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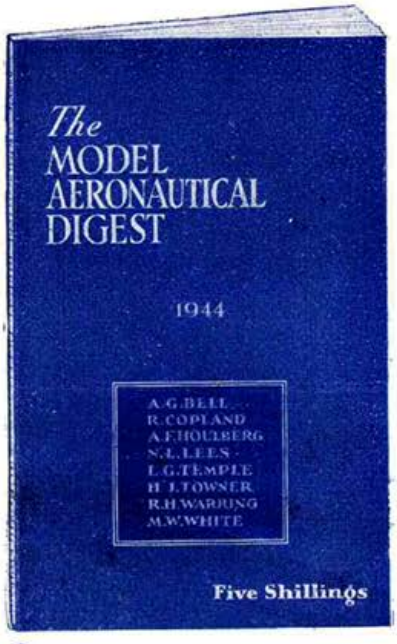

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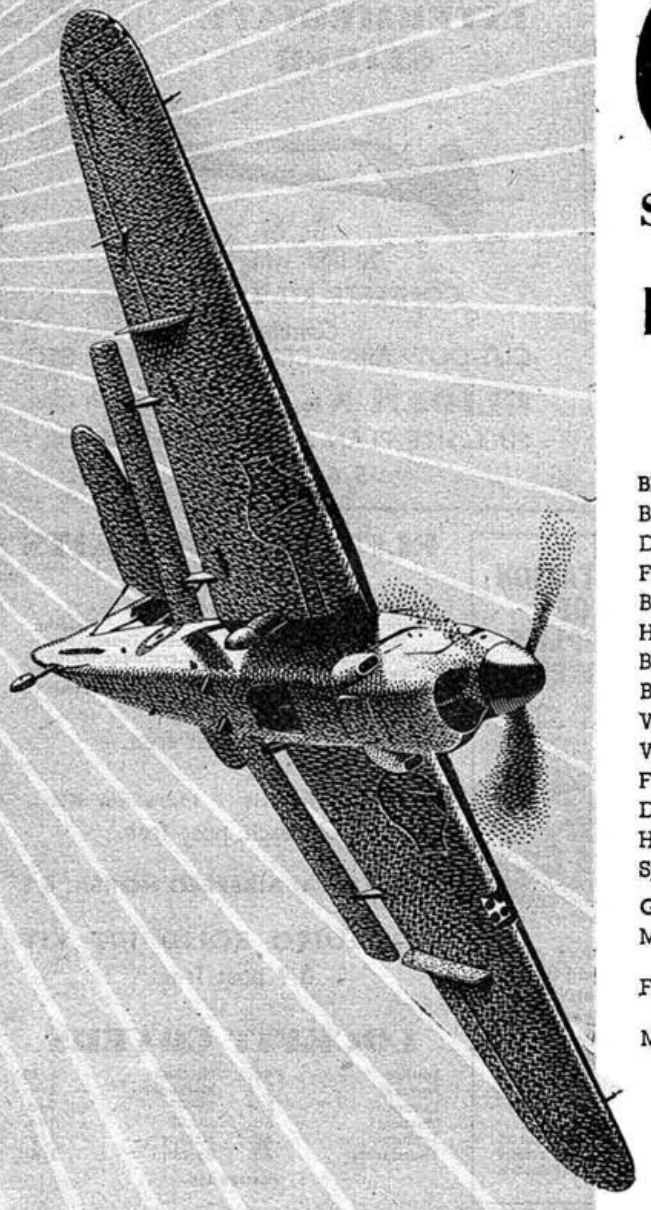

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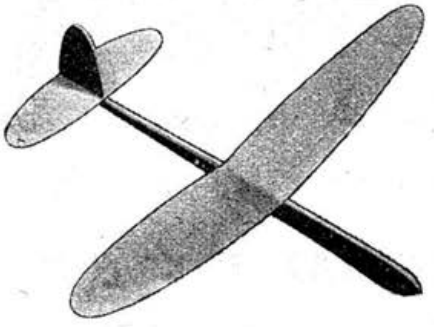

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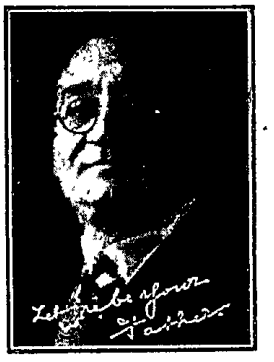

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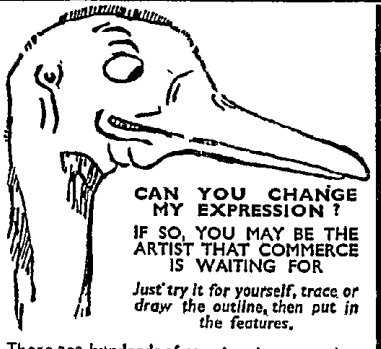

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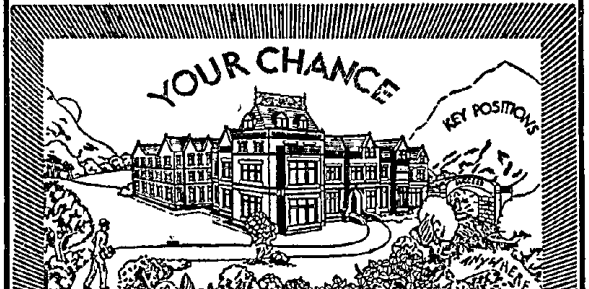

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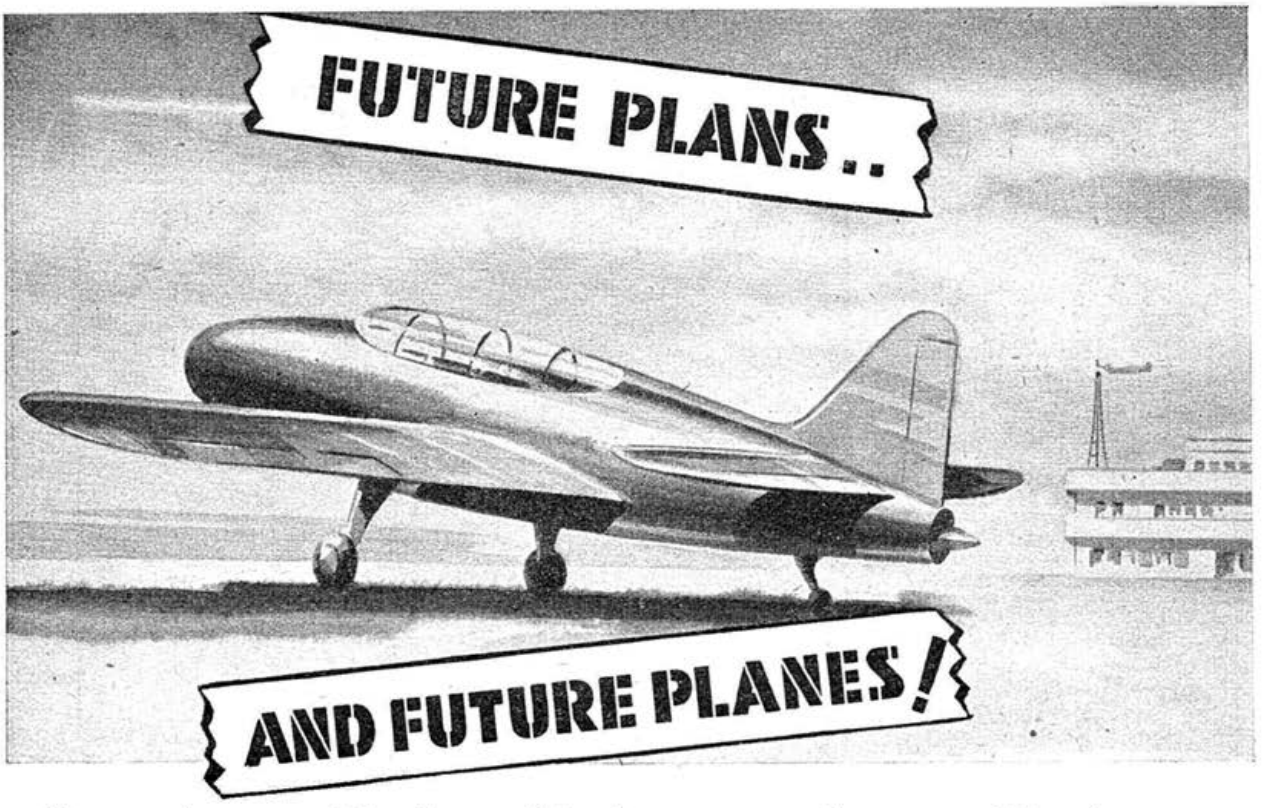

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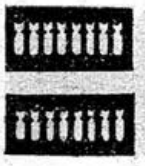

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The Model Aeronautical Journal of the British Empire

Established 1936

VOL. X No. 114 MAY 25th, 1945

PROPRIETORS: MODEL AERONAUTICAL PRESS, LIMITED

Managing Editor: D. A. RUSSELL, M.I.Mech.E.

Editor: C. S. RUSHBROOKE

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THE READER AS EDITOR

Our first word this month is on a topic that has already occasioned a considerable expenditure of ink, not to mention perspiration—the contents of the AEROMODELLER.

Last month, under the title "Kicks and Ha'pence," we referred to sundry letters of criticism (and commendation !) that we had received on this subject, and declared our intention at an early date to conduct another "Gallup Poll" of readers' views to guide us in our apportioning of space to various features. As we then dealt in some detail with various viewpoints, we do not propose to cover the same ground now, but one letter has since been received, from which it is well worth while quoting.

The writer, Mr. M. Garrett, of Henleaze, Bristol, begins with a reference to the distrust of theory so evident in certain quarters, and makes the very excellent point that probably much of this is due to the fact that certain basic data used in model design are faulty. Hence, he commends enthusiastically the research work being undertaken by Mr. N. K. Walker and others, not from any slavish devotion to pure theory, we hasten to add, but because he is confident that their investigations will achieve a straightening-out in this somewhat tangled region of model aeronautics, thereby facilitating improved and more predictable model performances, and at the same time disposing—we hope !—of a good deal of prejudice.

Mr. Garrett goes on to examine and comment upon the contents of the AEROMODELLER. Since last September, he declares, the proportion of theoretical articles to which some "practical" enthusiasts have objected, has decreased markedly. This, by the way, in our view, rather overstates the case, for the percentage was never more than about two or three, and a marked decrease would surely have resulted in virtual elimination ! But the decrease to which he refers is interesting in view of much of the criticism put forward recently. He then analyses in some detail the contents of the January and February issues of this year—the latest available at the time—and we are glad to know, though, frankly, we are not surprised that his verdict is that on the whole these issues are a very good compromise between the conflicting desires and tastes of our vast body of readers. It would be difficult, he thinks, to effect any improvement except by the obvious—but for the moment, impracticable—expedient of increasing the number of pages.

