of power. The rear hook is fixed in the tail boom as shown and is borne by a sheet of aluminium affixed as shown in the sketch.

Wing.

The wing is tapered and of fairly high aspect ratio. The section, R.A.F.32, is efficient and also sufficiently deep to allow of strong spars being used.

Ribs of 1/16 in. sheet spaced at 2 in. are used. The first and second ribs are of ⅛ in. sheet since they carry the whole strain of the weight in flight; all ribs are notched into leading- and trailing-edges for strength. The L.E. is solid tapering from ½ in. by ½ in. to ¼ in. by ¼ in., and shaped to the section: the T.E. is ➤-section and tapers from ⅝ in. by 3/16 in. to ⅜ in. by 3/32 in. The main spars are ⅛ in. square sunk below the rib surface as shown for smooth covering, and are formed for part of the span into a box by the addition of 1/16 in. sheet between the ribs. This type of spar gives fine strength for little weight; also the fact that the box sides stop before the tips helps to lighten the latter. The tips themselves are elliptical for efficiency and formed of 1/16 in. sheet.

Holes are bored in the first two ribs as shown to take them.

The area is little below 210 sq. in. and the aspect ratio is a little above 10. Dihedral is 4 in.

Elevator.

The area of the elevator was almost exactly 70 sq. in. This is given by a span of 20 in. and an average chord of 3·5 in. The construction is evident. Note that the inner spars are continuous and that the trimmer runs right across behind the fuselage—this avoids the annoying tendency for separate trimmers to take up different angles. The section is non-lifting and the incidence is 0 in. In my opinion lifting tails make for over-sensitive adjustment.

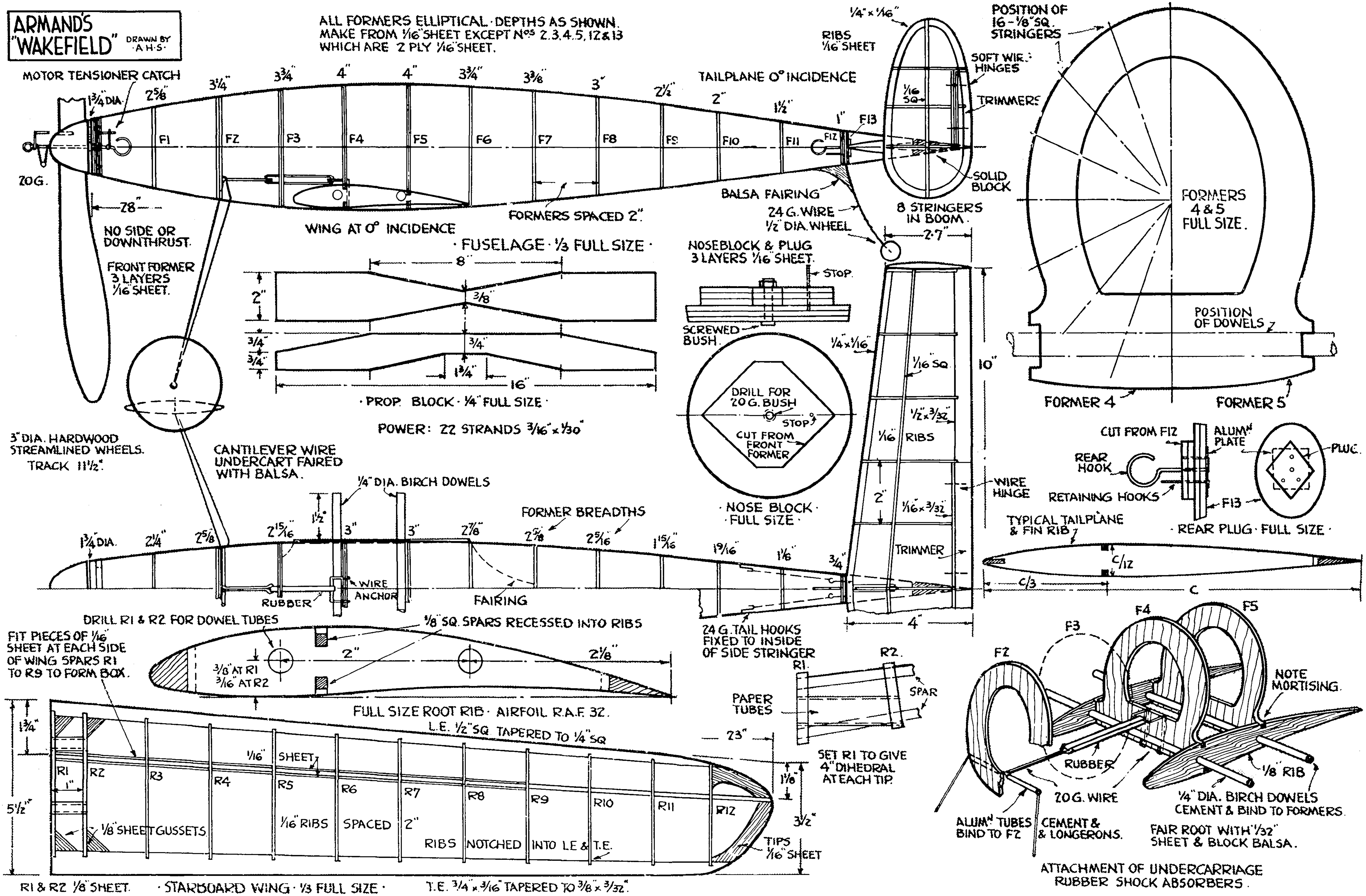
Rudders.

Twin rudders are employed as I consider that these tend to decrease end losses from the tailplane. Trimmers are fitted as shown.

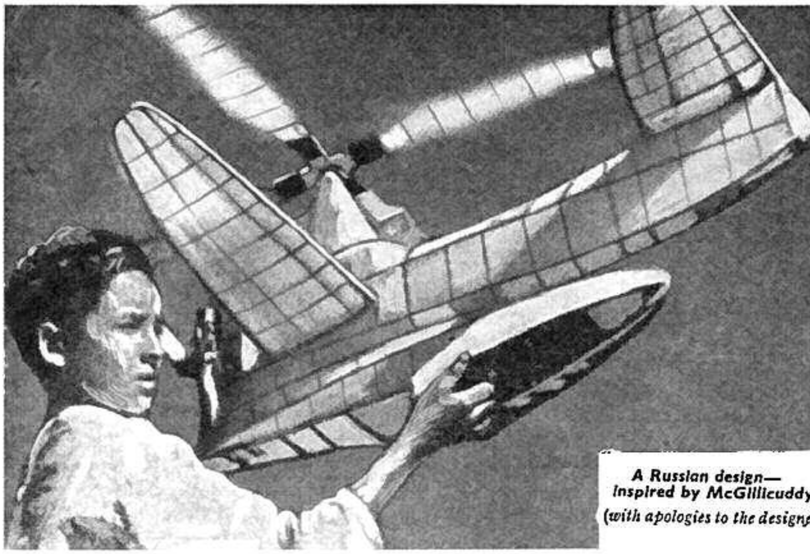
Generally speaking the design is such that the weight comes over 8 oz. as found in the earlier model mentioned before, and the strength should be ample.

Turning flight is obtained by use of sidethrust and offset of both trim tabs.

REDUCED SCALE WORKING PLANS ARE GIVEN ON PAGES 524-525 OF THIS ISSUE.



ARMAND'S "WAKEFIELD"
DRAWN BY A·H·S·
ALL FORMERS ELLIPTICAL · DEPTHS AS SHOWN.
MAKE FROM 1/16" SHEET EXCEPT Nos 2,3,4,5,12 & 13
WHICH ARE 2 PLY 1/16" SHEET.
MOTOR TENSIONER CATCH
1 3/4" DIA.
20 G.
2 5/8" 3 1/4" 3 3/4" 4" 4" 3 3/4" 3 3/8" 3" 2 1/2" 2" 1 1/2" 1"
F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12 F13
TAILPLANE 0° INCIDENCE
2.8"
NO SIDE OR DOWNTHRUST.
FRONT FORMER 3 LAYERS 1/16" SHEET.
WING AT 0° INCIDENCE
FORMERS SPACED 2".
BALSA FAIRING
24 G. WIRE
1/2" DIA. WHEEL
· FUSELAGE · 1/3 FULL SIZE ·
1/4" x 1/16"
RIBS 1/16" SHEET
SOFT WIRE HINGES
1/16" SQ.
TRIMMERS
SOLID BLOCK
8 STRINGERS IN BOOM.
2.7"
POSITION OF 16 - 1/8" SQ. STRINGERS
FORMERS 4 & 5 FULL SIZE.
POSITION OF DOWELS
FORMER 4
FORMER 5
8" 2" 3/8" 3/4" 3/4" 3/4" 1 3/4" 16"
· PROP. BLOCK · 1/4" FULL SIZE ·
POWER: 22 STRANDS 3/16" x 1/30"
NOSEBLOCK & PLUG 3 LAYERS 1/16" SHEET.
STOP.
SCREWED BUSH.
DRILL FOR 20 G. BUSH
STOP
CUT FROM FRONT FORMER
· NOSE BLOCK · FULL SIZE ·
1/4" x 1/16"
1/16" SQ.
10"
1/2" x 3/32"
1/16" RIBS
2"
1/16" x 3/32"
WIRE HINGE
TRIMMER
4"
CUT FROM F12
ALUMN PLATE
PLUG.
REAR HOOK
RETAINING HOOKS
F13
· REAR PLUG · FULL SIZE ·
TYPICAL TAILPLANE & FIN RIB
C/12
C/3
C
3" DIA. HARDWOOD STREAMLINED WHEELS.
TRACK 11 1/2".
CANTILEVER WIRE UNDERCART FAIRED WITH BALSA.
1/4" DIA. BIRCH DOWELS
1 1/2"
FORMER BREADTHS
1 3/4" DIA. 2 1/4" 2 5/8" 2 15/16" 3" 3" 2 7/8" 2 5/8" 2 5/16" 1 15/16" 1 9/16" 1 1/8" 3/4"
WIRE ANCHOR
RUBBER
FAIRING
24 G. TAIL HOOKS FIXED TO INSIDE OF SIDE STRINGER
DRILL R1 & R2 FOR DOWEL TUBES
1/8" SQ. SPARS RECESSED INTO RIBS
3/8" AT R1
3/16" AT R2
2"
2 1/8"
FULL SIZE ROOT RIB · AIRFOIL R.A.F. 32.
FIT PIECES OF 1/16" SHEET AT EACH SIDE OF WING SPARS R1 TO R9 TO FORM BOX.
R1 R2 PAPER TUBES SPAR
SET R1 TO GIVE 4" DIHEDRAL AT EACH TIP.
L.E. 1/2" SQ. TAPERED TO 1/4" SQ.
1 3/4"
1/16" SHEET
23"
R1 R2 R3 R4 R5 R6 R7 R8 R9 R10 R11 R12
1"
5 1/2"
1 1/8"
3 1/2"
1/8" SHEET GUSSETS
1/16" RIBS SPACED 2"
RIBS NOTCHED INTO L.E. & T.E.
TIPS 1/16" SHEET
R1 & R2 1/8" SHEET.
· STARBOARD WING · 1/3 FULL SIZE ·
T.E. 3/4" x 3/16" TAPERED TO 3/8" x 3/32".
F2 F3 F4 F5
NOTE MORTISING.
RUBBER
1/8" RIB
20 G. WIRE
1/4" DIA. BIRCH DOWELS CEMENT & BIND TO FORMERS.
ALUMN TUBES BIND TO F2
CEMENT & & LONGERONS.
FAIR ROOT WITH 1/32" SHEET & BLOCK BALSA.
ATTACHMENT OF UNDERCARRIAGE RUBBER SHOCK ABSORBERS.



A Russian design—inspired by McGillicuddy? *(with apologies to the designer)*

MORE ABOUT McGILLICUDDY

By ROBERT JAMIESON

And further yet shall spread his fame,
And greater yet shall be his name,
Till grand across the sunset ruddy
There flames the name McGillicuddy!

