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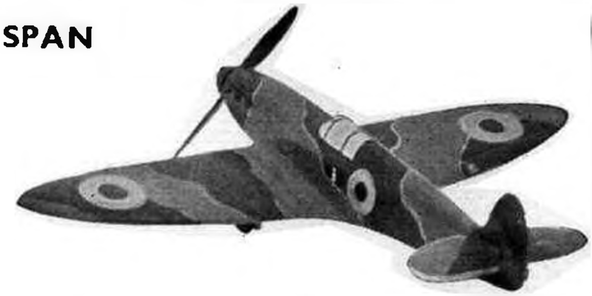

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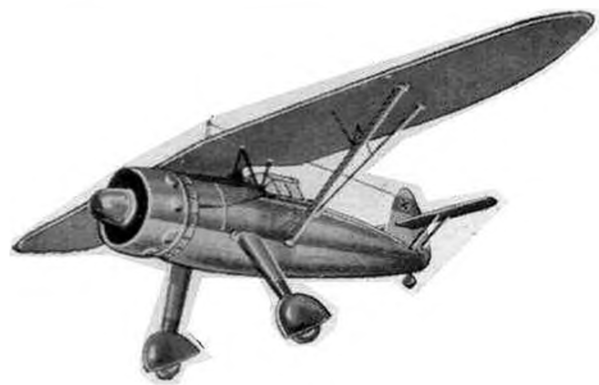

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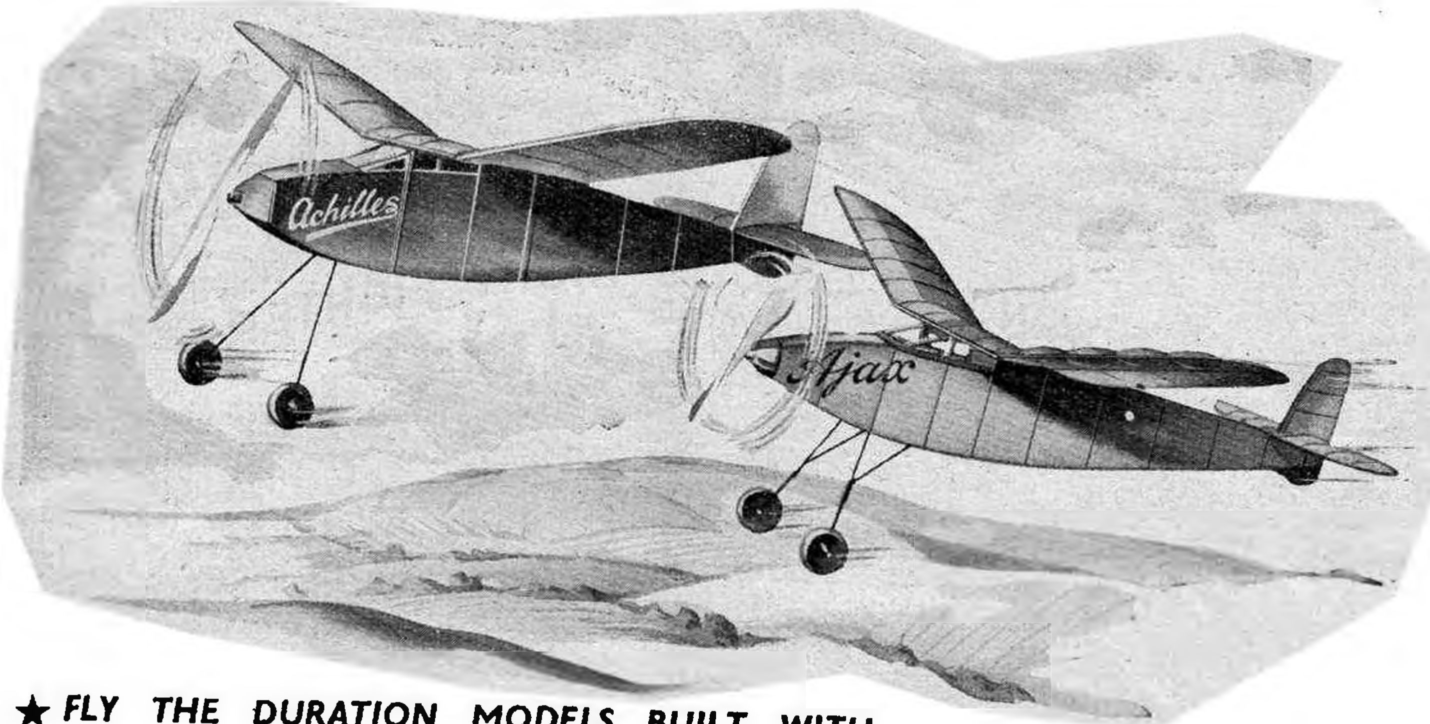

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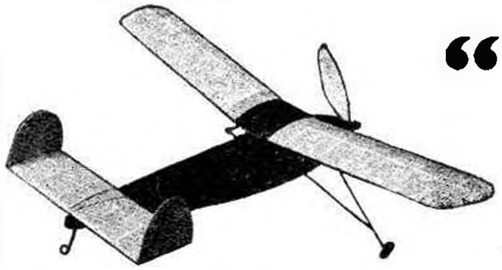

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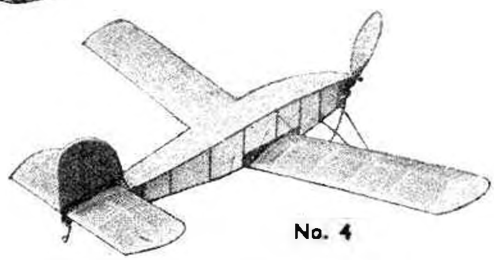

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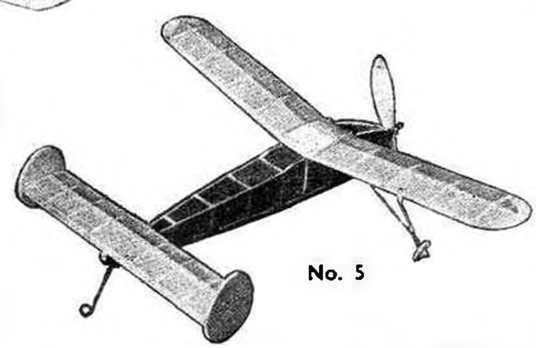

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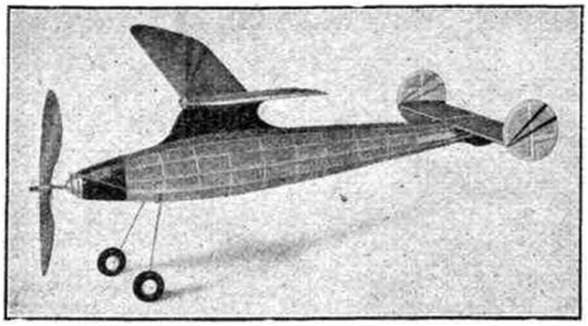

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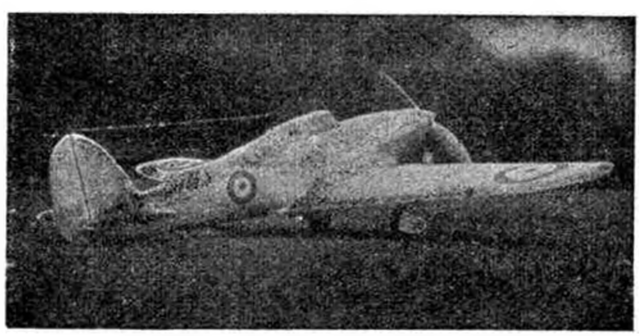

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CONTENTS OF THIS ISSUE

THE AERO MODELLER

Established in 1936

(INCORPORATING "THE MODEL AEROPLANE CONSTRUCTOR")

(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. 74 JANUARY, 1942

ALLEN HOUSE, NEWARKE ST., LEICESTER

EDITORIAL

IN view of the importance of the campaign recently organised by the Ministry of Supply with a view to obtaining a large tonnage of waste paper immediately, we make no apology for commencing our New Year Editorial with a further reference to this need. Already we hear of several Clubs which have appointed committees to deal with the collection of waste paper from their members, and at least one already reckons that it has got the ten guinea prize—which we have offered for the Club which collects the greatest tonnage—in its pocket!

As stated in the notice on page 704 of our last issue, this prize will be awarded on an equitable basis taking into account the total membership of each Club; thus even quite a small Club stands as good a chance of winning the prize as any of the largest Clubs in the country.

We would remind Club Secretaries that this competition is open until January 31st, 1942, and as soon as possible after that date they should send to us a certificate, signed by the Chairman or other official of the Club, showing the membership during the months of December and January, together with a receipt from the collector to whom the waste was sold and on which, of course, will be stated the exact weight.

We do urge all Club officials to get together on this matter and organise collections with a view to the model aircraft movement in this country producing several hundred tons of waste for the war effort. We have a complete list of "approved" waste paper merchants licensed by the Paper Control for the collection of waste, and will deal with any enquiries from Club Secretaries regarding disposal.

REVISED BUSINESS NOTICE

The attention of all advertisers, and potential contributors, is drawn to the revised Business and Editorial Notice printed on the last page of this issue, since several minor though important alterations occur, consequent on the change in layout of the pages of the journal.

AERO-MODELLING IN WAR-TIME

"In these times of national defence it is imperative that every active model airplane club keep itself informed as to how its members can aid national defence. In many ways model airplane builders are already serving their nation, and it is expected in the more critical times ahead even greater importance will be placed on model aviation and its organized groups throughout the country."

We regret being unable to claim that these words were written some years ago in regard to *this* country . . . our quotation is from the November, 1941, issue of *Model Aviation*, the official news bulletin of the American Academy of Model Aeronautics.

This registration of model aircraft clubs in America has been followed by the National Advisory Committee for Aeronautics notifying the Academy of several hundred vacancies for aero-modellers between the ages of 18 and 25 at the Government Test Laboratories at Langley Field, Virginia. Already a large number of aero-modellers are working at Langley Field, and according to W. Kendall Johnson, acting administrative official of the N.A.C.A., several hundreds more will be at work within the next few months.

In America, as in this country, little official support has been given to the model aircraft movement in peace time, but we are glad to see, once the seriousness of the situation has been realised, that the former country is now rapidly gearing to its war effort, the ability of aero-modellers in the best possible way.

The "state" organising of aero-modelling in Germany was, of course, undertaken as far back as 1933. In that year the Nationalist Socialist Party took control of all aviation and decided to centralise the civil flying clubs. Hermann Goering, who was head of the new controlling body, the D.L.V. (Deutsche Luftsport Verband), decreed that model building should be taught in hundreds of schools all over the country.

In France, Holland, and in Italy somewhat similar organisations were set up under varying degrees of Government control, and with a view to presenting our readers with a general survey of the development of State aero-modelling in the various European countries, we shall publish in our next issue an article by Mr. Leofric (George) Temple, who, prior to the outbreak of war, had considerable personal experience of Continental methods of teaching aero-modelling as part of the regular educational sustem of a country. Mr. Temple not only attended a number of classes for teachers in Germany and France, but was latterly an instructor of model aeronautics in one of the large State-sponsored Continental schools.

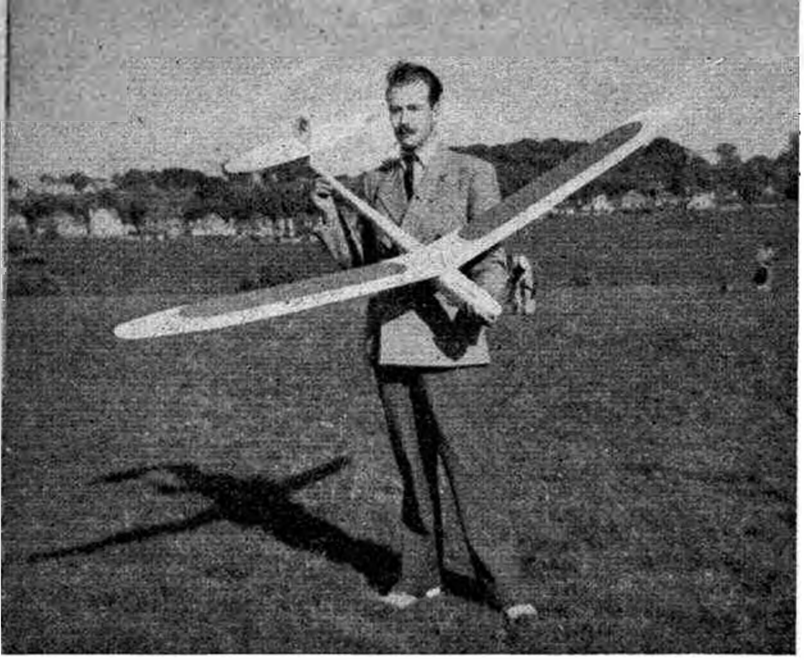
AERO-MODELLER "PLANS SERVICE" COUPONS

We have arranged for the two "Plans Service" coupons printed in our last issue to be accepted in regard to the range of 1/72 Scale Plans published in Volume I of "Aircraft of the Fighting Powers." Thus these coupons may be used against the purchase of *any* of the plans described in the centre pages of this issue. Coupon "A" will secure a rebate of 6d. against "solid" plans value not less than 2s. 6d.; and coupon "B" will secure a rebate of 1s. against a purchase value not less than 5s. For a purchase value exceeding 7s. 6d., the 2 coupons may together be used, securing a rebate of 1s. 6d.

"HARBOROUGH" BOOKS ON MODEL AIRCRAFT

It is necessary to record several small price changes affecting some of the range of Harborough books on model aircraft. *Solid Scale Model Aircraft*, by J. H. Elwell; *An A.B.C. of Model Aircraft Construction*, by C. S. Rushbrooke; and *Scale Model Aircraft that Fly*, by H. J. Towner and H. Boys, have all been increased from 3s. each to 3s. 6d. net, or 3s. 10½d. post free. The price of the other books remains as before, although we would remind readers that Volume I of *Aircraft of the Fighting Powers* was increased to 12s. 6d. some while ago. The most recent publication—*Simple Aerodynamics for the Aero-modeller*, by A. H. Smith (who for some while now has been responsible for all the drawings in THE AERO-MODELLER and many of THE AERO-MODELLER Plans Service drawings)—has met with a fine reception and is selling well, particularly to Air Cadets, for whom, of course, the book was primarily written.

D. A. R.



SAILPLANES —

IN this series of articles I do not propose to give a complete account of the design calculations necessary for the creation of a high-performance sailplane, but rather to put forward certain ideas which, in my own mind, seem the logical steps towards giving British model gliders a high place among those of the World.

In the past, and to a certain extent at the present time, British designers have tended to base their ideas too much on the rubber-powered competition model; this is an incorrect solution of the problem, for the model sailplane, alone of all flying model aircraft, follows very closely the design and even the construction of the full-scale craft. The light, small model will never hold its own against a large, robust, heavily loaded one, except under exceptional flying conditions, such as flat calms. A loading of at least half a pound per square foot, often more, and a size as large as we can get under the present ban, appears to me to be the logical answer, as I shall try to explain.

Aerodynamic Design

I shall assume that the readers of these articles, at least those wishing to put them to active use, have a fair knowledge of the basic principles of design; therefore I will not go into great detail as regards the mathematical side of the question, but rather shall point out the main requirements, which must be thoroughly understood. In any case there are excellent publications dealing very fully with the subject, and though these deal, at present, exclusively with full-scale sailplanes, practically all the calculations are applicable to models, provided that they are fairly similar to the big machines.

Undoubtedly the most important factor in designing a good sailplane is the choice of an airfoil, or wing section; this at first appears a difficult task, as there are a great many airfoils to choose from. Let us examine the reasons for our choice, and we shall see that the number of airfoils eminently suitable for our designs is not very great.

The first requirement is a *high coefficient of lift* (Cl), the importance of which lies in the fact that, for a given area, a wing with a high Cl max. will fly slowest, and therefore give us more chance to keep our machines in sight. It also means that the machine will climb swiftly on the launching line and when gusts are encountered. Next we should examine the *ratio of lift to drag* (L/D). A high L/D ratio is preferable because it indicates the general qualities of the airfoil; obviously, if the drag is very high, it will counteract the good obtained from a high Cl and will result in an inefficient section.

A small centre of pressure movement is a great advantage, since it means that the airfoil will be more stable and less likely to deviate from level flight in gusty weather. Thus we can use a smaller tailplane. However, many of the best airfoils have a comparatively large C.P. movement; so we should not place quite so much importance on this factor as does the designer of full-size craft.

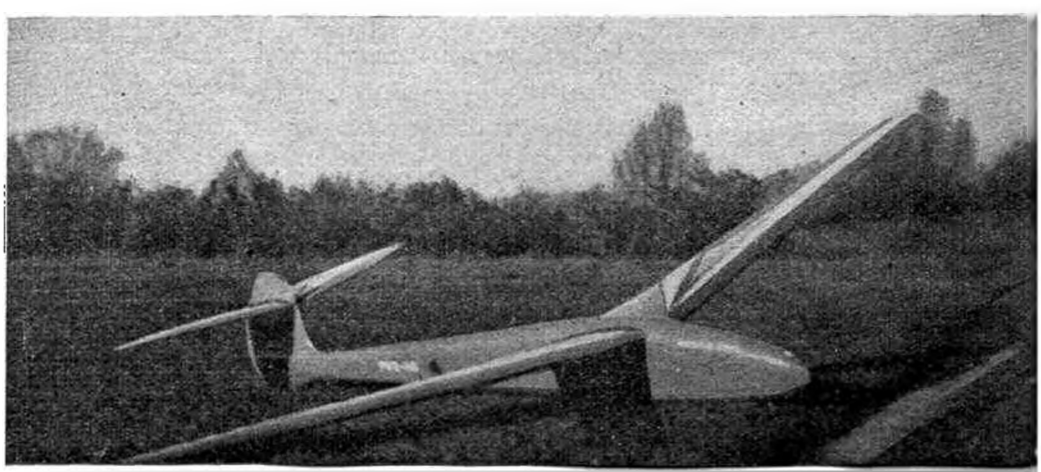
The next consideration is *low profile drag*. I wish to make myself perfectly clear on this point, as it is one which many aero-modellers apparently fail to understand. The drag of an airfoil can be divided into two components, the Profile drag (Cdp) and the Induced drag (Cdi). The former depends on the shape of the airfoil used, while the latter depends only on the aspect ratio of the wing. In choosing an airfoil we should therefore look for one with low profile drag.

Last, but by no means least, we must consider the *Power Factor*. This is an expression written $Cl^{1\cdot5}/Cd$, and the higher its maximum value, the smaller will be the sinking speed of the sailplane. This is obviously of the utmost importance, as the sinking speed governs the time the plane takes to descend from a given height. A low sinking speed also means good soaring.

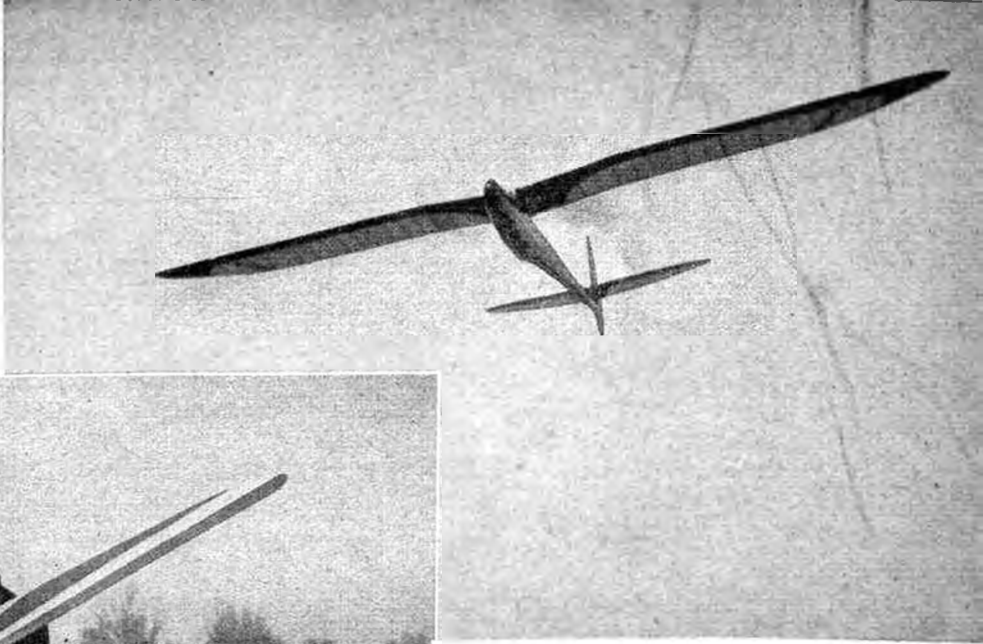
It should be borne in mind that Aspect Ratio affects not only induced drag but also the angle of incidence at which any particular Cl occurs; but the method of calculating these changes due to A.R. have been fully gone into elsewhere and I shall not repeat them. You can look it all up in any book on full-size sailplane design, and the publication on airfoils by the Harborough Publishing Company explains how to do it, too. It is well known that an increase in A.R. increases the efficiency of an airfoil, so that it would seem only logical to use as large an A.R. as possible. At first sight the amateur designer may feel that by doing so he is getting wonderful results in his theoretical work. However, we must not overlook the fact that, for a given airspeed, a large chord is more efficient than a very small one, owing to the Reynolds Number being higher for the former. It is a matter for much research and a great deal of tedious arithmetic, and very few people will care to calculate the optimum value of A.R. for a given span.

I have had excellent results from an A.R. of 14 and 15 to 1 on spans of about 7 ft., which means that the mean chord is about 6 in.; on the other hand an advanced designer of model sailplanes is at present carrying out experiments with a chord of 9 or 10 in. on a span of only 5 ft. His results in actual flying tests are exceptional, so here seems to be ground for further research.

I shall say no more about the mathematical side of designing a sailplane, except to record my disapproval of the slavish use of R.A.F. 32 and certain other "model" sections; the designer really should take the trouble to work out examples, in the form of a graph, for some of the other sections, and he



Their Design and Construction
By LEOFRIC GEORGE TEMPLE



will find some are far more suitable. Among the best for sailplane work and large models are the Göttingen airfoils 387, 535 and 652.

The Advantages of Large Machines.

At the beginning of this article I stated that a large, heavily built model is, under most conditions met with during normal flying in this country, superior to a very small, light one. I will do my best to explain why I hold this view.

Up to now most of us have based our model sailplanes on the rubber-driven aeroplane: quite naturally, as this is a type we all understand and with which we undoubtedly excel. On the other hand the Germans made their pre-war model sailplanes in a manner very similar to their full-size ones, and we all know how good they were at both. Some of you may have seen their models flying in the King Peter Cup just before the War. Those of you who have seen these German models, and other Continental ones, will perhaps realise, as I did, that they certainly have "a little something the others haven't got." Having studied and taught the design and building of sailplanes on the Continent before the War, I have had opportunities for examining these big machines, and here are some of the conclusions I have drawn.

The first point is that it is useless merely to build a large heavy model and imagine that the weight alone will make it break records; the weight must be wisely used or it will only have a detrimental effect. That is why I strongly advise anyone who has the time and knowledge, to utilise scientific design as opposed to hit-and-miss methods; after all, designing is not terribly hard. We must aim to incorporate the best possible wings, designed by proper methods and not just because "they look pretty" or because "everyone else uses ones like that," and we must set them at the correct angle of incidence for maximum performance—by which I mean minimum sinking speed.

We must do all we know to make our machines super-streamlined, because every little roughness or excrescence is going to add to the drag and reduce efficiency (I, personally, hate all these big rubber bands I so often see on otherwise "clean" machines—why cannot they be hidden away?), and we must make an effort to overcome the tendency towards bad finish, due to completing the model the day before the event, and in a frightful rush, too. You may feel that I am making a fuss over very minor points, but if we are to produce world-beaters we must do everything we can to make them efficient. Large models are much easier to "clean up" than small ones, as we can afford a bit of extra weight for glossy finishes, we can generally plank the fuselages and the leading portions of the wings and tails, and we can devise ways of putting most of the fittings inside, somewhere or other, instead of having lots of hooks and bands left showing.

When it comes to actual flying, the big heavy model scores again, unless there is a flat calm—and you all know how rare that is. Weight can be used to hold the nose of the machine into the wind, so that it has more chances of soaring when there are no thermals about than it would if it were merely blown along like a leaf, as a very light model often is, especially if the breeze is at all strong. There is no need to use tremendously high wing loadings to achieve steadiness in a breeze, and for normal use a loading of about 8 oz. per sq. ft. is sufficient, though the Continental machines were often far more heavily loaded than that. Now that we are limited to a span of seven feet, which means that most of us would design our sailplanes with wing areas from 450 to 600 sq. in. we shall only be building machines weighing a couple of pounds if we use a wing loading of eight ounces; so under the circumstances I do advise a slightly greater loading, say, 10 to 15 oz. per sq. ft., giving us somewhere between 2½ and 4 lb. weight. We need this weight in order to enable the machines to soar consistently and well.

If we consider thermal flights, we find the large model is as good as, or better than, the small one; owing to its low sinking speed it can take full advantage of every "riser." Its one disadvantage is that, because of its size, it cannot circle tightly, and consequently is unable to do those close spirals the rubber-driven models are so good at. However, the average durations of big model sailplanes are almost always superior to those of small ones, providing the design has been carefully carried out.

Large machines can quite easily be built amply strong and will stand up to any normal usage, and another great advantage is that, now that it is becoming so difficult to obtain balsa wood, we can easily make equally efficient machines from birch, spruce, plywood, and some of the balsa substitutes.

I shall deal with some of the problems of constructing large model sailplanes in a future article.

THE WAKEFIELD BELT

HE started to talk as soon as he caught up with me. "Going to the big fight?" he asked.

"I thought it was a flying rally," I said. "I've been abroad for a year or so and I've been quite looking forward to seeing some good model flying."

"Well," he said, "it used to be a flying meeting, but how long have you been abroad? Oh! then you'll remember the great Copland-Smith controversy? It all started out of that. They never really settled that argument, it's been going on for years; there are other scraps mixed up in it now, of course—the Maxwell-Jones business and so on; but slabside *v.* streamline has always been the big argument, kept getting worse—threatened to split the whole hobby wide open, so in addition to the Wakefield Cup they inaugurated the Wakefield Belt."

"Sort of safety valve; lets them work the poison out of their systems, you know, and after it's over they settle down quite happily for another year, all the best of pals again and so on.

"They use specially strengthened models now, of course—wing tips, tail and fin covered with 'Sorbo' rubber and no sharp prop. shafts allowed; it's great fun, generally spreads all over the field and ends up in a grand free-for-all."

"I got a black eye last year," he added rather proudly.