We have now devoted a fair amount of space to the views of the considerable number of readers who have written to us, but we would again point out that they form quite a small percentage of the total number of readers. And we would say, at the risk of being regarded as simply oozing with self-satisfaction, that we are fairly confident that the majority from whom no word of praise or complaint has been received are reasonably satisfied with the AEROMODELLER in its present form. This opinion is not simply the effect of bubbling optimism on our part, but is based on the experience common to all who produce popular publications, that for every individual who is sufficiently partisan in respect of this or that to write to the editor, there is a large number that have no complaint to make. Included in this number will be many who are actually quite enthusiastic, but to whom it does not occur to put pen to paper on the subject. In short, those who do write to express a viewpoint are by no means as representative of the whole body of readers as they are sometimes apt to think.

Coming now to the poll which we have promised, the appropriate form for readers to complete, together with some guidance as to how to set to work, will appear next month. But here and now we would stress the importance of *every* reader taking part if the result is to disclose the *average* view of what an *average* issue of the AEROMODELLER should be like, and not reflect merely the viewpoint of those with strong opinions ! We would also urge as scarcely less important, that when filling in the form every voter should think without bias.

So come along, you folk who normally do not trouble to express an opinion. We want your views as well as other people's. Let us have those completed forms in thousands.

The S.M.A.E.—and Ourselves

We are glad to learn—and to publicise the fact—that considerable progress in various directions was reported at the Annual General Meeting of the Society of Model Aeronautical Engineers at the Waldorf Hotel, London. The meeting, incidentally, appears to have been well attended, with provincial representation probably stronger than ever before, and to have been well conducted, a large amount of business having been disposed of very expeditiously.

High spots in the reports of the year's work were the steady flow of clubs affiliating to the Society, bringing the total membership to a figure three times that of 1939, a contest entry exceeding the record figure of the previous year, better results in contests despite the

doubtful quality of much wartime rubber strip, the securing of a partial lifting of the ban on the flying of petrol models, with the consequent holding of the first petrol model contest of the war, further decentralisation through the holding of certain delegate meetings in the provinces and the inauguration of Regional Committees, the holding of two exhibitions in London—though, frankly, we greatly regret the Society's decision not to co-operate in the tremendously popular exhibition which the AEROMODELLER staged at Dorland Hall—the negotiating of third party insurance cover for members, and the enlargement of the Society's journal.

For the first time the election of officers had been conducted by means of a postal ballot, and the results announced at the meeting showed a very satisfactory degree of provincial representation. An interesting contest programme for 1945 was adopted, including four contests for petrol models (one a control line event), and contests for seaplanes, flying boats, biplanes, scale models, as well as gliders and rubber-driven jobs of the Wakefield, "Flight" Cup, and "as you please" types.

Rather less satisfactory was the financial position. A balance of £93 was mentioned, but it was admitted that against this had to be set two heavy accounts outstanding at the time the books were made up. There was a disposition on the part of some members to argue that the rather small financial margin resulting was sufficient for a non-profitmaking body. Others, however, contending that present and projected activities, not to mention any unforeseen contingencies, necessitated stronger reserves, induced the meeting to request from the new Council an investigation, with this object in view, into a possible increase of affiliation fees to bring them more into line with wartime money values.

We are glad to report a good year's work—partly for its own sake, but also because its publication should prove salutary in the face of the suggestion that has been made in some quarters that the AEROMODELLER is biassed against the S.M.A.E.

Further, we regard the clearing of the air in this matter as of sufficient importance to the good of the Aeromodelling Movement to justify what may be regarded by some readers as the somewhat tedious recalling of the criticisms which we voiced some time ago. Those criticisms were made because we felt them to be necessary, and there was nothing personal or biassed about them. Should the occasion arise, we would certainly criticise again, and we would add that it would be a bad day for the democratic way of life should the Press cease to be privileged to comment, favourably or otherwise, on matters of common interest. We would further add that we should not fail to criticise just as strongly any organisation other than the S.M.A.E. should we feel it to be necessary.

Our complaints against the S.M.A.E., broadly speaking, were (1) that its outlook was too restricted for a body claiming to "govern" the aeromodelling community, and (2) that its tardiness in tackling the Air Ministry with a view to the lifting of the petrol model ban was most unsatisfactory, as was the fact that when the ban was eased the Society was content for the benefit to apply only to its own members, leaving a much larger number of aeromodellers out in the cold. We gather that the Society did not feel disposed to accept responsibility for modellers over whom it had no control, but this, unfortunately, only serves to emphasise our complaint that there were all too many enthusiasts whom it had not succeeded in attracting to its ranks, and that it either did not realise it or was not very concerned about it.

Those who allow their dislike of criticism to blind them to the fact that we have supported them in the past and have repeatedly declared our intention still to do so, are surely the people most deserving of being described as biassed. We reassert that we ourselves are quite unbiassed where the S.M.A.E. is concerned, and while we shall not hesitate to criticise again if we feel it to be justified, we shall be at least as ready to afford space, as we have done here, in which to record achievements.

Finally, we would urge the point that aeromodelling is too worthwhile an activity for us to contemplate with any satisfaction the spectacle of one group of enthusiasts expending time and energy in "pitching in" to those of different outlook. Obviously, we cannot all think alike. Some deplore the functioning of any organised body other than the well-established S.M.A.E. Others, like ourselves, feel that an "Opposition" (in the Parliamentary sense of the word) can be an effective spur to greater effort. So, whatever our views may be, let us drop the anti-this and anti-that outlook, and set to work along the lines we feel to be the best or the most practicable, determined by our enthusiasm, effort and freedom from bias, to keep model aeronautics well and truly on the map.

Models that Tick!

From these weighty matters, let us turn for relaxation to model aviation's own particular brand of quizzery—the Mystery of the Models that Tick.

The fun began several months ago when we published a letter from a reader in Devon, one G. Saxby, telling of mysterious ticking noises emanating from two of his models. Since then we have had letters from all over the United Kingdom recounting similar experiences, with the result that we are now in possession of a considerable amount of "gen" on the subject of "tickery."

Apparently, the tick follows no set pattern. They may be heard for several seconds at a time, at half-minute intervals, for an hour or two, and then be heard no more for hours, or days, or even months. One writer, however, has had the doubtful pleasure of hearing them go on all night. Sometimes the ticks are so faint that they can be heard only by listening intently, while in another instance, the modeller's workshop sounds like a watchmaker's shop.

It would also appear that the "ticker" has his (or her) definite preferences. With one exception—a solid model of an Avro Anson—all the ticking models have been constructed of balsa and covered with Japanese tissue. As to type, the ticker seems equally at home in a flying-scale model, a glider, or a duration job, but he seems to prefer a heavy-weight. One writer, hearing the ticks proceeding from a Gloster Gladiator, promptly shook it, but apparently only succeeded in driving the culprit into a glider. Appreciating that rude remarks might be made about his state of mind, he thereupon proceeded to provide himself with a witness by getting his mother and a friend to come and listen to the ticks.

Several correspondents speak of the ticks coming from the region of the tailplane, others from the wing, while

one poor fellow, just as he thought he had traced the ticking to a particular strut, was sardonically serenaded by simultaneous ticks from five different parts of a discarded fuselage. In a number of instances, the model from which the sounds came was hanging against a wall, and was damp.

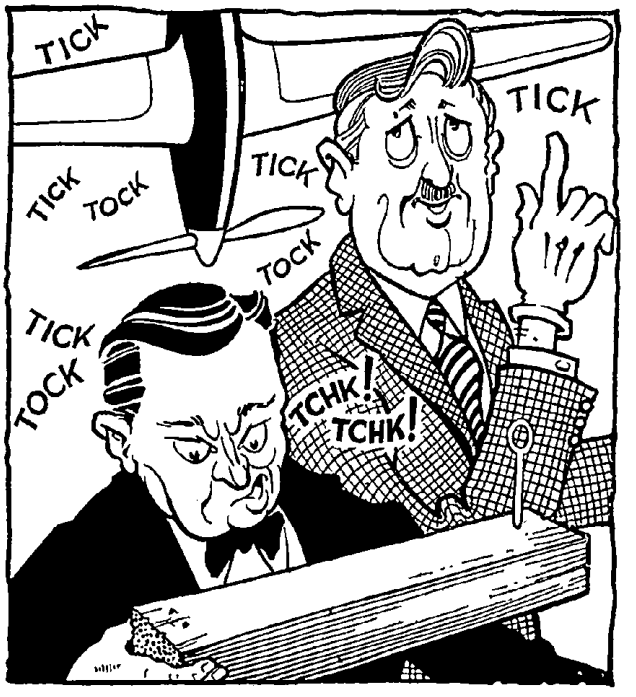
As to the possible explanation of the ticks, quite a few correspondents have been content to leave the matter in the realm of pure speculation, some suggesting that an insect is responsible, while others think a worm is at work. Yet another suggestion is that the ticking is caused by the fibres of the tissue covering shrinking and expanding with changes in temperature. By way of variation, one individual, with a bitterness obviously born of sad experience, yet with a pleasingly poetic touch, opines that the noise might be " the sighing of different parts of the model warping through damp."

Other more forthright natures have felt that the matter was one for *ad hoc* research, one such recalling that in the mating season the male spider is said to tick to attract a specimen of the more deadly sex—but he found no spider in his model. There were also those who, with ear cocked intently and razor blade poised expectantly, did not hesitate to carve up their model in the interests of pure science. But did they succeed in isolating the elusive ticker? The reader must judge for himself.

One of this noble band is Mr. J. Richards, of Countesthorpe, Leicester, who writes: " On removing a square of tissue from the fuselage, I placed my eye to the peephole, and lo, the mystery was solved! In the nose sat a particularly red-nosed gremlin! Putting the freewheel catch in the off position, he commenced slowly to turn the motor-shaft. Over the hook he placed a piece of piano wire, and when the hook turned, the wire fell on it at every revolution, thus causing a ticking sound. He kept up this game for several seconds, then scuttled to the rear end of the fuselage, crouching there and shaking with suppressed laughter. An interval, and back he crept to continue the trick."

Mr. D. R. Hughes, of West Kirby, Cheshire, writes that he has seen several small insects, about half the size of one of the commas in this article, crawling about on blocks of balsa, and suggests that the ticks, if the half-commas are responsible for them, are a means of communication. He adds, " One can start them off by making clicking noises with the tongue." Tchk! Tchk!