THE above simple stanza was written by our club bard. He never intended his words to be taken seriously, they were declaimed in a spirit of raillery on a rather hilarious occasion when one of the Maestro's experiments went wrong. Had you told him then that one day his words would come true, he would have laughed at you; but the incredulous of to-day is the commonplace of to-morrow, and we see now that his words were inspired and prophetic.

Daily, I may almost say hourly, I continue to receive messages from keen aeromodellers in all parts of the world saying how they have been assisted, cheered and encouraged by the Maestro's philosophy and teachings, and in some cases not only by his theories and facts, but in spite of them. "Any questions?" They are in almost embarrassing profusion. "Where can copies of his famous books be obtained?"; "Who (and why) are the publishers?" "What did McGillicuddy think of this?"; "What were his opinions on that (if any and why)" and so on *ad infinitum*.

Naturally, as his chronicler and scribe, this mass of correspondence has thrown a heavy burden upon the writer, but I have tackled this task cheerfully, I might almost say lightheartedly, believing that in this way I am doing some small service to our hobby by telling all his many fans "More about McGillicuddy." There is only one fly in the ointment.

Regretfully I must record that, in the midst of this swelling chorus of praise the work of the Maestro is receiving, there is one harshly discordant note. I refer to the carping attitude of certain individuals to whom, in the past, we had been wont to look for technical guidance and inspiration.

It may well be, of course, that these individuals feel their present positions untenable; and their thrones tottering under the impact of an intellect greater than their own; and reasoning, no doubt, that if they continue to attack McGillicuddy's work with sufficient ribald and derisive invective, their own work will continue to enjoy the same popularity as in the past. On their action in so doing it is not within my province to comment, I merely record the facts. Thus:

I had written to Mr. D. A. Dussell (Editor of the 'Aeroyodeller') suggesting that our collection of the Maestro's works should be lodged with him, to be held in trust for all aeromodellers. With the suggestion that possibly, when the present emergency is over, they could be re-edited and published in a cheaper form. His reply is remarkable to say the least.

Written—apparently in great mental stress—upon the back of an unpaid bill for two large blocks of balsa (presumably the wheel spats for his "Eastland Byestander") the greater part of his letter consists of rather rude abuse, repetition of which would serve no useful purpose. He does say, however, that it is no part of his job to collect old junk; and, if I have some waste paper to dispose of, the proper person to get in touch with is the salvage officer for my district.

I regard this as a deliberate insult to the Maestro.

Even worse, is a letter I have received from Mr. J. M. Haxwell, of the Slasgow club, in which he says that McGillicuddy is a gossiping old gasbag; that his book "Aerodynamics for infants and imbeciles" was apparently written for the former by one of the latter; that his calculations are all of the "simple and strong and it does the job" type; and anyway, the Slasgow boys knew all about that sort of thing years ago. This, from one of McGillicuddy's own countrymen, a fellow Scot! Fie for shame, Mr. Haxwell!

It is self evident the Maestro had a highly developed scientific mind. I have actually seen him calculating the area and auric resistance (in ohmns) of elliptical wings, putting one thousand and ninety-three turns upon a rubber motor with a winder geared at seven and five-eighths to two and twenty-one sixty-fourths, and crooning "Mother Machree" *all at one and the same time*.

Need more be said?

Before leaving the subject of his enemies, we cannot refrain from mentioning the dastardly actions of a certain artist who publishes his work under a nom-de-plume; or would it be more fitting to describe it as an alias? This individual, after publicly referring to one of the Maestro's books as 'this wretched work' has even gone so far as to caricature the Maestro, depicting him as a bibulous and swash-buckling old scoundrel. McGillicuddy, whose distinguished appearance and dignified address were an asset to any flying field. Such conduct is beneath contempt, though it does serve as a melancholy example of the depths of depravity to which normal kindly people will sink, when driven by the twin demons of malice and envy.

Owing to this prejudice and hostility in high places, the task of arranging and correlating the enormous mass of notes left by the Maestro will be long and difficult. Already I have discovered a new theory of "Eventual return" which, based on a tremendous amount of complications and calculations involving the height above sea level and phonic catabulence in decibells, seems to prove beyond doubt that "However far a body be directed contrary to the force of gravity, the directive energy must eventually be expended, whereupon the force of gravity will immediately reassume control," or to put it more simply "what goes up must come down." The effect of this startling theory upon the future study of aerodynamics simply cannot be calculated.

Under the heading of—

Squat and square or sleekly round,
Which flies the best when fully wound ?
Leave theory upon the shelf,
Let each man find out for himself.

The Maestro would seem to have anticipated the great slabside versus streamline controversy. And still further among his notes we find another gem of 'McGillicudalia' under the heading of "Advice to Seaplane Punters, stunters and thermal hunters."

To slab, or else to stream that is the issue,
Yet let there be no wrinkle in the tissue,
For if the thermal you'd strike on the nob,
Take care and pains to build a decent job.

This is proof positive that not only had the Maestro foresaw the great slab *v* stream argument long before Messrs. Copland and Smith tossed their hats into the ring, but had already decided upon his attitude to this momentous question, he intended to maintain the strictest neutrality, the conduct we could expect from so high an authority.

For some time previous to his disappearance, McGillicuddy had been engaged in a highly interesting series of experiments in connection with power assisted bird flight; ably assisted by his pet seagull Drambuie.

Unfortunately, I have not found any traces of his notes and reports with regard to these researches, so I cannot give any technical information regarding them, but can only describe the actual experiments.

The apparatus used was quite simple: consisting of a motor stick with a thrust bearing at one end and a rubber anchorage at the other. A 16 in. coarse pitch propeller was driven by a 14 strand rubber motor, about half-way along the motor stick was a short perch mounted at right angles and free to slide a few inches back or forward, thus allowing Drambuie to adjust his C.G. at will.

When the motor was wound up, Drambuie placed his feet on the perch and held the airscrew in his beak to prevent the motor unwinding, he then took off under his own power until a ceiling of 100 feet or so had been reached, he then released the propeller and held his wings stationary, while the Maestro carefully noted his performance from the ground.

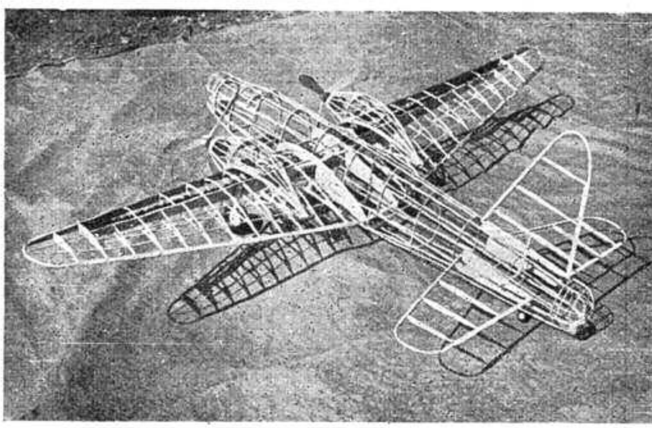
One direct result of this experiment can be seen on every flying field, the vogue for Parasol and Gull type wings; a direct result of the Maestro's pioneer work in this direction.

(I do not recommend that experiments of this sort should be attempted with budgies, canaries or other household bird pets as it is extremely doubtful if any of these will possess the standard of intelligence possessed by Drambuie. The fact that your budgie can mutter 'Jocky's a nice boy' is no criterion.)

FURTHER NOTES ON ELASTIC DRIVE INSIDE THE WINGS

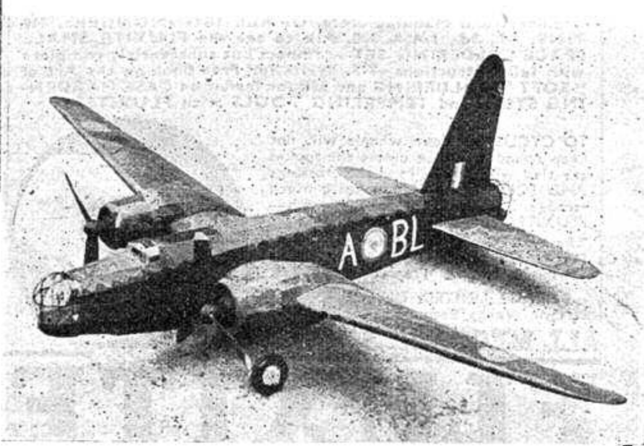
By FLT./LT. R. M. SMITH

In the May issue of the Aeromodeller we published a short article outlining a scheme for Elastic Drive Inside the Wings. Meanwhile the author has completed a flying scale model of the Wellington incorporating this layout and we feel that his report of the difficulties encountered will be of interest to readers. As we anticipated there were many 'snags,' not the least being the relatively small space inside the wing structure to accommodate the rubber motors. This can, of course, be overcome and a similar method has been employed with considerable success on certain commercial models.



The main disadvantages were as follows :—

1. *Only a limited amount of elastic could be squeezed inside the wing whose section was inclined to be inefficiently thick in the first place. (The root section of the majority of cantilever monoplanes is usually quite thick.) Ed.*
2. *Detachable wing fixing gave a lot of trouble and the distribution of weight and strength was unfavourable, even in minor crashes.*
3. *The centre of gravity rises with increase in dihedral, thus tending to cancel out the additional stability.*
4. *In the original model too many gears were employed and the percentage weight of elastic was too low for good durations.*
5. *The main application of this drive and the one which would meet with most success is the flying wing machine.*

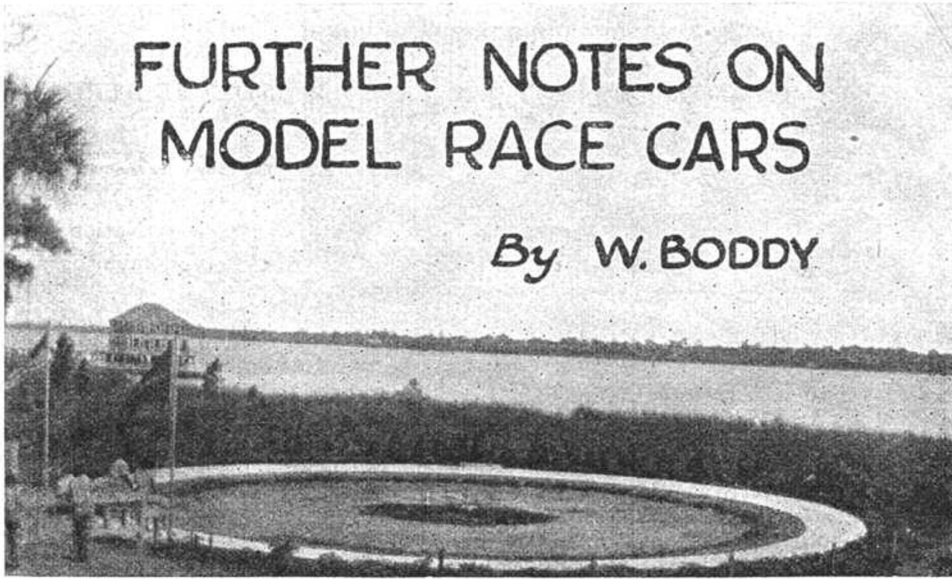


The two photographs are of the author's model Wellington in which the drive has been tested with limited success.

FURTHER NOTES ON MODEL RACE CARS

By W. BODDY

An extremely interesting and informative article by the Editor of *Motor Sport* discussing the possibilities of model race-car design. The heading photograph is particularly interesting, showing as it does a specially constructed model race track by the side of a big track. This is complete in every detail with a crash fence, etc. The pits are on the left. The tethering point is in the centre.