By this time we had reached the flying field and there was already quite a crowd gathered. The wind-sock was fluttering proudly above the loud-speaker van, but instead of the usual take-off board, a roped canvas square complete with stools in each corner stood in its place.

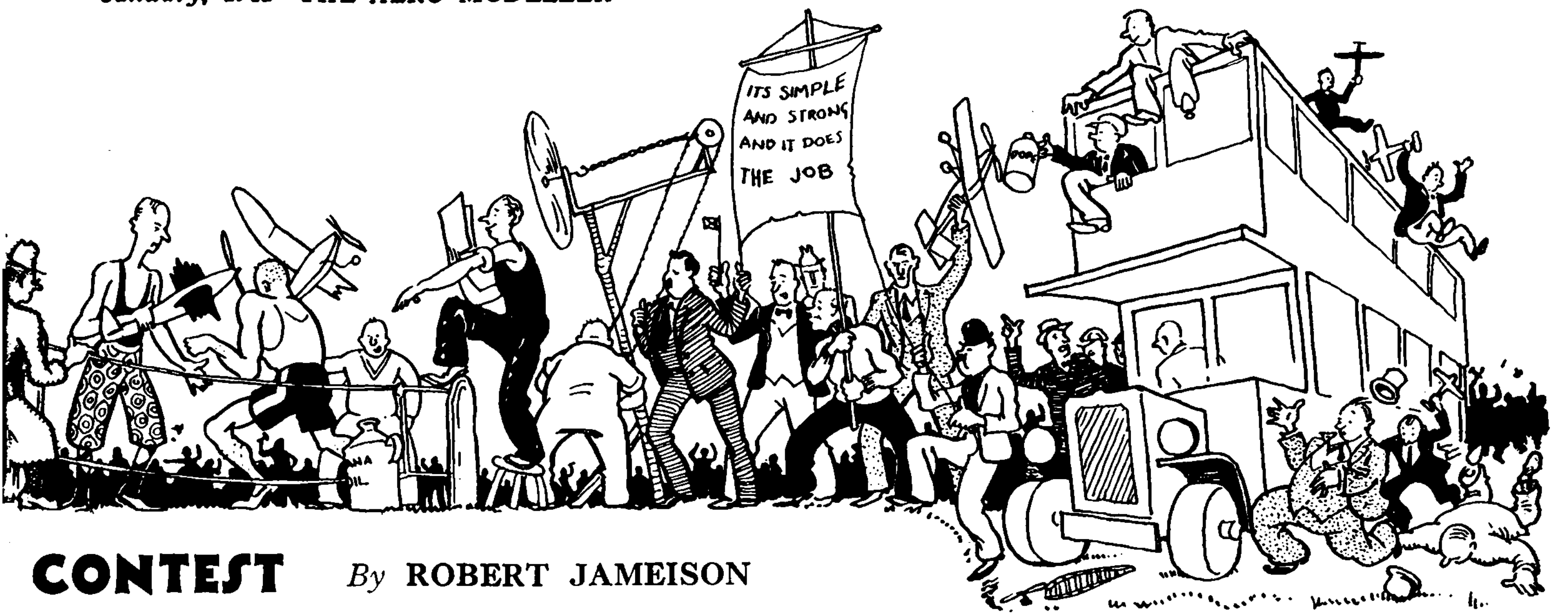
"You can see some flying if you care to," said my friend, rather disparagingly, "but it is generally out on the fringe of the crowd, kids mostly; all the interest is in the big fight."

We had not long to wait; soon several buses arrived on the field complete with banners and crammed with the principals and their supporters. The first two buses were beautifully streamlined; it was easy to see who they belonged to, and the banners they bore carried the proud slogan, "Aerodynamically correct!" The other three vehicles were aggressively slabsided. "It's simple and strong and it does the job!" was their caption. The crowd round the ring thickened, and soon the master of ceremonies, Silver-voiced Rith, was announcing the details over the loud-speaker. "No jabbing below the C.G., no prodding in the clinches, no sharp spinners allowed—a straight, clean sporting contest," was the gist of his remarks.

The men were now in their respective corners. Streamline's man was rather pale and studious looking, but Slabside's man looked cheery and confident and seemed to be by far the fittest man of the two. There seemed to be no limit to the amount of seconds allowed; they were all busy on their men, rubbing them down with banana oil and winding up the huge rubber motors which drove the cooling fans.

The gong went for round one and both opened cautiously. Streamline was using a Copland Wakefield ("Same as last year's," said my friend, "but look! Slabby's changed from a Smith to a polyhedral Korda) he was trained by Smith last year, but I hear he had some coaching from Korda recently." They feinted a little in the middle of the ring, both obviously trying to probe the other's weak spots. But though Streamline got in a useful spinner jab to the solar plexus and Slabside countered with one or two swift raps to the head with his tail unit, neither could be said to be in the lead when the gong went for the end of the round.

Streamline's men worked frantically over him during the interval, cooling him off with giant propellers and rubbing him down with a mixture of banana oil and lubricant, while



CONTEST *By* ROBERT JAMEISON

from below some of his more ardent followers, dome-headed chaps with far-away eyes shaded by large horn-rimmed spectacles, read aloud to him from the tomes they carried, droning coefficients of lift and drag, tables of aerodynamics, efficiency, sinking speeds and so on, while he lay back in his corner with closed eyes.

On the other hand, Slabside sat up cheerfully in his corner and chatted amiably to his seconds, whose advice to him took the form of reading to him in a loud and confident voice the long list of records held by slabsided models. "They always do that," my friend whispered, "it upsets the other fellows."

Both men came up briskly for the second round, and seemed to be much more confident. They circled and jabbed briskly, and then suddenly went into a clinch that the referee tried in vain to break. They stuck together like glue.

Disorder began to spread. The seconds began to yell abuse at each other. The crowd began to barrack, and Silver-voiced Rith, the M.C., whose running commentary had so far been all that the B.B.C. could desire, began to get rather sarcastic. Free fights began to break out among the spectators around the ring, and the dense crowd began to sway to and fro. My friend nudged me delightedly. "What did I tell you," he said, "it always goes like this."

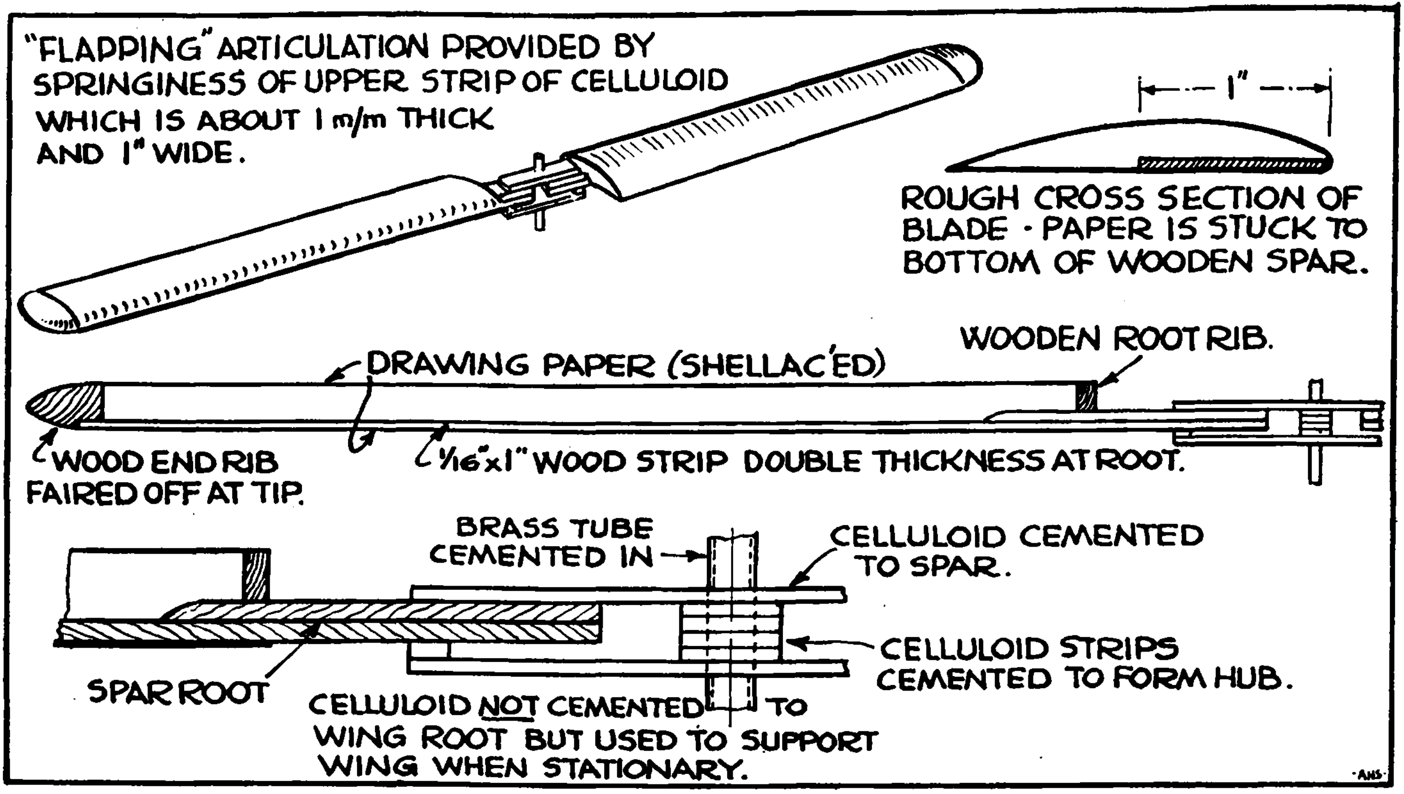
It was Silver-voiced Rith, however, who finally blew up the works. Grasping the microphone stand and all; using it like a gigantic mace, he sprang into the ring and began to belabour the contestants, the seconds, and anyone else who happened to be within his range.

In an instant pandemonium broke loose. The whole crowd joined joyfully in the fray to a man. Fuselages (slabside and streamline) rose and fell like flails. Wings, tails, props. and undercarts flew into the air in fragments. I got a terrific blow on the head which almost stunned me. I think it was a "Chasteneuf" wing, it seemed pretty solid, and feeling that discretion was the better part of valour, I put up my arms to guard my head and managed to struggle out to the edge of the crowd.

It was an amazing sight to look back on. Most of the leading personalities of the aero-modelling world seemed to be involved in the combat in one way or another. I caught a glimpse of Dr. Boster, who, true to the splendid tradition of his noble calling, was administering first aid to friend and foe alike. Even as I watched I saw him improvise a splint from a pair of Copland wings and tenderly bind up a damaged arm with them.

Mr. G. A. Dussel, on the other hand, had not joined in the fight, but had taken advantage of the Doctor's pre-occupation with the injured, and, having got hold of the Doctor's flying boat, had removed the engine, and was now busy dismantling it. He seemed entirely oblivious to the confusion around him, sitting back on his heels and gibbering softly to himself.

In a quiet corner of the field I caught a glimpse of Mr. M. R. Bright; he had managed somehow to get hold of the Slabside champion's model and was now trying it out as a low wing job, crooning softly to himself the while. I was watching the antics of "Lord Bushey" and "Mr. Slippon" locked in mortal combat, their beautiful models reduced to fragments, when someone grabbed my arm. It was my talkative friend, his nose was bleeding and his lip was split—otherwise he was unhurt. "Quick!" he gasped, "they're after me." At that moment a figure brandishing the remains of a beautifully polished monocoupe fuselage dashed up and aimed a terrific swipe at my companion who dodged quickly behind me. I got the full force of the blow in my ribs and it seemed to knock me out completely. It did more, thank goodness! It woke me up!



"START SPINNING"

By BRIGADIER M. J. PARHAM

NINE years ago I learnt to fly, and did my first solos on a thing with a wing loading almost exactly double that of a Hurricane. I am not saying this to show what a clever pilot I was (my instructor would soon "debunk" that theory if he read this!), but, curiously enough, to indicate a possible way of keeping aero-modelling going in spite of a possible failure of the supply of balsa.

All this may sound very involved, so I will explain.

The machine I learnt on was the C.19 Autogiro; its take-off speed was about 35 m.p.h., and its landing speed about 10 m.p.h.—but it is quite true about the wing loading . . . but then, one didn't have to go as fast as one's wings! Hence the high wing loading in spite of the low speed.

Now I am prepared to bet almost anything that the private flying machine of the future *will* have moving wings. Such machines are obviously far harder to design than fixed-wing ones, but the crust of the problem has already been broken. The advantages are enormous, and not least of these is the fact that the supporting wings can be extremely small and very heavily constructed. This brings me to the balsa shortage.

Couldn't this shortage be turned to good account by inducing aero-modellers to play with rotating wings? If they could be induced to do this, they would find it possible to use wings (or blades, if you prefer it) of quite heavy materials, since weight is essential to secure the stabilisation of the rotor by centrifugal force, and the wing area is minute.

Some years ago the Autogiro Co. at Hanworth had a most delightful autogiro kite. This had a rotor span of some 30 in., a two-bladed rotor with carved wooden blades of high aspect ratio, and a link mechanism whereby (if memory serves aright) the angle of incidence of the rotor disc increased as the kite sank and the pull of the string consequently became more horizontal. It flew beautifully.

Just recently I made a pair of two-bladed rotors (very badly and hastily made) of spruce and drawing paper, with celluloid hinges and hub. Each had a span of 24 in. and a chord of 2 in., and each weighed just over one ounce. The construction was as shown on the sketch, and with a small negative angle of incidence the rotors "auto-rotated" satisfactorily when held in a wind, provided the incidence of the rotor disc was kept fairly high (suitable for a kite rather than for a powered rotaplane, in fact). I put this last difficulty down to the fact that the finish was poor, the wing section too thick and the hub bearing unsuitable. Both rotors developed a high lift and (being of opposite "hand") also auto-rotated very satisfactorily when mounted one above the other on a common shaft.

The high wing loading admits of very strong rotors being provided, which will not suffer damage, and great economy of material. I feel that if anyone could spare the time (which I certainly *cannot*) they could have a great deal of fun by starting off with a simple glider, "winch launched" on a tow-line, then applying power to it (and so making an autogiro), and later blossoming out into experiments with twin rotors (either mounted co-axially or on outriggers), and finally on to power-driven rotors.

Don't let's laugh at Mr. Sikorsky in America because he has turned to helicopters after designing 'planes for a quarter of a century.

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J. H. Bennett

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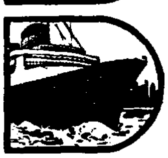


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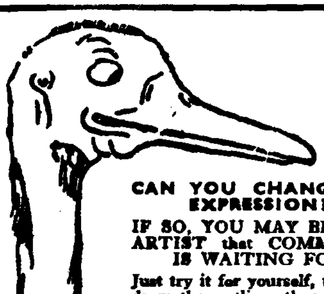

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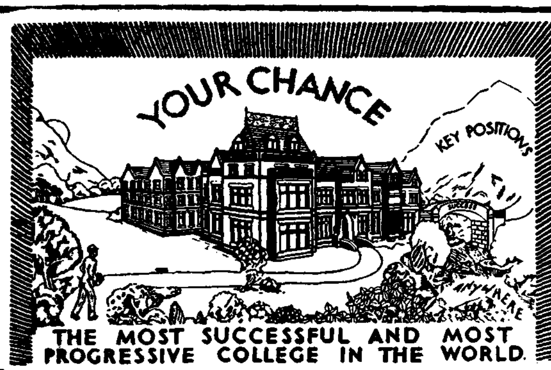

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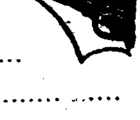

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A METHOD FOR CALCULATING THE PERFORMANCE OF RUBBER MOTORS—and a device for experiment—By R. BURNS (Glasgow M.A.C. Research Section)

FOR a long time now I have been suspicious of the methods usually advocated in books on designing for calculating performance, and have found that results always fell short of the calculated times and heights, in most cases by a wide margin. That being so, I determined to see if I could find a better way of handling the calculations, as I wished to ascertain from trials in the field whether the fast climb as used in America was really so much inferior to the slower cruising type of flight commonly found in England. I had a suspicion that the American style of flying might be better for Scottish conditions of wind and hilly country, and the mathematics of the business would obviously stand investigation at the same time.

Briefly, I advocate the use of energy units in these calculations, as it simplifies them enormously as compared with the use of horse-power units. The method is to calculate the energy stored in the type of rubber you use, to apply an efficiency factor for the air screw wastage (the omission of this is the main fault in such works as Mr. Stubbs's) (No, Sir! See middle of page 45 of latest edition, in which Mr. Stubbs allows 33 per cent. slip.—ED.) and to calculate how much energy is absorbed in the level flight of the machine, this leaving a quantity of energy available for lifting it, so that the height attainable can be forecast.

I compared the results of the calculations so made for my 1940 Wakefield machine with actual flights, and the machine can exceed the calculated times, without the aid of thermals, by a few seconds, so the figures err on the safe side.

The rubber I used was as tested by the Glasgow M.A.C. Research Section and found to be capable of storing 2,400 ft./oz. of energy for each ounce of rubber, and as I used 3 oz. the energy stored would be 7,200 ft./oz. I don't know the efficiency of the airscrew, but American tests are reported as showing an efficiency of 50 per cent. to 60 per cent. for a good outdoor airscrew. This might be thought to be too low, but it must be remembered that there is more energy expended in the first part of the power run than at the end, and the conditions then are at their worst as regards blade speed and torque, so that the average efficiency will be lower than might be expected. I do not expect any model will improve on 65 per cent. as the average airscrew efficiency in actual flight. Taking 60 per cent. as applicable to my machine, I thus have 4,320 ft./oz. of energy available for useful work, the rest being dissipated in overcoming the drag of the airscrew blade, and in tip losses and other ways. (Oh! but you allowed for 65 per cent. efficiency of airscrew, so are allowing only 5 per cent. for airscrew drag, tip losses and other ways.—ED.). This means that I use the energy stored in over an ounce of rubber without any advantage to the flight of the machine with a reasonably good airscrew, so the effect of a badly-carved one or one otherwise unsuitable can be imagined.

Other particulars of the machine are as follow:

Weight, 8·5 oz.; speed, 19 ft./sec.; drag, 1·15 oz.; L/D ratio, 7·4; sinking speed, 2·8 ft./sec. approximately.

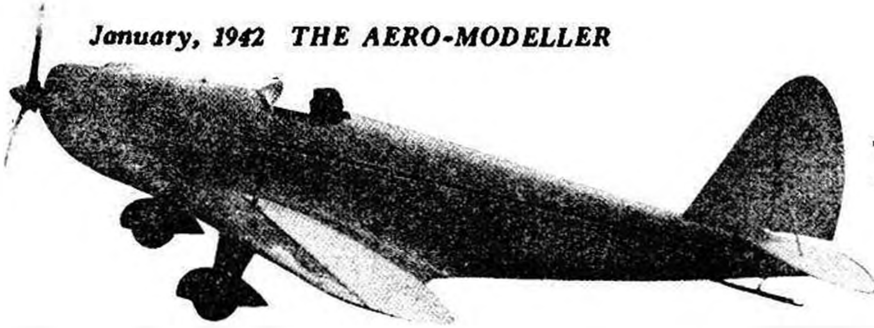
On timing a few flights where the power run was about 85 sec. to 90 sec., but in which the last 150 turns were not used, due to a spring tensioner stop, the average duration was found to be 181 sec., so the model does follow the results obtained by calculation. I tested with a long power run, about 110 sec., and got 184 sec., but the machine is not suited to that type of flight, so the greater height, shorter power run type was decided on. The loss is not great on paper, and is made up for in flying by the greater height actually keeping the model in view above obstacles which would cause the time-keeper to press the button had the model been 50 ft. lower. If you fly in a very flat part of the country then you may find that a long power run will pay, but that must be decided in the light of actual conditions. On a windy day the air below 150 ft. is always more turbulent than the air higher up, and the worst conditions are found near the ground, so the fast climb will enable a machine to score by being in this disturbed area for as short a time as possible.

The obvious question now arises as to how to design an airscrew to be driven by a given number of strands of rubber and to run for exactly so many seconds. In the present state of our knowledge I can't supply the answer, but there is another way out, that is to try a large number of different size airscrews, varying the P/D ratio, until you hit a combination of rubber and airscrew which exactly suits your model. There will be more than one such combination which will give the same number of seconds of power run; a smallish motor driving a smallish airscrew at a faster rate will have more turns put on it, so will run for the same time as a larger one driven by a heavier motor taking fewer turns, but the model will have more torque reaction in the latter case, so the drag may be higher and offset the slightly greater efficiency figure for the airscrew alone. To simplifiy the selection of the ideal airscrew I have been using a device consisting of a few pairs of single blades joined at their roots to an inch or so of thick dowel rod (½ in. diameter) by a spliced joint and a centre section of tin tube ending in a clamp controlled by a screw, so that the blades can be changed easily and locked at any angle, and a multiple airscrew of any pitch within reason and of diameter from 13 in. to 18 in. is the result. By fitting this to a new model it should not take long to decide what type of performance will best suit it, and a carved duplicate of the best airscrew can be made. It will be found necessary on most models to alter the trim slightly for different thrust values, since the longitudinal dihedral must match the thrust developed if the model is to avoid climbing too near the stalled position on one hand or speeding along at low levels on the other. It is possible to vary the power run a little by altering the trim of the machine, leaving the airscrew power combination alone, due to the alteration in angle of attack of the blades produced by varying speeds of the model.

My own preference at the moment is for a light motor and a fine pitch airscrew, and I use 16 in. diameter by 20 in. pitch on a Wakefield, driven by 16 strands of 3/16 in. by 1/30 in. strip, the motor being capable of taking 1,300 turns and giving a power run of 80 sec. on full turns, resulting in a fast steady climb. Perhaps later experiment will change this, but in the meantime I would like to suggest that readers try it, as the small torque will treat any defects in stability in a very kindly way, and the height is sufficient to put the 'plane in the way of any thermals that may be about.

The calculations are tabulated for four lengths of motor run and are as follow:

		60 sec.	80 sec.	100 sec.	120 sec.
Energy stored	ft./oz.	7,200	7,200	7,200	7,200
Airscrew efficiency factor	%	55	57½	60	60
Energy available for producing thrust ..	ft./oz.	3,960	4,140	4,320	4,320
Level flight.					
Distance covered by model at 19 ft./sec. ..	ft.	1,140	1,520	1,900	2,280
Drag (taken at higher value, due to slip stream)	oz.	1·25	1·25	1·25	1·25
Energy required to maintain model in level flight	ft./oz.	1,425	1,900	2,375	2,750
Surplus energy available to lift model. Weight 8·5 oz. ..	ft./oz.	2,535	2,240	1,945	1,570
Height attainable ..	ft.	298	263	229	185
Time of glide	sec.	106	94	82	66
Duration	sec.	166	174	182	186



The "TIPSY"

By A. ABBOTT

Construction—Fuselage.

First of all, obtain a block of soft balsa, 2 in. by 1¼ in. by 2¼ in., and carve carefully to shape. When this is done, split the block down the centre-line and hollow out to wall thicknesses shown, not forgetting to leave a ¼ in. hole for nose-button. The rest of the fuselage is made on the stringer principle. Pin master stringers on the drawing and cement half-formers on to these. When dry, remove from plan and complete the fuselage by adding opposite half-formers, the two side stringers and the tail-blocks. Cover the entire fuselage except the turtle-back with 1/64 in. balsa; add bamboo stringers and cover with tissue. Also cut a portion of the balsa covering away for insertion of rubber.

Pierce holes in fuselage and cement drinking straws firmly into position.

Wings.

Place spars in position on plan, also the trailing edges. Slot ribs and cement on to the spars. Rib C is cut from hard ⅛ in. balsa, to which the landing gears are fitted. Cement wing tips in position and cut slots for and fit leading edges. Cover wing to dotted lines with 1/64 in. sheet balsa and place 1/16 in. sheet stiffening in position on underside of wings. Locate wing dowels from straws in fuselage and cement in position. Cover rest of wing with tissue.

Empennage.

The construction of the tail and elevator is very similar to that of the wings. Cut *all* ribs to streamline section and cement spars in position; attach movable parts by means of aluminium hinges. Stabiliser rib A–A is made of ¼ in. by 1/16 in. balsa, and tips are of 1/16 in. sheet.

Undercarriage.

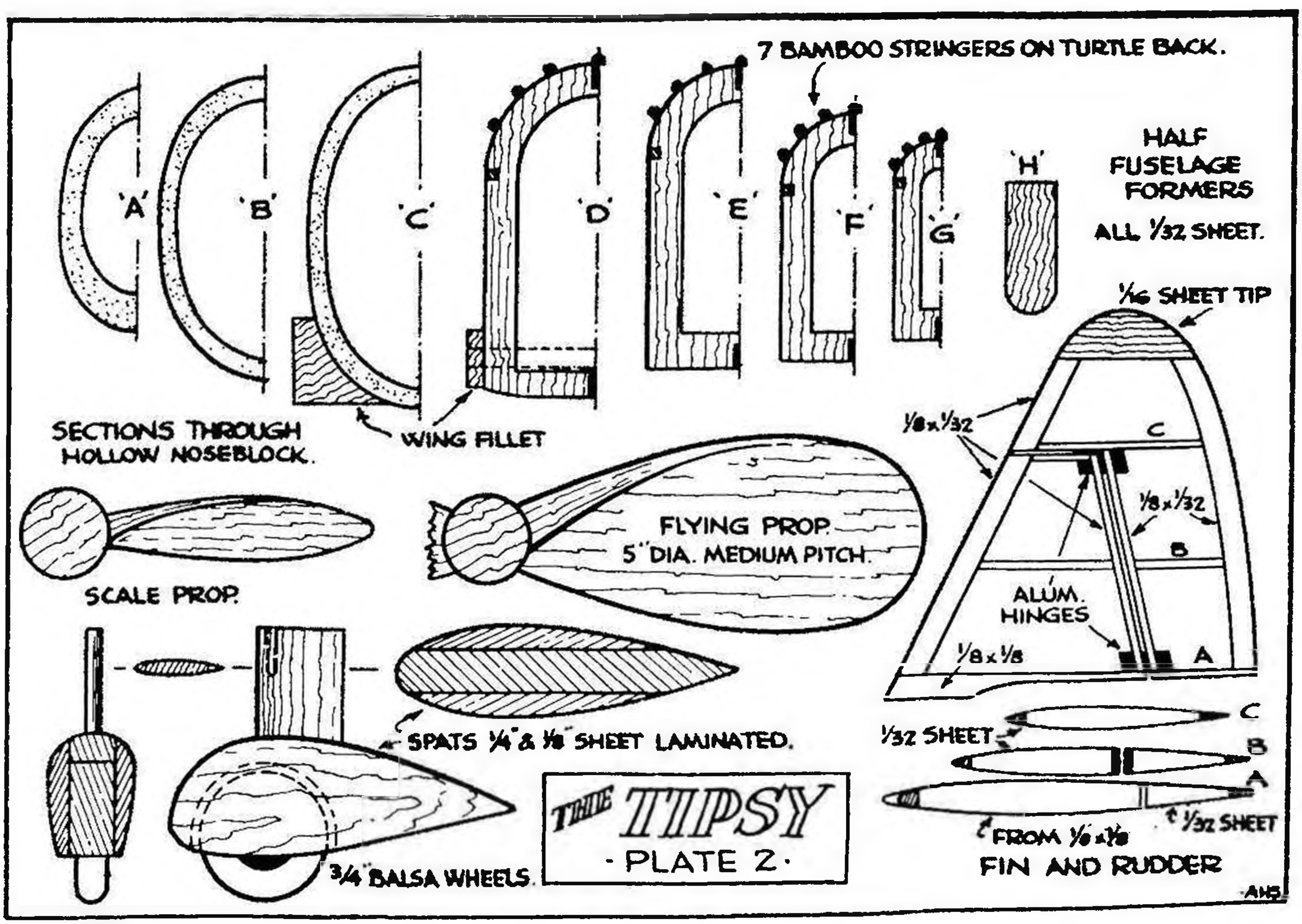
Cut two shapes of ¼ in. balsa and four of ⅛ in. balsa. Cement one piece of ⅛ in. each side of ¼ in. sheet after space to take wheel is cut out. Carve to streamline section and fit ¾ in. balsa balloon wheel. Strut is carved to section Y–Y and cemented to spat. Force a 1/16 in. diameter bamboo peg into the strut, and attach landing gear to rib C.