An even more illuminating contribution has come from that doyen of scale modellers and experimenters, Mr. H. J. Towner, of Eastbourne, who writes that he has found insects about one-sixty-fourth of an inch in length and of a whitish colour like balsa, which may cause the ticking by gnawing the wood, the sound being amplified by the tissue covering. " But," he adds,



" after two or three years of ticking, off and on, on a particular model, I have never found any wood dust such as one gets with 'worm,' or found the structure impaired." He is inclined, therefore, to believe that the ticking is the insect calling his mate, as a grasshopper does, and adds that this theory is almost proved by the fact that a " silent " model placed near a " talkie " will presently commence to tick!

There, for the moment, we must leave this par-tick-ular matter. Meanwhile, one of the newly-formed research groups may care to take up the hunt for the ticker.

Back Numbers

The happy-go-lucky days when back numbers of the AEROMODELLER were easily obtainable are now a long way behind us, and each issue is sold out almost as soon as it appears.

It so happens, however, that a small quantity of certain numbers has become available. These include the issues from June, 1944, to December, 1944 (October excluded). They can be obtained at two shillings per copy, post free, from our Leicester office, and envelopes should be marked " Back Number Department."

CONTENTS OF THIS ISSUE

AEROMODELLING IN PALESTINE

BY F. PINCZOWER

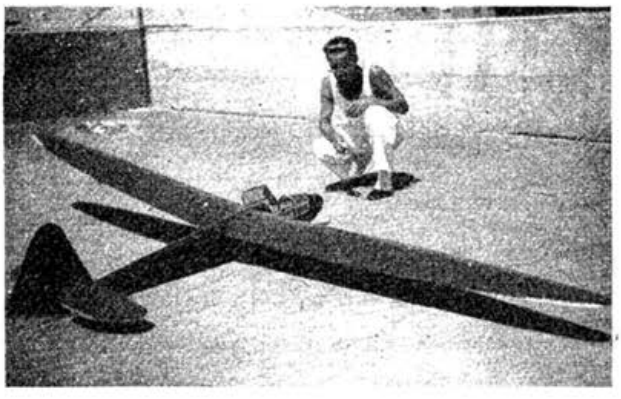
This, the second of our glimpses of Aeromodelling in various parts of the world, is a story of amazing progress in a very short space of time. It fully demonstrates the spectacular growth of the Movement in Palestine in spite of handicaps such as lack of instructors and materials.

YOUNGEST of all sports in Palestine is the model flying movement, which is organised by the "Club Ha-Erez Israeli le-Teufah" (Aero Club of Palestine). The club began its work in 1935, having been founded two years previously, with these objects: developing aviation in Palestine as a sport and as a profession; training pilots and specialists in all branches of aviation by theoretical and practical work on aeroplanes and gliders; model building and the study of any subject allied to aviation; and in March, 1936, the first gliding camp was opened at Givat Brenner.

Since then the club has been hard at work to achieve its goal. A flying school was opened by the "Aviron" Co., Tel Aviv, at different places throughout the country. Yearly gliding camps are held at Givat Ha-moreh in the valley of Jezreel, and local gliding sites are in use on many occasions. Five years ago, in March, 1940, the first soaring competition took place on Mount Carmel. At this competition fine records were achieved for a country so new to aviation. The duration record was brought up from 5 hours 16 mins. to 9 hours 10 mins.; the longest distance covered was 38 km., and the maximum height recorded 1,800 m. A target flight from Haifa to Naharia was successfully executed.

From this time onwards flying activities, especially soaring, decreased for reasons of security, but action in the club has by no means ceased—more time being devoted to the aim of making the Palestinian youth and public air-minded. Work is therefore concentrated on model building and theoretical study.

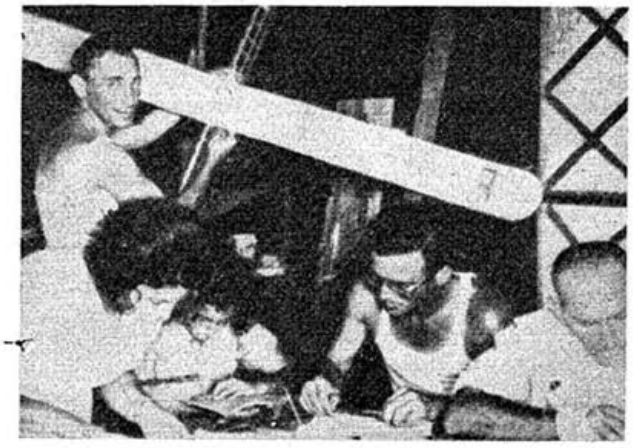
On the theoretical side members are given regular courses in various subjects, commencing with elementary aerodynamics for beginners (as necessary for the "A" gliding certificate). Later on they usually take a course on meteorology with especial regard to aviation. The older and more advanced members are taught higher ærodynamics for the "B" and "C" gliding and soaring certificates, having in the meantime usually spent some time in a gliding camp. From time to time lectures are given by constructors or engineers, etc., on various other subjects allied to or concerning aviation.



Concentrated work on model building commenced only two years ago with the formation of some groups of younger boys in the three main cities, Tel Aviv, Jerusalem, Haifa, and later in the settlements at four further places. The instructors and advisors were mostly experienced model builders, headed by Dr. M. Sultan and Emil Pohorille. Dr. Sultan, internationally known glider and model builder, has been connected with the model world since 1914, when the development of continental model building first began. He gained first place in the International Flying Exhibition, Leipzig 1914, with his model the "Sultan Eindecker." In the period 1929–33, he spent much time and work on the construction and development of a new type of glider, the "Segelschwingenflugzeug." It was after the collapse of the German Jews through the Hitler regime that he went to Palestine. Emil Pohorille is a German Jew, and the designer of the well known record-breaking glider "Wien," with which Robert Kronfeld established many records.

Models are usually built from German plans, commencing with the "Winkler Junior," of plywood-spruce construction, and from them passing on to other gliders, especially those featuring a different method of construction, such as the "Pimpf." During the last few years some good models were designed by local members of the club alone, one of which has already been adopted throughout the country as a good advanced type. This is the "To-Si 4," which is of plywood-spruce construction, span 1·5 metres. It probably holds the unofficial Palestine duration record, having been lost from sight after more than three minutes' flight when launched on the Carmel Mountains. Models for beginners include the "Pirol" and the "Shippel 7" of Palestinian design, while more advanced types are the "Winkler Senior," "Baby," "Strolch," "Gentsch," "Hast," "K.S. 30," and others as yet unnamed, designed by members of the club.

During these years English and American designs and plans have been received, but it has proved impossible to build them, as all were designed for balsa, wood which at present is virtually unknown in Palestine, and will not be available until after the war. The method of construction in this country differs fundamentally



The heading photo shows modellers at work in the club room. Note the banner on the wall bearing a biblical quotation from Isaiah. Top left shows an Instructors' course in progress at the Aero Club, the model being a "Hast" glider. The other three photos show Dr. Sultan with his 12½ ft. span sailplane "Maha II", which weighs 4 kgs. The photo at top right shows Dr. Sultan about to hand launch the model. The flying ground appears to be ideal.

therefore from that used in Britain and America, an additional factor being that most of the plans and instructions originated from Germany. The construction is based upon that of full-size machines, using plywood (special aviation type, *i.e.* 3-ply = 1 mm.) for all sheet work, and spruce for everything else, with slow-drying cold casein glue for all joints. This means that even the smallest glue junction must be held firmly in a vice for at least four hours to obtain proper drying. Thus many small glueings of this type on one model are hardly worth the time or labour, which cuts out such things as built-up ribs. Then, too, there is the difference that most of the glue used in other countries is of the type sold in tubes which dries in the course of a few minutes. For these reasons, even the largest models use ribs cut straight from plywood and connected by the simplest of spars, *i.e.*, one straight longitudinal member. All of the models named above are constructed in this manner with the exception of the "Strolch," which has two parallel spars, not interconnected. The "K.S. 30," a tailless type, has two spars one above the other, these being connected by slanting strips of plywood. It is only very lately that built-up spars have come into use.

The same thing applies to fuselages. The stereotyped construction being four, or very few more, longerons connected by ply ribs. A different method is being tried out now, working from a Russian design, in which part godetic and part monocoque construction is used.

Nearly all the models are covered with parchment paper, no silk being obtainable. Some of the larger models have leading edges and fuselage noses covered with thin cardboard, in the same way that full-size machines are planked with plywood. The parchment paper is stretched taut by damping it. Varnish is rarely used on wood, the air being sufficiently dry in summer. Before the war silk covering was used, tautened with air-craft dope.

From building models, club members pass on to the repair of full-size gliders in anticipation of the yearly camps. Later they begin the actual construction of gliders. There are also people other than members of the club who work at modelling as a hobby. Some of these have shown quite remarkable work. Mr. John Kamar, a former member of the Y.M.C.A., Jerusalem, has constructed a miniature power unit (flying motor) about 3 ins. high, yielding one-seventh h.p. and up to 13,000 r.p.m., and Dr. Sultan has made a new glider, MAHA II, span 3·80 m., length 1·55, covering cotton fabric, weight 4 kg. Although constructed solely of pine and beech, this model has clocked 3 mins. (*cont. overleaf*)

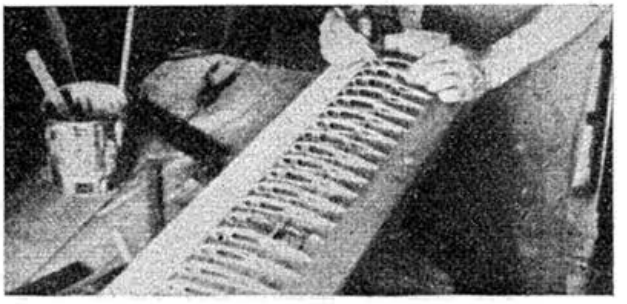
In the middle of the last school year a group of older members from the Tel Aviv and Haifa clubs began giving instruction in model building to groups of third and fourth form boys from local elementary schools. With the help of the handicraft teachers of these schools, courses were given twice weekly. The model chosen for the beginners was the "Winkler Junior," which was thought to approximate the standard of work expected. At the end of the year more than 50 per cent. of the participants had finished the model.

For the coming year there is a possibility that a more advanced model will be tried on beginners, jumping the present "beginner" stage altogether. Then, too, there will be a necessity for theoretical lectures—probably elementary aerodynamics, and these will be adjusted to the age and understanding of boys 12–15 years of age.