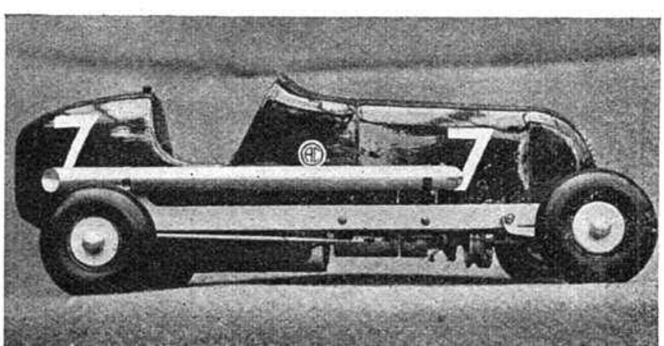


As one who, many moons ago, wrote plaintively to "The Model Engineer" in an attempt to further interest in model car racing, I wish Mr. Russell every possible success in his endeavour to popularise this pastime. It is early yet to visualise how far-reaching the movement will become, but one can hope that some of the enthusiasm prevailing in America will become evident in this country. Over there, of course, many banked concrete tracks of up to 1/16th of a mile to the lap are regularly operated, replete with safety hedges, electric timing, tuning benches, score-boards, loud-speakers and accommodation for the public. Speeds of 70 to 100 m.p.h. are reported, and these "mighty termites" find their own position on the banking during this rapid lappery, the line trailing slack, which must be a very stirring sight.

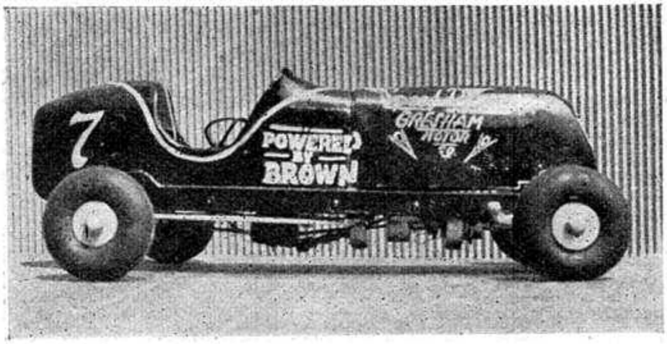
Certainly there should be ample variety, once the pastime gets going. Apart from sheer speed, acceleration contests on the level and uphill will call for different qualities of weight distribution, gearing and suspension. It should not be impossible to hold endurance records of, for example, 15 minutes, 30 minutes or one hour, as I suggested years ago, for both boat and car contests. Making these tiny engines run both fast and long should present some fascinating problems to more advanced constructors of miniature i.c. engines, nor would chassis reliability and accommodation for large fuel tanks, perhaps with pressure-feed, represent easy solutions.

All the foregoing, however, is looking ahead, and we must not forget that things are only just shaping and have scarcely begun. It is for this reason that I would venture to qualify some of Mr. Russell's comments which appeared in the October Aero-Modeller. I notice that a list of cars is given therein, of which photographs appear in back numbers of "Motor Sport," and that these are suggested as possible prototypes.

I was not, myself, responsible for this list and I do feel that, for the present, only purely racing-type cars should be attempted. Making models run fast and reliably should constitute enough of a headache for a while, without attempting to fit models out with mud-guards, windscreens, hoods, doors, etc. Nevertheless, I do agree that cars should look reasonably like the real thing. There is no reason at all why they should not, in outline, resemble recent Mercedes-Benz, Auto-Union, Alfa-Romeo, E.R.A., Maserati or similar racing cars, many photographs of which will be found in past issues of "Motor Sport." The four most difficult obstacles to realism in what little model car building there has been up to now were the modelling of the leaf springs and I-section front axle, the channel-section "dumb irons," the wire wheels and, to a lesser extent, the radiator. We now come to the fortunate realisation that present-day racing cars are most accommodating to the model builder. Leaf-spring springing has given way to independent suspension with wishbone or trailing "axles" controlled by coil springs or torsion bars, and "dumb irons" have vanished in consequence. These forms of suspension should be relatively easy to model—and I think some form of real springing will be needed to obtain proper wheel adhesion at the high speeds these models attain. Radiators on modern racing cars are invariably enclosed behind grilled cowls—again very easy to model. Disc wheels have been used on quite a few racing cars and discs have been seen on the wire wheels of modern record-breaking cars. So many of the former difficulties which beset the model car constructor have been overcome; perhaps we may yet see kits of parts offered here as they now are in the U.S.A. One moan I have got against the Americans—and Mr. Galeota—is that they seem always to base their models on cinder-track cars, inasmuch as the road wheels are out of proportion to the rest of the car. As model cars attain speeds which are above scale in comparison with the real thing (!), why make them appear like the very slowest type of racing car? Indeed, strictly they should



An interesting American model weighing about seven pounds and capable of speeds in excess of 60 m.p.h.



Another American car weighing 6¾ pounds. The body work is of wood.

all appear as Absolute Record cars, like John Cobb's 370 m.p.h. Railton, and, incidentally, such cars should be fairly easy to copy. If builders will remember that not more than between 2½ and 2⅞ times the outside diameter of a tyre should exist between the rear edge of the car's front tyre and the front edge of its rear tyre, and if other proportions are in keeping, decent and realistic appearance will result. Closed cockpit cars have been used for record breaking, so this might form another line of approach, perhaps with the engine protruding up into the cockpit "lid," the central location then suggesting drive to all four wheels, when springing will be out of the question—or have I underrated the ingenuity of the model-maker? In any case, it will be interesting to see whether four-wheel drive and no springing permit as good adhesion as rear or front-drive only and some form of suspension that enables the driven wheels to follow inequalities in the surface of the track. I am assuming that, when things have got as far advanced as this, steering, round the pole, will be accomplished by swivelling and locking the front stub axles, and not by a pivoted front or back axle as such.

Let us, at first, build simple models for sheer speed and learn while doing so. Petrol tanks filled through realistic fillers, decent outside exhaust systems, racing numbers, and similar "essential" fittings should be the only attempts to follow full size practice, apart from a generally effective appearance. To accommodate the engine, flywheel, battery, coil and fuel tank, etc., a fair amount of space about the chassis will be needed and something based on the big Brooklands cars of a past age might be a useful layout. The famous Leyland-Thomas comes to mind, as having had enclosed radiator and "dumb irons," disc wheels, and a long bonnet. External chain drive, as found on some of the aero-engined track cars, might offer an easy means of quickly experimenting with different final drive ratios. Perhaps I may later be allowed to give plans of Brooklands silencers, and typical suspension systems, radiator cowls, body lines, etc. For the present, however, I will just wish builders every possible enjoyment, and remind them that they are pioneers.

National Motor Racing Colours.

N.B.—Colours are based on nationality of entrant, not of car or driver. Principal competitors in recent Grand Prix races: Britain, France, Italy, Germany, Siam. Colour schemes of individual cars will be supplied to the best of the writer's ability, on application to The Aero-Modeller.

National Motor Racing Colours.
(Compulsory in International Contests.)

	Body, bonnet and frame.	*Numbers.*
Great Britain	Green	White.
France	Blue	White.
Germany	White	Red.
Italy	Red	White.
Siam	Blue, yellow	White.
U.S.A.	White, blue	Blue on white.
Switzerland	White, red	Black.
Sweden	Blue, yellow, blue crossbands	White.
Spain	Yellow and red	Black and white.
Rumania	Navy blue, red	Yellow.
Portugal	Red, white	White.
Poland	White, red	Red.
Lithuania	Yellow and green squares	Red.
Latvia	Black, white	Black on white.
Eire	Green, orange band	White.
Hungary	Red, white, green	Black.
Holland	Orange	White.
Finland	Black	Blue on white.
Estonia	Blue, white, black	Black on white.
Egypt	Pale violet	Red on white.
Czecho-Slovakia	Blue, white, red	Blue.
Chile	Blue, red, white	Half blue, half red, on white.
Bulgaria	Green, white	Red on white.
Brazil	Pale yellow, green	Black on yellow.
Belgium	Yellow	Black.
Argentine	Blue, yellow, black	Red on white.

An interesting tether arrangement constructed from an old tyre and wheel with 1/32 in. steel cable "line." This was actually used on the broadwalk of an aerodrome, but is quite suited for any similar surface—even indoors on a wooden floor. It is not heavy enough for speeds over about 60 m.p.h., when the "pull" is sufficient to topple the base.

DETERMINATION OF C.G. POSITION

By T. E. G. BOWDEN
Grad. R.Ae.S., M.I.E.T

A simple technical article explaining how the centre of gravity of a completed machine may be found, following the same practice as employed by full-size aircraft practice.

THE position of the centre of gravity is of great importance when dealing with the equilibrium of of an aircraft. Unless the centre of pressure of the aerofoil is approximately vertically above or below the C.G. the aircraft will require a lift, either upwards or downwards, from the tail unit. As the C.P. does not remain in the same position for varying angles of incidence and the C.G. will alter as fuel is consumed or bombs dropped, etc., it will be seen that the ideal conditions are not likely to occur. However, as it is necessary to keep the error as small as possible, accurate determination of the C.G. is desirable.

There are two methods which are generally employed. The first method is by weighing an actual machine. It is placed on two platform scales, the main wheels resting on one and the tail wheel or skid on the rear scale. Two weighings are then made—one with the tail up as shown in figure 1, and the other with the machine in a tail down attitude (fig. 2). The following readings are taken in both cases:—W_1 the weight recorded on the forward scale, W_2 the weight on the rear scale, a, the distance from a convenient point such as the wing leading-edge to the centre line of the main landing wheels, and b, the distance from the tail wheel to the main wheels. Then by taking moments about the leading-edge the following result is obtained:—

$(w_1 \times a) + w_2(a+b) = W \times X$, where W equals the total weight of the aircraft, $w_1 + w_2$, and X equals the unknown distance of the C.G. from the leading-edge. By re-arranging the equation, $X = \frac{(w_1 \times a) + w_2(a+b)}{W}$, the position of a line passing through the C.G. is obtained. The two values of X obtained from the two different readings enable the C.G. position to be obtained, i.e. the point at which the two lines intersect (fig. 3).

In the above method care must be taken to weigh the machine in still air, as incorrect results will be obtained if this precaution is not adhered to. The scales and the equipment carried in the machine should also be carefully checked.

The second method is by theoretical calculations. The weight of the major items of the machine, e.g. wings, fuselage, engine, undercarriage, etc., and the positions of their centres of gravity, both horizontally and vertically from convenient datum points are estimated and a diagram such as shown in figure 4 constructed. Only a few of the items are indicated in this example. The position of the C.G. may then be obtained by taking moments about the datum points. For example, X, the horizontal distance on the diagram =

$$\frac{w_1 \times x_1 + w_2 \times x_2 + w_3 \times x_3 \text{ etc.}}{W}$$

and Y, the vertical distance =

$$\frac{w_1 \times y_1 + w_2 \times y_2 + w_3 \times y_3 \text{ etc.}}{W}$$

Accurate results may be obtained from the latter method, but the C.G. position should always be checked by the first method whenever a completed machine is available.

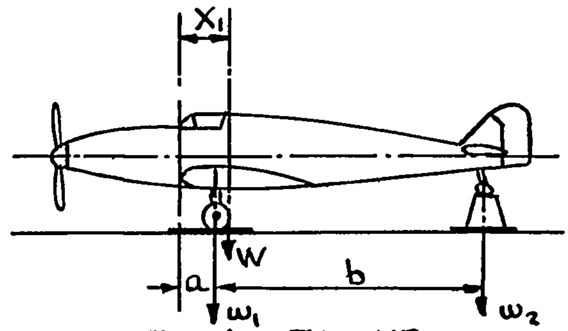


FIG. 1 -TAIL UP.

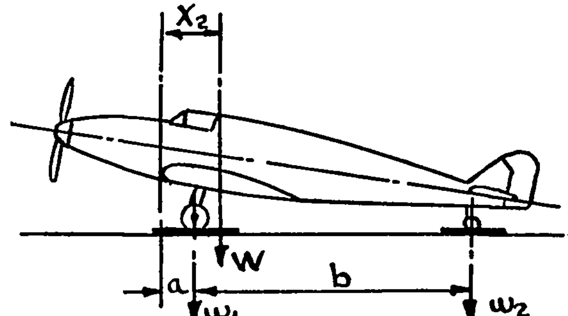


FIG. 2.-TAIL DOWN.