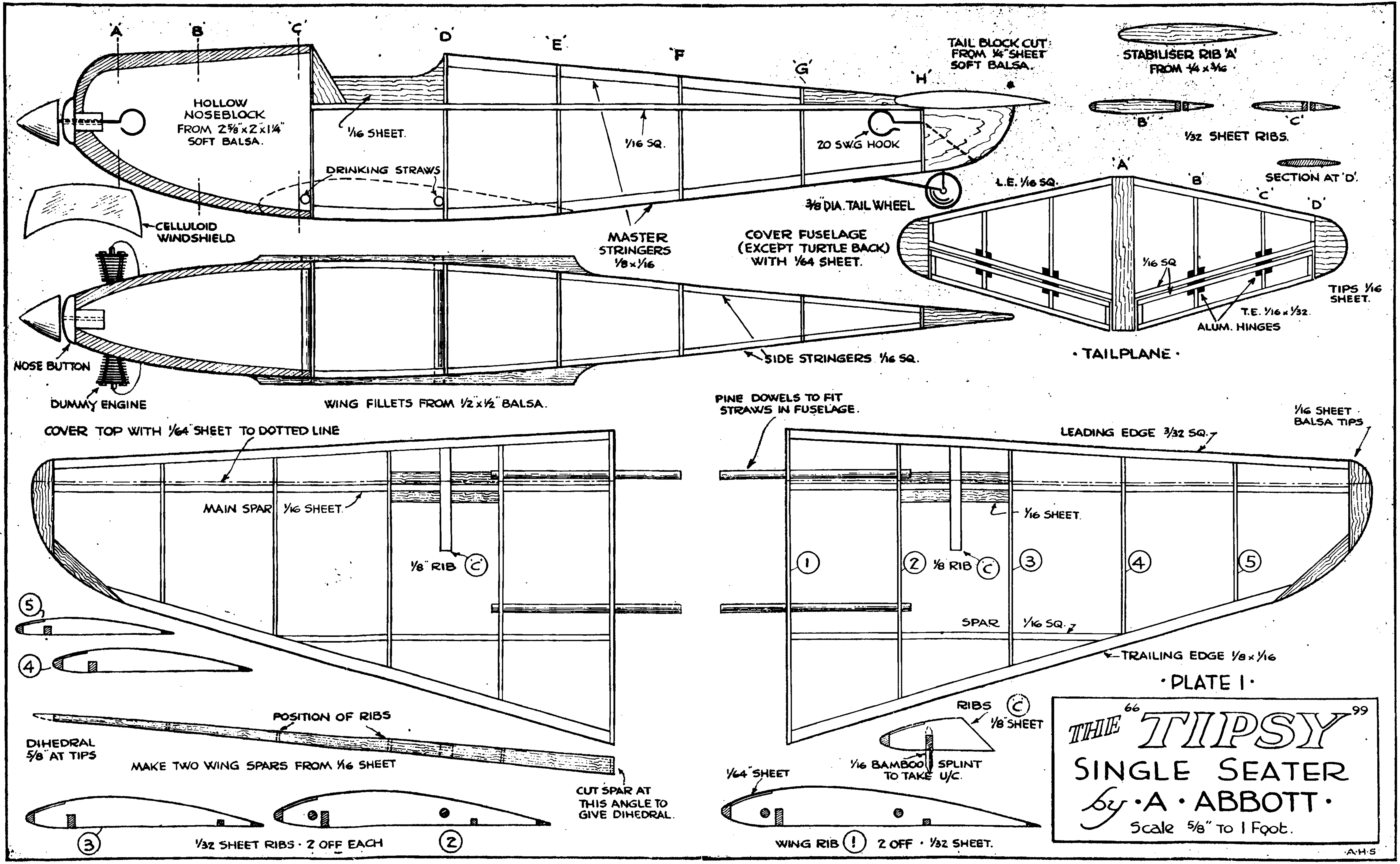
Covering and General Finish.

Sand fuselage with extremely fine "garnet" paper and give one coat of clear and two coats of coloured dope. Cover turtle-back with tissue paper and add the dummy engine, which may be made by winding thick thread round balsa cylinders and adding valve rods and spark plug leads to make a realistic job.

Flying.

Fit a 5 in. "wind shovel" type propeller and two or three 12 in. loops of ⅛ in. by 1/30 in. rubber. Add very small weights to nose or tail until correct trim is obtained.





THE "TIPSY" SINGLE SEATER

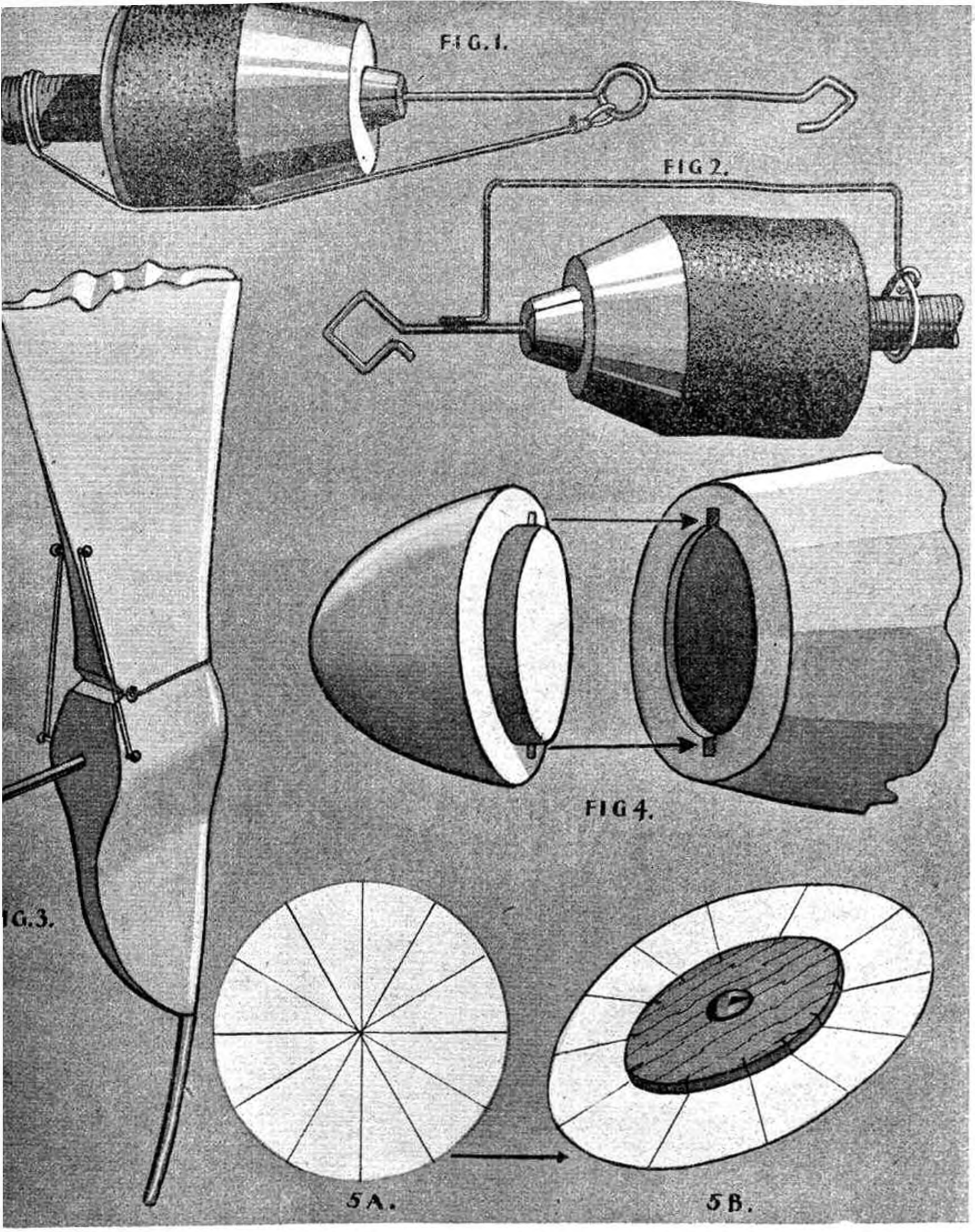
by · A · ABBOTT ·

Scale 5/8" to 1 Foot.

A·H·S

GADGET

CONDUCTED BY M. R. KNIGHT



"TRIFLES make the sum of human things, and half our misery from our foibles springs," quoth the poet, which little essay in philosophy is brought to mind by an idea for a safety-first winder-hook received from a reader in Norwich, and (with "mods.") from another in Arbroath, 400 miles distant.

In a perfect world, of course, these hooks would never come adrift, but such is the frailty of human nature that even seasoned modellers, having succeeded in piling on the umpteenth turn, habitually fling away their winders in gay abandon. Subsequently, out flies the hook, and someone's fuselage and/or fingers are flattened. So simple a device serves to prevent this contretemps that some will doubtless be found to sniff at its inclusion in this review. However, its use may perchance in many cases render apt another poetic utterance, "What mighty contests rise from trivial things!"

Mr. S. A. Girling, of Norwich, incorporates a loop in the stem of his winder-hook, and links this with copper or iron wire to the threaded drill shank, around which several turns are taken. (Fig. 1.) This may not prevent the slipping of the hook, but will furnish a visual warning "before the bang occurs." Mr. D. D. Edwards prefers to solder each end of the check-wire (Fig. 2).

It is an experience by no means uncommon for the publication of an idea to be followed by a letter claiming that it is already in use by the writer, or by someone he knows, and that it is therefore neither new nor original. Aviation history, as a matter of fact, contains sundry examples of ideas being evolved and applied by several people quite independently of one another, and it would not be surprising if the safety-first winder-hook had occurred to more people than the two now submitting it. Be this as it may, they have taken the trouble to write, and in the reviewer's opinion the idea will prove acceptable to many.

In a previous review it was pointed out that the idea commonly held that the air-flow can be relied upon to fold a hinged airscrew when the power ceases is fallacious. Experience has shown that centrifugal force tends to hold the blades extended and turning until rotation is arrested, and that unless the latter process is effected progressively by some form of spring, the stresses on the blade-hinges are likely to prove serious.

Mr. P. G. Browne, of Aldenham School, Elstree, sends details of a single-blade airscrew which folds neatly and unfailingly without the use of any such mechanical trip. As will be seen from reference to Fig. 3, use is made of a rubber band linking the blade with the boss. A piece of thin wire is passed through the boss close to its rear face, and allowed to project on each side. Some distance along the rear face of the blade is a similar wire, and a rubber band is anchored to the two lower pegs thus formed, and slipped over the two upper pegs. The tension is sufficient to overcome the blade's disinclination to fold, even when the model is gliding downwind.

From the same reader comes a description of a nose-block suited to a glider with a fuselage of circular cross-section. This block carries a trimming-weight, and the special feature is that it locks into position. Two pegs projecting from the rear plate or "adapter" are slipped through slots cut in the front bulkhead. The block is then turned through half a circle, the resultant slipping of the pegs behind the bulkhead serving to lock it in place. Fig. 4 portrays the working out

REVIEW

ILLUSTRATED BY C·RUPERT·MOORE.

" Gadget Review " continues to be a much appreciated feature, and contributions of original ideas are invited. Envelopes must be marked " Gadget Review." All ideas published are paid for. Ideas not published cannot be returned to senders.

of the idea, which has proved satisfactory over the past twelve months.

Mr. Gordon Allen, of Prescot, Lancs, forwards sketches indicating how the position of stringers can be marked quickly and accurately on circular formers. A circle is first drawn, the diameter of which exceeds by a small amount the maximum cross-section of the fuselage-to-be. This is divided into sections (see Fig. 5A), the lines corresponding in number with the number of stringers to be employed. Before the formers have their middle part cut away, a drawing-pin is passed through the centre of each in turn, and into the centre of the segmented circle (Fig. 5B). The stringer positions can then be pencilled on the rim.

The idea can be adapted to oval formers, care being taken, of course, to align the major axis of each with that of the segmented pattern.

Fig. 6 shows a means by which those who are keen on small solid scale models can produce " pneumatic " wheels from the rubber reservoirs of discarded fountain-pens, the inkstain imparting a realistic tint. A pencil is pushed into the reservoir, stretching it slightly. It is then rolled back on itself until it slips off the pencil, and two hubs of 1/32 in. balsa sheet are glued to it. A reduction in the length of the reservoir serves to reduce the diameter of the wheel. The idea is sent by Mr. Alan G. Loukes, of Sheffield, who suggests that it could also be used to form tail-wheels for flying models.

A neat free-wheeling device concealed within the airscrew spinner, the work of Mr. R. B. Laroche, of Bexleyheath, is depicted in Fig. 7. It will be seen that the airscrew-shaft carries a loop in front, and its end is bent back to form a peg which, under the tension of the rubber motor, engages with a hole in an aluminium plate, thus driving the airscrew. The release of the tension allows a spring in front of the disc to disengage the peg. The hollowed spinner is cemented to the front of the airscrew.

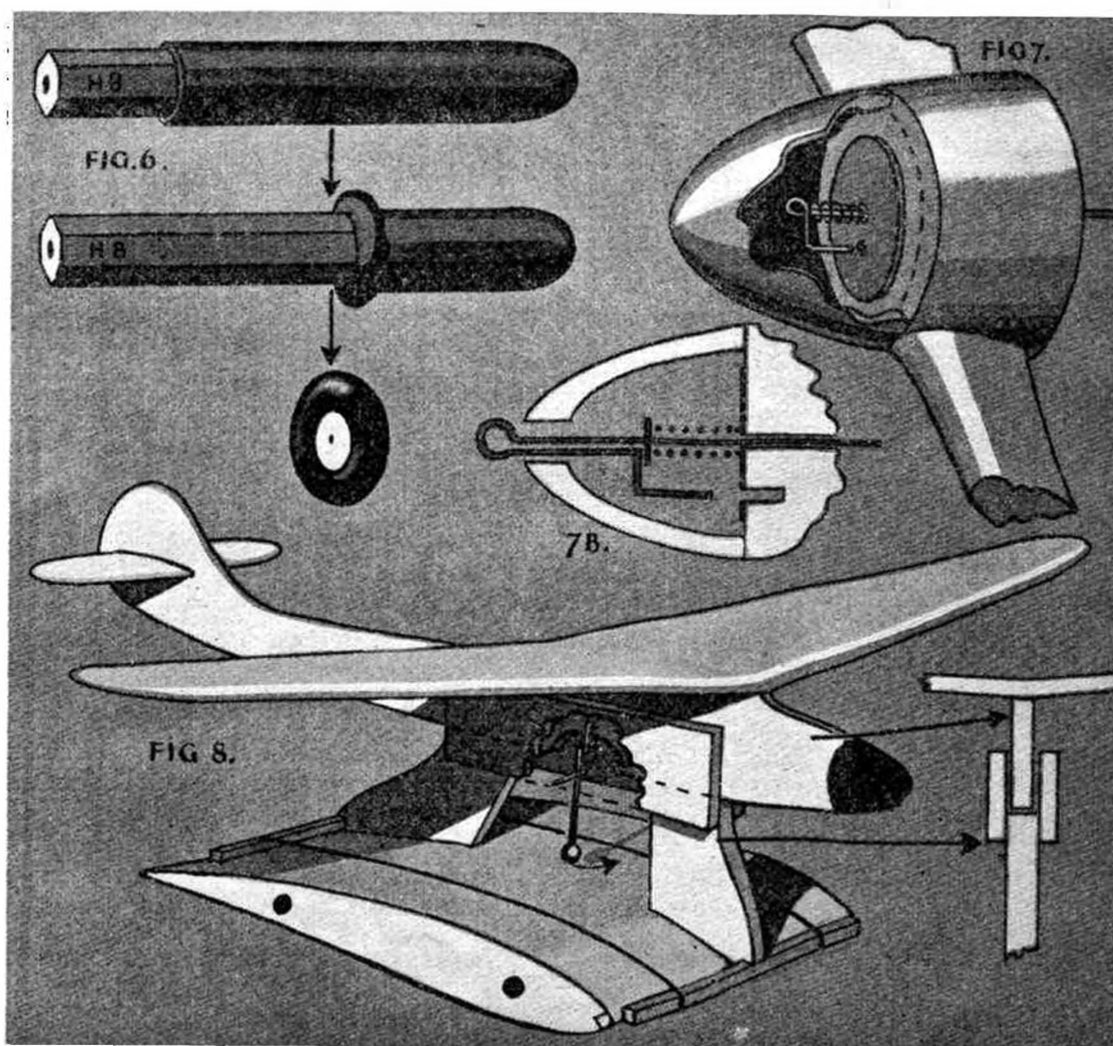
One would suggest that a detachable spinner, secured by two small press studs, would enable the loop in the shaft to serve as a winder-hook attachment. Alternatively, the spring could be held in place by a soldered washer, and the shaft extended forward to allow the loop to project from the spinner, as in Fig. 7B.

Our final description this month is of a release gear for a composite aircraft. Devised and used by Mr. J. Lambert, of Sandyhills, Glasgow, it is illustrated in Fig. 8.

The lower component, a rubber-powered high-wing model of 35 in. span, carries a cradle secured by rubber bands, and comprising two pieces of ⅛ in. balsa sheet, supporting two guides of 1/16 in. sheet, between which is pivoted a small pendulum. The latter consists of a wire carrying 3/16 oz. of lead. In the case under review the upper component is a 10 in. solid glider. It is slipped between the guides, and pushed rearwards until a wire loop beneath its centre part engages with the hooked upper end of the pendulum. The outfit is then tilted to a slight climbing attitude, and launched, the weighted end of the pendulum serving meanwhile to hold the hook securely within the wire loop. As the model assumes its gliding angle, the weight moves forward, thus disengaging the hook, and freeing the glider.

Suitable modification of the supports would allow a small rubber-powered model to be substituted for the glider. It should be mounted in such a position as would allow its airscrew to rest against the fuselage of the glider, thus preventing rotation prior to release.

From a fairly extensive experience with composite models, the reviewer would suggest that care be taken to reduce as much as possible the weight of the pendulum and the upper component, as the biggest problem with this type is to secure a sufficiently low position of the centre of gravity. It can be done, and one's own efforts culminated in an outfit consisting of a 42 in. low-wing weighing 8⅛ oz. supporting a 2 oz. low-wing of 26 in. span, successful releases being televised at Alexandra Palace and Kensington Gardens.



"QUESTIONS AND ANSWERS"

Questions will be answered through the post, **provided** *a stamped addressed envelope is sent. Following is a selection from recent replies which are of general interest.*

Q. I wish to use very thin gear wheels. Would tool steel be satisfactory?—(J. W., Thetford).

A. Gear wheels specially made from tool steel would be quite satisfactory if the teeth were as narrow as 1/16 in., although I would advise you to make them ⅛ in. wide, otherwise you will have to be very careful in lining them up to avoid stripping in the event of any flexibility in the gear frame.

I would say that standard brass gears ⅛ in. wide would give satisfactory service when driven by the 4 oz. rubber that you indicate is likely to be used.

Q. Can you tell me whether the undercarriage of the "He 70 A" retracts, where the wireless aerial is situated, and how many persons are carried? How does the "He 118" differ from the "He 70 A"?—(F. M., Hounslow).

A. The "Heinkel He 70 A" was designed as a fast mail or passenger 'plane. In the former case a pilot, wireless operator and one passenger were carried in addition to the mail load. As a passenger aircraft six passengers and a pilot were carried.

The undercarriage consists of two units which retract outwards into the wings, panels covering the wheels when drawn up, and a trailing aerial is carried under the fuselage between the undercarriage legs.

The "He 118" is very similar to the "He 70 A," but was designed as a bomber and has a Daimler-Benz motor instead of a B.M.W. It is slightly larger and rather faster than the "He 70 A."

Q. Can you give me the names of books dealing with gliding and sailplaning?—(J. A., Ashtead).

A. "Gliding and Motorless Flight," Carr and Howard-Flanders, 7s. 6d.; "Gliding and Soaring," White and White, 12s. 6d.; "Gliding and Sailplaning," Starmer and Lippisch, 5s.; "Kronfeld on Gliding and Soaring," Kronfeld, 21s.; "Motorless Flight," Ashwell-Cooke, 7s. 6d.

Q. Have "Hurricanes" or "Spitfires" ever been fitted with two-bladed propellers?—(D. H., Mansfield).

A. Both the "Spitfire" and the "Hurricane" when they first appeared were fitted with two-blade wooden airscrews. Various experiments have been made, and all aircraft of these types now built are fitted with three-bladed Rotol airscrews.

Q. What was the engine and propeller size used by the designer of the "Firebrand" (May issue)?—(P. W., Leicester).

A. The engine used by the designer was an "Ohlsson," but any 7–10 cc. engine would be suitable.

The airscrew size would vary in relation to the size of the engine, but with an "Ohlsson" would be about 14 in. diameter by 8 in. to 10 in. pitch.

Q. Can you give me colour schemes of the "Catalinas" now in service with the R.A.F.?—(J. S. M., Sedburgh).

A. The Consolidated Model 28 "Catalina" now in service with the R.A.F. Coastal Command is painted similar to other flying boats of that Command. The top surfaces and sides are camouflaged green and brown, and undersurfaces are coloured silver. Red and blue roundels are carried above the wing tip; underneath they are red, white and blue with an additional yellow ring. The fin bears red, white and blue stripes, the red foremost. Two squadron letters and a single identification letter are painted in pale blue-grey on each side of the hull.

Q. What are the uses of and the difference between a pitot tube and a venturi tube?—(D. J. M., Norfolk).

A. The pitot tube on an aeroplane is used for measuring the air speed, i.e. the speed of the passage of the aeroplane *through the air*. The common type of tube usually consists of a static and a pressure tube pointing forward.

The venturi tube is used for the same purpose. This is usually fitted on to the side of the fuselage and is a tube, the diameter of which is narrower in the middle than it is at its ends.

Q. Have you details of the "Martin Baker Fighter"?—(N. B., Kettering).

A. This machine was a single-seat low-wing monoplane which was produced in 1937, but was not put into production. It was of metal construction with fabric covering, and carried eight machine-guns, four in each wing. Main dimensions were: Span, 34 ft.; length, 34 ft. 6 in.; height, 9 ft. 9 in. You will notice that the length is actually greater than the span—a very unusual ratio. Performance figures have not been released. The motor was a 805 h.p. Dagger III.

Q. Can you please tell me what British and American aircraft are used by Jugoslavia, Iraq and Sweden?—(S. J., Birmingham).

A. *Jugoslavia:* Hawker Fury, Hawker Hurricane, Bristol Blenheim.
Iraq: D.H. 84 Dragon, D.H. Puss Moth, D.H. Tiger Moth, Gloster Gladiator, Hawker Nisr (Audax with Pegasus motor), Douglas 8S ordered.
Sweden: Hawker Hart, D.H. Tiger Moth, Douglas 8A–1x, Gloster Gladiator, Bristol Bulldog, Handley-Page Hampden. Vultee Vanguards ordered, but orders transferred to Great Britain.

Q. Why was the "Heinkel He 112" an unsuccessful design?—(S. S., Hucknall).

A. I am afraid I am unable to tell you why the "Heinkel He 112" was not considered a successful aeroplane.

When a new aeroplane is a "white elephant" the manufacturers do not usually explain the reason for any default, but it would appear that the low aspect-ratio elliptical wing combined with the very powerful Daimler-Benz motor resulted in a very high wing loading which would make the 'plane difficult to fly and land.

A small number of "He 112s" were built, but were soon replaced by the "He 113," which as it happens is another bad design and is not in much use by the Luftwaffe.

Q. I wish to build a small petrol model to use a 6 cc. engine and fit with radio control. Would this be O.K.?—(J. J. S., Derby).

A. I strongly advise you to build a fairly large machine. You could not expect to get a 'plane weighing more than 5 lb. off the ground with a 6 cc. engine, and then the performance would not be startling. Generally, 6 cc. engines are fitted to 'planes of not more than 4–4½ lb.

Unless you have some very wonderful radio development up your sleeve I am sure that you could not build a small 'plane to carry an equipment of this weight.