The Aero Club is not only interested in the airmindedness of just a few young people, but in the airmindedness of the general public as well. Therefore, except in its purely technical and professional activities, it extends its interest to the public also. Associated is a large group of contributing members, whose monthly and annual contributions form a financial basis for its activities.

At the beginning of this year the Department of Civil Aviation of the Government of Palestine invited the club, the R.A.F., B.O.A.C., and other lines, to a flying exhibition held in the Y.M.C.A. building in Jerusalem. The club, together with "Aviron" Co. (the Palestine Aviation Enterprise, Ltd.) occupied a large part of the whole exhibition. The exhibits shown included one local built preliminary glider of the type "Vrona Bis"; parts of one of the gliders designed locally, "Poho 35"; many models and parts of such, showing methods of construction; aerial photographs, graphs and statistics of the club's activities, and physical instruments related to aviation. The achievements of the club were highly praised by many of the high government and military officials visiting the exhibition. The *Palestine Post*, dated 29th March, 1944, wrote of this exhibition:

"One of the high lights of the exhibition, especially for airminded youngsters, will be the Vrona Glider exhibited by the Aero Club of Palestine and the beautiful model planes and gliders built by Dr. M. Sultan, Tel Aviv, and by members of the Jerusalem, Tel Aviv and Haifa branches of the club. It is easy to predict an immense success for this first Palestine aeronautical exhibition, which should be shown in other towns as well."

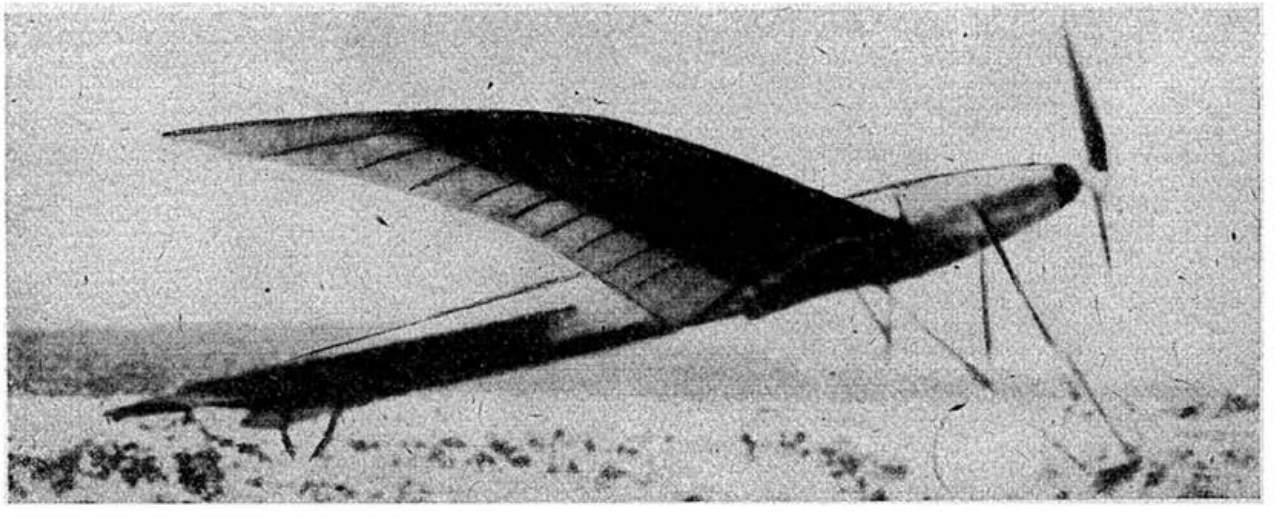


During the year the club held special courses for teachers at three places throughout the country, to foster and spread the growing interest in aviation, especially in the more out-of-the-way schools of rural districts and communal settlements. Some of the latter had already given help in the building up of aviation, as had the settlements around Affikim, who donated a flying field for their local schools. One of the larger sailplanes of the club was assembled and dismantled at three different places in the suburbs of Tel Aviv and shown with full explanation to factory workers and school children. This demonstration was usually accompanied by a small exhibition of models and pictures.

Palestine at the moment possesses 455 members. Fourteen instructors are working for the club in different parts of the country. Over 100 club members have joined the Army, the R.A.F., Navy and other fighting forces. For the youth of Palestine special aviation literature is published in Hebrew by the Aero Club. As yet four books have been published as follows: "Theory of Flight," "Constructional Plans," "Theory for the Aeromodeller," "Dictionary of Aeronautical Terms."

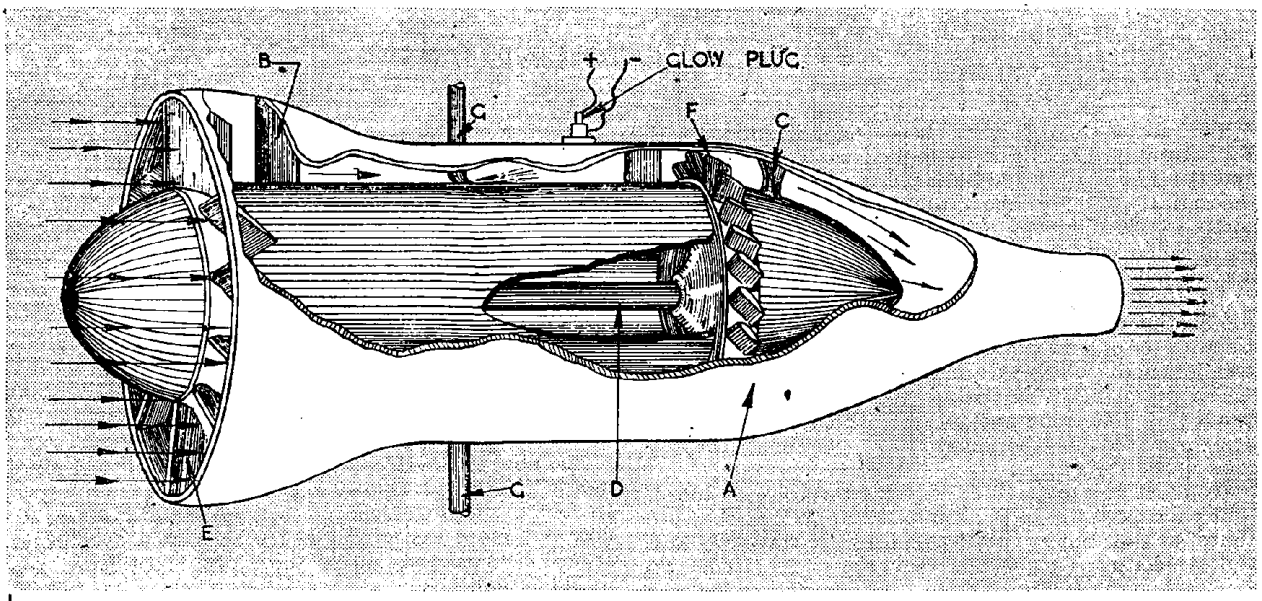
In the model building workshops are various banners with quotations from the Bible (see heading photo), and last but not the least, the Palestinian equivalent of a famous British aviation phrase, "z'lach 'ufrach!"—"Happy Landings!"

The photo above illustrates the wings of the "Hast" under construction. Below is Dr. Sultan's prize winning model the "Sultan Eindecker" exhibited at the International Flying Exhibition, Leipzig, in 1914. Note that except for the absence of a fin, the layout is very similar to that of the modern duration model.



JET PROPULSION—and its possible application to Model Aircraft. Pt. III

By G·W·W·HARRIS



In Part IV of these articles the author will attempt to review some of the main difficulties that beset those experimenters who hope to be the first to achieve a successful flight with a model jet plane. As there is no data yet available on very small high-speed air compressors and gas turbines, we must content ourselves with whatever knowledge we can glean regarding these units. For this reason the author intends to study—mainly on the practical side—full-size blowers and gas turbines. The results of these studies will also be discussed in Part IV of this series.

FOLLOWING my recent articles on Jet Propulsion, a number of readers have written to the Editor and myself offering ideas and suggestions, and in some cases asking for advice. It is not possible for me to answer all of the letters individually but I hope to cover most of the points of interest contained in them in these columns. Thus we will avoid duplication of our researches, saving time and bringing us more rapidly towards our goal—a practical miniature thermal jet-propelled aircraft.

Perusal of the correspondence received to date reveals that some confusion exists in the minds of many as to what is meant by Jet Propulsion. Many letters, for instance, contain reference to rockets and other irrelevant matter. This brings us to the old question "What is jet propulsion and why does it differ from rocket propulsion"? Before you go on to read R. H. Eaton-Williams' article that follows this, let us start from the beginning. Study the sketch above, A is a metal tube with a tapered extention, both ends are open. B and C are streamlined section supports for carrying the bearings of the shaft D. On the shaft D is mounted an air compressor E and a turbine F. G is a fuel supply pipe and jet. The air compressor and turbine are *fixed* to the shaft so that they will revolve with the shaft. Now assume that the shaft is engaged by an electric starter motor, spinning it at high speed, air will be drawn into the tube. A, by the action of the compressor, as this moving stream of air travels through the tube liquid fuel is mixed with it, the fuel is sprayed into the airstream from the jet G, the gas thus formed is ignited by some suitable means such as a glow plug. When once the ignition has taken place the combustion of the gases will be continuous until the fuel supply is checked. The gases which result from this combustion are extremely hot and expand with extreme rapidity and so taking the least line of resistance rush out towards the outlet or nozzle, passing through the blades of the turbine wheel on the way.

Now I think that even the youngest of our readers will appreciate that if we have a wheel mounted freely on a spindle and that around the periphery of the wheel we arranged a number of small blades and that each blade is set at an angle (just like the blades of an airscrew), we have only to hold the wheel or turbine in a stream of swift flowing gas and it will spin. Not only will it spin, but generate power, so, now the J.P. unit is running itself and we can disengage the electric starter motor and switch off the glow plug.

The force of the gases leaving the nozzle reacts on the unit, thus if the unit is fitted to an aeroplane the aeroplane will be pushed forward until it becomes airborne. The thrust of the unit will increase as the 'plane gathers momentum because of the increasing quantity of air passing into combustion space; this additional air entering the air-intakes creates what is known as "ram effect"—a term which explains itself. As the jet-propelled machine climbs, the unit's efficiency is further improved because of the lower air temperature.

Rockets and thermal jet units are divided into two classes: in the case of the rockets *the oxygen necessary for combustion is contained in the chemical fuel used.* A thermal jet unit *absorbs the oxygen from the surrounding air.* It is for this reason that a jet-propelled 'plane cannot climb indefinitely.