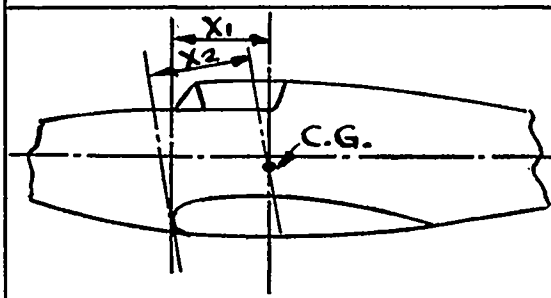


FIG. 3. C.G. POSITION.

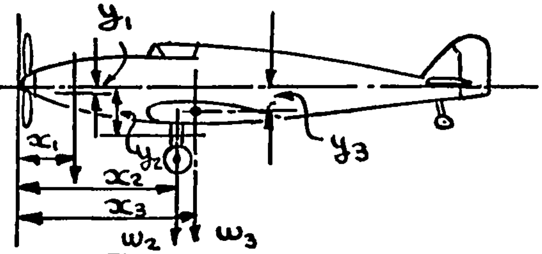


FIG. 4.

A Number of Selected Titles from the

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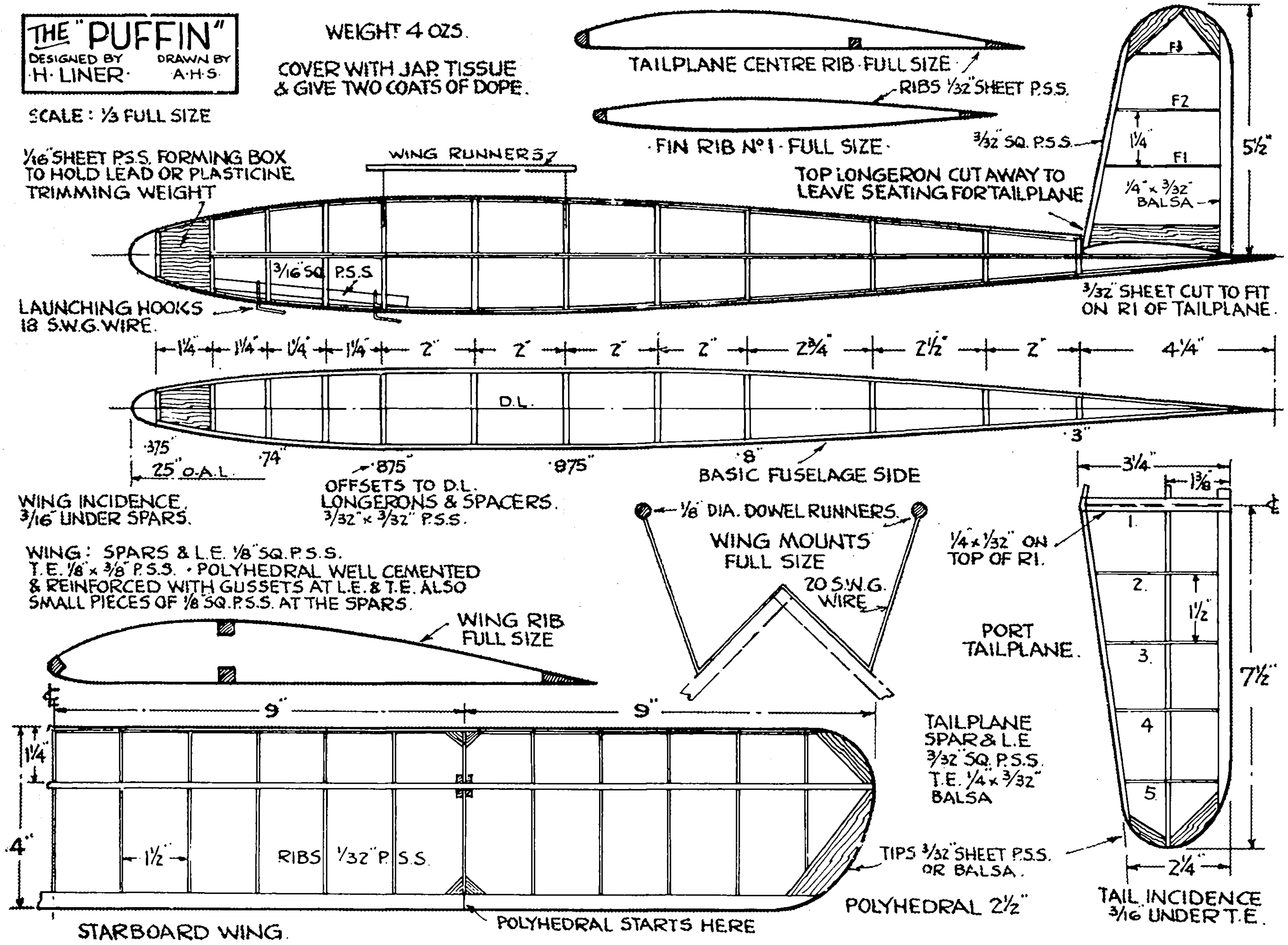


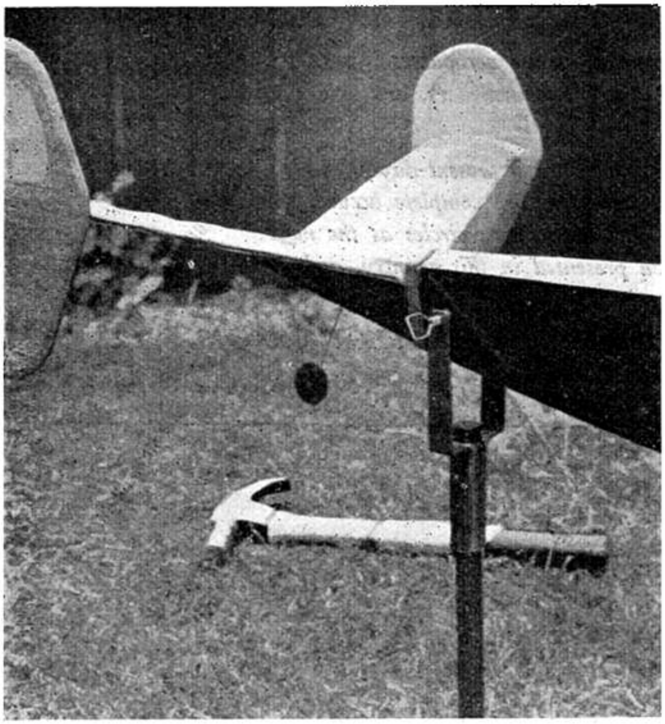
THE "PUFFIN"
DESIGNED BY H· LINER·
DRAWN BY A·H·S·
SCALE : 1/3 FULL SIZE
WEIGHT 4 OZS.
COVER WITH JAP. TISSUE & GIVE TWO COATS OF DOPE.
TAILPLANE CENTRE RIB · FULL SIZE
RIBS 1/32" SHEET P.S.S.
FIN RIB No 1 · FULL SIZE
3/32" SQ. P.S.S.
1/16" SHEET P.S.S. FORMING BOX TO HOLD LEAD OR PLASTICINE TRIMMING WEIGHT
WING RUNNERS
TOP LONGERON CUT AWAY TO LEAVE SEATING FOR TAILPLANE
F3
F2
F1
1/4
1/4" x 3/32" BALSA
5 1/2"
3/16" SQ. P.S.S.
LAUNCHING HOOKS 18 S.W.G. WIRE.
3/32" SHEET CUT TO FIT ON R1 OF TAILPLANE.
1 1/4" 1 1/4" 1 1/4" 1 1/4" 2" 2" 2" 2" 2 3/4" 2 1/2" 2" 4 1/4"
D.L.
·375"
·74"
·875"
·875"
·8"
·3"
25" O.A.L.
OFFSETS TO D.L. LONGERONS & SPACERS. 3/32" x 3/32" P.S.S.
BASIC FUSELAGE SIDE
WING INCIDENCE. 3/16" UNDER SPARS.
WING: SPARS & L.E. 1/8" SQ. P.S.S. T.E. 1/8" x 3/8" P.S.S. · POLYHEDRAL WELL CEMENTED & REINFORCED WITH GUSSETS AT L.E. & T.E. ALSO SMALL PIECES OF 1/8" SQ. P.S.S. AT THE SPARS.
WING RIB FULL SIZE
1/8" DIA. DOWEL RUNNERS.
WING MOUNTS FULL SIZE
20 S.W.G. WIRE
3 1/4"
1 3/8"
1/4" x 1/32" ON TOP OF R1.
1 2 3 4 5
1 1/2
7 1/2"
PORT TAILPLANE.
TAILPLANE SPAR & L.E. 3/32" SQ. P.S.S. T.E. 1/4" x 3/32" BALSA
9"
9"
1 1/4"
4"
1 1/2
RIBS 1/32" P.S.S.
TIPS 3/32" SHEET P.S.S. OR BALSA.
POLYHEDRAL 2 1/2"
2 1/4"
TAIL INCIDENCE 3/16" UNDER T.E.
STARBOARD WING.
POLYHEDRAL STARTS HERE

WIND WITH CARE

By H. V. DUDLEY

WINDING the rubber motor of a fairly large duration model can be a fearful job if your companion is inexperienced, and almost impossible if one is alone. I have tried most of the gadgets described from time to time which should enable one to dispense with the services of a second person, but none of them was quite satisfactory, so I had a go myself at inventing something. The two stereograms should make my idea quite clear.

First, a pointed rod about 14 in. long is knocked about



6 in. into the ground, on the upper portion of which is a two-pronged fork and which is free to revolve about the rod and being held from sliding up or down by two protruding pins.

Through the two tips of the fork are two small holes to take a piece of 16 gauge wire, this fork is made of heavy gauge sheet brass soldered to a brass ferrule from an old fishing rod.

The other requirement is a special rear rubber peg which must be tapered in shape to fit tightly in both the fuselage and rubber bobbins. *It must also be hollow*, light in weight, and strong. I solved these various requirements by using a selected portion of a porcupine fishing float and reinforcing the cut ends by binding and cementing.

In use the piece of 16 gauge wire is pushed through the fork of the gadget and through the *hollow* rubber peg, and I can assure fellow winders that this contraption is well worth making and very practicable as I have used mine some hundreds of times and there are no snags.

AIRFOIL THEORY—AN ENLIGHTENING EXAMPLE

By N. K. WALKER

A practical example employing the formulæ given in N. K. Walker's September article showing the extreme rapidity of the new method.

NEW notation applied to example given in R. H. Warring's "Model Gliders," page 27.

This example has Gottingen 652 section wing at Aspect Ratio $=20$ and $C_B = \cdot 025$.

$M_5 = \cdot 0707$. $\alpha_0 = -13{\cdot}25^\circ$. $C_{D\min 5} = \cdot 027$. $\theta m_5 = 3{\cdot}25^\circ$, $K_5 = \cdot 000414$.

$D + K\theta m^2 = \cdot 027 + \cdot 000414 \times 3{\cdot}25^2 + \cdot 025 = \cdot 0564$

and this is invariant with aspect ratio (equation 20)

$$M_5 = \cdot 0707. \quad M_{20} = \frac{1}{\frac{1}{\cdot 0707} - 18{\cdot}24\left(\frac{1}{5} - \frac{1}{20}\right)} = \cdot 08825$$

$$K_{20} = K_5 \times \left(\frac{M_{20}}{M_5}\right)^2 - \frac{M_{20}^2}{\pi}\left(\frac{1}{5} - \frac{1}{20}\right) = \cdot 000274.$$

$$\theta m_{20} = \theta m_5 \times \frac{K_5}{K_{20}} \times \frac{M_{20}}{M_5} = 6{\cdot}13^\circ$$

$$\theta_5 = \sqrt{\frac{3D + K^2\theta^2_m}{K} + \theta_m} - \theta_m \text{ (equation 7)} = 19{\cdot}47^\circ$$

$\alpha_5 = 19{\cdot}47 + \alpha_0 = 19{\cdot}47 - 13{\cdot}25 = 6{\cdot}22^\circ$ (From Warring's graph $\alpha_5 = 7^\circ$.)

$C_{L5} = 19{\cdot}47 \times \cdot 08825 = 1{\cdot}72$. (From graph $C_{L5} = 1{\cdot}66$.)