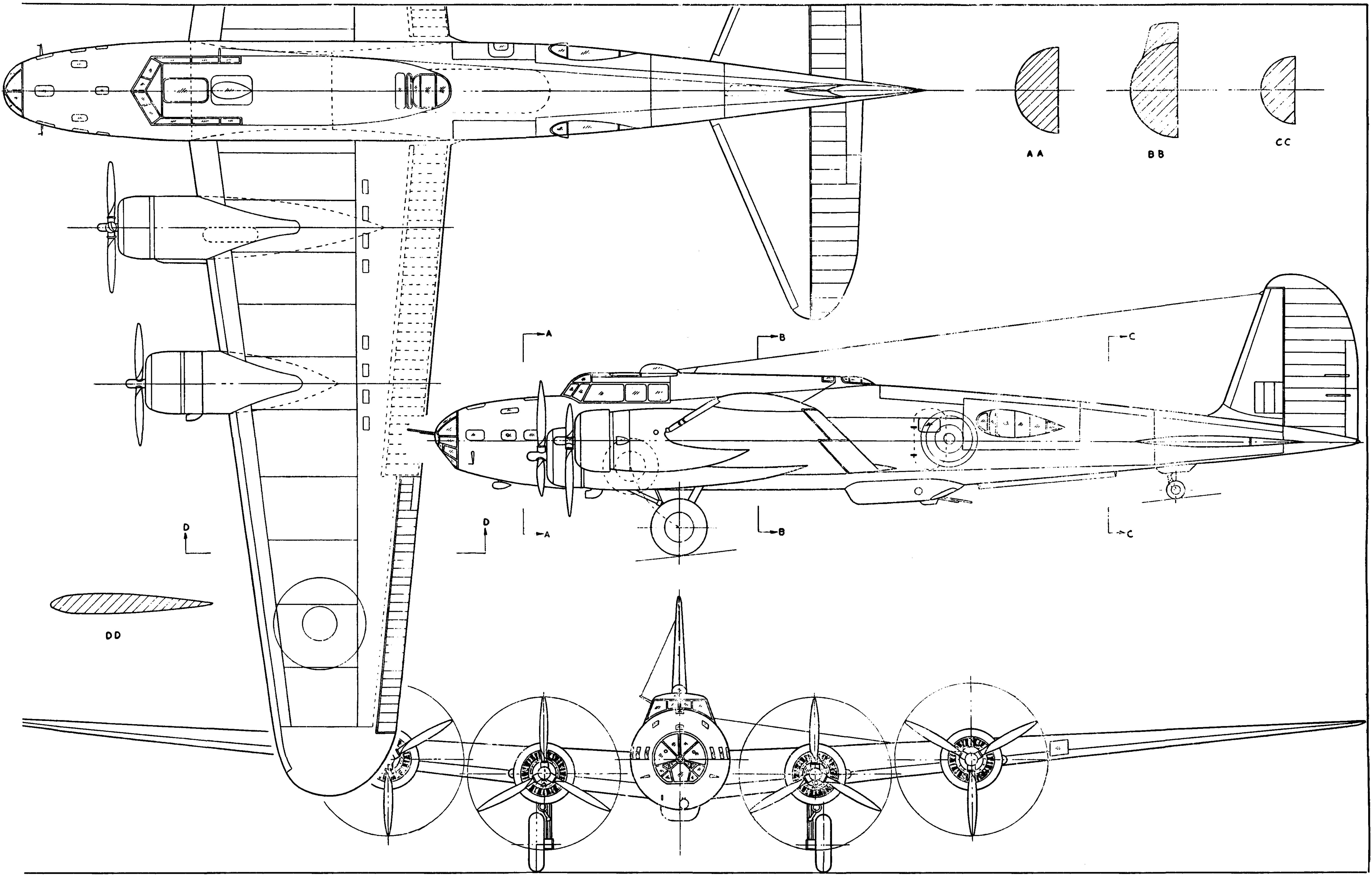
Q. Can you tell me from which 'plane the following aircraft have been developed: Boston, Hudson and Liberator?—(A. B. W., Exeter).

A. The "Douglas Boston Bomber" now in service with the R.A.F. was developed from the "Douglas D.C.5" commercial monoplane produced a few years ago. Certain modifications have been made, but the external similarity between the two types is apparent.

The "Hudson" is a development of the civilian "Lockheed 14" monoplane, and apart from the colouring differs only in the addition of the gun-turret above the fuselage and equipment. The "Lockheed 16" and "Ventura" have been developed from the "Hudson."

The "Liberator" is the only large landplane produced by the Consolidated Aircraft Corporation, and is an evolution of the Model 29 XPB2Y–1 flying boat.

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.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RADIO CONTROL FOR MODEL AIRCRAFT

By G. F. PENVER

In war-time it is not possible fully to describe radio-control, but this short article explains the elementary principles on which the " reed " system operates.

As far as I can ascertain the only radio control systems which have been used as yet with any degree of success have been those with a single relay operating the rudder alone. These are very definite in action, resulting in either full rudder or none at all, that is to say, one cannot choose the tightness of the turn taken by the model in flight.

There are, of course, selector systems which apparently work quite nicely, such as the one described in the May, 1939, issue of THE AERO-MODELLER (memorable month !). These, however, all suffer from time-lag ; a certain amount of time must elapse between the transmission of the signal and the commencement of the manœuvre by the aircraft.

I have heard various wails from the modelling fraternity that, notwithstanding the petrol engine, models still cannot be made of actual machines that will perform correctly in the air and land without damage. This, of course, disregards the differences in rudder and elevator areas which are necessary in nearly all cases. One must admit that an undercart mounted on a scale model in a position that gives safe landings looks very out of place, and spoils the model as a scale model.

The Wireless.

The reed system operates with the reception of an audio-frequency signal on a wavelength of about ten metres. Most modellists have pals who are interested in radio whom they could persuade to design, and better still to build, a transmitter of about three valves, working preferably off an ordinary 6 or 12 volt car battery. The transmitter control system is plugged into the transmitter, where a microphone would normally be. The receiver would be an ordinary single or double valve audio-frequency short-wave receiver. If two valves are used it would be better to use a Class " B " valve, that is, two valves in one, to save weight. One half can be used as the detector, and the other as a low or audio-frequency amplifier. Fig. 1 shows the diagram of a receiver that will serve the purpose. This receiver operates on a H.T. voltage of 45 volts. A large saving in weight can be effected by making a H.T. battery from " Pen-lite " cells. This will result in a much shorter life for the battery, but it seems to be worth it. Other batteries required will be an ordinary 4½ volt flat battery for engine ignition purposes, any 3 or 4½ volt battery to operate the relays, and a single 1·5 volt cell for valve filament heating.

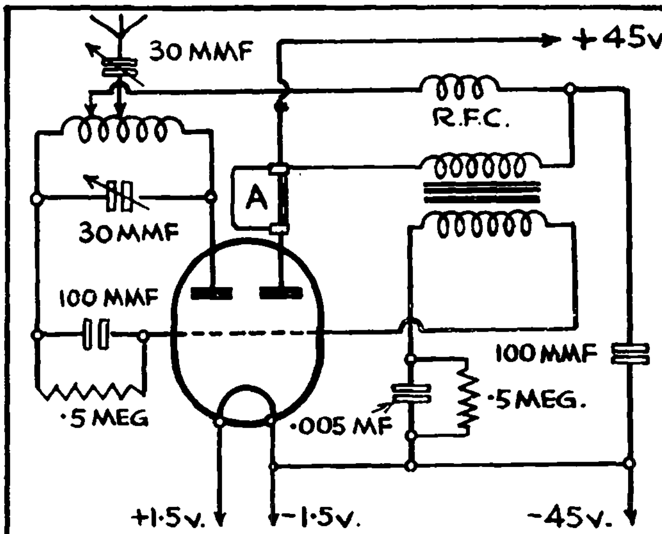
A further decrease in weight may be effected by trimming off the outer parts of the metal laminations forming the core of the transformer, until only a single straight core running through the coil is left. This will detract from the efficiency of the transformer, but the saving in weight is worth it.

The Reed System.

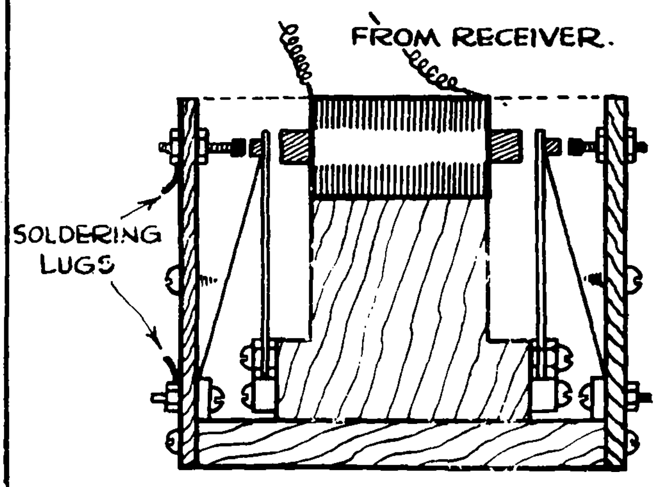
This particular piece of work is the " heart " of the whole control system. The reed consists of a piece of steel spring about 3/16 in. wide, and two or three thousands of an inch thick. Its length depends upon the note at which frequency it is required to vibrate. The length for convenience should be about 1 in. to 1½ in. The frequencies will be about 100 to 150 cycles per second. It doesn't matter which frequency is obtained providing the frequencies of the reeds are not harmonically related or the same.

Now, if a frequency of say 121 cycles per second is superimposed on the carrier wave of the transmitter, and the receiver is tuned in to that transmitter, the H.T. circuit of the receiver output valve will have a frequency of 121 cycles per second. If this current is passed round an electro-magnet coil which is placed close to a reed tuned to that frequency, the reed will vibrate. The fact that other reeds not tuned to that frequency are in the field of the electro-magnet means nothing to them.

As this reed is vibrating it is made to close contacts in a circuit operating a relay, which in turn operates the particular aircraft control to which it is attached. Since the reed must return and swing the other way after it has closed the contacts, however, they only remain closed for a very brief period until the next cycle, so one of the contacts is mounted on a spring to increase that period. The other contact is mounted in a fixed position about 1/16 in. or a little less from the contact which is mounted on the spring. This spring must be very light and slow in movement, so that the reed on its return closes the contacts again almost before they have had time to re-open. Thus a nearly continuous current is flowing through the contacts, which is sufficient to operate the relay.

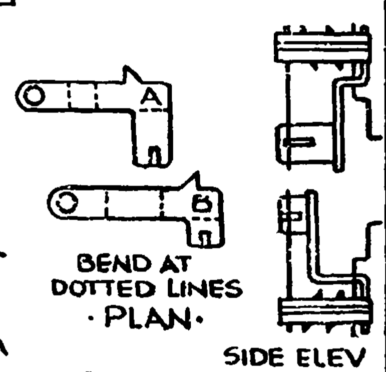


VALVES SHOWN, APPROXIMATE
A = SELECTOR MECHANISM.
RECEIVER DIAGRAM. FIG.1.



SELECTOR MECHANISM. FIG.2.

FIG.4. SHADED PORTION CUT AWAY TO FORM RATCHET TOOTH.



PAWLS FIG.6.

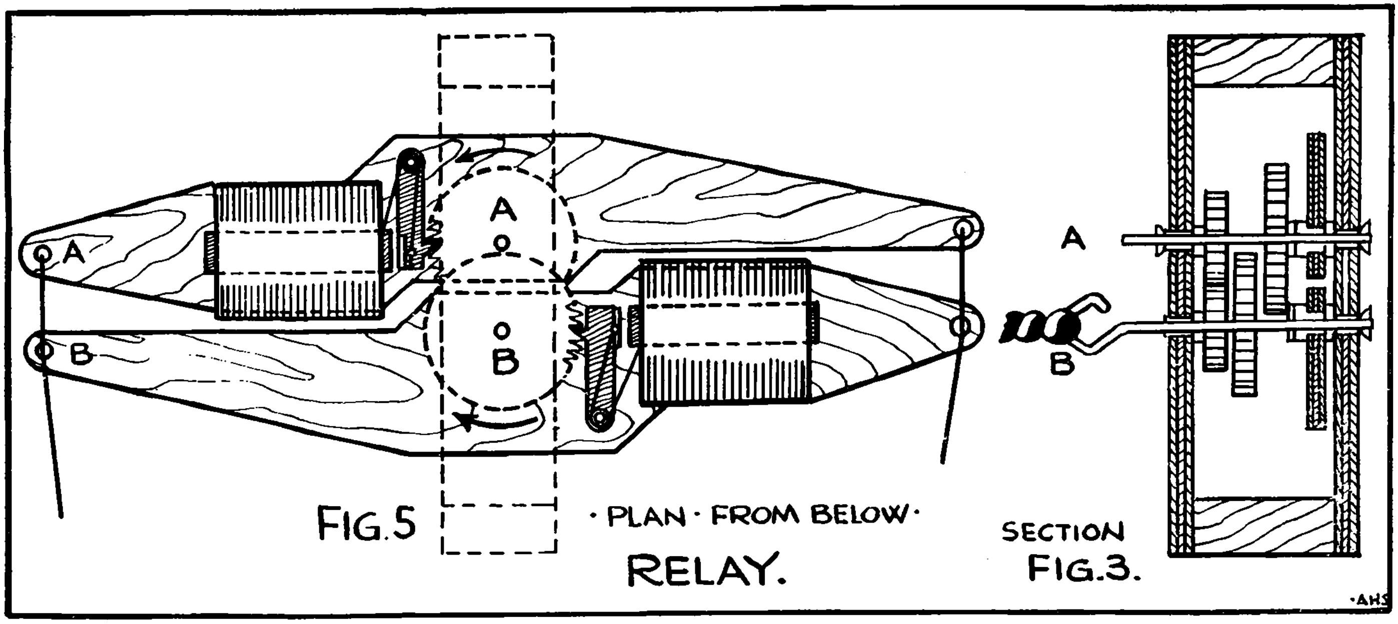


FIG. 5 • PLAN • FROM BELOW •

RELAY.

SECTION FIG. 3.

The number of reeds required depends on the degree of control required over the aircraft. Four controls only are needed to obtain full control. They are throttle, aileron, elevator, and rudder controls. Since each of these will require a means for reversing their positions, eight reeds will be required, which can be mounted four at either end of the electro-magnet. Fig. 2 shows the lay-out of the reed selector mechanism. The core of the magnet should be of soft iron 1 in. wide, about 1/16 in. thick, and about 1¼ in. long. The reeds should vary about 3/64 in. in length from 1 in. to 1⅜ in., with an extra 1/16 in. tacked on to allow for securely fixing at one end between metal plates in such a fashion that their free ends are all level and opposed to the end of the magnet. The magnet is glued and bound by linen strips to the wooden block upon which it is mounted. The reeds are mounted 1/16 in. from the end of the magnet, and the light springs which they compress are bolted by means of a metal strip to the sheet bakelite ends of the unit. Their free ends just touch the free ends of the reeds, but must not bear against them. The other set of contacts are screwed through the sheet bakelite ends opposite the contacts mounted on the light springs. These contacts should be adjustable, so as to give a maximum closing period without affecting either the movement of the reeds or the gap which should be between the contacts when the reed is at rest. Soldering tags are also fitted to the adjustable contacts. Two wooden sides, about ¼ in. thick, are added to strengthen the bakelite ends, and to orm a box for the whole unit. When the unit is mounted in the machine it would be advisable to add some form of shock-absorber to avoid outside interference from vibration.

The Transmitter Control.

This unit is built much the same as the receiver selector system except that the light spring is dispensed with and the contact is mounted on the reed itself instead. Each reed then is part of a separate buzzer system, with the contacts making and breaking the impulses supplied to the electro-magnet. The reeds are synchronised with those in the receiver unit by taking each one separately and adjusting the contacts and the length of the reed until its fellow in the receiver system is excited. This may be done by connecting a battery in series with the two reeds' circuits. Push-button switches for each of the transmitter reeds may be mounted on a control panel and appropriately marked.

The Relay.

A very light and economical form of power for the relay is an ordinary rubber motor. As all the opposite actions can be worked from the same motor operating the controls, only four of these are needed. They should be mounted in the fuselage so that their fixed ends are accessible for winding purposes. As the number of turns taken from each motor varies with the type of evolution performed, it is advisable to unwind and rewind each motor the correct number of turns before each flight.

THE WASP

By W. A. DEAN

For the Fuselage. Select a 7¼ in. length of ¼ in. square hard balsa, and cement the nose piece and undercart, as shown in the plan. Add firmly the tail hook and celluloid washers to the nose piece.

The propeller is cut from 3/32 in. sheet and steamed to shape. The propeller shaft is cemented to it, and the hook bent over after it has been threaded through the nose-block.

The wing is next made from medium 1/32 in. sheet, the centres cut out, and the 1/16 in. by 1/32 in. braces cemented in place. The wing mount is made from ¼ in. sheet and sanded to a streamline shape. Finally, cement it to the wing, making the dihedral under each tip 1 in.

The tail assembly is made entirely out of 1/32 in. sheet, including the fins.

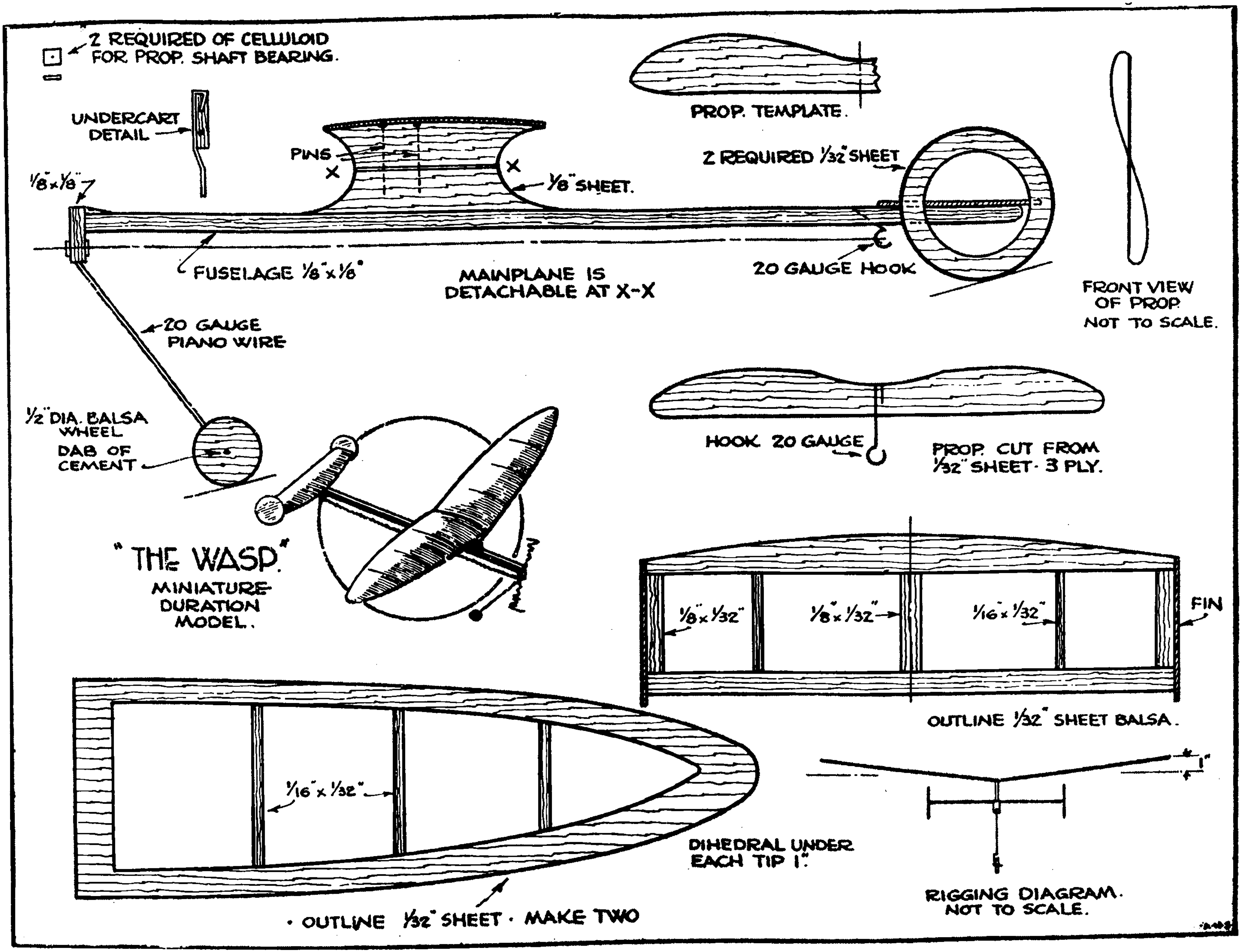
Assemble the parts to the rigging diagram, after first sanding smooth. A glance at the plan will show how the wing can be made detachable if required.

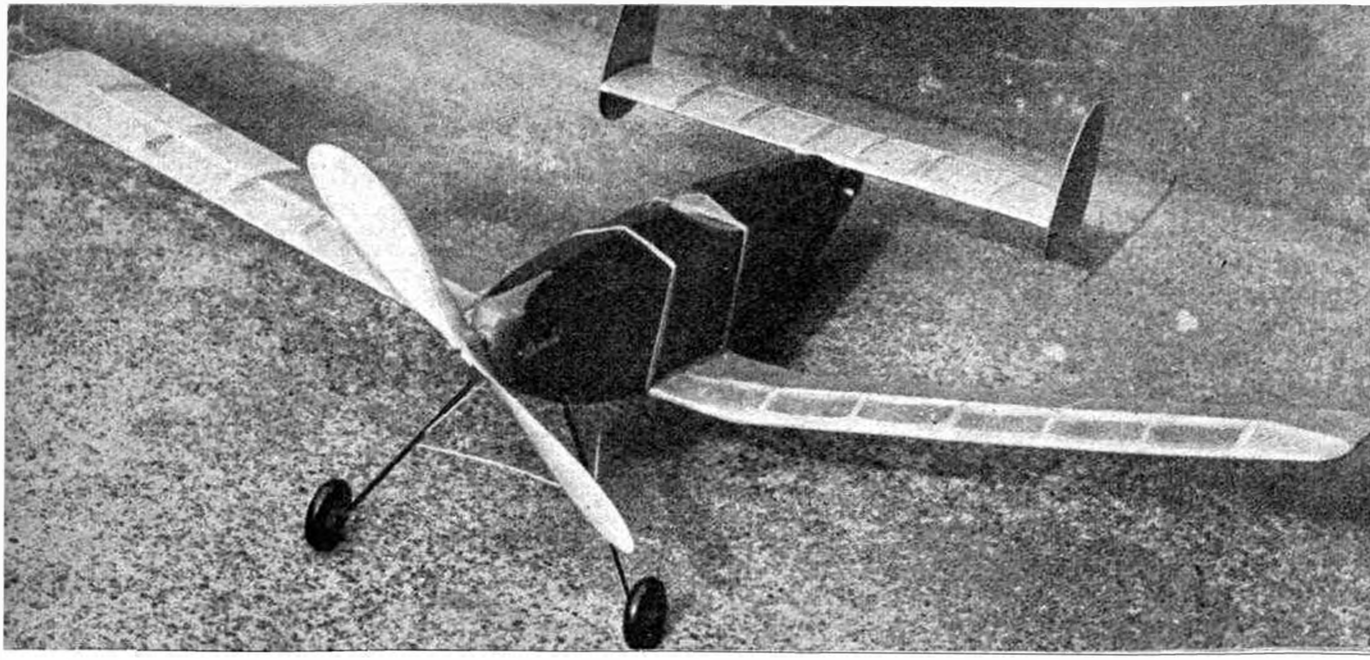
The covering of the original wasp was yellow and black superfine tissue. Cover the wings and stabiliser in yellow and dope ¼ in. bands of black tissue at equal distances along the fuselage. All the surfaces are only covered on the top side except the fin, tightening being done with water alone.

Power is four feet of 1/16 in. by 1/16 in. rubber for outdoor flying (arranged in three loops). 32 in. arranged in two loops is sufficient for indoor flying. A small ring is attached to the rear end of the elastic, so that it can be taken off the hook and stretch wound. The model should balance level when held by the wing tips.

Lubricate your motor, brush the shavings out of your hair, and your "Wasp" is ready for its first trip into the rafters. Adjust the rudders to make it fly in circles about half the width of the club hall. Give her all she'll take (500 is the limit), place on the ground, then dash for cover and prepare to see aerial history made.

For the doubtful, quite safe r.o.g.'s *can* be made with this type of undercart, because by the time the supporting fins are off the ground the model is sufficiently air-borne to remain upright.


2 REQUIRED OF CELLULOID FOR PROP. SHAFT BEARING.
UNDERCART DETAIL
PINS
X
X
1/8" SHEET.
1/8"x1/8"
FUSELAGE 1/8"x1/8"
MAINPLANE IS DETACHABLE AT X-X
PROP. TEMPLATE.
2 REQUIRED 1/32" SHEET
20 GAUGE HOOK
FRONT VIEW OF PROP. NOT TO SCALE.
20 GAUGE PIANO WIRE
1/2" DIA. BALSA WHEEL
DAB OF CEMENT
HOOK 20 GAUGE
PROP. CUT FROM 1/32" SHEET · 3 PLY.
"THE WASP."
MINIATURE DURATION MODEL.
1/8"x1/32"
1/8"x1/32"
1/16"x1/32"
FIN
OUTLINE 1/32" SHEET BALSA.
1/16"x1/32"
DIHEDRAL UNDER EACH TIP 1".
1"
· OUTLINE 1/32" SHEET · MAKE TWO
RIGGING DIAGRAM. NOT TO SCALE.



Concluding *The* "KAMLET"

The top surface is more difficult, partly on account of the camber and partly because the tissue has to be pulled over the leading and trailing edge spars and stuck to their edges. (See Fig. 10.) The centre-section, where the fuselage rests, is not covered on its top surface. One piece of tissue, therefore, reaches from rib A to the nearer wing tip, and one from rib B to the opposite wing tip. Allow the usual overlap. You may experience a tendency to pull the tissue too tightly between the front part of the ribs, where the camber is greatest. A better result will be obtained if you finish the covering at the rib nearest to each wing tip, and then use two small pieces of tissue to finish, one reaching from the mid spar to the leading edge and the other from the mid spar to the trailing edge.

Cover the underside of the tail-plane with a single piece of tissue. Small nicks must be cut to allow it to fit neatly around the saddles. First paste two or three inches of the centre portion and carefully smooth the covering, coaxing it over the saddles. Then work towards each tip. The top surface will not be quite so easy because, as in the case of the top surface of the wing, the tissue has to be turned over the spars and pasted to their edges.

The time needed for the covering to dry after spraying will vary with the weather, and it would be best to allow twenty-four hours, storing the parts in a dry (but not hot) place meanwhile. Do not attempt to hasten the drying process with artificial heat. When dry, the covering is treated to render it air-proof, and as far as possible damp-proof. Clear dope is often used for the purpose, and this tightens the covering further. Banana oil is more suitable, however, as it tightens sufficiently and offers better protection against damp. There is therefore no need to use dope as well as banana oil, as is sometimes done, and the practice is to be deprecated, since three successive tightenings of the delicate tissue—by water, dope and banana oil—render it liable to split.

For the "Kamlet," use one coat of thin banana oil for the tail-plane and two for the wing and fuselage. Alternatively, the wing and fuselage can be given one coat of thick banana oil, and the tail-plane one coat of thin. Apply it with a soft brush, preferably flat, and about ½ in. wide, and brush off any pools that form. Treat both sides of the wing and tail-plane on the same occasion, as, if they are left for any length of time with only one side proofed, the structure is likely to pull into a curve.

When the tail-plane is dry the fins can be cemented to the end ribs, in the position shown on the blue print. Apply a little cement where the fins touch the ends of the leading edge and trailing edge, and at the same time apply a little to the opposite sides of the fins, as the pull on one side only tends to force them into a curve.