We would remind all readers who intend submitting articles on jet propulsion, that these articles are all submitted for censorship before being considered for publication. [*Ed.*].

THE THEORY OF MODEL REACTION PROPULSION

BY R · H · EATON-WILLIAMS

FOR some time I have been experimenting with Reaction Propulsion as applied to Model Aircraft, and the results obtained have led me to investigate the theoretical side of the problem. I have therefore compiled the following information, trusting that it will be of some use to others interested in this branch of aeromodelling.

All aircraft reaction motors consist essentially of combustion chamber into which is forced a fuel and a supporter of combustion (petrol and air in the case of a true jet engine which we are about to consider).

The petrol burns in the air, thereby producing gases at a high temperature and pressure which exit through a hole provided in the combustion chamber, thereby causing the thrust.

We must first understand why the thrust is produced. When the gases are in the combustion chamber they are almost at rest, but as they leave, they are travelling at a high velocity. This means they are accelerated. To accelerate a mass, a force must act on it, and in the case of our gases this force can only be caused by the combustion chamber itself. By Newton's laws action and reaction are equal and opposite and therefore an equal and opposite force (called the thrust) will act on the combustion chamber. Consider a combustion chamber from which a mass (m) of gas is ejected in t seconds at a velocity of v feet per second. As each particle of gas passes through the chamber it is accelerated from negligible speed to a velocity v. A mass (m) is accelerated to a velocity v in t seconds.

(As (m) flows in t seconds)

Put $v=\frac{x}{t}$

Then (m) is accelerated to velocity $\frac{x}{t}$ in t seconds

or its acceleration $=\frac{x}{t^2}$

Force = mass × acceleration.

The force required to produce this acceleration is therefore equal to

$m \times \frac{x}{t^2}$ and is in the direction of the velocity v.

It was shown above that this force is equal and opposite to the thrust. The thrust therefore acts in the opposite direction to this force, that is, in the opposite direction to that in which the gas is ejected.

$m \times \frac{x}{t}$ may be written $\frac{m}{t} \times \frac{x}{t}$

$\frac{x}{t}$ we made equal to the velocity, therefore

Thrust = mass ejected per second $\left(\frac{m}{t}\right)$ × velocity at which it is ejected $\left(\frac{x}{t}\right)$

If thrust is in pounds, then mass per second is in slugs per second and velocity in feet per second.

$$\text{Horse power} = \frac{\text{Energy per second}}{550}$$

$$= \frac{\text{Force} \times \text{Velocity}}{550}$$

$$= \frac{\text{Mass per second} \times \text{Velocity}^2}{550}$$

$$= \frac{m v^2}{550}$$

The above shows that the common idea of a reaction motor "pushing" against the air behind it is erroneous. In fact if there were no air behind it the gases would flow out more easily and hence at a greater velocity. It will be seen that under these conditions the thrust would actually be greater.

A certain amount of energy is required to force the air and petrol into the combustion chamber. The energy to inject the petrol is small, but that required to inject the air is considerable and this is usually supplied in a jet engine from the exit gases by means of a gas turbine and an air compressor. It is evident that the air must be injected at a higher pressure than that of the gases in the combustion chamber or no air will enter.

The velocity at which a gas flows through an orifice increases with the pressure difference across the orifice. The exact formula for this velocity is very complicated, involving the principal specific heats of the gas.

An approximate formula for fairly low pressure is :—

$$V = 350 \sqrt{P}$$

where V = velocity in ft./sec. P = difference in pressure in lbs. per sq. inch.

It is doubtful if large pressures could be obtained with a model rotary compressor, so this formula may be used. The changes in velocity due to temperature are not very large and will be neglected.

If p_1 = pressure of injected air (lbs. sq. in. absolute)

p_2 = pressure of gases in combustion chamber (lbs. sq. in. absolute)

V_1 = velocity (ft./sec.) of air as it enters chamber

V_2 = velocity (ft./sec.) of gases leaving combustion chamber

Atmospheric pressure = 14·7 lbs. sq. in.

then $V_1 = 350\sqrt{p_1 - p_2}$ (1)

and $V_2 = 350\sqrt{p_2 - 14{\cdot}7}$ (2)

The petrol forms only 2 per cent. of the correct mixture of petrol and air, so its weight compared with the air will be neglected. By the conservation of mass, the mass entering the combustion chamber = mass leaving it = m slugs per second.

$$\text{Horse power} = \frac{\text{Mass} \times \text{Velocity}^2}{550}$$

$$\text{Horse power required to inject air} = \frac{m V_1^2}{550} \quad (3)$$

$$\text{Horse power of exit gases} = \frac{m V_2^2}{550} \quad (4)$$

The H.P. required to inject the air multiplied by a suitable factor to allow for the efficiency for the turbine and compressor must be subtracted from the H.P. of the exit gases to give the H.P. available for the propulsion of the aircraft.

$$\text{Nett available H.P.} = m \left\{ V_2^2 - \frac{1}{E} V_1^2 \right\} \quad (5)$$

Where E = The efficiency of turbine and compressor (·2 to ·4).

From the general gas equation.

Pressure × volume = Mass × gas constant × temperature.

Also volume = Velocity × area.

Now if T_1 = Temperature of air entering combustion chamber.

T_2 = Temperature of gas leaving combustion chamber (°F Absolute).

v_1 = Volume of air injected per second.

v_2 = Volume of gas expelled per second.

A_1 = Area of air inpit aperture in sq. ins.

A_2 = Area of aperture in which gases exit from combustion chamber.

R = Gas cohstant = 20800 for air.

$$\text{From gas equation } m = \frac{p_1 v_1}{R T_1} \quad (6)$$

$$\text{but } v_1 = A_1 \times 12 \times 350\sqrt{p_1 - p_2} \text{ cub. ins. per sec.} \quad (7)$$

$$\therefore m = \frac{p_1 \times 4200 A_1 \sqrt{p_1 - p_2}}{R \times T_1}$$

then (5) may be re-written

$$\text{H.P.} = \frac{45\, p_1 A_1}{T_1} \left\{ (p_2 - 14{\cdot}7) - (p_1 - p_2 \frac{1}{E}) \right\} \sqrt{p_1 - p_2} \quad (8)$$

$$\text{then } v_2 = A_2 \times 12 \times 350\sqrt{p_2 - 14{\cdot}7}$$

$$\text{Mass of air injected per second} = \frac{p_1 \times 4200 A_1 \sqrt{p_1 - p_2}}{R_1 \times T_1}$$

$$\text{Mass of gas expelled per second} = \frac{p_2 \times 4200 A_2 \sqrt{p_2 - 14{\cdot}7}}{R_2 \times T_2}$$

These are equal by conservation of mass,

The gas constant for the products of combustion is approximately equal to the gas constant for air, therefore :—

$$\frac{p_1 A_1 \sqrt{p_1 - p_1}}{T_1} = \frac{p_2 A_2 \sqrt{p_2 - 14.7}}{T_2} \quad (9)$$

then

$$\frac{p_2}{p_1} = \frac{A_1}{A_2} \frac{T_2}{T_1} \frac{\sqrt{p_1 - p_2}}{\sqrt{p_2 - 14{\cdot}7}} \quad (10)$$

This equation can be solved in particular cases if required but provides most interesting information as it stands, as will be shown in the following paragraph.

Returning to formula (8) we will see that if the engine is to work at all, the part in the bracket must be positive.

To obtain a large nett H.P. $(p_1 - p_2)$ must be made small compared with $(p_2 - 14{\cdot}7)$. This means ejecting the air over a large area. It will also be seen from formula (8) that both p_2 and p_1 should be made as large as possible.

Unfortunately p_1 must be greater than p_2 as was shown earlier, and p_1 is limited by the compressions obtainable from model rotary compressors. The conclusion therefore to be arrived at is that a large mass must be handled at a relatively low velocity for a given thrust. The power input is obviously proportional to the mass of mixture handled in unit time. In full size work higher compression and hence higher velocity may be used. This is the main reason why a model jet unit must be inefficient compared with its full size counterpart.

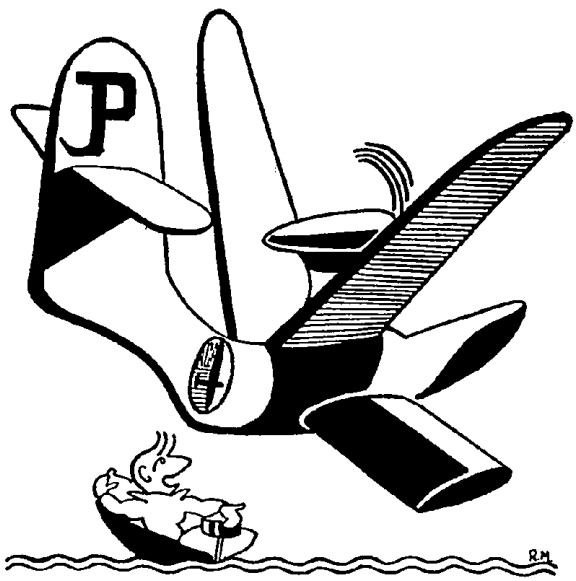
We see above that $(p_1 - p_2)$ must be made small compared with $(p_2 - 14{\cdot}7)$ for a large output. It follows $\sqrt{p_1 - p_2}$ must be made small compared with $\sqrt{p_2 - 14{\cdot}7}$ and from formula (10) to maintain this for a given value of $\frac{p_2}{p_1}$ the ratios $\frac{T_2}{T_1}$ and $\frac{A_1}{A_2}$ should be large.

The values of these ratios is limited by the fact that p_1 must be greater than p_2 and hence the ratio $\frac{p_2}{p_1}$ must be less than unity.

In designing a unit a compromise must be made between all the foregoing considerations.