$C_D = D + K\theta_m^2 + K\theta_5^2 - 2K\theta_m\theta_5 = \cdot 0948$

$(C_L^{1.5}/C_D)\max = 23{\cdot}7$ (From graph $24{\cdot}2^\circ$.)

$$\text{Incidence for flattest glide} = \sqrt{\frac{D + K\theta_m^2}{K}} \quad \text{(equation 4)}$$

$$= \sqrt{\frac{\cdot 0564}{\cdot 000274}} = 14{\cdot}34^\circ. \quad \alpha_{L/D}\max = 14{\cdot}34 - 13{\cdot}25 = 1{\cdot}09$$

$C_{L_{L/D}}\max = 14{\cdot}34 \times \cdot 08825 = 1{\cdot}26$

$$L/D\max = \frac{M}{2K(\theta_{L/D} - \theta_m)} = \frac{\cdot 08825}{\cdot 000548 \times 8{\cdot}21} = 19{\cdot}6$$

All of these theoretical calculations giving good agreement with figures obtained from the graphs.

Time taken 12 minutes.

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TO the extensive range of 1/72nd scale general-arrangement drawings of modern and civil aircraft available from the AEROMODELLER PLANS SERVICE have recently been added a number of similar drawings of British, German, French and Italian aeroplanes used during the Four Years' War of 1914–18.

The names of Fokker Triplane and Bristol Fighter meant in 1917 what those of Focke-Wulf and Bristol Beaufighter imply to-day, and although the former aeroplanes are twenty-five years out of date they have not lost their popularity with modellers, and appeal as much as, if not more than, the aircraft of this war.

The drawings have been met with as enthusiastic a reception as were those of present-day types. An immense amount of research and checking has been carried out to ensure complete accuracy of outline and detail, and the drawings have been reviewed in authoritative circles as the most authentic available. Many of the types have not before been presented in this country, and none have appeared with the amount of detail which these drawings incorporate.

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† Bristol F2b Fighter.
† Bristol Monoplane.
† D.H.1a.
† D.H.2.
D.H.4.
D.H.5.
† D.H.6.
† D.H.9.
† D.H.9a.
† D.H.10.
F.E.2b and 2d.
F.E.8.
† Martinsyde G100 Elephant.
† Martinsyde F.4 Buzzard.
† R.E.8.
† S.E.5a.
† Sopwith Camel F.1.
† Sopwith Dolphin.
† Sopwith 1½-Strutter.
Sopwith Snipe.
† Sopwith Tabloid.
† Sopwith Triplane.
Short N2b.
Vickers F.B.5 and F.B.9 Gunbus.

FRENCH

† Breguet 14 A-2
† Maurice Farman Shorthorn.
† Nieuport 17 C.1.
Nieuport 28 C.1.
† Spad S.VII.

GERMAN

A.E.G. G.105.
† Albatross C.III.
Albatross D.I.
† Albatross D.III.
† D.F.W. Aviatik C.V.
Fokker Monoplane.
Fokker D.VI.
† Fokker D.VII.
† Fokker Dr.I Triplane.
Friedrichshafen G.III.
Halberstadt D.
Halberstadt C.L.IV.
Halberstadt C.L.III.
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L.V.G. C.V.
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ITALIAN

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Allen House,
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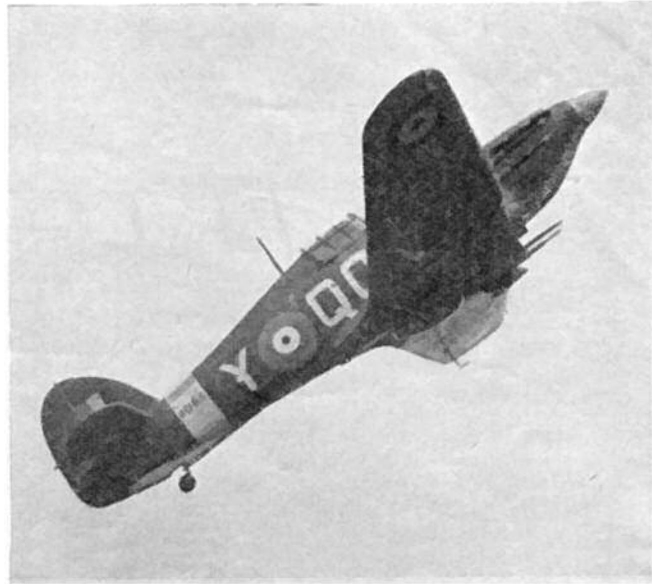
Photographs only are available of the Sopwith Pup, Sopwith Baby and Blackburn Kangaroo.

Drawings of these types will be available shortly.

MONTHLY MEMORANDA No. 9 by O. G. THETFORD



One of the finest scale models that has appeared on this page, and posed in a most realistic manner. This Hurricane IIc is the work of G. R. Woollett of Maidstone.

U.S. Army Camouflage.

The exact shade of camouflage used on aeroplanes of the United States Army Air Forces has been in question for some time but it can now be revealed that all types of machines are painted on the upper surfaces a muddy khaki-green, a colour sometimes known as "dun." It can be obtained by mixing together light green and brown paint in proportions determined by the method of "trial and error." A convenient method of checking the result is to compare with the finish of U.S. Army automobiles and mechanical transport generally which is often camouflaged in the same way as the aircraft equipment. The under surfaces of the aircraft are painted a pale grey and the dividing line between the camouflage and the light shade usually follows an undulating pattern. The dividing line meets the leading-edge of the wing and continues as a general rule from the trailing-edge to the leading-edge of the tailplane. Under-slung motor nacelles are normally regarded as "under surfaces" and painted light grey. A five-figure serial number is painted on the fin(s) of all aircraft in yellow and any identification letters on the fuselage are also in yellow.

The American Volunteer Group.

Many readers have asked for information regarding the markings of the Tomahawks of the American Volunteer Group, colloquially known as the "Flying Tigers." This fighter squadron, commanded by Col. Claire L. Chennault, was formed in 1940 at Rangoon with one hundred Curtiss P-40Cs diverted from the British order and after training in Burma went into the Chinese battle area where it did wonderful work in defence of the cities of Kunming and Chunking. Its later operations over Burma after U.S.A. had entered the War are well known. The squadron is now a regular unit of the U.S.A.A.F.

"Flying Tiger" Curtiss P-40Cs were so known because of a distinctive tiger shark insignia which was painted around the radiator fairing beneath the nose. It was copied from the marking carried initially by an Australian Tomahawk squadron in the Western Desert, but differs in having larger teeth, the reason being that the Japanese are reputed to have poor eyesight! As the P-40Cs were originally intended for the R.A.F. they carried British camouflage and markings. The roundels were replaced by the Chinese national insignia, a twelve-pointed white star against a blue disc with a white spot in the centre surrounded by a blue ring. Blue and white horizontal stripes are carried on the rudder. Various individual insignia were painted on the fuselage sides near the cockpit and usually took the form of nude females. The pilot's name was painted beneath the cockpit in small lettering in the customary U.S. fashion.

Canadian Training Aeroplanes.

A vast number of aeroplanes of many different types is now operating under the Empire Air Training Plan at a hundred or more Flying Training Schools throughout Canada. The mushroom-like growth of the scheme and the fact that aircraft have been obtained from three differing sources in addition to those taken over from foreign governments has given rise to an amazing variety of colour schemes, but the following generalisation may be taken as accurate.

(1) Transferred French aircraft, i.e., N. A. Yales :—French cockades replaced by R.A.F. rings and rudder stripe by fin stripe. Aircraft left silver as originally painted to French order but panels of training yellow painted above the fuselage decking aft of the rear cockpit; above the tailplane and over the inner section of the wings.

(2) Aircraft from Great Britain, i.e., Fairey Battles, Avro Ansons and Airspeed Oxfords :—Panels of training yellow painted above the inner wings, tailplane and fuselage decking. Yellow belly. Original green and brown shadow shading retained elsewhere. Battles used for target-towing are entirely yellow with diagonal black bands. Northrop Nomads are also used for this work and painted similarly.

(3) Canadian built aircraft, i.e., Fleet Finch, D. H. Tiger Moth, Fairchild Freshman, Fleet Fort, Harvard II, Anson II :—Entirely training yellow. American-built aircraft built to Canadian order such as the Cessna Crane are also painted in this manner.

(4) American-built Harvards intended for Britain and transferred to Canada were camouflaged green and brown on the upper surfaces and yellow underneath. These aircraft have had panels of yellow painted above the wing centre-sections, the tailplane and the fuselage decking in a similar manner to aircraft sent out from Great Britain.

(5) American built aircraft used by Norwegian Air Training Camp at Toronto, Canada. This includes Fairchild M-62s, Curtiss Mohawk IIIs and Douglas DB-8A5s. Norwegian markings are carried on the wings and rudder consisting of two wide red stripes on the outside of two narrow white stripes between which is a blue stripe. The stripes are painted chordwise on the wings well in from the tips and vertically on the rudder.

THE BRISTOL F.2B——————BY E. J. RIDING

THE Bristol F.2B, "Biff" or "Brisfit" as it was nicknamed, was designed by Capt. F. Barnwell during 1916 and put into service in 1917. Classed as a Fighter Reconnaissance aircraft, the F.2B was a two-seater, double bay wire-braced biplane equipped with a 250 h.p. Rolls-Royce Falcon engine, giving it a speed of 119 m.p.h. at 6,500 ft. The Service Ceiling was given as 20,000 ft. and the duration as three hours. The machine was used by the following squadrons :—Nos. 11, 20, 22, 48, 62 and 88.

The fuselage consisted of four spruce longerons interspaced with cross struts, diagonal and compression members rigidly braced with piano wire anchored to steel sockets and fittings. In cross section, the fuselage was rectangular in shape at the gunner's cockpit, tapering to a wedge at the sternpost. Forward of the pilot's cockpit it developed an oval shaped decking, culminating in a radiator also of roughly oval shape.

The wing arrangement was unusual in that the lower wing was attached to a centre-section slung underneath the fuselage, which was in turn attached to the bottom longerons by a system of tubular steel struts. Eight interplane struts made from spruce supported the top plane and the centre-section struts were made from streamlined section steel tube, the whole being braced with streamlined wires.

The tailplane was adjustable and was actuated by a "cheese-cutter" lever working on a quadrant on the right hand side of the pilot's cockpit.

This lever controlled two bell-crank levers to which was attached a floating bearing clamped to the front spar, thus raising or lowering the front spar, the movement of the leading edge being about 2 in. Two fins were fitted, one above and one below the fuselage. The rudder was unbalanced and was operated direct from the rudder bar, the cables passing into the fuselage about four feet ahead of the tailplane.

The control column was attached to a cross tube, protruding through the sides of the fuselage, to which were attached the elevator control levers transmitting movement through external cables to the elevators. The control column was free to move from side to side on the cross tube and the aileron cables were attached direct to the column, the return wires running across the top plane.

The wings were of wooden construction throughout, two spindled spruce spars being employed with two nose-ribs between each main rib. The under-carriage consisted of two tubular steel Vee struts faired with wood bound into position with doped fabric. Elastic cord or Bunjee, wound and knotted round the axle and vee strut fittings absorbed landing shocks and the tail skid was of the swivelling pattern mounted on four pylon struts controlled direct and moving with the rudder bar; the skid was also sprung with elastic cord.

The armament consisted of one Vickers gun firing forwards through the propeller arc and either one or a brace of. Lewis guns mounted on a moveable Scarff mounting around the rear cockpit. The front gun rested on a semi-circular bar fixed to the top longerons forward of the pilot's dashboard and fired through a hole in the radiator face.

The fuel tanks were both carried inside the fuselage, one strapped onto the top longerons aft of the engine and the other situated underneath the pilot's seat, selection being obtained by means of a three-way petrol cock on the dashboard. The compass was fitted into a recess in the trailing edge of the centre section just above the pilot's line of vision.