The nose-block, propeller and undercarriage struts should be given a protective coat of banana oil.

After proofing and painting, the parts should be rechecked for accuracy. A warp that has occurred through uneven application of the banana oil can usually be removed by the simple expedient of gently coaxing the part concerned into the correct position and holding it near heat for a few seconds. If this fails, a sparing application of banana oil to the faulty area, and holding it in position while it dries, may do the trick.

Final Checking.

It is not sufficient merely to fit the parts together, insert the motor and commence flying. Notwithstanding the care taken with the covering and doping, small inaccuracies may have crept in. They may not prevent the model flying, but will render the adjustment of it somewhat of a guess, and sooner or later a crash may result.

First of all, therefore, fit the undercarriage to the fuselage and stand it on the building-board. With your setsquare again check that the fuselage sides are vertical.

Then strap the wing into place and take check measurements vertically from the building-board to the underside of the leading edge, just beneath the rib nearest the tip (Fig. 11). This dimension should be the same on left and right sides of the wing. The trailing edge should be similarly checked. Any variation can be remedied by cementing packing pieces of thin card on top of the leading edge or trailing edge, as the case may be, where it rests beneath one or other of the bottom longerons.

Often the tail-plane will be found to lean to one side, owing to slight inaccuracy in the fuselage assembly. The left or right top longeron, as the case may be, should be packed to the required height with thin card.

Fins that are out of alignment may cause the model to turn sharply, or even to sideslip. Each can be checked by pushing a pin a little way into the leading edge and trailing edge of the wing, exactly 4⅜ in. from the sides of the fuselage. Looking from the front, with both pins in line, you should see only the edge of the fin. (See Fig. 12.) If either side is visible, it may be due to the tail-plane saddles being misplaced. The easiest remedy at this stage is to cut away the faulty pin and the rib to which it is attached, and to replace them in alignment with the check pins. On removing the pins, cement the holes.

Bamboo pegs, 1/16 in. in diameter and ½ in. in length, can now be glued (not cemented) into holes in the sides of the fuselage 1/16 in. behind the front bulkhead and in line with the propeller shaft. From these a 1 in. rubber band can be taken to hold the nose-block firmly in place during flight.

Form the rear motor peg from a piece of birch dowelling ⅛ in. in diameter and 1⅞ in. long. Shallow grooves can be cut ⅛ in. from each end, from which a 2 in band can be taken beneath the fuselage, thus preventing the peg from slipping out of place and releasing the rubber motor.

Preparing and Fitting the "Motor."

The rubber motor can consist of either 6 strands of ⅛ in. flat rubber, or 8 strands of 3/16 ins. As it is an advantage to plait the rubber motor, the 3/16 in. motor is to be preferred, as any number of strands not divisible by four is somewhat awkward to manipulate. The method of plaiting is the same in both cases, but it is necessary to form small loops on each end of the 6-strand motor, and work up from a 3-strand "double length" instead of a 4-strand item as noted later.

The 8-strand motor consists of 15 ft. of flat rubber strip 3/16 in. wide. This should be joined to form an endless band by overlapping the final 2 in. and getting someone to hold the ends stretched while you bind them several times with thread and securely knot the ends. Thread and rubber ends should be trimmed to within ¼ in. of the lashing. Pour a little rubber lubricant into one hand and rub it thoroughly into the rubber until every part is moistened, shaking off any excess. Lay it on clean paper so that it cannot pick up grit, which would cut it and cause it to burst in the fuselage.

The motor has now to be plaited so that, though longer than the fuselage, it shall stretch from the propeller hook to the rear peg without sagging and upsetting the balance of the model. This allows more turns to be given than would be possible with a short unplaited skein, and so enables longer flights to be obtained. Double the loop of rubber so that it consists of four strands of equal length. Measure the exact centre of the skein, and mark it with a knotted piece of thread. Get someone to hold one end of the 4-strand skein, slip the double loop at the other end over the hook of a geared winder, stretch to twice its length, and give it a hundred turns to the right. As the average winder is geared four to one, that will mean twenty-five turns on the winder handle. Slip both ends of the skein—that is, four loops—over the propeller hook and you have an 8-strand motor. Attach a weighted line to the centre of the skein, marked by the thread. Hold the fuselage vertical and drop the weight through the front bulkhead. Then coax the rubber skein through and slip the nose-block into place. Pull the rear end of the skein through the uncovered end of the fuselage by means of the weight, and slip a finger of the left hand through all four loops. Remove the weighted line, and with scissors cut away the marker thread. Push the motor-peg through the hole in one side of the fuselage, slip the four loops of the rubber skein over it, taking care that the tension of the motor does not pull it out of your grasp and back into the interior of the fuselage, and then push the peg through the opposite side of the fuselage. Secure the peg with a 2 in. rubber band around the bottom of the fuselage, and slide the end of the motor to the centre of the peg.

The Point of Balance.

Mark a point on each top longeron exactly 2 in. behind the front edge of No. 4 vertical strut. Push a straight length of 18 gauge wire about 6 in. long through the tissue immediately beneath these points. The front edge of the wing should be 2 in. in front of the wire, that is, in line with the front edge of No. 4 vertical struts. When the model is suspended from the wire, the top longerons should be horizontal. Should the nose droop, the rear curved wire undercarriage members, which act as shock-absorbers, can be shortened by straightening the turned-over ends and re-forming them. This will bring the weight of the undercarriage struts and wheels slightly back. Alternatively, or additionally, a little can be carved from the front of the nose-block, thus enabling the brass bush to be pushed back and the weight of the propeller taken rearwards.

Should the model be tail-heavy, the tail-skid can be shortened, or new and longer wires fitted to push the undercarriage further forward, or a hole drilled in the base of the nose-block, a piece of lead inserted, and the hole sealed with plastic wood or balsa wood and cement.

First Flights.

When properly adjusted, the "Kamlet" will fly quite well in strong winds. But for the correct trim to be found without guessing, with a crash as the likely penalty for a wrong guess, first tests should be carried out in calmer conditions. Then any peculiar antics will definitely be due to the model and not to the weather. Moreover, they will be less serious in effect, and a remedy can be applied before serious trouble develops.

The motor has now to be "broken in." Get someone to hold the model, their left hand grasping the sides of the front bulkhead, and their right hand the ends of the motor peg. Pull the nose-block out of the bulkhead, slip the winder hook through the propeller shaft loop, stretch the skein to twice its length and give the winder, say, twenty-five turns, turning the propeller to the right. Grasp the propeller shaft-hook firmly with the left hand, with the loop in the front of the shaft downwards. Remove the winder and rotate the propeller until you can slip the free-wheel pawl into the loop, as shown in Fig. 13. Note carefully the exact position of loop and pawl. Replace the nose-block, and, while holding the model, allow the motor to unwind.

Now, at long last, the model is ready for its first flight. Having given about thirty turns on the winder, strap the nose-block into place (the right way up!) and face the wind. Holding the propeller with the left hand and the bottom of No. 8 vertical struts with the right hand, and keeping the model level laterally and longitudinally, give it a gentle forward push and let go. It should make a short flight without climbing, and possibly turning slightly to the right. The next flight can be made with sixty turns on the winder, and the third with eighty. Should the right-hand turn become too sharp with the additional power, the brass bush must be removed and the offset reduced.

At first you may find it difficult to launch the model without pointing it upwards or else hurling it into the ground. Get a critical friend to watch while you practice a straight launching movement. Having mastered it, you can apply more turns and get the model to climb. Advance the wing 1/16 in. at a time, testing each new position with not more than fifty turns. Eventually it will stall, and you know the limit has been passed, but if you have kept the turns down, as suggested; the model will rear up, pause, and dive slightly, instead of coming to a dead stop and diving.

Individual models will vary slightly in behaviour, owing to small differences in the fuselage shape altering the angles of wing, propeller shaft and tail-plane. For instance, the top longeron, which should be perfectly horizontal, may have bent down a little at each end, thus reducing the tail angle and tilting the propeller shaft forward. If the model refuses to climb unless the wing is moved more than ¼ in. forward (this should be the limit), try the effect of slipping a piece of card, or even 1/32 in. balsa, between the fuselage and the trailing edge of the tail-plane, or between the nose-block and the bottom of the front bulkhead. Examine the model carefully, and try to judge which adjustment is needed, and when satisfactory flight is obtained, cement the packing-pieces into position.

Do not be satisfied to obtain a good climb at the expense of the flat glide of which the "Kamlet" is capable. Set the wing to secure the glide, and if the climb is sluggish with more than a hundred turns on the winder, tilt the nose-block slightly upwards.

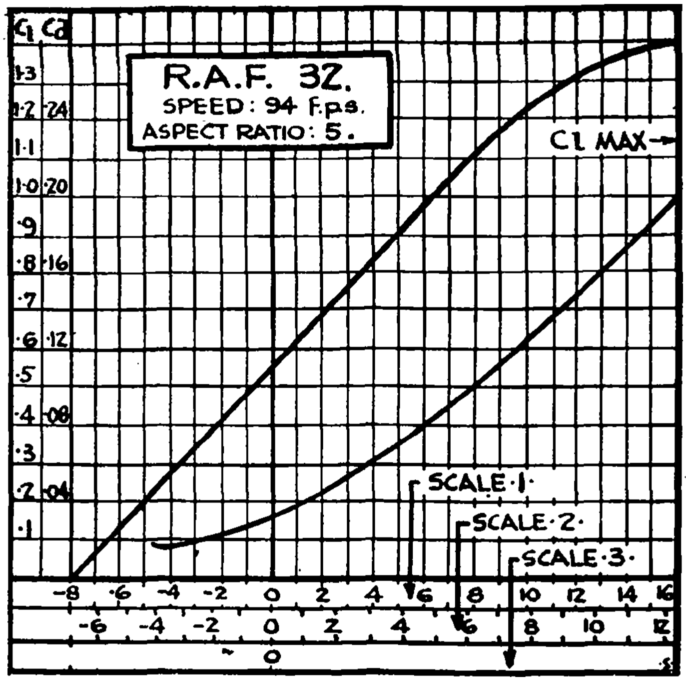
Rise-off-ground flights can be achieved from a reasonably smooth surface. If the model turns to the right, rest it on the ground facing slightly to the left of the wind. At least eighty turns will probably be needed to secure sufficient power for take-off. Hold the propeller with the left hand and rest the right on the fuselage. Let the propeller run for a second or two before lifting the right hand.

For most flights, do not exceed 120 turns on the winder, but occasionally this number can be increased to 180.

When you have finished flying, slip the motor peg, remove and unplait the rubber, and store it wrapped loosely in greaseproof paper in an air-tight tin, with plenty of room to expand. Relubricate it as soon as it shows signs of dryness.

Though not a duration model, consistent flights of over a minute have been obtained in non-soaring air. In suitable weather conditions the low sinking speed should enable much longer flights to be obtained.

DESIGNING FOR



MY previous articles have been upon the subject of sinking speed and how its minimum is obtained, and upon the effect of airfoil shape on performance. This is a furtherance of that scheme. It is the purpose here to enquire into the matter of finding the angle of incidence to be used, taking an airfoil and a specific fuselage assembly to obtain a minimum sinking speed. This will necessitate two articles, and this first will, in the main, be upon the production of low-speed graphs and the study of "scale effect."

Now, of necessity, there must be a great deal of "approximating," for there is very little slow-speed wind tunnel data available. But it is my belief that, if the methods detailed here are followed, an excellent result will be obtained, very close to what the wind tunnel would bring to light.

I have done much work on literally dozens of graphs of airfoil curves recently, with the view to finding out what sort of airfoil seems to be most suitable to the demands of duration flying. I have come to the conclusion that there is not one. I thought that, perhaps, by increasing the lift coefficient by various methods known to you all, I should be able to get a better $C_d/C_l^{1.5}$ figure—in some cases this proved so.

Another "line" was that minimum drag was important, but although many small drags occur in many airfoils, so does the lift correspondingly decrease, bringing the $C_d/C_l^{1.5}$ value down, not by large amounts, but *enough*. In such airfoils the lift coefficient does not reach any useful value until the higher angles are approached. Since high angles are not prevalent in *any* type of airfoil at slow speeds, they are nearly ready—at any moment—to become stalled. *And yet in very similar airfoils vast differences of sinking-speed ratio occur.*

Draw what you will from this, all I can say is that the thing is a sort of cut-and-try business, and a pretty surprising one at that.

I hope that others may bring more to light.

Anyway, here goes for a little of my own findings. I give, in table form, a few of the important angles and minimum rates of descent. (It should be noted that I have not attempted to correct these figures to slow speed in every case, except one, as you will see; it already involves a great deal of work without adding to it. Even so, the figures will help, and again show *trends* in various characteristics.)

In addition to the figures given for N.A.C.A. M-6 and 6512, Grant X-8, R.A.F. 32 and Clark-Y sections in the previous article, which *were* corrected, there are:

Gott-387.	Gott-535.	Gott-532.
4° = ·1494	4° = ·116	4° = ·1082
6° = ·1090	6° = ·1125	6° = ·09615
8° = ·1125	8° = ·1136	8° = ·1131

Gott-652	Gott-426.	R.A.F. 34.
4° = ·1133	4° = ·0876	6° = ·09476
6° = ·1121	6° = ·0749	8° = ·0986
8° = ·1232		

R.A.F. 32.	Gott-549.	R.A.F. 31.
2° = ·066	3° = ·0897	3·9 = ·069
4° = ·0668	4° = ·0887	6· = ·0715
6° = ·0939	5° = ·0988	7·9 = ·0736
	6° = ·1064	
	8° = ·1131	

Gott-436.	N.A.C.A. 6309.	Gott-497.
2° = ·094	2° = ·0798	2° = ·0734
4° = ·0925	4° = ·0677	4° = ·0739
6° = ·1305	6° = ·055	6° = ·078
	8° = ·0676	

Eiffel 431.	R.A.F. 28.	Dr. Shukowsky.
0° = ·0679	2° = ·096	2° = ·096
2° = ·0605	4° = ·0897	4° = ·0571
4° = ·0749	6° = ·0989	6° = ·062

R.A.F. 33.	Clark-YH.	N.A.C.A. 6409.
2·8 = ·0944	4° = ·0943	1·6 = ·0639
4·8 = ·0732	6° = ·0996	3·8 = ·0613
6·7 = ·0693	8° = ·0988	5·0 = ·0641
10·5 = ·0708		

R.A.F. 15.	Eiffel 400.	
2° = ·113	0° = ·0932	4° = ·06216
4° = ·109	2° = ·0569	6° = ·0680
6° = ·5	3° = ·060	8° = ·0743

I should like you to study the above figures in conjunction with a drawing of each section, and see if you can find out any wrinkle that seems to affect something in the performance.

There are, however, two things that one does not have far to look for, and that is the rather outstanding ability of the N.A.C.A. 4309 section and the Eiffel 400 section. The "4309," however, is a very thin section and, since we intend to use very high aspect ratio, it would be well nigh impossible to construct a wing of this section. We will, therefore, choose and concentrate on the *Eiffel* 400.

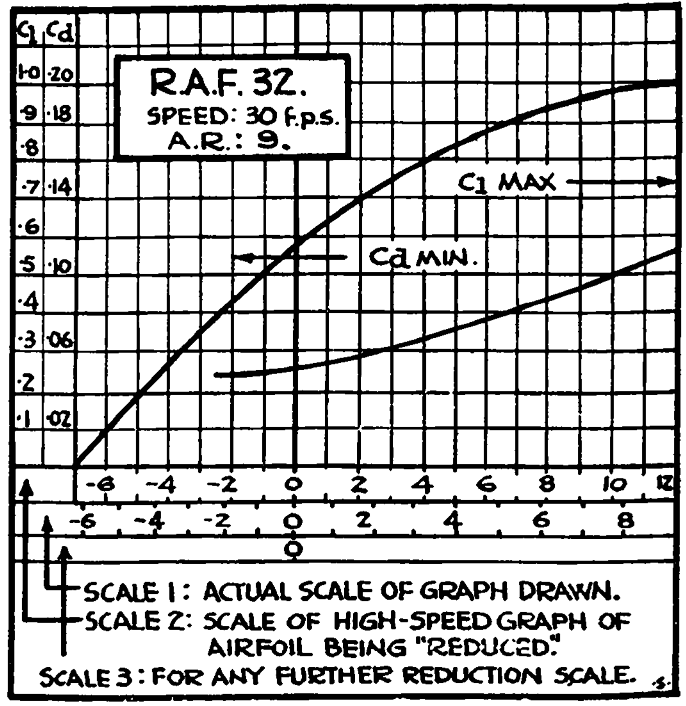
Since there are no 20-30 f.p.s. graphs available for this section we must construct some. It is a very difficult job to do. There are so many variants involved that nothing *really* accurate can be done, which is a very great pity. If there are any readers who have at their disposal a wind tunnel from which fairly good results for airfoil characteristics might be expected, I beseech them to use their chance and aid us all immeasurably. Uncertainty, fear of what *might* happen makes us give, perhaps, wider margins than we would if we had more *definite* data, which fact must bring in its wake certain losses in performance which, however slight, we must now consider.

However, we must make the best of a nasty position, and I hope here to produce a set of graphs for the Eiffel 400 section. The method is, naturally, one of "ratio reduction," the ratio depending on the relation of speeds, etc.

Now, if one studies Mr. Stubbs's graphs ("Design of Wakefield Models") of corrections for R.A.F. 32, for instance, while using the "basic reduction" of R.A.F. 6, we find that when we compare these with Powdrill and MacBean's wind tunnel results that they are a very long way out—with all due respects paid, of course. I think the method, of course, is a good one; the changing of the lift and drag values on a percentage basis of an airfoil whose characteristics are known at both the speeds, i.e. at the speed of the section to be reduced, and at the speed to which it is wanted to be reduced. After all, if one considers it, there *must* be some sort of agreement coming in, although it depends on the nearness of the approach of the *two* sets of characteristics of the section as to what sort

DURATION—III

By G. W. JONES



of result is obtained. You see what would happen if one used, for instance, Judge's R.A.F. 6 low speed figures to reduce the R.A.F. 19's graphs to a low speed, or the Gott-652, or the N.A.C.A. 8318. We can see there the limitations of the scheme.

Perhaps I am a little presumptuous; perhaps some of you have not even heard of Arnold Wathew's method for reducing airfoil characteristics to low speeds, in order that we might be more accurate in our calculations. Anyway, here is a short outline of the system. The idea is to have beside one the graphs of the R.A.F. 6 section, drawn to various speeds, say, 15, 20, 30 and 60 f.p.s. Now it is noted that as the speed varies, so do the lift and drag coefficients, as in the case of the R.A.F. 6 and, by having the coefficients of the airfoil "Z" by one's side also at, say, 60 f.p.s., it is also possible to construct a graph of "Z" at 15, 20 or 30 f.p.s. on a percentage (or, as I call it, a ratio reductive) basis. So if the R.A.F. 6 at 4° at 60 f.p.s. has a lift coefficient of ·59, and at 15 f.p.s. a C_l of ·5, then "Z" producing × units of lift at 4° and 60 f.p.s. will, at 15 f.p.s., produce $\frac{\cdot 5}{\cdot 59}$ × units.

A further aid was brought in by taking the distance from $C_l = 0$ to C_l max. of "Z" as being the correct scale to work from, and the number of units (that is degrees) of "Z" must therefore be reproduced on R.A.F. 6, e.g. if "Z" had a "range" of 20°, then R.A.F. 6, too, from $C_l = 0$ to C_l max., must have twenty sections, equivalent to a degree on the "Z" scale. (It looks quite accurate, but the wind tunnel has proven it not so.)

The thing was that, as shown above, the system only held good for similar airfoils, and depended *entirely* on R.A.F. 6, which in itself seems foolhardy, having regard to the great number of sections that there are.

What was wrong, I believe, is that the R.A.F. 6 does not approach, say, the R.A.F. 32 closely enough to get good results; if R.A.F. 14 or R.A.F. 15 had been "changed," probably all would have been well. Working upon this idea in future I shall use one of the Powdrill and MacBean's airfoil results to find the characteristics of another that approaches closely to it; for instance, Clark-YH, R.A.F. 31 and 34 would demand M-6 as their basic ratio reducers; for Gott-436 and N.A.C. 4309 the Clark-Y figures would be useful. Between the R.A.F. 32 and N.A.C.A. 6512 sections one must judge to the best of ability the closeness with which either one approaches the section in question. However, there are not many sections that have the form of the "6512," and the most used will definitely be the R.A.F. 32 figures. Ex the Gott-387, U.S.A. 35B, Gott-426, N.60, Gott-497 and 602. Moreover, we are fortunate in having graphs of this section at 94, 60 and 30 f.p.s., and this range of speeds should cover the whole of those likely to be encountered. Now, when we get down to 30 f.p.s., it will be possible to use, perhaps, the R.A.F. 6 figures for this final, and more *even*, adjustments; but please yourself, you can just reduce them by a certain percentage in this final stage, according to the reduction of speed, say, from 30 to 20-25 f.p.s.

At this point, when a graph is produced at the speed—or near it, for we must know our limitations—there must be taken into account the aspect ratio correction. This is a somewhat intricate business, and is a point where, undoubtedly, mistakes have been made many times. It will, as a matter of fact, be deferred until next month for fuller treatment.

At this point let me outline, step by step, the plan that I intend to follow in this example case of the Eiffel 400 and the manner in which it is to be carried out.

First of all this will be a general reduction of the graph of Eiffel 400 at 94 f.p.s., disregarding, *for the present*, the aspect-ratio factor.

The method: First put down the factors to be used.

A little study will show that practically no change in $C_l = 0$ is experienced, even in great differences of speeds. So we will take it that, at 30 f.p.s., Eiffel 400 will have an angle of no lift almost at the negative angle of 7°. As for the positive side of this graph, since Eiffel 400 has a

Airofoil.	Speed, f.p.s.	Angle of $C_L = O$.	Angle of C_L max.	Range in degrees.
EIFFEL 400 ..	94 f.p.s.	– 7 deg.	12·2 deg.	19
R.A.F. 32 ..	92 f.p.s.	– 8 „	16 „	24
R.A.F. 32 ..	60 f.p.s.	– 8 „	15 „	22
R.A.F. 32 ..	30 f.p.s.	– 7 „	9 „	16

"streamlined" nose, she will not be so much affected by change in speed and angle as one (such as R.A.F. 32) that has its nose "dipped." Take a look at the sections and you'll see what I mean. It is, then, very reasonable to suppose that 2·2° drop in angle of attack for the 94-60 f.p.s. drop will equal the 3° drop of the R.A.F. 32 in similar circumstances.

Correspondingly, that a further reduction of 2½° in the "400's" figure to the 30 f.p.s. mark should *equal* that of the "nearly 6" deg. of the R.A.F. 32, since there will be *less effect the lower the speed*. This results, then, in the Eiffel 400 having, say, $C_l = 0$ at – 7 to – 6½° and C_l max. at 7½°.

Further, to take the reduction proper at any angle β° we use the following table. (It is to be remembered that Eiffel 400 may be replaced by any other airfoil you may choose.)

1. C_l for Eiffel 400 at 94 f.p.s. at $\beta° = x$.
   C_l „ R.A.F. 32 at 92 „ „ $\beta° = y$.
   C_l „ R.A.F. 32 at 60 „ „ $\beta° = z$.

According to the thesis, then,

C_l for Eiffel 400 at 60 f.p.s. at $\beta° = \frac{xz}{y} = K$.

2. C_l for Eiffel 400 at 60 f.p.s. at $\beta° = K$ (just found).
   C_l „ R.A.F. 32 at 60 „ „ $\beta° = z$.
   C_l „ R.A.F. 32 at 30 „ „ $\beta° = p$.

So,

C_l „ Eiffel 400 at 30 „ „ $\beta° = \frac{kp}{z} = c$.

But $k = \frac{xz}{y}$ Therefore, $C = \frac{xz}{y} \times \frac{p}{z} = \frac{xp}{y}$

You will note that, since the section to be reduced, i.e. the Eiffel 400, has its graph speed at 94 f.p.s., that the 60 f.p.s. R.A.F. 32 graph is eliminated, that is "z." Had we decided to reduce a section from 60 f.p.s. the 94 f.p.s. figure would have disappeared in exactly the same way.