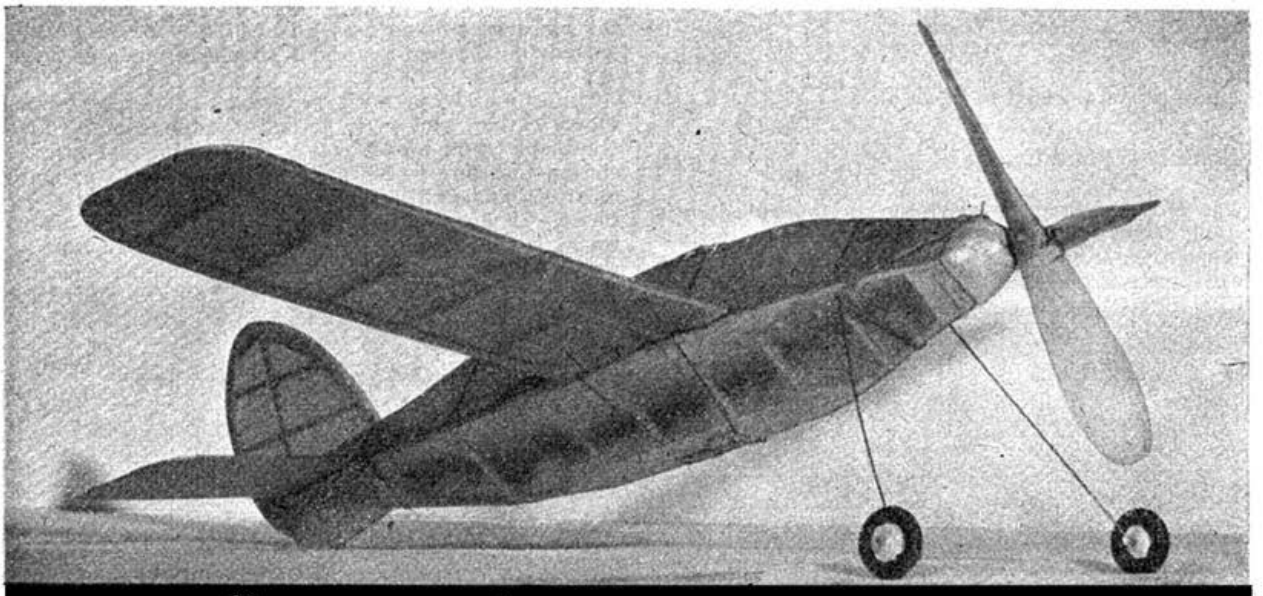
As in most design work, the design of a model re-action unit is largely a "hit and miss" process, but these calculations give us some idea of what is required and provide information which if applied to the practical side of the problem may make all the difference between a successful unit and a failure.

CARICAPLANES No. 3



THE MERMAID

DR. FORSTER'S HIGH PERFORMANCE FLYING BOAT

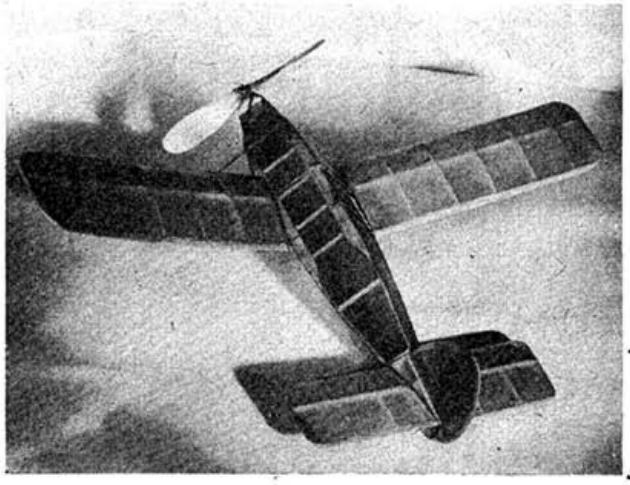


THE "MIDDY" DURATION MODEL

DESIGNED BY J · S · EVANS

THIS small model was officially tested by the AERO-MODELLER staff—which means a great deal! Even after the ministrations of this body, whose tender feelings where models are concerned have long since atrophied, the " Middy " came through all the strenuous tests with flying colours, having proved itself virtually crashproof. The model was tested on four strands of ¼ in. by 1/30 in. rubber, and on average turns clocked a regular 45 secs. The amazing thing about this model when trimmed for right-hand circular flight, is the way it consistently makes three circuits, then glides in very flatly to a point seldom more than 20 ft. from the launcher—a great boon to one's " poor old feet."

The model flies very well indeed on the four strands of rubber used, but the performance is considerably improved when powered with six. To sum up, the hallmarks of this model are simplicity, stability and consistency. We have no hesitation in recommending it to our readers as an excellent general purpose model, especially suitable for the beginner to the hobby, who wishes to build his first duration model.



This photo and the one above clearly demonstrate the sturdy appearance and compact lines of this interesting little model, which has such a remarkable good performance for its size. The springy mono-wire undercart makes the " Middy " practically crashproof.

Construction and Flying.

The fuselage is built in the same manner as an ordinary slabsider, *i.e.*, two sides are built on top of each other on the plan. Cut all cross-members first, four for each station. When the two sides have been built on the plan and the cement has set, they may be separated with a razor blade. It is best to put in the centre members first, using cardboard jigs or cardboard formers to preserve the shape; wait till the cement has set, then insert the remaining front and rear spacers, drawing each end of the fuselage together with rubber bands, using one at each station as the cross-members are inserted.

The wings are constructed in the usual manner. a tracing should be taken of the port wing so that when reversed it will form the plan of the starboard wing. The rest of the construction follows conventional practice, the only point where great care is needed is with regard to the wire wing mounts which must be let in exactly as shown on the wing rib section in order to preserve correct incidence on both wings.

For normal flying in a small field, power with four strands ¼ in. by 1/30 in. rubber, but for a really snappy climb six strands should be used. Trim for right-hand circular flight and flattest gliding angle in the usual manner, little or no downthrust should be required. If the plan is strictly adhered to no packing for incidence should be necessary; the dihedral angle may be increased if extra stability is needed on windy days, etc., by bending the wire wing mounts upwards.

'MIDDY'
DESIGNED BY
J. EVANS

POWER.
4 OR 6 STRANDS 25" LONG, 3/16" FLAT.
(WHITE METHOD TENSIONED)

CONSTRUCTION :— ALL BALSA. IF USING SUBSTITUTE REDUCE SECTIONS OF WOOD ACCORDINGLY. COVER FUSELAGE WITH TISSUE & APPLY 2 COATS OF DOPE.

SCALE
HALF SIZE.

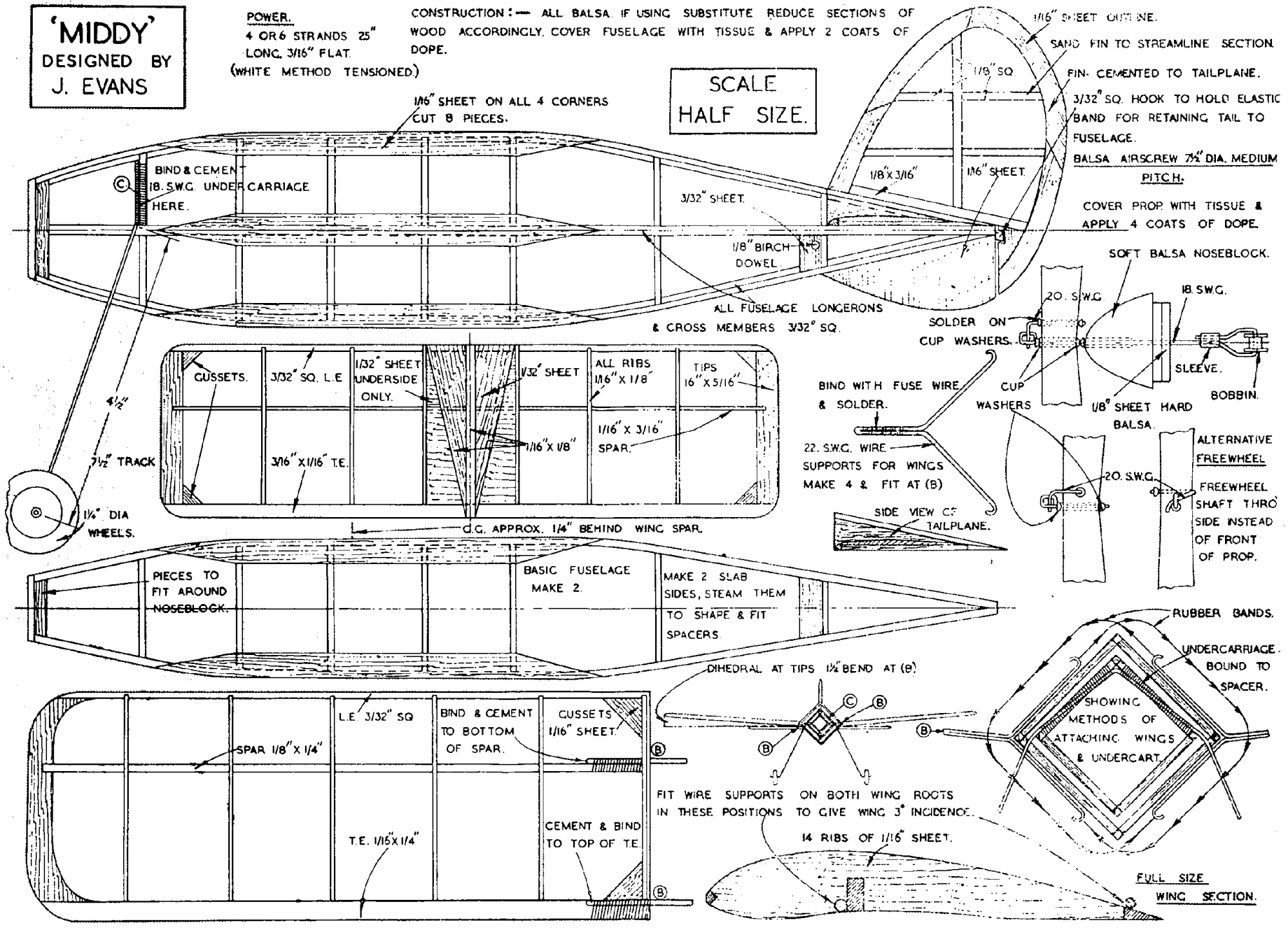


Photo by courtesy of "Flight."

THE AUSTIN WHIPPET

BY

E · J · RIDING

AUSTIN Motors, Ltd., the great firm of motor car manufacturers of Northfield, Birmingham, were builders of S.E.5As and other aircraft to Government specifications as well as one or two private ventures in the shape of the Austin-Ball single-seater fighter and the Austin "Kestrel" two-seater. In 1919, although production of war contracts ceased, the firm retained a design staff who, under the guidance of Mr. J. W. Kenworthy produced the "Whippet," a diminutive single-seater biplane of very robust construction intended for the private owner who had no facilities for complicated maintenance work.

The fuselage was a fabric-covered steel tubular structure with a plywood decking around the cockpit. The wings were of wooden construction embodying spruce ribs and box spars. They were braced by a pair of streamlined steel tubular struts running from the top interplane strut socket fittings to the lower wing roots and were designed to fold about the rear spar joints. The tail section bore a marked resemblance to that of the S.E.5A in that a lower fin and faired in tail skid were fitted. All the tail surfaces were wooden frames with outlines of light gauge steel tubing and fabric covering.