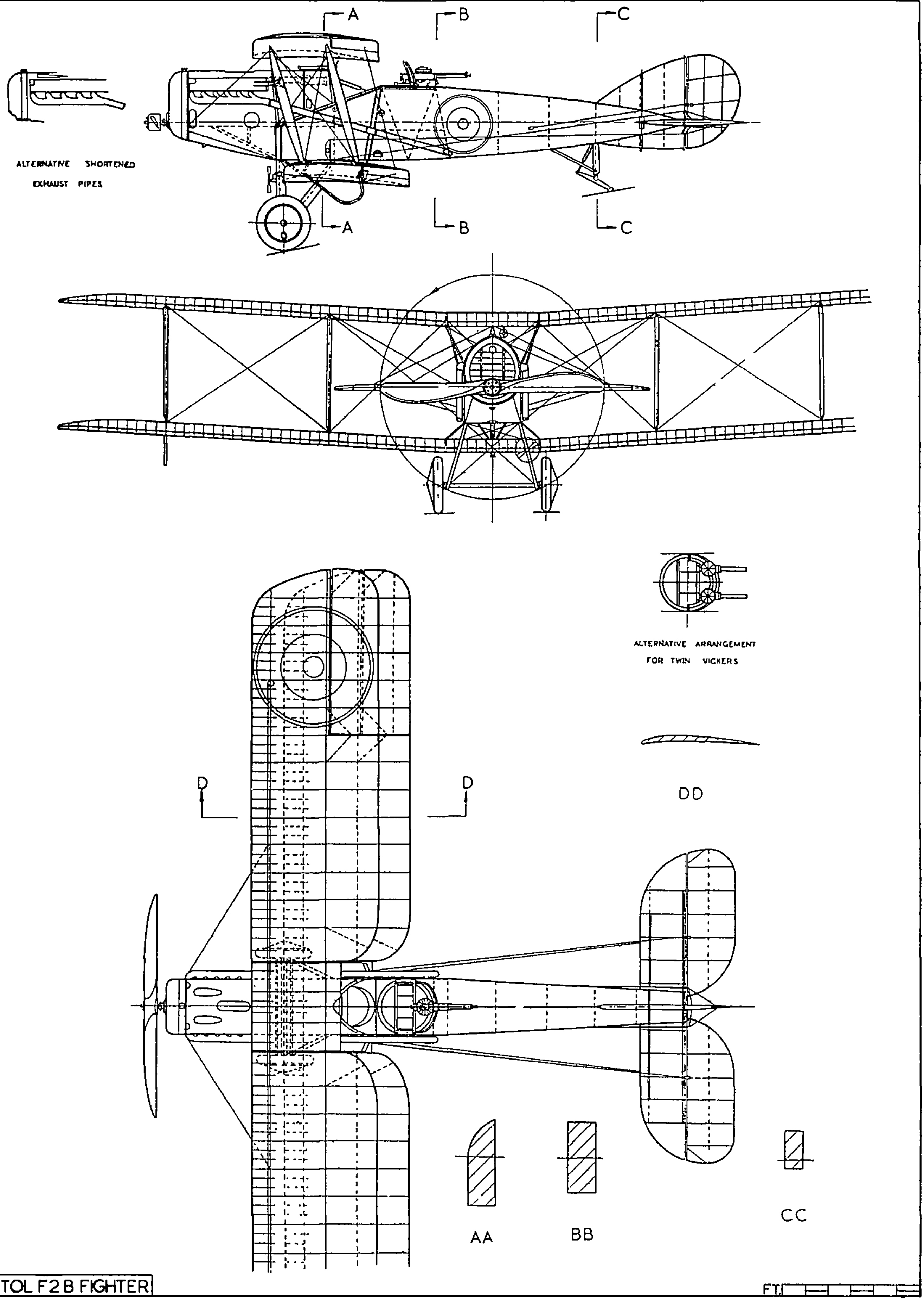
The first Bristol Fighters appeared on the Western Front in 1917 but, unfortunately, the first squadron to be sent to France landed by mistake on an enemy aerodrome.

This machine was also fitted with the 215 h.p. Sunbeam Arab and the 200 h.p. Hispano-Suiza engine.

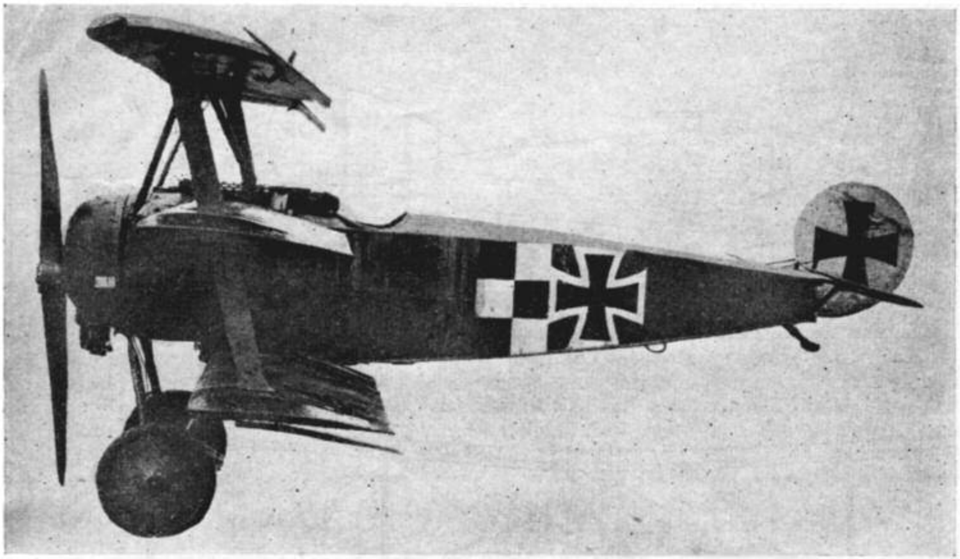
Unlike the German aircraft of the period, individual colour schemes were banned on British aircraft and the colour scheme employed on the F.2B consisted of: drab green fuselage, wings, etc., doped fabric coloured undersides of fuselage and wings, i.e. yellowish white. Red, white and blue roundels on sides of fuselage and wings, stripes on rudder with the red stripe at the trailing edge. Flight and machine numbers were sometimes carried painted in white on the sides of the fuselage.

Span	39 ft. 3 in.
Length	26 ft. 2 in.
Chord	5 ft. 6 in.
Gap	5 ft. 4½ in.
Height	8 ft. 9 in.
Stagger	16 ft. 9 in.
Incidence	1¾ degree.
Dihedral	3½ degree.

Copies of the heading photograph may be obtained from the Aeromodeller Office. Price ***3d.*** *each.*



BRISTOL F2 B FIGHTER



[Photo by courtesy of Imperial War Museum

THE FOKKER DR.I TRIPLANE

By E. J. RIDING

THE Fokker Dr.1, or "Tripehound" as it was affectionately called, was a remarkable aeroplane in more ways than one. It came into service with the German Air Force early in 1917 and was in regular use alongside the Albatross D.3 and Pfalz D.3 until superseded in the middle of 1918 by its successor the Fokker D.VII.

The Fokker Triplane will always go down in history as the favourite mount of Manfred von Richthofen, Germany's greatest ace of the 1914–18 war. He was credited with 80 confirmed victories and 21 of these were shot down whilst he was flying this type. Finally he was himself shot down on April 21st, 1918, whilst flying a Fokker Triplane by Lt. R. Brown of No. 209 Squadron, flying a Sopwith Camel.

The machine itself was a wireless cantilever triplane, i.e. there were no flying or landing wires, the only external bracing being that of the centre section and under carriage. The prototype did not have inter-plane struts—these were only added afterwards to give confidence to the pilots who were to fly them.

The fuselage was made entirely from welded steel tube braced aft of the pilots cockpit by means of piano wire looped through lugs welded to the points of intersection of the longerons and cross-members and tautened by a single turn-buckle. Triangulated construction was utilised forward of the cockpit, thus doing away with any form of wire bracing. In cross section, the fuselage was circular at the nose, tapering away to a rectangle and finally to a knife edge at the sternpost. The change from a circular to a rectangular cross section was evolved by utilising a system of simple streamlined fairings consisting of triangular shaped sheets of thin plywood, the base of the triangle being clipped to the engine bulkhead and the apex reaching to a point just aft of the cockpit. The decking behind the cockpit was made in a similar way, the fairing terminating in a point at the leading-edge of the tailplane.

The undercarriage consisted of two streamline steel tubular Vee legs supporting the axle, which was encased in a plywood fairing.

Incidentally, this fairing being of aerofoil shape must have added quite a considerably amount of extra lift to the machine.

The three wings were without doubt the most outstanding part of the whole machine. As already mentioned, they were of cantilever pattern, the top wing being supported above the fuselage on two inverted Vee steel tubular struts. Each wing had one large box spar made from two sets of spruce flanges with plywood webbing and the ribs were plywood blanks reinforced around the contour with strips of pine. The leading-edge was covered with a sheet of serrated plywood, the peaks of the serrations being tacked to the spar. In this way the wing was made rigid and the designers believed that internal wire bracing was unnecessary. The trailing-edge was unusual in that it was formed from a length of wire stretched along the end of each rib and gave quite a pleasing scalloped appearance when the action of the doped fabric pulled the wire inwards.

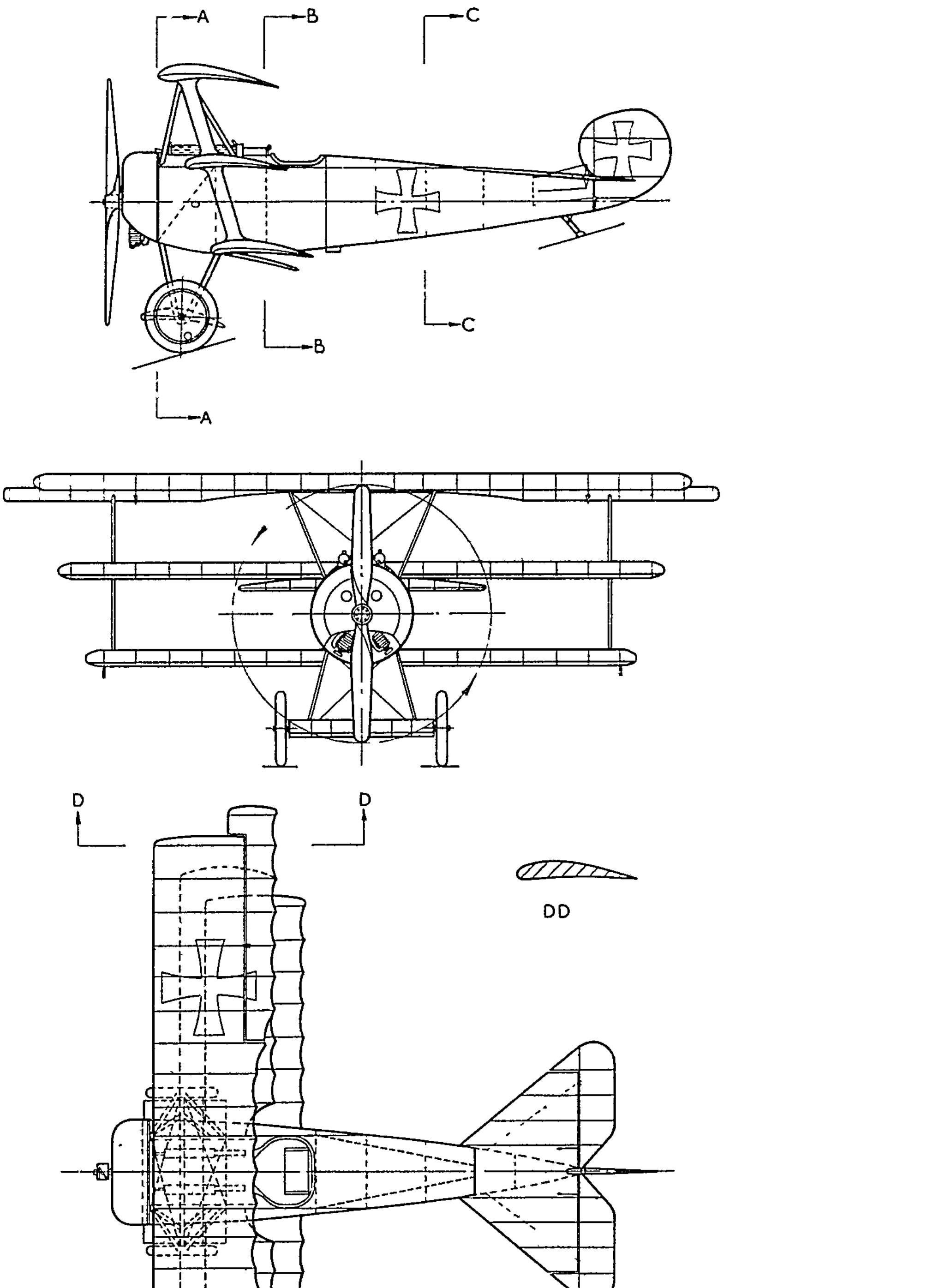
The interplane struts were both made in two portions, being merely pieces of thin spruce attached to the spars by an arrangement of plate fittings and bolts. There can have been no real structural strength in these struts and their presence was purely for moral effect.