The reader should make a special note that, in the above table, the *sign stands for the angle in the scale of Eiffel 400 at 30 f.p.s. graph;* you remember the point about the range

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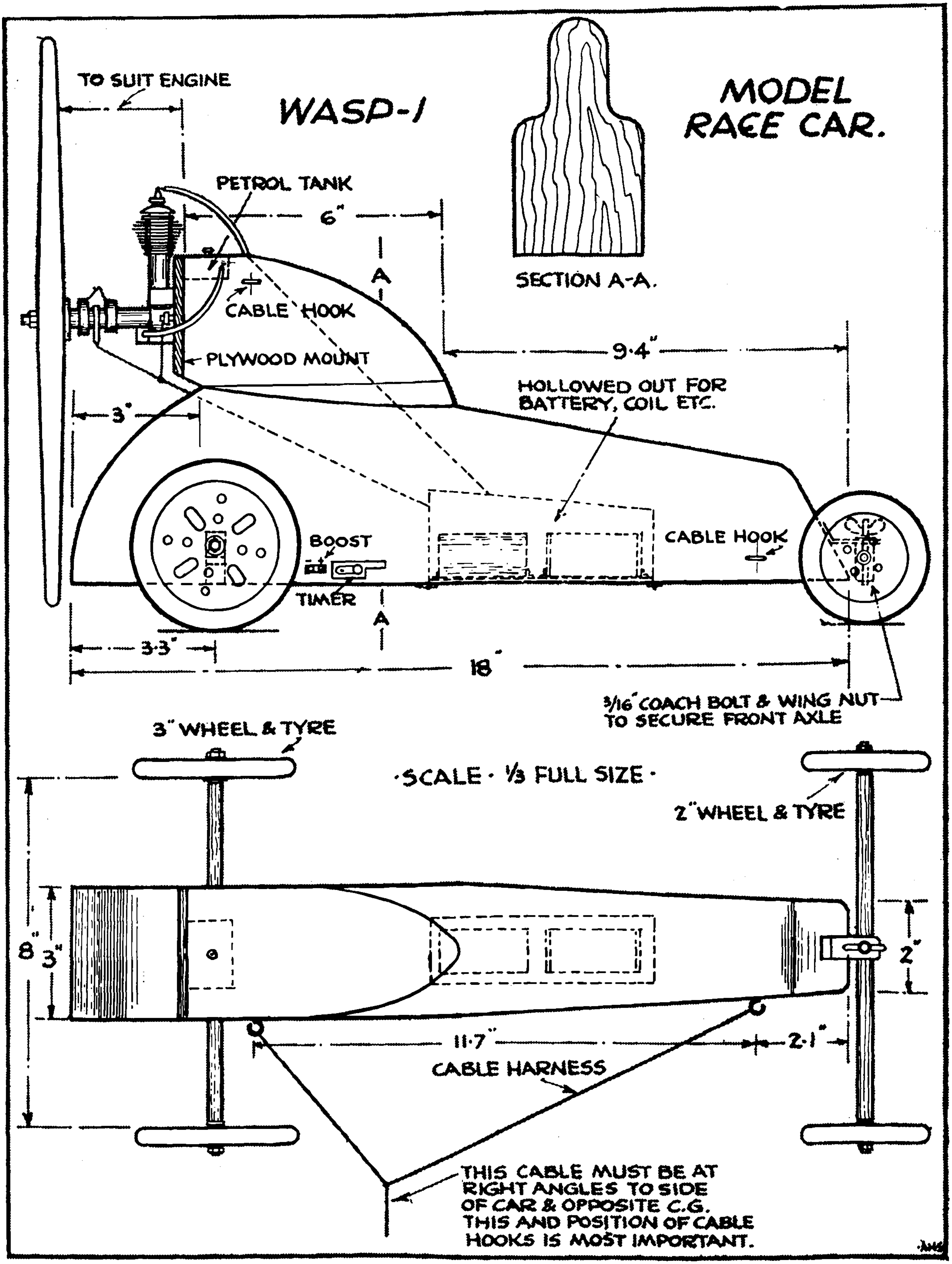
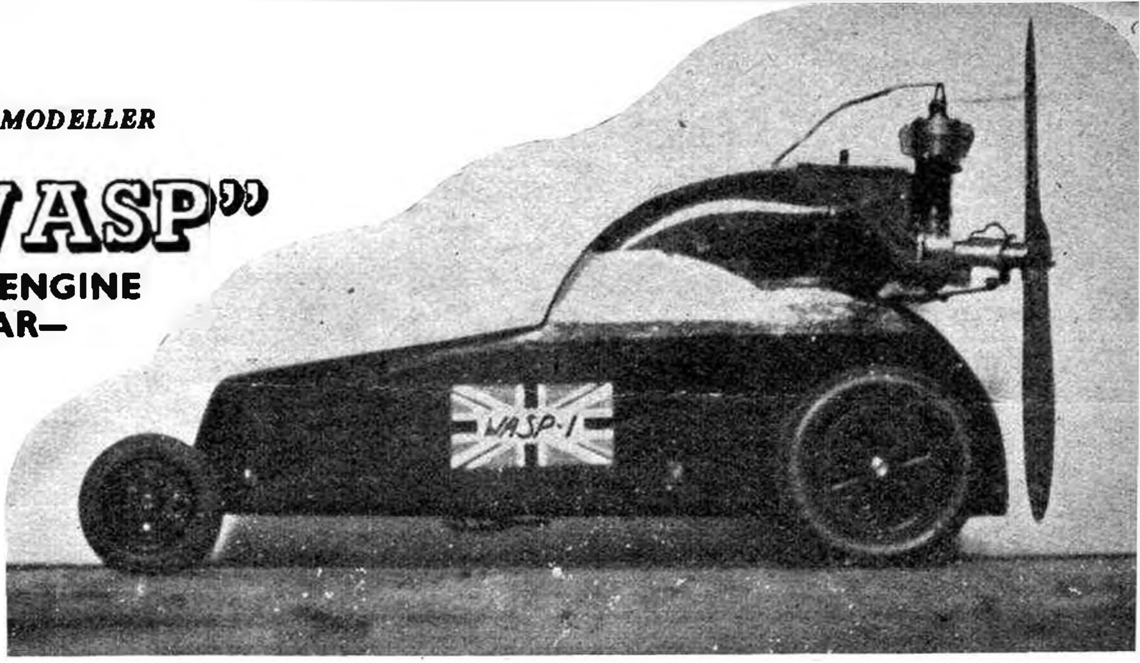


WASP-1
MODEL RACE CAR.
TO SUIT ENGINE
PETROL TANK
6"
A
SECTION A-A.
CABLE HOOK
PLYWOOD MOUNT
9·4"
HOLLOWED OUT FOR BATTERY, COIL ETC.
3"
BOOST
TIMER
CABLE HOOK
3·3"
18"
3/16" COACH BOLT & WING NUT TO SECURE FRONT AXLE
3" WHEEL & TYRE
·SCALE · 1/3 FULL SIZE ·
2" WHEEL & TYRE
8"
3"
2"
11·7"
2·1"
CABLE HARNESS
THIS CABLE MUST BE AT RIGHT ANGLES TO SIDE OF CAR & OPPOSITE C.G. THIS AND POSITION OF CABLE HOOKS IS MOST IMPORTANT.

THE "WASP"

A MODEL PETROL ENGINE DRIVEN RACING CAR—

N. J. Crane



THE materials required for the construction of this model are :—

Two pieces of wood, 4 in. by 3 in., for body. Two pieces of hardwood for axles. Two 2 in. Meccano wheels and tyres. Two 3 in. Meccano wheels. Two small cup hooks. One $\frac{3}{16}$ in. coach bolt and wing nut. One aluminium bracket for front axle fixing. A few yards of stout picture cord. Two ft. of $\frac{1}{4}$ in. square rubber.

Commence construction by planing one side of each of the pieces of wood for the body (any wood will do, deal was used in the original). When this is done they should be glued together with carpenters' glue and clamped together overnight. The body is then shaped with spokeshave and plane. After this cut the slot in the bottom of the body for the rear axle, which is screwed into it. The body is hollowed out at the bottom to receive the battery, coil and condenser. The timer is screwed to the side of the body opposite this portion, together with the booster plug sockets. Ignition wiring is carried out in the usual way. The front axle bracket is now screwed to the front with long screws to hold in the end grain. The 3 in. wheels are used on the back and 2 in. on the front. The back wheels should be soldered around the bosses to prevent them coming loose. The wheels are retained by wood screws of suitable size, a brass washer being placed behind the boss to prevent it touching the wood. These screws are done up until the wheels are free to revolve with no wobble. The cable hooks should be fitted in the exact places shown on the plan, and a cable harness should be made from stout blind cord and arranged so that the cable from the harness to the pole around which the car is to run is opposite the C.G. of the car, and at right angles to the side of it. These are *most important* points to watch.

A piece of $\frac{1}{4}$ in. ply should be glued and screwed with large screws to the engine mounting, this to take the small screws used to hold the engine, as these will not hold in the end grain of the wood. The top of the body is hollowed out to receive the petrol tank, which is made from a two-penny mustard tin. As a pusher propeller is used, it is advisable to fit a thrust washer behind the cam to take the thrust. The cable which is used to hold the model to the pole (a large screw in the floor will do) is made from picture cord. A loop of $\frac{1}{4}$ in. rubber is placed in the cord with a loop of cord placed across it to prevent excessive stretch. This rubber is to allow the model to find its correct position on the circle before it gets up speed.

The performance is very thrilling. I fitted the original with my old 6 cc. Wasp, which has done much flying, but even so, timed speeds of up to 30 m.p.h. have been obtained on a 12 ft. circle. The front wheels should be set to turn a slightly larger circle than the cable will allow.

The green and brown camouflage colours vary slightly, but a little observation will enable a modeller to gain a correct colour scheme.

A Letter To and From The Ministry of Aircraft Production

Dear Sir,

On behalf of this Society I have pleasure to enclose a cheque for £200 which has been subscribed by various clubs throughout the country affiliated to this Society, and by various individuals interested in the Model Aeroplane movement.

Our ambition was to raise sufficient money for the purchase of a fighter aeroplane, but we were not able to realise this owing to the many other funds of a similar nature organised throughout the country.

We hope, however, that this sum of money may be the means of equipping part of a fighter aeroplane, when we can rest assured that the pilot who flies it will do his part towards the destruction of the enemy.

Yours faithfully,

L. J. HAWKINS,

Hon. Treasurer.

Sir,

I am directed by the Minister of Aircraft Production to acknowledge receipt of your letter of the 31st August forwarding £200 on behalf of the Society of Model Aeronautical Engineers towards the cost of a fighter aeroplane. An official receipt is enclosed herewith.

The Minister will be grateful if you will convey to all who contributed, his warm thanks for this generous gift and say how much he appreciates this donation to the National effort.

The donors may be interested to know that their contribution will purchase two machine-guns for a fighter aircraft.

I am, Sir,

Your obedient Servant,

D. L. ENDERSBY.

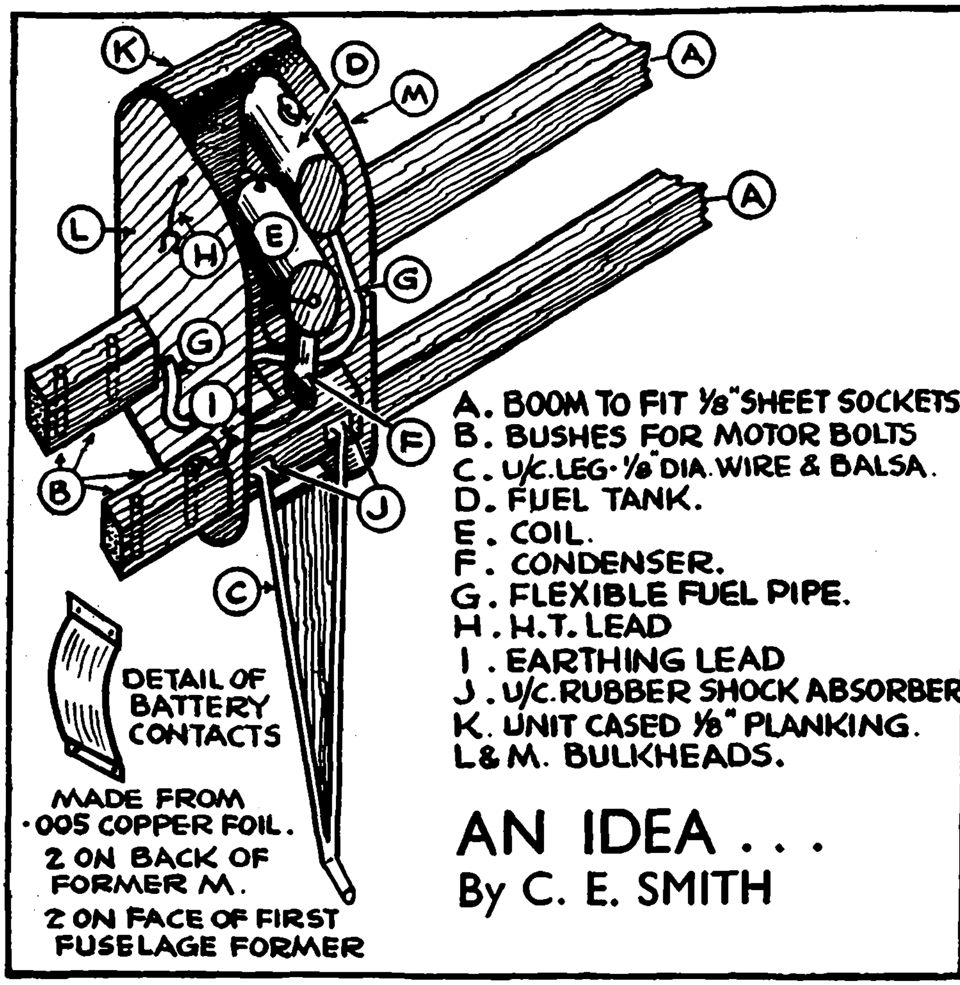
Designing for Duration—contd. from page 31.

of the all-section concerned being divided up into pieces according to the section being worked upon ? This is it, "β." So you see that the limits of β are $-6\frac{1}{2}$ to $7\frac{1}{2}°$, which is approximately fourteen.

Well, fellows, I think that that is enough for this month. What I would like you to do is to do some "private"—you know, amongst the "club boys"—probing, and see what *you* think and find.

Since the R.A.F. 32 section will be much used I have drawn the graphs of it at 94, 60, 30 f.p.s., together with little notes, to aid you in your studies.

Jolly important, eh ? Mmm.



FOR THE PETROL- AN IDEA . . .

By C. E. SMITH

PERHAPS the most interesting part of our hobby is, for reasons of finance, not open to the majority, name'y, the building and flying of petrol-driven models.

When peaceful days arrive once more, the following idea could be carried out by most model aeroplane clubs, and would give everyone a chance to build and fly a petrol-driven model, without the expense of a motor and undercarriage.

Most clubs could afford to buy out of their funds a petrol motor, complete with all the necessary ignition parts, including a timer, and wheels for the landing gear.

The committee or " ace builder " of the club could make the following compact unit, which is a combined motor, ignition and fuel system, with undercarriage, and without external connections. This unit can be removed from one model and placed and run in another inside a matter of a couple of seconds.

From the sectional drawing the idea can be followed quite easily. Members using this unit for their models will have identical nose formers, but this fact will not bar any individual scope in the design and construction of a model.

This unit has been tested with a 3·5 cc. Hornet motor, the booms (AA) being ½ in. square balsa ; the sockets, which have to be fitted to each individual model, were made from ⅛ in. sheet 6 in. long.

The cantilever undercarriage consists of ⅛ in. dia. wire forced into a block of hard rubber, which gave sufficient flexibility in all directions to cushion the worst landing shocks.

The unit is planked with ⅛ in. sheet balsa, and a cowl made for the motor ; the cooling system, an arrangement of ·005 copper foil baffles, the hot air finally being drawn out by the venturie effect of the exhaust gases passing through a slot in the cowl.

The battery connections are formed by two copper strips on back of former M, and two more in identical positions on front of first fuselage former.

The whole unit, as described, weighed only 14 ounces, and a normal orthodox model was in no way nose-heavy when fitted with this unit.

A MINIATURE ACCUMULATOR By A. J. WATSON

A LITTLE while ago I was looking over some of last year's AERO-MODELLERS and I came across " Petrol Topics " in the April issue. In this article was a paragraph describing a baby accumulator for petrol planes. This set me thinking and I got busy making one.

I first went into a reference library and spent an hour or two looking through some books on electricity and batteries, etc. After that I went to a local garage and got a bunch of old plates. I took these home and set about cutting them up. Here the fun started ; I had to use a screwdriver and a small hammer to break up the plates and square the edges. After discarding many plates because they cracked and broke, I finally got two negative plates (the grey ones), and two positive (light brown), of the right size, only to find that they weighed close on 5 oz. by themselves, so the work of chipping and chopping had to start all over again ! After more prolonged effort I reduced them to about two-thirds of their original size and their weight was 2½ oz. This was decidedly better, so I set to work to make two celluloid containers for them, one negative and one positive plate in each. The containers were quite simple to make leak-proof with balsa cement, which, of course, dissolves celluloid,

I now cut two insulating sheets of cardboard about the same size as the plates, and made four lead terminals, one of which I fixed to each plate by melting them on. This was tricky work and I had to be careful not to damage the plates.

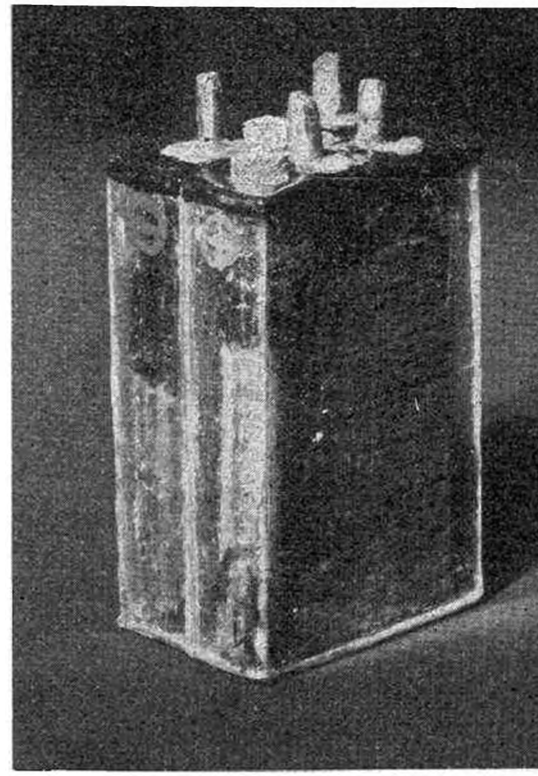
I took one positive plate and one negative plate and pressed them gently together with an insulating piece of cardboard in between. A little pitch melted over them at each corner held them together. I cut two pieces of 1/16 in. sheet plywood to fit into the top of the containers and drilled two holes in them so that the terminals would pass through. I took the two plates which were stuck together and pushed one of the plywood pieces on the terminals and melted pitch all round to keep it in place. I then slid the plates with the plywood on top into one of the containers so that they rested on the bottom (which by the way ought to be made thicker than the sides). I cemented the plywood on top of the container, making a strong leak-proof joint. I now had to fill the cell with acid so I cut a hole in the top of the container and poured the acid in. The specific gravity of the acid ought to be about 1·250 or about 1 part acid to 4 parts distilled water.

The cell was now absolutely complete and only needed to be charged. It weighed 2·1 oz.

To charge the cell I just connected it up to a 4 volt accumulator with a 2·5 volt bulb in between the positive of one and the positive of the other. I had to be careful when connecting the cell up to be charged. Connect the negative terminal to the negative of the accumulator and the positive to the positive terminal of the accumulator. I fitted the other plates together and put them into the other container and filled it with acid in exactly the same way and then cemented the second cell to the first so making the full 4 volts.

After I had charged the two cells I made some tests and

PLANE ENTHUSIASTS



these were my results :—

I started my engine up and had her running for 20 minutes, then I stopped it and gave it a rest. Later I had to start it with a "booster," but the little accumulator kept it going for a further 5 minutes. This was very good. I charged it up again and ran my engine for 3 minutes at a time, starting it up with the small accumulator each time. It ran for 5 times and then I started it up again with the booster and it ran for another 6 minutes.

These results ought to satisfy all my wants, for I can go out (after the war is over), and have over 20 one-minute flights without recharging.

(We consider the results obtained from this accumulator to be good. There will undoubtedly be a demand for a small accumulator of the type described, when the flying of petrol 'planes is resumed after the war; and we feel that research and development should be encouraged.
If any other readers have constructed small accumulators, we should be glad to have particulars (with photo) for publication at our usual rates.—Ed.)

AN AIRDRAULIC TIMER

By A. J. WATSON

FIRST of all cut threads on the sides of the larger discs, and at both ends of the wider tube (on the inner sides), so that the discs can be screwed into it. Next bore a hole 1/8 in. diameter through one of the discs in the centre, and screw this disc into the end of the tube.

The piston rod is made from the other tube (3/16 in.). At the top of it cut a thread. Bore holes in the smaller discs 3/16 in. diameter, and screw one on to the piston rod. Bore the same sized hole in the leather disc and push it on to the rod. By screwing on the second disc it is kept firmly in position (Fig. 1).

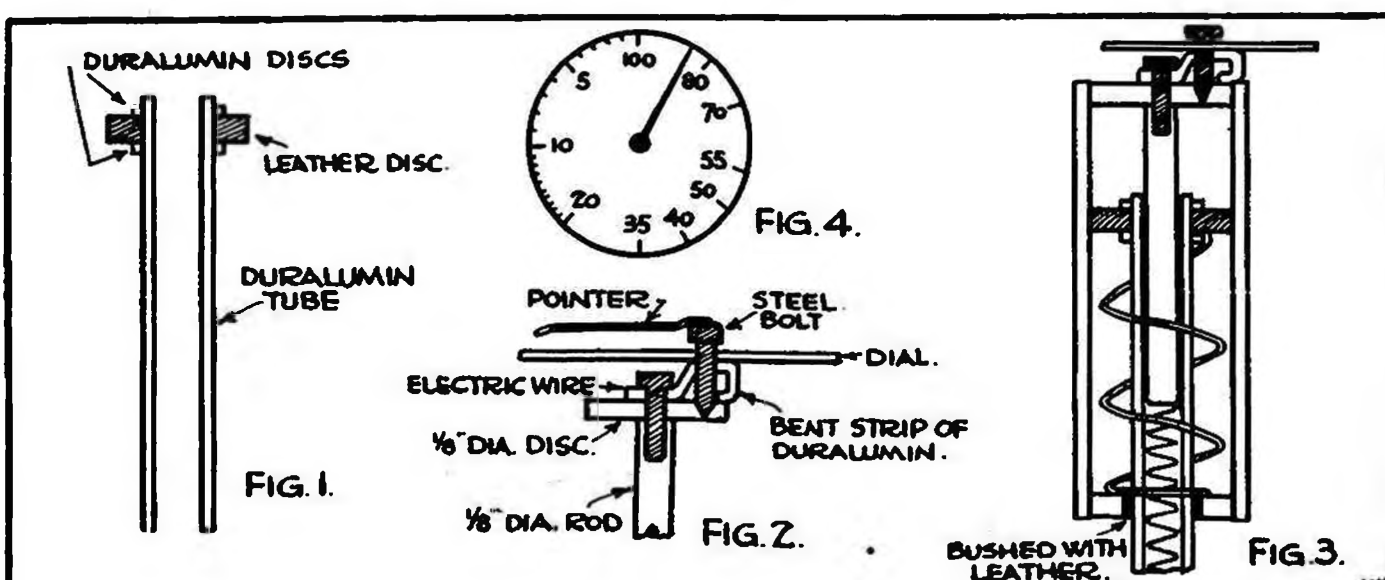
Drill a hole 1/16 in. diameter in the second, larger disc, and cut a thread on the inside of it. Drill another hole of the same size in the end of the steel rod and make a thread around this hole; bolt the disc on to the centre and end of the rod. Drill a V-shaped hole in between the centre and the edge of this disc. Take a bolt 1/16 in. diameter, 1/2 in. long, and grind the end to a point to fit snugly into the V-shaped hole. To obtain a perfect fit it is advisable to grind the point into the V-shaped hole with fine grading paste. Cut a piece of duralumin 1/16 in. thick, 1 in. long, 3/16 in. wide. Drill a hole through it 1/16 in. diameter near one end, and another near the middle, so that, when it is bent to shape and fitted in position, the point of the bolt enters the V-shaped hole in the middle (Fig. 2). Fit a dial on to the aluminium strip and solder a pointer on to the head of the bolt. (Also shown in Fig. 2.)

The last job is to assemble all the parts as in Fig. 3, fitting the two springs as shown.

The timer is now ready for use. Fit it into the ignition system, joining the ends of the wires to the top and bottom bolts. Push the piston in as far as it will go, and close the valve by screwing the pointed bolt tightly into the V-shaped hole. The current passes along the rod and through the spring. Open the valve one complete turn (this moves the pointer round one turn also), and time with a stop-watch how long it takes for the piston to be pulled out and break the A. Mark the time on the dial at this point. Repeat this about five times with the pointer at different places on the dial, marking on the dial the times. A typical dial is illustrated in Fig. 4.

Note that the heavier spring does not push the piston in but pulls it out: the valve must be as long and as finely tapered as possible: and the threads on the steel bolt must be very close together.

Materials required :—
Duralumin tube, 1¼ in. long, ½ in. diameter.
Duralumin tube, 1¼ in. long, 3/16 in. diameter.
Steel rod, 1 in. long, ⅛ in. diameter.
2 duralumin discs, ⅛ in. thick, ½ in. diameter.
2 duralumin discs, 1/16 in. thick, ⅜ in. diameter.
1 very light spring, 1 in. long.
1 heavier spring, ½ in. long.
1 hard leather disc, ½ in. diameter, ⅛ in. thick.



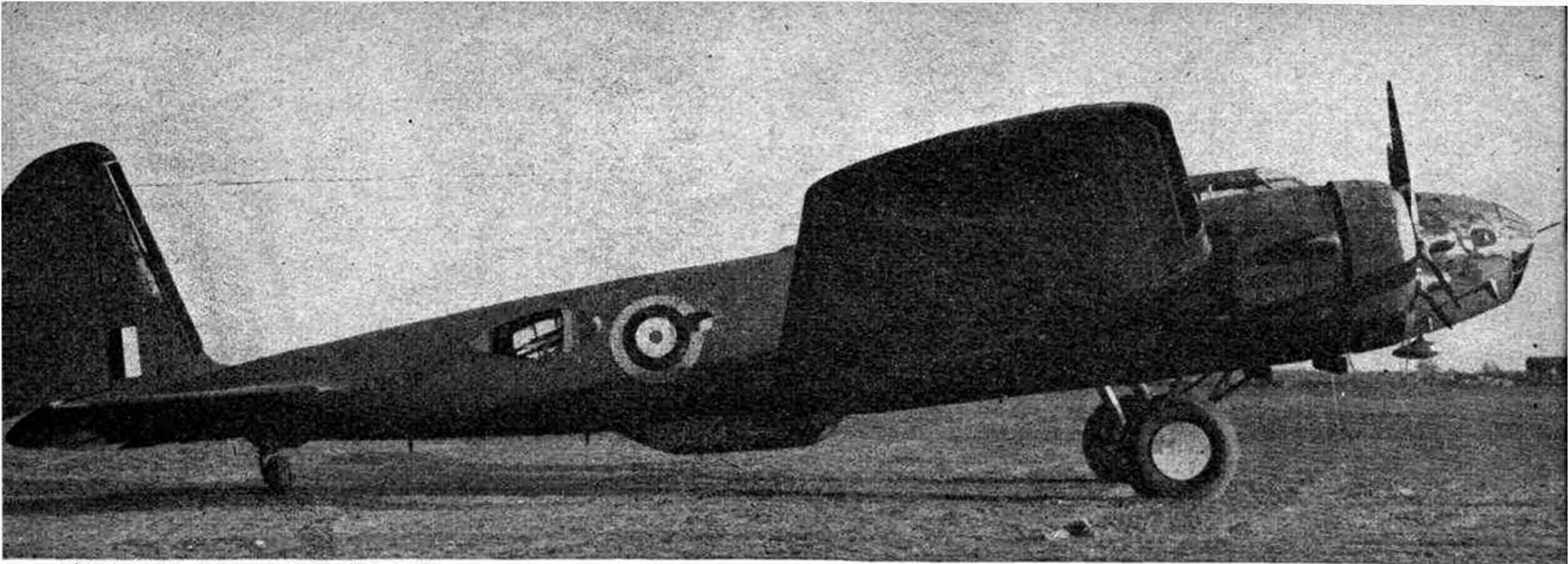


Photo by courtesy of Ministry of Aircraft Production.

FIGHTING AIRCRAFT OF

THE BOEING "FORTRESS" I

THE Boeing 299 four-motor bomber first flew in the summer of 1935—six-and-a-half years ago. It was then powered by 750 h.p. Pratt & Whitney Hornet motors, and reports indicated that its performance equalled the maximum set down in the U.S. Army Air Corps specification to which it was built, it having a maximum speed of 250 m.p.h. and a range of 2,500 miles. The XB-17, as it was called by the U.S. Army, created a newspaper sensation by flying from its birthplace at Seattle, Washington, to the U.S. Army Air Corps test station at Dayton, Ohio, 2,300 miles off, in nine hours, averaging 255 m.p.h.