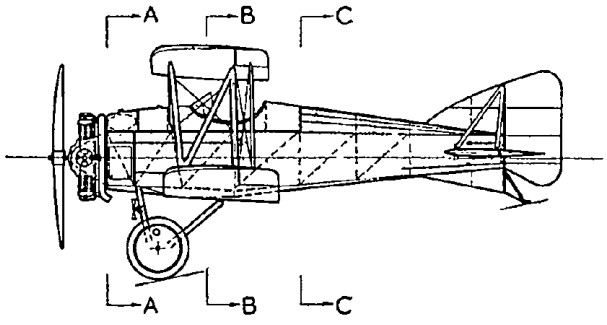
The undercarriage consisted of a pair of steel tubular Vees, braced with streamlined wires, shocks being absorbed by elastic cord wound round the axle and apex of the Vees. In spite of its small proportions, the "Whippet" had such features as an adjustable tailplane, a steerable tailskid, a luggage compartment beneath the pilot's seat and an arrangement whereby the engine could be started from the cockpit. Power was supplied by a 45–50 h.p. six-cylinder Anzani air-cooled radial engine and the advertised price was £450. A "Whippet" was shown in skeleton at the 1920 Olympia Aero Show, where it received a considerable amount of attention and publicity.

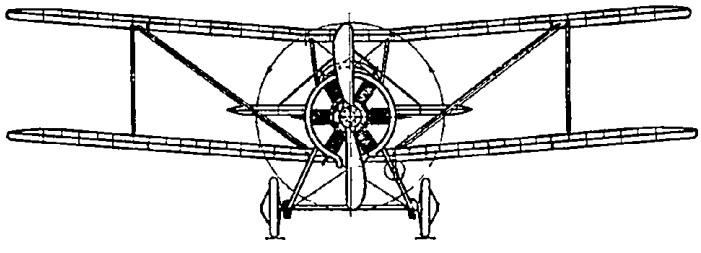
Three machines were built. The first one was allotted the number K 158 (early 1919 civil registration) and it was later re-registered G-EAGS. The second machine, G-EAPF, had a comparatively long life, for after its registration in November, 1919, it passed through the hands of some half-a-dozen owners until it faded into retirement in November, 1932. Its colour scheme was silver all over with black letters. The third and last "Whippet" was registered G-EAUZ in July, 1920, and the owner, Mr. A. J. Greenshields, took it out to Argentina with him in October of the same year, where it was still flying in 1928.

Photo by E. J. Riding.

Conceived many years before its time, the "Whippet" was put on the market at a time when private flying was still regarded in official quarters as a secret vice. Had it been a two-seater, offered at the same price, it might have brought forward the advent of organised private flying by at least five years.

Specification: Span, 21 ft. 6 ins.; length, 16 ft. 3 ins.; height, 7 ft. 6 ins.; wing area, 134 sq. ft.; duration, 2 hours; max. speed, 95 m.p.h.; landing, 45 m.p.h.; tare weight, 580 lb.; loaded weight, 810 lb.





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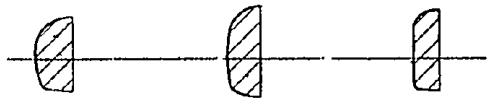

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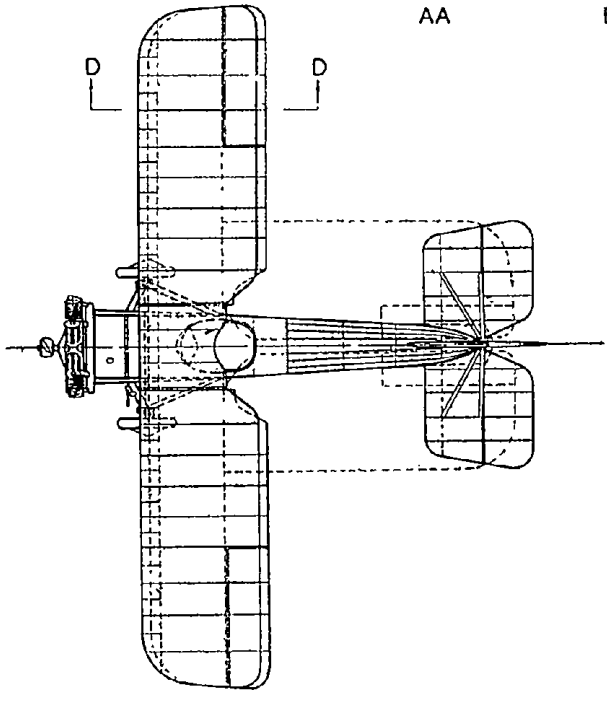
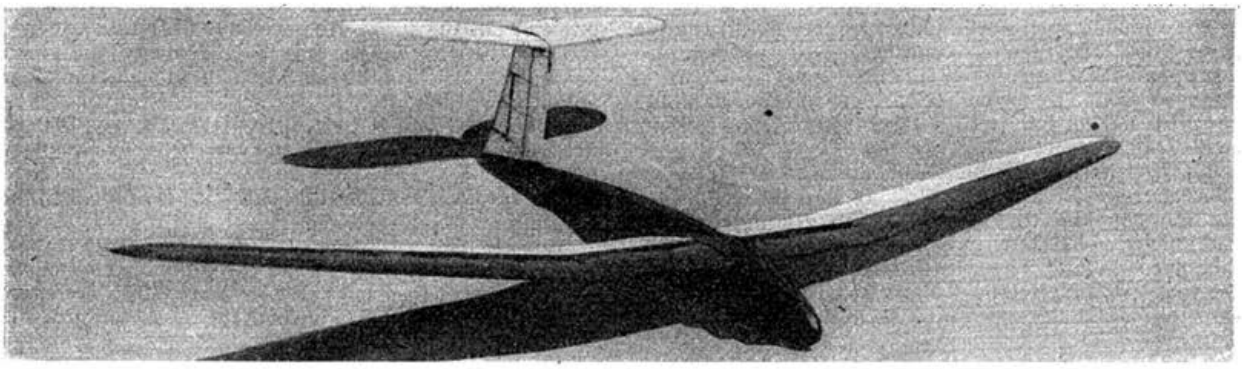


AUSTIN WHIPPET

F.T.

"SATANUS" A 4ft. SPAN SAILPLANE OF UNUSUAL CONSTRUCTION by RONALD COLEMAN



THE shortage of balsa wood to-day is responsible in no mean degree for many unorthodox construction methods and materials used in model aircraft. It can be said to have influenced the design of this model glider more than any other factor . . . the basic idea was to prove that balsa wood and other light woods are not necessarily essential to the construction of high performance models, and in this I have succeeded far beyond my expectations, even although the wing loading and flying speed turned out to be much higher than that of any previous model I have built. This takes a bit of getting used to if you happen to be a staunch lightweight duration fan.

The design was made to comply with four main requirements, viz. :—

1. No balsa to be used in construction (later modified).
2. To conform to F.A.I. rules.
3. To have a streamlined monocoque fuselage.
4. The wing span to be around 4 ft. for the sake of convenient transport.

When I commenced to gather up the latest information on model gliders, I found it was like starting the hobby of aeromodelling all over again. Many advances have been made with this type of model during the last year or two, and I was virtually a beginner, and completely out of touch with things.

Anyway, after reading various articles and in particular those by Mr. L. G. Temple, the design procedure outlined in R. H. Warring's "Model Gliders" was followed. Mr. L. G. Temple advocates a higher wing loading . . . I really took this to heart and decided to use 1/40 in. and 1/16 in. and plywood birch for the entire construction . . . a wood some five times the weight of balsa . . . the finished model turned out at 17½ ozs., a wing loading of 11·7 ozs. per sq. ft. and with a calculated flying speed of 17 m.p.h. !

When the model was half built this decision was somewhat modified and a composite construction of birch and balsa used for the tailplane and fin and rudder in order to keep the tail of the machine reasonably light. This, of course, was only because I happened to have the balsa on hand, otherwise balsa substitute or spruce or other light wood would have been used.

Fuselage.

The fuselage is very strong, being a hollow two-ply birch and paper shell supported by 3/16 in. ply nose bulkheads and 1/16 in. sheet rear bulkheads. The method of construction is reminiscent of that used for the famous De Havilland Mosquito, and it is something of a combination of a monocoque fuselage as described in. "The Design and Construction of Flying Model Aircraft," by Mr. D. A. Russell, and one made of paper described in Zaic's 1937 Year Book.

A solid wood former is carefully carved and sanded to the plan and side elevation and section of the fuselage; when tracing on to the wood block from the drawing, trace along the inner of the two fuselage outlines, so that the former is actually smaller than the finished fuselage by the thickness of the shell walls.

After checking the sections carefully with card templates at all bulkhead stations the former should receive a final fine sanding and then a smooth coat of candle wax, this to ensure that no glue adheres to the former.

Mount the former on a couple of bearings so that it can be rotated (a lathe comes in handy here) and then commence to wind on 12 in. by ½ in. strips of brown paper which have previously been soaked in water to secure temporary adhesion to the wax. Complete the first layer of strips with no overlapping of the edges. The winding should be diagonally, and odd triangular strips will be required at various points along the tapering former.

Work as quickly as possible, and before the water has had time to dry, give the whole a good coat of glue (Croid or similar) and wind on the second layer of paper strips diagonally in the opposite direction to those of the first layer.

Apply another coat of glue and set aside to dry out.

After a couple of days the paper and glue-covered former should be sanded lightly to remove any rough spots. Cut a quantity of 12 in. by ½ in. strips from 1/40 in. birch veneer and soak them for an hour in hot water, then commence to glue them down longitudinally on the former, using drawing pins to hold the ends and edges of the strips down while the glue sets. Here I found a cold water glue (Casco) more convenient than other brands which tend to gum one's fingers up together.

Complete the first layer of strips, making sure there are no overlaps, gaps or bad joints. Don't worry about the inevitable splits caused by the drawing pins so long as they are not continuous along a strip. You may find that several attempts are necessary to get some strips to fit correctly. Use plenty of drawing pins but not more than 4 or 6 to a strip, one pin can be made to hold down two ends or edges which butt together.

A good solid adhesion between all layers is essential.

When it has dried out the first layer of wood should be

sanded smooth, after removing all drawing pins of course, then finish off with the final layer of 1/40 in. strips, making sure that all joints are staggered with those of the first layer, i.e., " bonded."

The fuselage shell is completed by having all the pin holes filled with plastic wood and everything sanded down smooth, finishing with fine sandpaper. It is removed from the former by cutting along a carefully pencilled datum line with a razor blade, using a short steel straightedge.