Ailerons were fitted to the top plane only and were actuated through cables running up into the wing from the cockpit. The tailplane and rudder were both constructed from welded steel tube and as will be seen from the G.A. drawing, the elevators were balanced and there was no fin.

The whole machine was fabric-covered and the colouring was apparently left to the whim of the pilot. Richthofen's machine was red all over, with small black crosses and at one time bore the serial number Fok.Dr.1./107/17. Machines of his squadron were all red with certain portions such as an aileron, rudder or tailplane, etc., of a different hue to distinguish it from the leader. The Fokker Triplane in which Lt. Werner Voss put up such a brilliant performance against odds before being shot down by Lt. Rhys-Davids of No. 56 Squadron, was reported to have been of a silvery-blue shade. The Dr.1 was fitted with a nine-cylinder 120 h.p. Oberursel rotary engine which was similar in most respects to our 110 h.p. Le Rhone, and its armament consisted of two forward firing synchronised Spandau machine guns supported in four "U"-shaped fittings fastened to the top fuselage cross-members. Petrol (16 gals.) and oil (4 gals.) were carried in a sub-divided tank situated immediately aft of the front bulkhead.

Span (top) : 23 ft. 6 in.
Span (middle) : 20 ft. 4½ in.
Span (lower) : 18 ft. 6½ in.
Length : 19 ft.
Track : 5 ft. 3 in.
Chord (top wing) : 3 ft. 3¼ in.
Depth (top wing) : 5 in. (approx.).
Span of tailplane : 8 ft. 10 in.
All up weight : 1,259 lb.
Duration : 2½ hours at 10,000 ft.
Speed : 100 m.p.h. at 10,000 ft.

Copies of the heading photograph may be obtained from the Aeromodeller Office. Price ***3d.*** *each.*



FOKKER DR.I.

FT.

Club News

By CLUBMAN

I WAS in conversation with a very well known aero-modeller the other day, and an old controversial subject cropped up, namely whether one should be allowed to change parts on a model during a competition. Apparently some clubs do not bother to stick to the generally accepted national rules in such matters, though why this is not done is beyond me. In my opinion it would be a natural safeguard against all criticism, and a means of keeping club members in proper training for S.M.A.E. events. But—well, it seems that some groups still make their own "do's and don'ts" here and there.

The point arose over a contestant being allowed to almost entirely change a model half way through a competition (I am told that the only part originally entered was the wing!—everything else being changed). Well, well, how anyone can reconcile this sort of practise with aero-modelling competitions is beyond understanding, and it is no wonder that certain visitors were decidedly upset. Had the affair been a purely local comp. it may have been permissible, but this was at a Gala Day stunt, and visitors to such open events expect the generally accepted rules to apply.

Speaking of rules, I came across a very lucid and concise discourse on the subject by "The Loiterer," a well known contributor to "Cycling," and I am sure he will have no objection to my quoting certain pertinent passages from his article, his remarks applying to all sports no matter what their character.

"Rules, or laws, or regulations in sport are made by the majority in order to ensure that everyone who plays the particular game does so as near as possible in the manner in which all the other competitors play that game.

"The primary reason for rules in sport is to provide an equal opportunity for all to take a part in the contest. Rules then are necessary, and no sport could exist long without them.

"It is essential to acquire the proper mental attitude towards rules in sport, and to endeavour to understand why they are made . . . The perfect rules have yet to be formulated.

"So you can see how important rules are to our hobby, as indeed they are to every other sport that is played seriously . . . When we learn to match our prowess one with the other for the goodwill of the competition, then, perhaps, we shall need no rule books. But we haven't reached that ideal yet. We each struggle hard to achieve personal success and it is essential therefore that all of us shall compete as near as possible to one common standard.

"That is why rules are so important. That is why we must all subscribe to them and, equally important, understand the purpose behind them."

With which I leave you to chew over the truths contained in those few words, and see if such pettifogging differences can be eliminated.

The American aero-model industry evidently came under the axe rather quickly following the entry of the States into the war, and already the shortage of balsa is being felt over the Herring Pond. We did have a short period during which we could still obtain almost all we wished for in our hobby, but cuts were instituted right from the start with our American contemporaries. Government regulations prohibit the use of balsa in solid model kits, and all the mags. are carrying articles on the use of other woods for both solid and flying jobs. As here, gliding is coming in for more attention, and I can foresee some tougher contests in the International gliding events later on. Very few Americans took any interest in model gliding before the war, but, as with us, conditions may force them to realise just how great a field is open to them without the need for rubber and props. It's an ill wind!

The de-centralised contest for the Clyde Model Dockyard Trophy met with varying conditions at the various centres. Glasgow had high winds and heavy rain, and from twenty-two entries, only three managed to get in their three flights. Dundee were more fortunate in having no rain, and R. Bishop of Rosyth proved the eventual winner with a time of 5: 21, R. Burns of the Glasgow section placing second with 3 : 08.4. No competitors flew at Edinburgh, the weather being too rough.

In spite of the difficulties of war-time travelling and restrictions on spare time, over 250 aero-modellers and their friends turned up for the NORTHERN HEIGHTS

THURSTON GLIDER CUP

	Aggregate
R. F. L. Gosling (Merseyside)	211·0
A. T. Taylor (Bushy Park)	204·7
A. H. Taylor (Bushy Park)	192·5
D. Blair (Birmingham)	136·4
G. Bradwell (Birmingham)	121·55
R. Sylvester (Bushy Park)	97·7
M. Wright (Bushy Park)	91·5
W. H. Bushell (Birmingham)	48·6
J. Tylor (Birmingham)	46·25
P. C. Doughty (Birmingham)	18·5

The awful results of not ensuring that the handle is properly fixed to the winder ! ! W. P. Tyrrell, of the Halstead M.F.C., got away with minor damage in this instance, but you should have seen some of the models that have suffered from similar 'gadgetfailuritis.'

M.F.C. Gala Day on the 13th Sept. The weather was far from brilliant, and gusty conditions made trimming very difficult. A large number of gliders made their appearance on the field, but it was evident that more experience in flying these models is required by the large majority of modellers.

A number of well-known visitors were entertained, and clubs were represented from Bedford, Brighton, Croydon, Eastbourne, Harrow, Hayes, Hillingdon, Leeds, Leicester, Monmouth, Sudbury and Walthamstow. (Incidentally, this little bird would like to know why the "champions" from Bushy Park failed to appear after making anxious enquiries about the prize list ! Don't tell me that the kudos count more than the comps.)

Results were :—

Nomination :	Mr. Long (Slough), ·5 sec. error.
	Mr. Akerman (Northern Heights).
	Mr. Gow (Harrow).
Open Duration :	M. Farthing (Croydon), 245 sec. agg.
	N. Gregory (Harrow), 168 sec. agg.
	D. A. Gibbs (Harrow), 162 sec. agg.
Gliders :	N. Gregory (Harrow), 101·75.
	G. Richards (Northern Heights), 77·5.
	J. Marshall (Hayes), 76·35.
Inter Team :	Harrow, 806·25 points.
	Northern Heights, 594·5 points.
	Croydon, 404·5 points.

Challenge Cups were presented to the winners of the three main events and after speeches, etc., the field dispersed feeling well content. The only snag was the disqualification of several competitors for PUSHING. This is very surprising in view of the general recognition of present-day requirements in launching technique, and makes one wonder if all contests are free of such infringements.

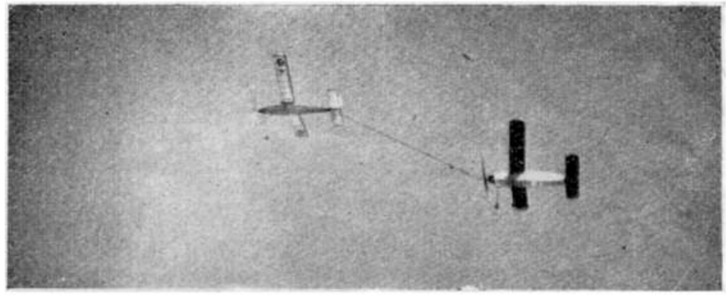
The HEALEY & D.M.A.C. also held a Gala Day in August, but were cursed with a very high wind. R. Calvert, of Halifax, made the best time of the day, and won the open duration event with an aggregate of 2 : 59. J. Townsend (Ilkley), was second with 1 : 43 and K. F. Lees (Healey), third with 1 : 23. Townsend won the R.O.G. event with 2 : 43, Lees following with 1 : 10. K. H. Simpson, of Healey, won the Nomination event, and Townsend rounded off the day with a third placing by running second in this contest. Mr. Sheard, an unattached modeller, walked off with the Concours classes.

The SOUTH BIRMINGHAM M.F.C. have been presented with a silver cup, contest being for the best flight of the year. To date honours go to W. Louch whose glider made a H.L. flight of 2 : 22·5, this also counting as a club record. This chap lost a heavyweight model some time ago, and after two months in a cornfield the model was returned, stripped, recovered, and clocked 1 : 45 on its first flip !

"Gamage" Courtney of the OXFORD M.F.C., again won the club's "Forward Memorial Cup," his time for three flights being 1 : 45, Mr. Houlberg placing second with his "Davis-Wing Isis," adapted for the comp. No spectacular times were set up—the weather being far from suitable. Son followed in father's footsteps by winning the Junior Cup with an aggregate of 4 : 45, B. S Glyde and J. Ellis being the runner's up. A point of interest is that the first two models were "Northern Arrows," but while the winner was a normal 4 oz., the second machine weighed just double that amount.

The TAUNTON & D.M.A.C. are still going strong, and had quite a day out when they ran four comps. in one day recently. Winners were Watson (2 firsts and a second), Blackmore and Ford. Best time was set up by Ford in the Medium Weight event, his time being 2 : 30·2.

The newly formed MOTHERWELL & D.M.A.C. have secured a perfect flying ground with approximately 2½ square miles of ground—and not a pole or tree in sight ! Members are concentrating on the production of solid models in order to raise funds, and would welcome new members.



Here's a new stunt to try (or is it not so new?) Members of the Torquay club have been having some interesting flying with two or more models linked with rubber strip. But why is the 'glider' model at a lower altitude than tower? Anyone know?

Reorganising of the BLACKPOOL & FYLDE M.A.S. is taking place, and with the amalgamation of another group the membership now stands at about 40. Junior and Senior sections are being formed, and the juniors will have a full say in committee matters. The clubroom is at 2, St. Annes Road, and interested modellers are welcomed there at any time.