After the usual extensive flying trials to which all new U.S. aircraft are subjected, during which it was known as the YB-17, the Boeing was fitted with 850 h.p. Wright Cyclone radials, and an order for thirteen was placed by the U.S. Army Air Corps. As delivered to the Army the Boeing had an all-up weight of sixteen tons, and was armed with five manually-operated machine guns. Because of its size and what was for some reason called its remarkable armament, the American Press hailed it as a "Flying Fortress." The Boeing was, by reason of this cliché, not unjustifiably ridiculed in this country, and although the version now in service with the Royal Air Force has increased armament, the expression is still hardly appropriate, our own Sunderlands, Stirlings, Halifaxes and Manchesters being more heavily armed and carrying greater bomb-loads. The Air Ministry has, however, condescended to popular denomination, and the Boeing is officially the Fortress I.

After the B-17 (it dropped the Y after its tests were completed) came the B-17A, a similar version, but one with which experiments were made with exhaust-driven superchargers.

In the autumn of 1937, a third and slightly improved version, the B-17B (or B-299Y, the manufacturers' works number), was developed for operating at great heights, and an order was placed for a small number. This version was similar to the original model and differed externally only in minor details, in a modified nose gun position, and in the adoption of superchargers similar to those fitted to the B-17A. This version was tested in the summer of 1939. Twenty-six were ordered for the Army Air Corps and their delivery completed early in 1940.

When on test one of these Boeings flew from Burbank, California, to New York, a distance of 2,500 miles, in 9¼ hours. The average speed was 263 m.p.h. and the flight made at a height which varied between 20,000 and 33,000 ft.

In the spring of 1941 a number of Boeings ordered by the British Purchasing Commission in America began to arrive in this country, their long range of over 4,000 miles (without bombs) making possible delivery by air. These Boeings were of the B-17C (B-299T) type, and included certain improvements in performance and armament. External modifications consisted of the replacement of the side "blisters" of the B-17B with flat panels flush with the fuselage, the under blister being extended in length, and the area of the rudder being slightly increased by the incorporation of a more vertical trailing edge.

Initial arrivals equipped No. "WP" (Bomber) Squadron, R.A.F., and first went into action on 24th July, 1941. The raid, which caused much excitement in the Daily Press, was made in daylight on the German battle-cruiser "Gneisenau," then lying at Brest. The attack was made from the sub-stratosphere by single aircraft which dropped their bombs and escaped practically undetected.

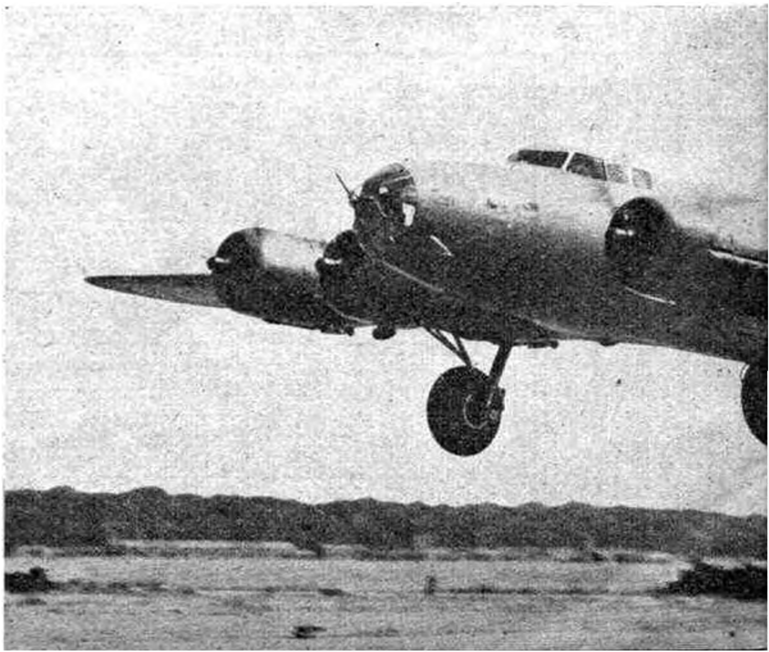
Mr. Rupert Moore's cover painting, "Dawn in the Stratosphere," is a representation illustrative of the raids carried out by these aircraft. Here a Fortress is shown approaching its target at thirty-odd thousand feet with the rising sun lighting it from below, the British Isles lying detachedly in the north, and half-way down to the ground the vapour trails of the opposing fighters coming up in an attempt at interception.

Fortress aircraft have raided Kiel, Cologne, De Kooy, Bremen, Rotterdam and Oslo, and in many cases have left German fighters several thousand feet below.

The Fortress is a low-mid-winged monoplane of all-metal construction, has pleasing lines and is reported on favourably by pilots and crews flying them.

The wing is built in four sections, two inboard bearing the motors, and two outer sections. It is built up on two spars and is stressed-skin covered. Ailerons fitted to the outer sections are fabric-covered. Trailing-edge split flaps are fitted between ailerons and fuselage. The fuselage is of all-metal semi-monocoque construction. The tail-unit is constructed similarly to the wing, the tailplane and fin being covered with stressed skin and the movable surfaces with fabric. Trimming tabs are fitted to rudder and elevators.

The undercarriage of the Fortress is of the forwards-



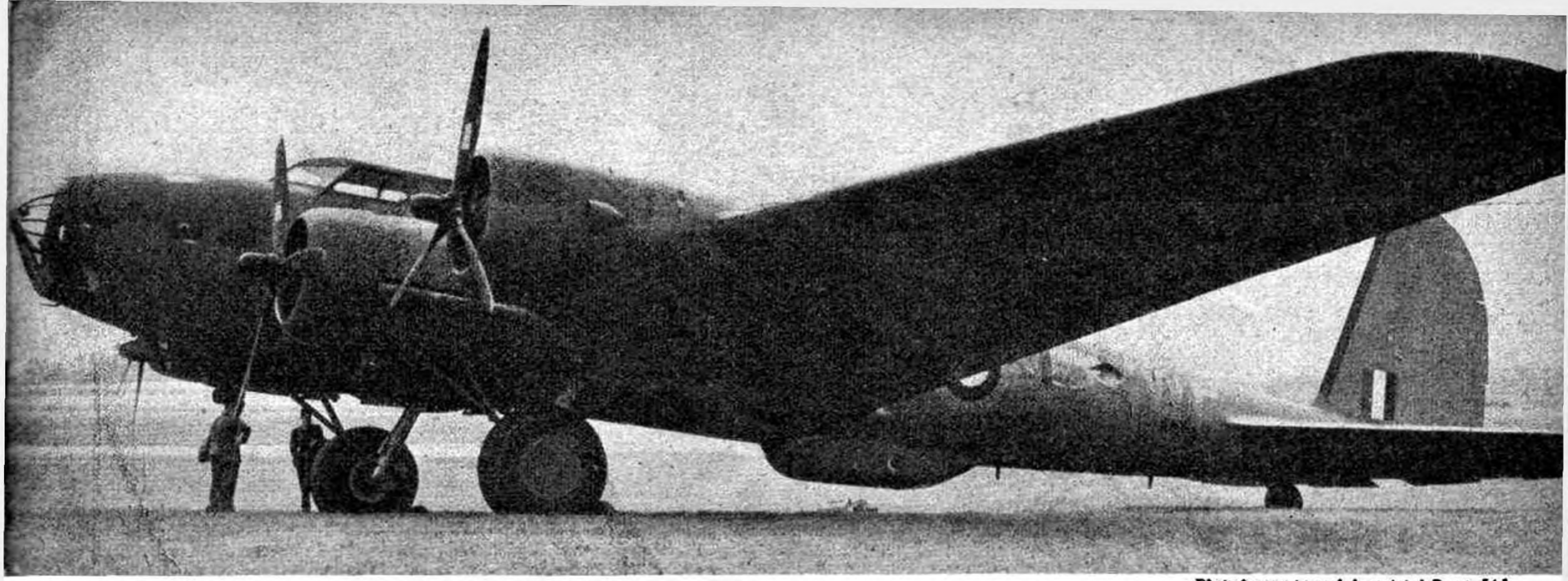


Photo by courtesy of Associated Press, Ltd.

THE PRESENT WAR—XII

BY H. J. COOPER

retracting type with single oleo-pneumatic shock-absorber legs, and is operated electrically. The tailwheel retracts backwards.

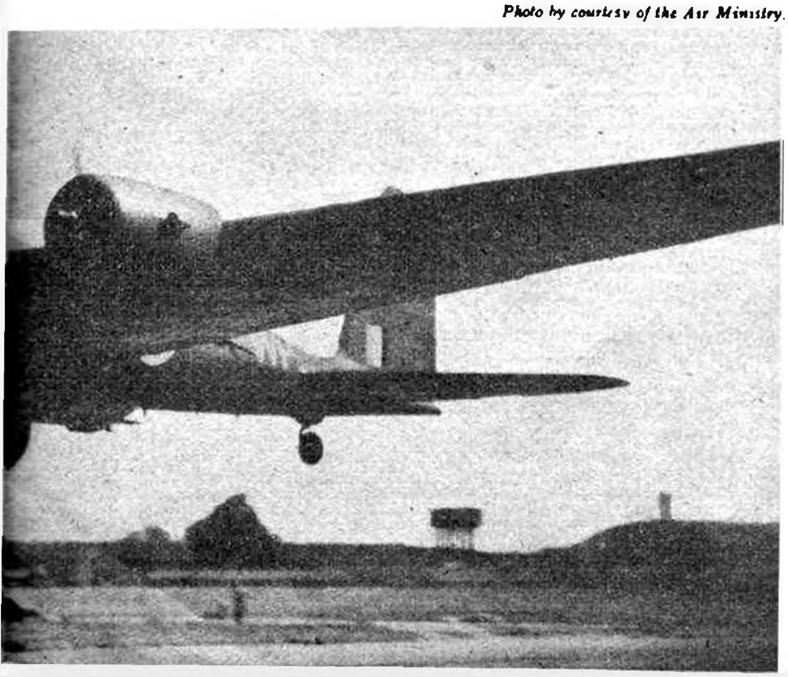
Power is supplied by four 1,000 h.p. Wright Cyclone G-205A-R-1820-666C fourteen-cylinder air-cooled radial motors fitted with Hamilton-Standard Hydromatic three-bladed constant-speed airscrews.

The crew of a Fortress varies from seven to nine according to the nature of the flight on which it is engaged. There is accommodation for a pilot, second pilot, radio operator, forward gunner, navigator/bomb-aimer, port and starboard gunners and a fire-controller. The latter watches the whole sky from the astro-hatch above the pilot's cockpit and reports all activity. The arrangement is suoh that the crew can all change positions freely.

Defensive armament consists of six manually-operated ·50 Browning machine-guns: one in each of the beam positions in the fuselage, two in the fairing below the fuselage for rear defence and two above the fuselage, and a seventh Browning of ·30 calibre in the nose. The bomb load of about 3,000 lb. is carried in the fuselage.

The Fortress has a rather distinctive appearance, with a tail down " sit " (no one has thought of a substitute for that word which need not be draped with inverted commas), and the high rudder, with no turret behind it, is a strong recognition point in the side view. From above or below the placing of the motors is noteworthy, as all new British four-motor types have the motors placed well out along the span. The leading edge of the wing is swept back rather sharply, and tapers slightly more than the trailing-edge.

Photo by courtesy of the Air Ministry.



The Fortress is one of the first types to carry the new camouflage of azure blue for under surfaces and sides of fin and rudder for day-bombers, which renders them as near invisible as possible in the high regions in which they operate. The blue extends half-way up the sides of the fuselage. Upper surfaces are camouflaged according to a new scheme with grey and green similar to the former green and brown. Standard roundels are carried: red and blue above the wings; red, white, blue and yellow on the fuselage. None are carried below the wings. The fin bears the rectangular red, white and blue marking which is now also standard on all types. Squadron code letters are painted in pale blue-grey and serial numbers are painted in black on each side of the fuselage.

A further development of the B-17 is the B-17D, which is almost identical, differing only in minor details, and has been delivered to the U.S. Army Air Forces.

The seventh and latest model in this line is the B-17E, also for the U.S. Army, and for the Royal Air Force known as the Fortress II. Appreciable improvements over the Fortress I have been incorporated. Three power-driven gun turrets—one behind the rudder, one above the fuselage and one below—supply the defensive armament. The fin has been extended forward along the fuselage in the manner of that of the Boeing Stratoliner to give greater stability at height. The new Fortress is reported to be able to cruise at 35,000 ft. and has a maximum speed of about 300, which is only a little slower than the Fortress I. The loaded weight is about 60,000 lbs., or nearly twenty-seven tons. The Fortress II first flew early in September, 1941, and is now in large-scale production at the factories of the Boeing, Lockheed-Vega and Douglas companies. Over a thousand have been ordered; presumably half are for the R.A.F.

SPECIFICATION—FORTRESS I:

Dimensions.
- Span: 103 ft. 9⅜ in.
- Length: 67 ft. 10 9/16 in.
- Height (tail down): 15 ft. 4½ in.
- Wheel track: 21 ft. 1½ in.
- Chord at root: 19 ft. 0 in.
- Chord at tip: 9 ft. 0 in.
- Tailplane span: 33 ft. 9 in.
- Tailplane chord at root: 7 ft. 6 in.
- Wing area: 1,486 sq. ft.

Weights.
- Tare: 31,150 lb.
- Loaded: 45,470 lb.
- Max. overload: 47,500 lb.

Performance.
- Max. speed: 320 m.p.h. at 20,000 ft.
- Operating speed: 232 m.p.h. at 14,000 ft.
- Climb: 1,300 ft./min.
- Service ceiling: 36,700 ft.
- Range at 232 m.p.h.: 2,100 miles.
- Range at 232 m.p.h. with max. fuel and reduced bomb load: 3,160 miles.

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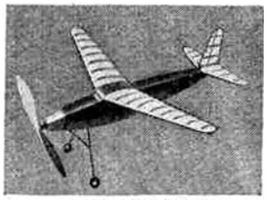

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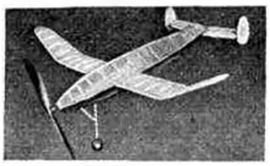

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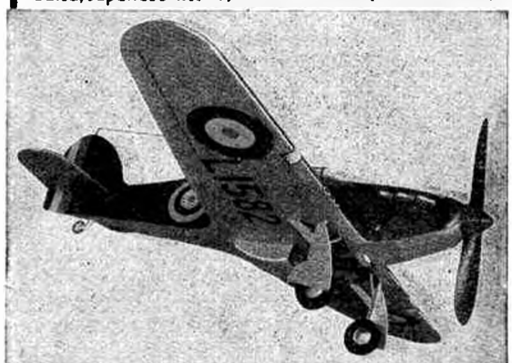

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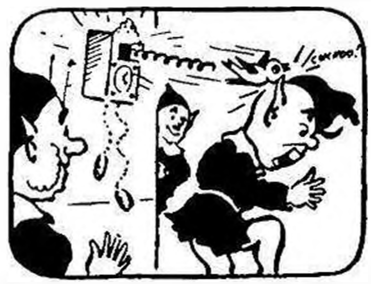

"Time waits for no man
they say,"
Moaned OI, "Oh ye gods,
what a day."
Then the old cuckoo clock
Sprang to bits—what a shock.
"Ten to one it needs
FLUXITE," grinned EH.

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CLUB NEWS

By "The Clubman"

HOW'S things, chaps—and how goes the balsa situation ? What a brick to drop right at the start of the New Year (as far as this magazine is concerned !) Do you know, I actually saw a fellow carrying home a chunk of balsa the other day . . . and, believe you me, there was a string of panting aero-modellers trailing behind him offering all sorts of bribes in an effort to discover where he obtained such rare material. Even his answer that he " reared it 'imself " was no consolation to the madding crowd. Ah me, to dream of the days when I used to cut a two-inch wheel out of a six-inch plank—and throw the rest away ! Yes, I said " dream."

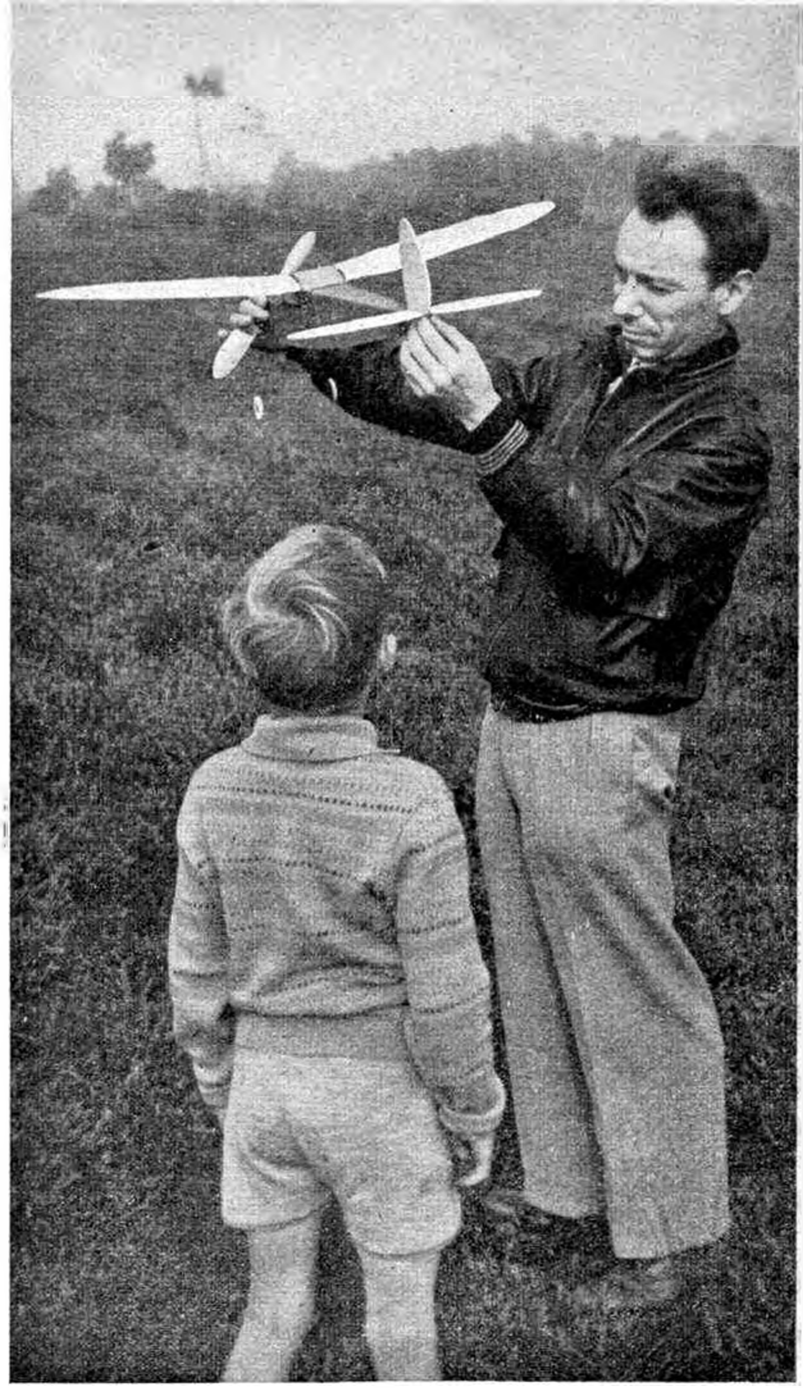
Incidentally, how many of you noted two little slips in last month's issue. I note that our old friend Bowden is now using *plated* rubber (page 687) . . . and one assumes that he has carried his high degree of finish to the interior as well as the exterior of his models ! And just think of the awful predicament of Dr. Forster's South African friend, who spends his time wandering over the kopjes (hills to you higerant 'ounds) and finds them covered with *prickly BEARS.* Ain't nature a wonderful thing ? (All right you ; you know darn well its your fault for not checking the proofs properly.—ED.)

Rushy's little piece brought back a number of memories to me, and made one realise just what good times we used to have —even if we didn t always appreciate them. One of these days I'll write my own reminiscences and shock the literary world . . . the only trouble is finding a publisher for 'em. I'm threatened with immediate extinction if I dare show the MSS. here. As the Editor said, " Anyone can write about beer and skittles, but when that's added to your murky past . . . nothing doing." And after all the dinners I've stood him too !

Quite a number of modellers are asking us " where can I buy a petrol engine ? " and it becomes increasingly difficult to give them any helpful answer. With American imports limited to essentials, and British manufacture turned over to munitions, all stocks on hand at the start of hostilities seem to have been snapped up, and the shops are as bare as Old Mother Hubbard's wine-cellar. (Incidentally, I presume all these models being built are only being *built* and not *flown*. Don't forget the Air Ministry ban on the flying of petrol models during wartime, but don't let that prevent you from building and experimenting in readiness of the lifting of the restrictions.)

Apropos of the foregoing (by which I mean of " still talking about engines " !), we do hear occasionally of a reader who has an engine, model, kit, wheels, or other accessories for disposal, and in order to help both possible purchasers and sellers, I shall be pleased to forward any letters to the right quarters if sent in to THE AERO-MODELLER offices, accompanied by a 2½d. stamp for re-addressing. Please mark the envelope " P. E. E. C-M." I have one request on hand now for a pair of 4½ in. Air Wheels, and a 2½ in. ditto, so send in your notices right away. (No charge for all this—all I'll have is a couple of turkeys at Xmas.)

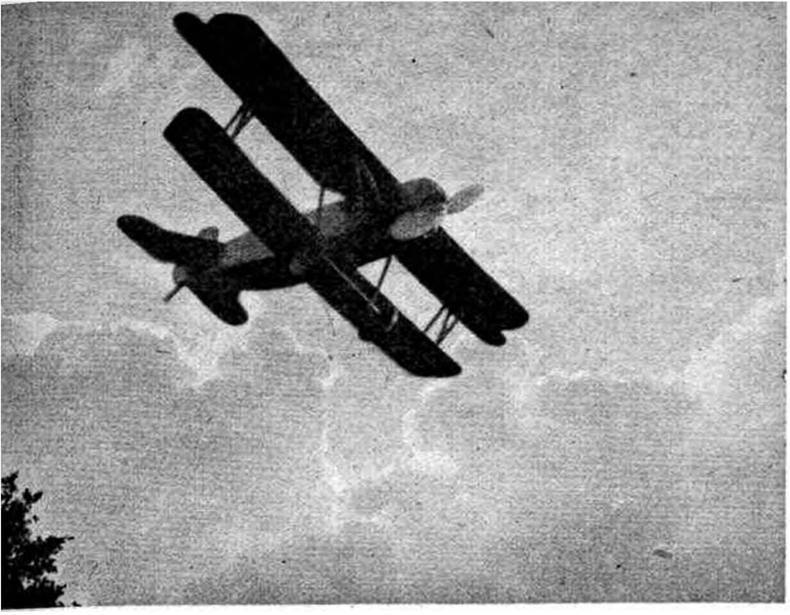
There seems to be a big disturbance in America at the moment over the subject of petrol model regulations. Many are agitating for an increase in both the wing and power loading, while others advocate a shorter engine run. One thing I cannot understand is why they still stick out for assisted take-offs. Usual practise is for the entrant to run along with his model, holding one wingtip until the model is lifting nicely, and then letting go. I may be pig-headed (you certainly are.—ED.), but I still maintain that any model worthy of the name should be able to take off as well as fly like the real thing. Just imagine the spectacle of a " Halifax " taking off across the aerodrome with fifty men running under each wingtip, shoving it up with broomsticks ! No, for goodness sake let us design and fly our models to act properly right from the word go. If a model is designed and powered right, it should have no difficulty in getting off without assistance (always taking into account the nature of the take-off spot, of course).



" Hey . . . . it's my turn now ! " F. T. Rogers of Woking casts a critical eye over the little fellow's model while the owner wonders when he will get the chance of another flight !

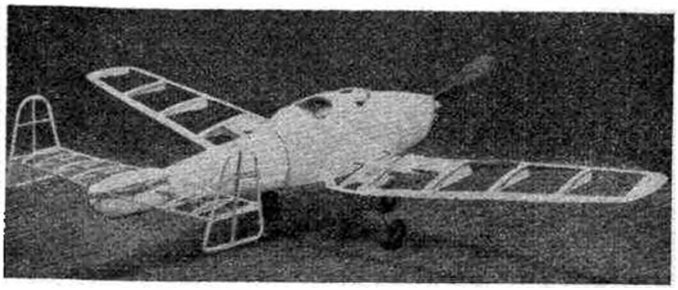
As a matter of fact, in view of the difficulty most chaps have in getting hold of up-to-date news from abroad, and the fact that I'm fairly lucky in that respect, I have suggested to the Editor that I give a general write-up occasionally as a separate article. Cannot take too much room out of the Club News section itself, so we'll see what can be dished up in the near future.

I am pleased to welcome a new club this month in the form of the De HAVILLAND M.A.C. This group is connected with the famous aircraft firm, and hopes to make the club " as big a name in the miniature field as in the full scale." R.T.P. models are being specialised in for a start, and the Edgware club has been challenged to a match on the 22nd December. Several super Wakefields are on the stocks, also three radio-controlled petrol models. (I can see a big future



Clever photography by A. B. Hanby of Dumfries. The model is a " Fokker D.VIII". (Pity the prop wasn't removed, it would have looked more realistic.)

N. Slatford wins a 10/6 prize for this model of the G. A. 'Owlet' built from Aero-Modeller plans.



for this class of job when the present spot of bother is over—but then, I'm not clever in prophesying that, am I ?) Affiliation to the S.M.A.E. has already been undertaken, and competition will be welcomed with any other club in the area. Secretary is Mr. J. Treeming, and all communications should be addressed to the De Havilland Sports Club, Stag Lane, Edgware.

I am very pleased with one piece of news to hand from the " frozen North." The old Liverpool, Wirral and Allerton & District clubs have amalgamated, and now form the MERSEYSIDE MODEL AIRCRAFT SOCIETY, under the secretaryship of Mr. I. S. Cameron, of 47, Neville Road, Bromborough, Wirral. This wise step was taken at the instigation of Mr. Gosling, an old stalwart of the Bradford club, and it is intended to make a great attack on all S.M.A.E. events from now on. As the Press Sec. states : " After all, why should a number of clubs, all within a few miles radius, rival each other, when they could be pulling their weight together as one club." All this I heartily endorse, and many of you will remember my plugging this point for many moons. I do wish we could cut out the silly business that exists in some places, where more than one chap wants all the credit in a club, and if he doesn't get it all his own way, shoves off and starts a rival group in the same district.