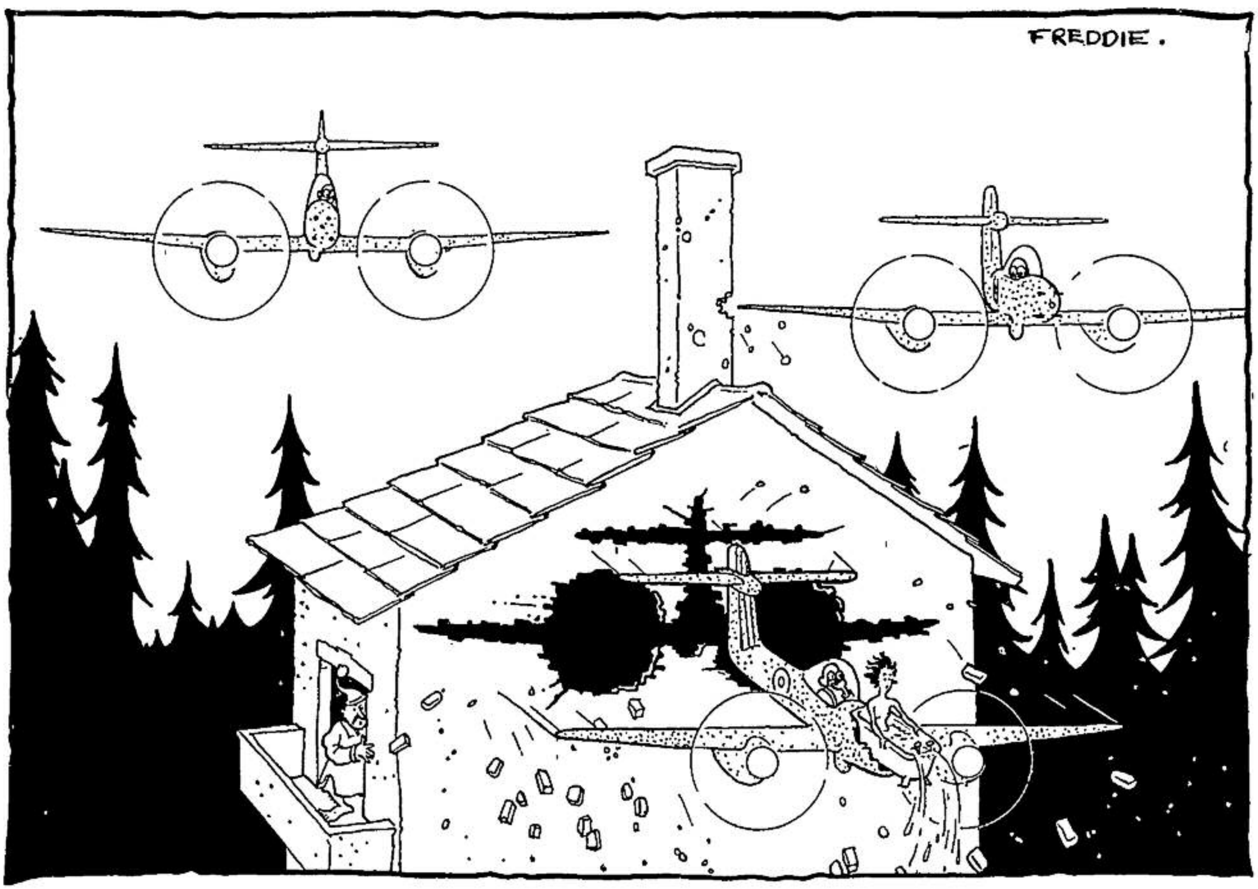
Another club to hold an open meeting on the 13th Sept. was the DARLINGTON M.A.C., when absence of wind and rain made things quite enjoyable—and unreal! Local A.T.C. units provided the opposition, and there was some good if not record breaking flying, resulting as follows :—

Under 30 in. span :	Richardson (A.T.C.), 2 : 36·8.
	Canham (D.M.A.C.), 2 : 18·2.
Over 30 in. span :	Wanless (D.M.A C.), 2 : 26·8.
	Trenholm (D.M.A.C.), 2 : 08·4.
Open Duration :	Canham (D.M.A.C.), 3 : 06·4.
	Richardson (A.T.C.), 2 : 18·8.

Canham won the silver cup offered for the best flight of the day with a time of 1 : 21, while Richardson carried off the special prize for the best flight by an A.T.C. cadet with a time of 53·4. The Darlington club welcomes any member of the Forces at their clubroom on Wednesday and Friday nights, and Saturday and Sunday afternoons and evenings. Details from the secretary, Mr. E. Canham, 24, Orchard Road, Darlington.

Members of the TORQUAY & D.M.A.C. have been trying out towline flying with powered models (see photo on this page). This is quite a stunt, and the following tips are passed on from their experience : use rubber towlines, and launch with the line well slack so that the 'planes get up flying speed easily. E. H. Davies won the club " Eagle Trophy " for R.T.P. work with a time of 3 : 01, the speed event going to E. J. Tyler with a speed of 43 m.p.h.

The BRISTOL & WEST M.A.C. have had quite a successful and interesting season, doing well in S.M.A.E. events. Experiments have been made with " thermal extractors " (no details given, unfortunately), and the usual list of lost models per season has been cut down in consequence. Messrs Lee and Wilkins used this device



"BASIL ALWAYS DID OVERDO HIS LOW FLYING!"

It is generally agreed that to get the best out of a rubber motor, the winder should stretch to five times the original length. Mr. Hassall, of the Birmingham M.A.C., has evidently taken this axiom very much to heart.

to good purpose in the Gutteridge and M.E. Cup events, models being available for the second and third flights instead of, as sometimes happens, the model being gone for good on the first flip. When comps. are on a three flight average (or aggregate) it doesn't pay to get too good a flight early in the event.

"Night flying" has been tried out by the GRANTHAM M.A.C., one model being lost after a flip of 1 : 09. How to you see 'em—tie glow-worms on the undercart? This club is now well under way, and two comps. have been held, senior class going to S. Spackman (1 : 19) and the junior to P. Osborne (1 : 54).

BLACKHEATH M.F.C. have been going strong on competitions, the "Gosnell Trophy" going to H. C. Baines with a 2 : 20 aggregate, with W. Bishop (remember his early petrol-driven biplane, chaps?)

Miss B. le Messurier, 'champ' of the Halstead club, prepares to launch her "Clipper." This is one girl who can give the chaps a beating at any time, as her record proves.
Below: Solid models constructed by members of a West country factory spotter group. Many firms are finding that to actually construct a model is a very sure way of memorising the salient features for recognition.

second with 2 : 09·7. C. H. Saunders won the Novices event with 2 : 50·1, while the " Faulkner Trophy " goes to A. J. Mann with 54·1. A new junior record of 6 : 30 has been set up by G. Prins.

A near perfect day graced the STEWARTON M.A.C. general comps. on the 19th Sept., when visitors from Motherwell were entertained. Comps. went to R. Burns, R. Jones, C. Ewart and W. Donald. An interesting innovation was a " banner towing " contest, the models being fitted with banners or streamers of at least equal length to span. Incidentally it has been noted that gliders show less inclination to " hunt " on the line when fitted with a streamer of this type. What about rigging the line so that a streamer can be utilised on the launch, and released with the line ?

Frank Davies has capped his successful season with the LEICESTER M.A.C. by winning the Aero-Modeller Cup with an aggregate of 10 : 52. He also cleaned up the Everard and Stafford Cups, while the Farmer Cup for juniors went to D. J. Gee.

Good flights are being put up in the GRIMSBY & D.M.A.C. The club record was recently broken by R. D. Walkley, his model going o.o.s. after 12 : 45, the machine being retrieved by some ham-handed youngsters from about six miles away. Other flights of note are 5 : 00 by J. Porter and 6 : 24 by R. C. Monument's streamlined heavyweight.

The COLERAINE & D.M.A.C. held their annual Gala Day on the 5th September, with a nice high wind and plenty of rain to make the day a real success ! ! Honours went to Messrs. Tosh, Molloy, Troy, Struthers and Lyons, though unfortunately no times are given. The Efficiency Cup, awarded on points throughout the season, goes to A. C. Tosh.

Mick Farthing of the CROYDON & D.M.A.C. has been going great guns this year, and follows up his recent winning ways in open contests by winning the

A real busman's holiday! The gorse in the background doesn't look too nice for models, so we hope the wind was coming towards us.

Paterson Shield for gliders with a time of 5 : 13, runner up being B. G. Green (4 : 13). This latter fellow won the Fanconi Cup for scale models. (An S.O.S. is sent out for Mr. Wright, third place winner in the recent Croydon open event. Please send name and address to B. G. Green, 17, Prior Avenue, Sutton, Surrey.)

A new club has been formed at Bromley, Kent, the title being the DOWNHAM & D.M.A.C., secretary Mr. K. Upton, 192, Farmfield Road, Downham, Kent. Interested aero-modellers are asked to get in touch with this club at the earliest opportunity.

The same remarks apply to the newly-formed SEAFORD M.F.C., the secretary in this case being Mr. D. W. Bartlett, 7, Sea Cottages, Seaford, Sussex. Good accommodation for indoor flying is a feature with this group.

Messrs. C. H. Newey, of 31, Gordon Street, Lozells, Birmingham, and G. Exley, c/o T. W. Close, Aire Street, Knottingley, Yorkshire, are anxious to get clubs going in their respective districts, and would welcome contacts with aero-modellers who would assist in the project.

A Forces reader is anxious to replace his N.G.A. badge, lost somewhere or other, and as all stocks are now exhausted and impossible to replenish until after the war, wonders if any reader has one for disposal. Also he is anxious to obtain back numbers of the AERO-MODELLER from No. 1 up to about June, 1940. If anyone can oblige, please get in touch with R. F. Fowler, at 21, Somerford Grove, Park Lane, Tottenham, London, N.17.

Has anyone a well tried model glider of medium span for disposal? M. D. Lavin, of The Old House, Sonning, Reading, wishes to purchase such an article. Likewise, F. L. Smith, of 11, Buccleuch Street, Garnethill, Glasgow, would like to get hold of copies of Zaic's 1937 and 1938 Year Books.

That is not the full list of "wants," by a long shot, but it is impossible to list all the enquiries for petrol engines. Apparently a number of readers are unaware of the current difficulties encumbent on supplying and even manufacturing these small affairs, so I must state definitely that we can carry no more requests for engines, as it is purely a waste of time. Manufacture has ceased in this country owing to munition requirements, and shipping space is too valuable to allow of their importation from abroad.

And so, ta ta for now boys, and may your clubrooms never grow too cold to work in! It's a bit of a lark nowadays isn't it, with lighting and heating rationed. Still, just try a spot of doping with the thermometer knocking at the bottom of the tube—the results are fine!!

The CLUBMAN.

Who guessed the identities of the foursome heading this month's News? Reading from left to right: Messrs. Taylor, "Gamage "Courtney, Houlberg and the Editor, all watching Courtney's "Isis" on a flyaway at the Oxford Open Meeting.

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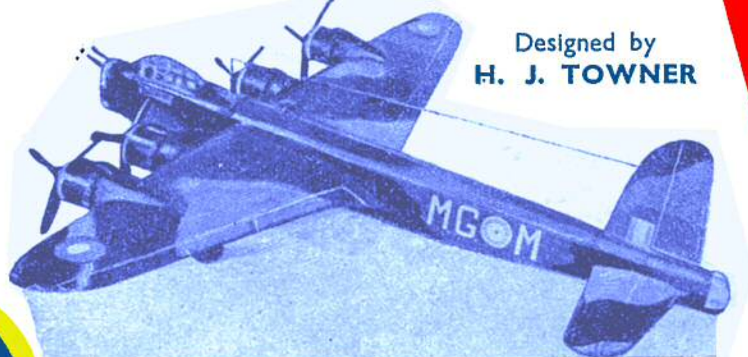

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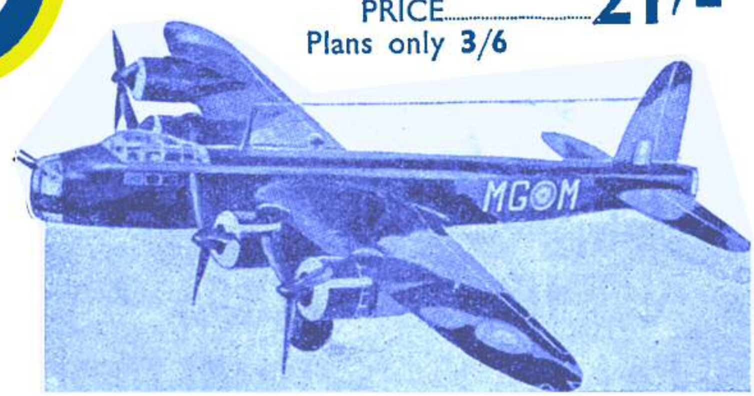

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