Another pleasant news item is from an A.T.C. section, the 301 SQUADRON M.A.C. This is one of the far too few aero-modelling groups set up in the A.T.C., and my congratulations go to their O.C. for realising the great value of aero-modelling in the training of young airmen. Weather has restricted outdoor activities with this club, but indoor flying has been tried out successfully, Cpl. Bungay clocking 57 sec. with a Veronite " Hawk " R.T.P. Splendid facilities are available, as these chaps have the use of the woodwork room and tools at a local school, so they should go far.

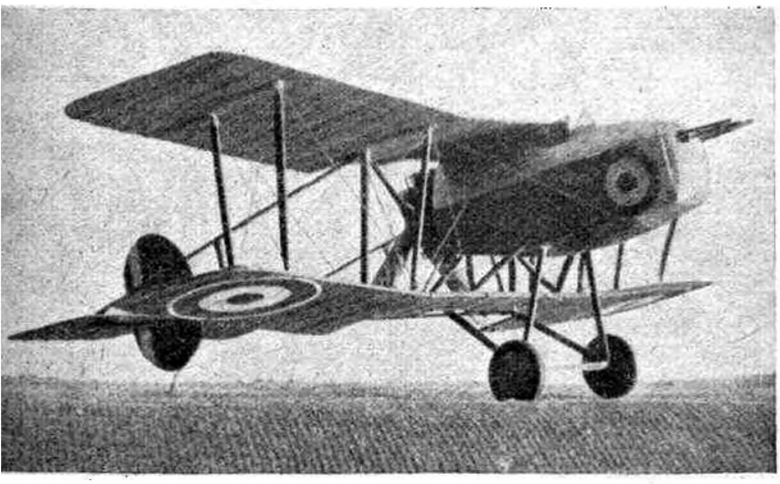
The LEICESTER M.A.C. have started a series of special indoor meetings, where indoor flying alternates with lectures every other Sunday afternoon. The first meeting (flying) saw a good turn-out of members, and some good times were made round the pole. F. Wilkinson tried out a Pterodactyl, which seemed quite suited for the job, while F. Davies and J. Marsh got in some good flying with duration and scale types. (P. Day has hit on a novel stunt for covering his streamlined fuselages, the procedure being to beg, borrow or steal a silk stocking, and then slip the fuselage inside ! Well, well, and in these days of rationing, too.)

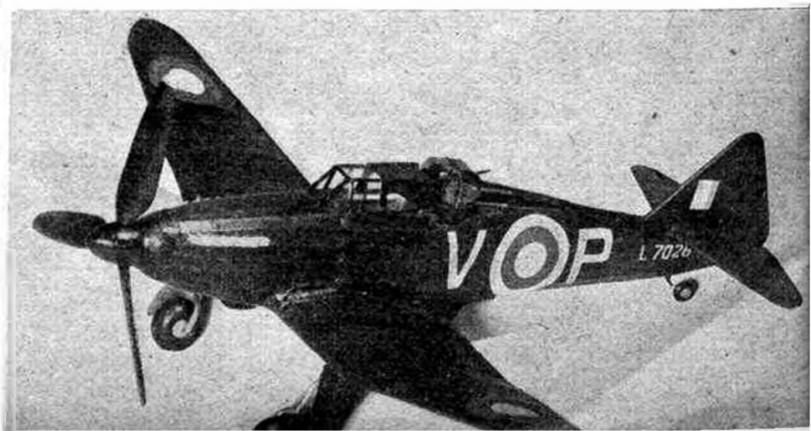
The last outdoor meeting of the DERBY M.A.C. was held in their new 23-acre field (lucky blighters !) when, in spite of frost, wind and mud, some passable flying was witnessed. P. Ward totalled 1 : 48·4 for two flights, beating J. Wright by 8 seconds for first place. This club now numbers some 60 members, and is progressing A.1.

Young Peter Albericci of the LEEDS M.F.C. is still showing the senior members where to get off, having just raised his own club record to 2 : 04 H.L. Unfortunately the model finished in the top of a fifty-foot tree, considerably reducing the possible duration—and some of the tissue !

With the weather unfit for outdoor flying, the BURY & D.M.A.C. lads have been renovating their club-room, getting more whitewash on their persons than the ceiling ! Remember the old song ? " When Father papered the parlour . . . " With balsa almost non-existent with them, greater uses are being found for the harder woods, and performance does not seem to be drastically effected. In fact, one member has constructed a " Kamlet "—and what do you think it weighs ? I shudder to say it, but it's all of 12 ounces ! What've yer built it of, mate—lead and oak ?

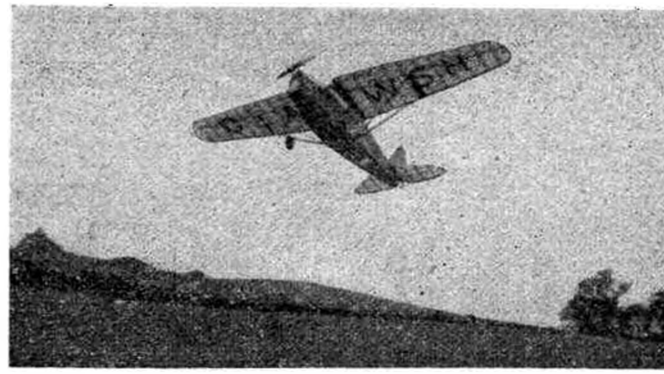
A new club has been formed in Leicester under the title of the GOLDEN WINGS M.F.C., all the members being from a firm engaged on Government work. The first club flying meeting to be held resulted in a win for Mr. Jones, who





The Old and New. A 'Vickers Vampire' (builder unknown) and a 24 inch span 'Defiant' constructed by A. Halls of Oundle.

A. W. Shaw of Lancs. M.A.S., snapped his 1-inch scale model 'Leopard Moth' getting away for a fine flight.



Another lucky prizewinner is P. Hickson of Seale who built this fine looking "A.M Cabin Monoplane."

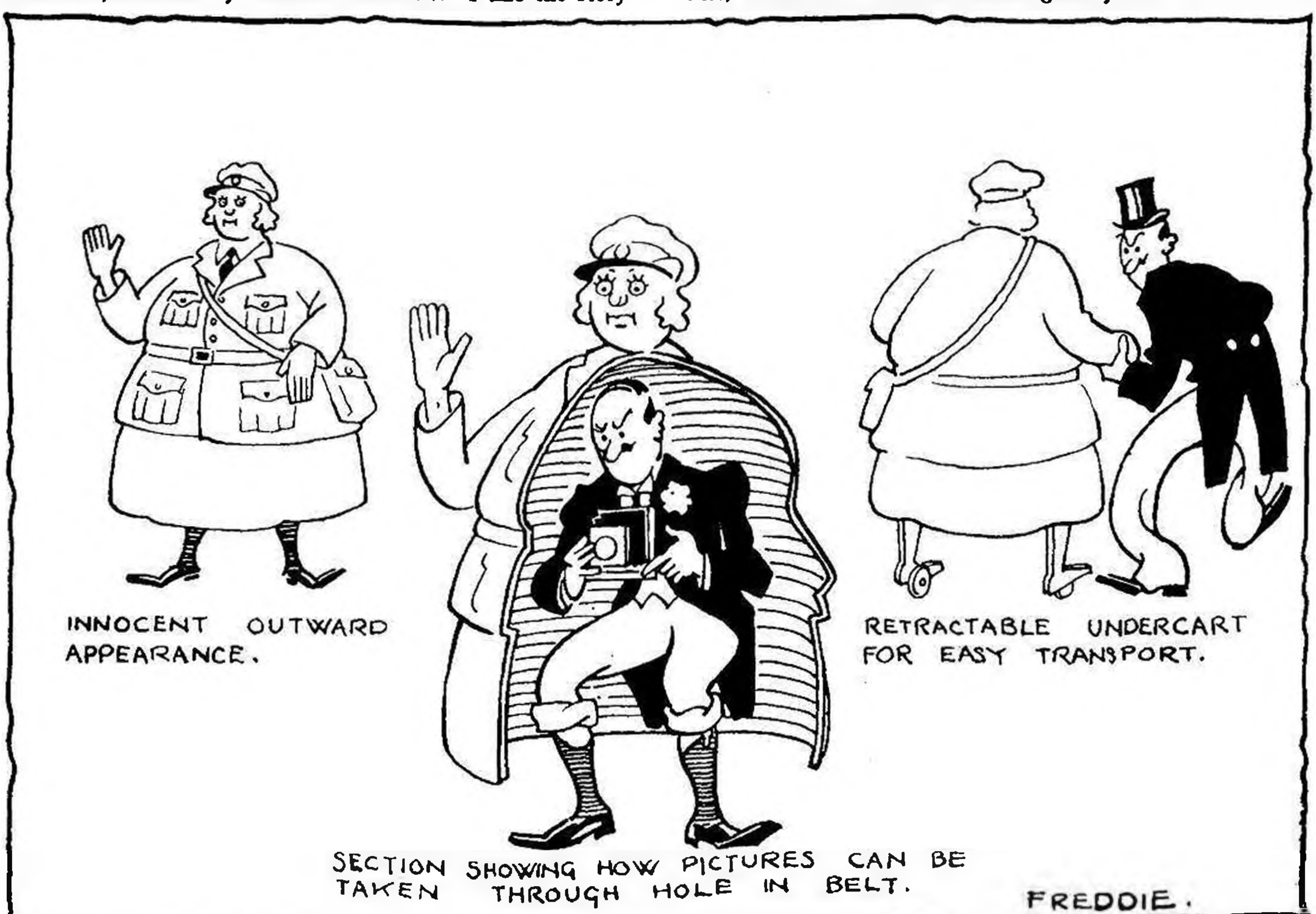
averaged 1 : 30·2 with his "Club Super," Messrs. Ivory and Kimber being the runners-up with times of 1 : 05 and 39·6 respectively. Trees and wind took their toll of the models in their usual charming manner, but the seed has been well sown, and prospects are good for the future of this new body.

The GENERAL AIRCRAFT M.A.C. are also disappointed at the lack of enthusiasm shown by the A.T.C., as very little advantage has been taken of their offer to conduct contests and instruction for them. It's hardly cricket to snub such offers, and I do feel that there is a sad lack of foresight on the part of some O.C's. A. D. Roles won the club Lightweight contest with an average time of 41·3 in spite of very bad conditions, followed by Marshall with 21·5. I like the story of the two "evacuees" who have been conducting airflow tests on top of the bus to and from work. What were the findings ?

Pole flying now takes place every Saturday afternoon with the STRATFORD-ON-AVON M.A.C., and visitors are welcomed at the New School, Alcester Road. D. Megainey raffled a model "Lysander" in aid of a Russian fund, the useful sum of £6 being realised.

Activity is strong in the COLERAINE & D. M.A.C., with R.T.P. flying each week, aircraft recognition contests, etc. Entries for the indoor flying are larger than anticipated, and the members are really getting down to designing special models for the job. W. S. Troy and F. J. Molloy have been winning the recognition events, while R. J. Troy has raised the flying scale record to 40 sec. with a 36-in. Leopard Moth.

A useful step has been taken by purchasing a number of kits, which were distributed among the junior members, and



FREDDIE'S INGENIOUS METHOD FOR OBTAINING PHOTOGRAPHS OF NEW AIRCRAFT TYPES !

Well . . . look who this is ! Howard Boys, famed for his large flying scale designs, tries his hand at solid scale models. The model under construction was for exhibition in a special War Weapons event, and looks up to the usual H.B. standard.

building is carried out in the club-room under the guidance of senior members. One up to Coleraine. An open competition is being arranged for Boxing Day, and all aero-modellers in the district are invited to enter.

Messrs. Rippon and Bell were the judges of a " solid-scale " contest at the EDGWARE M.A.C., K. Wright gaining first place with a total of 37 points out of a maximum possible of 40, his model being a " Blenheim." R. Wallis (Me 109) was second with 36½ points, and F. Honey third with 36 points, the model being a " Hanover." A special drawing contest was won by E. Rock.

D. Piggott, of the BLACKHEATH M.F.C., has set up a figure of 3 : 59·75 with a glider—hand launched—and this has been submitted to the S.M.A.E. as a new British record. Much interest is being shown in gliders now that balsa is getting so scarce, the hard woods being so suitable for this class of model. (I can see a lot more interest all round with the innovation of Mr. Temple's expert articles.) The club has started a chart system, showing the relative positions of members in regard to flight times, this acting as a great incentive to the younger members.

Activities have been re-started in the YORK M.A.S., an outdoor meeting resulting in wins for K. Skelton (1 : 04·8 H.L.) and A. Linfoot (1 : 04·5 R.O.G.). This latter fellow also carried off a R.T.P. event with a time of 1 : 49·8, L. Fawcett placing second with 1 : 25·2. Fawcett holds the club R.T.P. record with a time of 1 : 58.

Competition for the clubs' first trophy—the " Members Cup "—proved somewhat hectic with the HEYWOOD M.A.C. High winds saw three machines written off while being carried out to the fray, but G. Whitlam set up three consistent times of 40, 43 and 42 secs. to win from C. Watson, whose times were 32, 32 and 30 secs. Consistent if not spectacular ! One machine that got away for a long distance flight was deliberately run over by a passing motorist—which was very kind of him, I don't think. Queer sense of humour some folks have got.

The MILLOM & D. M.A.C. want to buy a second-hand printing press, and welcome any offers. (Haven't you heard there's a paper shortage somewhere ?)

Another encouraging A.T.C. news item is to hand from No. 10 F Squadron, who express appreciation of the way that the LUTON & D. M.A.S. are helping them, conducting a class of over 20 Cadets. That's the give to stuff 'em, Luton, and let's see others taking a lead from you.

The CHESTER M.F.C. have a spot of luck with the possession of a flying field two miles by one mile in area—and NO TREES. What do your poor little dogs do ? Two competitions held recently resulted as follows —

Wakefield Types.		
R. Moulton	(Copland)	5 : 04 agg. of 3.
F. Dodd	(Korda)	4 : 20 ,,
C. Pink	(Victrace)	4 : 18·2 ,,
Glider (Winch-launch, 150 ft. line).		
D. Cave	.. ..	2 : 13·4 ,,
F. Wilde	.. ..	1 : 54·8 ,,
R. Moulton	.. ..	1 : 30·6 ,,

Cave used a 5 oz. model with 208 sq. in. wing area, slabsider fuselage, with Grant X8 airfoil section. Wilde's model was a 6-ouncer of the same area, but with a streamlined fuselage and R.A.F. 32 section.

Indoor records are getting a bashing at the RIPON M.F.C., the over 18 in. span class going to C. F. Elliott with 1 : 17, the smaller class figure of 26·2 being held by B. Davis. A 3 in. span model has actually flown—but found the smoker's thermals too much for it ! Where do you get your smokes you chaps—I went on the wagon months ago !

The BRIGHTON D. M.A.C. have secured an excellent hall for indoor flying, and great things are expected following an important lecture on the subject. 'Orrible rumours have been heard of Obeechi R.T.P. jobs—and I bet they fly as good as the balsa jobs, too. Don't forget what I said about that " balsa complex "—and just see if I'm not a good prophet.

The HALSTEAD & D. M.F.C. are staging a " spotting contest " with the local A.T.C., and speculation is rife as to who is the better team. Male members are trying frantically to catch up with the lady members—but Miss le Messurier is still leading them all round the garden. Comment is made in a recent issue of the club magazine *re* the lack of entries

A scale Boeing F434 4-F-7 constructed by Pte. A. A. C. Jordan of the Pioneer Corps. (Engine is ½-inch diameter.)

from the ladies of the large clubs—and veiled comments are made regarding certain of these large groups. What's the trouble, Halstead? I'd appreciate a hint as to what, whom and how this dis-satisfaction is created, and perhaps I can help all round through my renowned powers of tact and arbitration!

Some "Definitions" tickled my fancy, a sample being that for "Aeronautical Literature"—"Books cunningly devised to trick you into thinking that the experts know more about it than you do." Wonder what their definition of the Clubman would be—or would the printing press catch fire? And what was the idea of printing the sketches back to front? Case of "Alice threw to Looking Glass."

Official results of the ASHTON & D. M.A.C. Open Rally are to hand as follows:—

Open Duration.	R. E. East	(Buxton)	412·5 points.
	Blackman	(Wirral)	363·5 ,,
	N. Lancaster	(Lancs)	302·3 ,,
Wakefield.	N. Lees	(Halifax)	380·4 ,,
	N. Lancaster	(Lancs)	270·5 ,,
	G. Eifflander	(M'field)	250·1 ,,
Sailplane.	A. W. Shaw	(Lancs).	
	G. Dunmore	(Leicester).	
	G. Eifflander	(M'field).	
Nomination.	R. Scott	(St. Helens).	
	J. Rudkin	(Ashton).	
Solid Class	G. Dunmore	(Leicester).	
	G. Parrish	(Ashton).	

All profits went to a local charity. The committee wishes to thank all the many visitors from near and far, and regret that the "do" was not quite the success as planned. Certain criticisms—some justified and some not—have been duly noted for future occasions, and apologies are tendered for any inconveniences caused to any visitor.

The EXETER M.A.C. recently staged an exhibition, as a result of which the membership has climbed to the 60 mark. D. M. Peters seems to have just about cleared the board this year, holding six out of seven records, and winning 50 per cent. of the season's competitions.

D. Fidler, of the MOUNTAIN ASH M.A.C., got down to record breaking during R.T.P. meetings held at the club-room, setting up times of 1 : 31 R.O.G. and 1 : 12 H.L. Two classes are held for R.T.P. work—specially built models and outdoor types, even an "Air Cadet" doing its stuff round the pylon! Fidler won the special class with an average time of 1 : 21, while G. Lineham carried off the outdoor class with an average of 38 secs. Shows the difference between adaption and a model built for the job, doesn't it.?

And this is your old pal closing down for another month. Cheerio everyone.

The CLUBMAN.

Messrs. Fletcher, Robson and Jackson prepare the former's 'Korda' for a days flying. This model enjoys immense popularity with clubmen.

New Clubs.

GOLDEN WINGS M.F.C.
R. A. Kimber, 60, Crown Hills Avenue, Leicester.
PENN M.A.C.
I. E. Hough, 35, Wells Road, Penn, Wolverhampton.
THEYDON BOIS M.A.C.
N. Watson, "Grey Fell," Morgan Crescent, Theydon Bois, Epping.
DE HAVILLAND M.A.C.
J. Treeming, The De Havilland Sports Club, Stag Lane, Edgware, Middlesex.
DOWNHAM AERO-MODELLERS CLUB.
Mr. Martin, 70, London Road, Downham Market, Norfolk.

Secretarial Changes.

HORNCHURCH M.A.C.
P. Jenson, 616, Upper Brentwood Road, Gidea Park, Essex.
GUILDFORD & D. M.A.C.
J. Gilbert, 66, Denzil Road, Guildford.
DERBY M.A.C.
H. Clamp, 18, Mortimer Street, Derby.
BRIGHTON DISTRICT M.A.C.
P. G. Browne, 31, Sussex Square, Brighton, 7.

SOCIETY OF MODEL AERONAUTICAL ENGINEERS

The Minutes of the Council Meeting of October 5th, held at The Royal Aero Club, Piccadilly.

Present: Messrs. A. F. Houlberg, A. G. Bell, L. J. Hawkins, J. C. Smith, C. A. Rippon, Flight/Lt. Gutteridge, H. W. Hills, and H. P. Costenbarder.

In the chair: Mr. A. F. Houlberg.

The meeting opened with the Chairman calling upon the Hon. Sec. to read the minutes of the last Council Meeting, held on July 13th. The resolution for "adoption as read" was moved by Mr. J. C. Smith, and seconded by Flight/Lt. P. R. S. Gutteridge. This was carried. One item arising from the minutes, namely, the Records Chart, would be discussed later in the agenda.

Correspondence.

The Secretary, acting on the instructions of the Delegate Meeting of September 7th, had been in communication with The Royal Aero Club on the continuance or otherwise of the Federation Aeronautique Internationale Licences. The reply had been favourable. Commander H. W. Perrin, C.B.E., on behalf of the Royal Aero Club, could see no reason why the Competitors' Licences issued by the Society under arrangement with the R.A.C., should not be renewed. The Council expressed the view that all serious competition flyers should now renew their F.A.I. licences.

The finished drawing of the Certificate of Record was placed before the Council for their consideration before going to the printers. The Council agreed that no alterations were necessary. The Secretary would order two hundred of these certificates, and would also make arrangements for a drawing of a diploma that would in due course be awarded all prize winners.

The Council was pleased to grant the British Record for O.I.P.I. Models to Mr. William J. S. Murrey, of the Fife M.A.C., for a hand-launched flight of 3 min. 1/5 sec.

Re-affiliations.

The following clubs were re-affiliated: Halstead M.F.C., Fife M.A.C., General Aircraft M.A.C., Hayes and District M.A.C., Torquay and District M.A.C., and Salisbury and District M.E.S.

A Council Member's Resignation.

The Secretary read a letter which he had received from Mr. H. York resigning his Press Secretaryship, as he expects to be called to the R.A.F. in a very short time. The Society will remember with gratitude the fine and steady service given at all times generously by this gentleman, and the Chairman expressed the feeling of the Council when he suggested that a letter be sent to Mr. York expressing our regret that he has to relinquish his duties, and wish him every success in his new career with the R.A.F.

The consequent discussion *re* a nominee for the office of Press Secretary brought forward the following resolution, moved by Mr. J. C. Smith, and seconded by Mr. C. A. Rippon, "That the matter be left until the next Council meeting, and meanwhile Mr. H. York be requested to advise the Secretary of the commitments of his office under present conditions." This was carried. The Secretary was invited by the Council to carry on the Press Secretary's duties until the office is again occupied. This he agreed to do.

Classification of Models.

The Technical Secretary gave his final suggestions for the standards to be followed. His article giving the reasons for the adoption of the Records Chart by the Society would be published in the Journal, and would, no doubt, create much healthy discussion among clubs who will vote on the acceptance either in its present, or amended, form at the Annual General Meeting. Warm admiration was expressed for Mr. A. F. Houlberg's work in compiling this chart.

Scale Models.

The Council then went into the suggestion made by Mr. W. T. Chandler, the Secretary of the Chingford Club, at the last Delegate Meeting, that a revision of rules covering scale models was necessary. The discussion which followed showed that the time was not opportune for any alteration to the existing rules.

A hearty vote of thanks to the chair, moved by Mr. L. J. Hawkins, and seconded by Mr. C. A. Rippon, brought the meeting to a close at 1 p.m.

The Minutes of the Council Meeting of November 2nd, held at The Royal Aero Club, Piccadilly.

Present :—Messrs. A. F. Houlberg, A. G. Bell, J. C. Smith, C. A. Rippon, H. W. Hills, H. P. Costenbarder, M. R. Knight, and F. H. Briggs.

In the Chair :—Mr. A. F. Houlberg.

The meeting opened with the Chairman calling upon the Hon. Sec. to read the minutes of the last Council Meeting, held on October 5th. The resolution for "The adoption as read" was moved by Mr. C. A. Rippon, and seconded by Mr. H. P. Costenbarder. This was carried.

Correspondence.

The invoice from the printer for Membership Cards was placed before the Council, who decided that the cost to clubs shall be one penny each. Those clubs who had difficulty in obtaining club cards from their local printers should take advantage of the Society's stock. Should any club want their title added to the cover, the overprinting would cost three shillings for fifty, and three shillings and ninepence for one hundred ; this is, of course, in addition to the price of one penny each. Clubs should place their orders with the Hon. Secretary of the Society.

Requests had been received for Indoor Flying at the Royal Albert Hall during the coming winter months, and the Competition Sec., Mr. J. C. Smith, was invited to arrange some dates if this is possible, Saturday afternoons being favoured. The Council, having in mind the growing popularity of R.T.P. flying, would also include this style with Microfilm flying.

Affiliations.

The Council was pleased to grant affiliation to the following three clubs :—Taunton & Dist. M.A.C., Streatham Aero-modellers, and Plymouth Aero-modellers.

R.T.P.

Minor alterations to some of the rules governing the R.T.P. Competition were agreed to by the Council. The Competition Sec. would re-draft these rules which would be available at the next meeting. The competition would follow the same lines as that of last year.

Record.

The Council granted the British Record (hand-launched) for Gliders, to Mr. A. L. Piggott, of Blackheath M.F.C., for a flight of 3 min. 59·75 sec. made on October 19th.

Delegate Meeting.

The Hon. Sec. would try to arrange the next Delegate Meeting to take place at The Royal Aero Club on the first Sunday in December.

A hearty vote of thanks to the Chair was proposed by A. G. Bell, and seconded by Mr. C. A. Rippon. Carried unanimously.

The meeting ended at 12.45 p.m.

BUSINESS AND EDITORIAL ANNOUNCEMENTS

MODEL AIRCRAFT TRADE ASSOCIATION

The AERO - MODELLER is recognised as the official journal of the Model Aircraft Trade Association, and the policy of the journal is to support the M.A.T.A. in every possible way.

ADVERTISEMENTS.—All instructions, matter and blocks for all kinds of advertisements must reach **Allen House, Newarke Street, Leicester,** not later than the 3rd of the month, otherwise we cannot guarantee to provide proofs in time for checking. Passed proofs should be sent direct to our printers, **Alabaster, Passmore & Sons., Ltd., 64, Cannon Street, London, E.C.4,** to arrive not later than the 6th of the month. We reserve the right to hold over until the following issue, if necessary, advertisements or passed proofs thereof received at our printers later than the 6th of the month.

Copy must be supplied without application from the publishers, and current copy and blocks will be repeated if new copy is not received at the time of closing for Press. Advertisement copy is subject to the approval of the publishers. All advertisements and contracts are accepted and made upon the express condition that the publishers have the absolute right to refuse to insert copy to which they may object for legal, public, or trade reasons, which includes the right of rejection of advertisements, whole or part, containing cut prices of goods coming under any price maintenance scheme as approved by the Model Aircraft Trade Association, and such refusal shall not be good ground for advertisers to stop a current contract or to refuse to pay for the same, or for taking action for breach of contract.

REMITTANCES.—Postal orders, cheques, etc., should be made payable to Model Aeronautical Press, Ltd., and remittances from abroad should be made by international money order in sterling.

TERMS.—Monthly accounts strictly net.

EDITORIAL.—All communications should be addressed to the Editor, THE AERO-MODELLER, Allen House, Newarke Street, Leicester, and contributions must be accompanied by a stamped addressed envelope for their return in the event of being unsuitable. Whilst every care will be taken of MSS. submitted for consideration, the Editor does not hold himself responsible for safe keeping or safe return of anything submitted for his consideration.

ARTICLES should (preferably) be typed or written on one side of the paper only, and should normally not exceed 1,200-1,400 words.

DRAWINGS should be in Indian ink on white card or linen tracing cloth. Actual size is not important, but the length/width ratio should be 10 × 7½ (for full-page reproduction) and 5 × 7½ (for half-page reproduction).

PHOTOGRAPHS must have sender's name and address and full description written on the back.

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