The positions for the bulkheads are marked out on the fuselage halves. Bulkheads C, D and E are joined together by the tow-bar (*see* Auto Rudder Control) and the screwed rod and the guide wire of the fine C.G. adjustment. The wire staples on bulkhead C and the wire hooks on bulkhead E are fitted before the whole assembly is securely glued into the upper half fuselage.

Now cut out the remaining bulkheads B, F, G, H, I and J and glue in position along with the hardwood noseblock.

The ¼ in. wide slots to take the wing tongue between bulkheads E and F require very great care in marking out and cutting to ensure correct setting for the wings. Cut out the wing tongue from ¼ in. plywood and glue in position after fitting the small 1/16 in. fillets to bulkheads E and F.

Glue in the two 3/16 in. ply platforms, one between noseblock and bulkhead B and one between bulkheads B and C.

The tailblock is made from balsa, if possible; if not use the lightest wood available.

Apply a liberal coating of glue to the edges of bulkheads, nose and tail blocks and the edges of the shell and drop the lower fuselage half into place after having cut the two small slots through which the tow hooks protrude.

Ordinary pins can be used to hold down the shell to the bulkheads, also strip rubber may be wound round the fuselage while the glue sets.

Make sure the datum line joint is a close fit—if there are any gaps some of the bulkheads may be too large, or if the shell can be pressed in at any bulkhead positions they will be too small; thus it is essential to check this well beforehand.

When the glue has set, mark out the inspection hatch between bulkheads C and E and cut out with a razor blade. The hatch cover is made from 2 mm. plywood, and has 1 mm. ply lugs on the top edge to engage behind the upper edge of the opening. The lower edge is held by a strip of adhesive tape. 1/16 in. sheet stops are glued to bulkheads C and E.

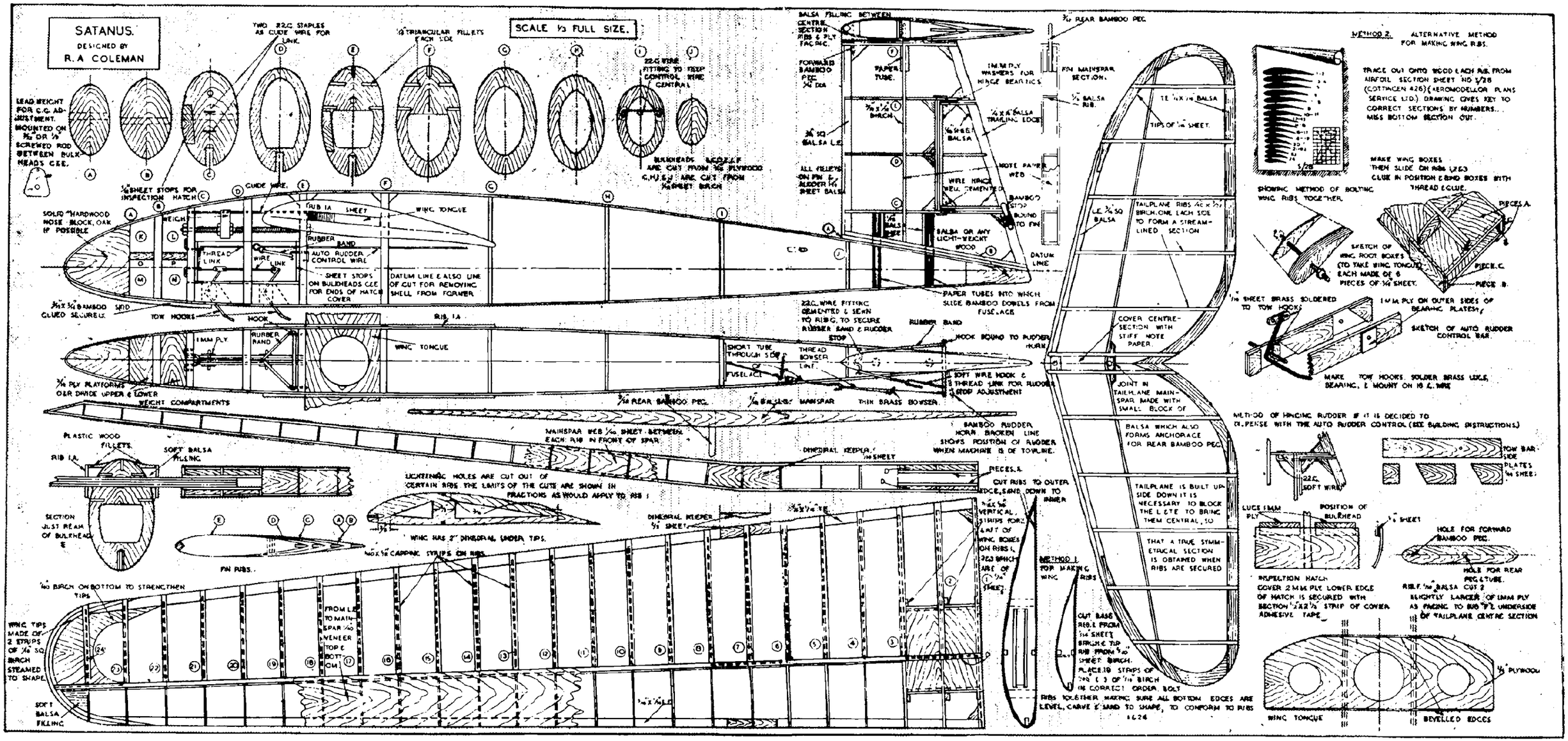
Cut ribs 1a from 1/16 in. sheet birch and slide and glue into place on the wing tongue, along with soft balsa filling between fuselage and rib. Complete wing root fillets with plastic wood and sand off smooth.

A bamboo landing skid, 3/32 in. by 3/16 in., is securely glued to the underside of fuselage from the noseblock to the first tow hook. The bamboo can be curved to shape around a candle flame. Wind plenty of strip rubber around the nose of fuselage to hold the skid in place while the glue sets. Plastic wood should be used to streamline the edges nicely into the fuselage lines.

Wings.

The wings are very strong and will stand up to any amount of hard wear. The structures are absolutely rigid before the covering is added, therefore it is practically impossible for them to warp.

The drawing shows the wings set at 2 in. tip dihedral; this is sufficient for normal weather flying, but if you



fly your models in really rough weather, and at all seasons, it is advisable to build the wings up to 3 in. tip dihedral, using re-designed dihedral keeper plates at the mainspar joint.

The wing root boxes should be made first, using 1/16 in. sheet birch, two pieces each of A, B and C. Note the directions of the wood grains.

The boxes are bound with thin thread and glued after sliding 1/16 in. ribs 1, 2 and 3 into place and glueing. The inner wing panels are then built up as far as rib No. 6, using ⅛ in. by 1/16 in. spars top and bottom, joined with 1/40 in. sheet web; ¼ in. by 1/16 in. leading and trailing edges. Build up the outer wing panels, using the same wood sections. The trailing edge will require 1/40 in. packing up at the front edge on the building board.

Note that all ribs are notched 1/16 in. into trailing edge and have triangular holes cut in (excepting ribs 1, 2, 3, 7, 22, 23 and 24), to reduce weight. Wing tips are of 1/16 in. square birch in two layers. The inner and outer wing panels are joined with a dihedral keeper of 1/16 in. sheet at the mainspar between ribs 6 and 8, also the 1/16 in. by ¼ in. tapered plates at leading and trailing edges.

Add rib No. 7 in two parts and the 1/16 in. fillets at rib 1, also the 1/16 in. by 3/16 in. pieces fore and aft of the wing root boxes.

Trim off the mainspar web and sandpaper all ribs down evenly, then glue on the 1/40 in. sheet covering top and bottom from mainspar to leading edge; this can be done in three pieces along the wing, from ribs 1 to 7,—7 to 15,—15 to 24, the joints being made by bevelling the edges and overlapping, using plenty of glue. The veneer is best held down while the glue sets by binding lightly with strip rubber, and using a few pins here and there.

Now glue the ⅛ in. by 1/40 in. capping strips to all ribs top and bottom, using short lengths of thread to tie each strip down temporarily; complete the tips with soft balsa filling forward of the mainspar, and 1/40 in. sheet birch on under sides.

Use plastic wood where necessary for the leading edge sheet covering, and sandpaper everything off smooth ready to receive the tissue covering.

Check up and see that the wings fit correctly up to fuselage rib 1a and that the wing tongues are a good fit in the wing root boxes, but not too tight to prevent the wings being knocked off in a bad landing, or so loose that they fall off in flight!

Tailplane.

If you have the balsa wood available build this part up in the conventional manner, with 1/32 in. sheet ribs. The drawing shows 3/32 in. by 1/40 in. birch strips curved over a 1/16 in. sheet balsa mainspar to form the ribs. The leading and trailing edges will require careful packing up on the building board in order to bring them central and preserve a symmetrical section.

The tailplane is laid out upside down on the building board as the undersurface has a slight dihedral angle.

The bottom of the centre-section has wedge-shaped pieces of balsa glued on to form a level surface, this being faced with 1 mm. ply the same shape as fin rib F. The fore 1/16 in. and aft 3/32 in. bamboo dowels are then set through the plywood into the leading edge and mainspar joining blocks. Make sure that these dowels are in line, and at right angles to the top tailplane surface.

Fin.

This too should be built of balsa, if possible, excepting for the ⅛ in. by 1/16 in. birch spars which are joined by a stiff notepaper web. Glue the two paper tubes into the tail end of the fuselage and bottom two ribs (B and C) of fin, at the same time keeping them in line with the waxed bamboo dowels. The holes to take the tubes require very careful drilling and sanding out to get them aligned correctly. When dry fill in the space between fuselage and rib A with plastic wood and sand off smooth. Glue in the 1/16 in. balsa plates between ribs B and C close up to the paper tubes. Now fit the two wire hooks to leading and trailing edges just below rib F; and face rib F with 1 mm. ply after fitting the top paper tube which takes the 3/32 in. rear bamboo dowel of tailplane. A 1/16 in. hole is drilled in rib F to take the forward bamboo dowel. The tailplane is held down to the fin by a rubber band looped over the centre-section and around the two wire hooks.

The rudder is loosely hinged on two wire hinge pins.

Auto Rudder Control.

A full description of this can be found in "Model Gliders." The mechanism fitted to "Satanus" is thoroughly reliable and has the advantage of two towing hook positions (the rear hook being used for very calm weather flying), also the tension on the rudder can be varied quite easily. Adjustment to the rudder is applied by varying the length of the thread stop, bending the soft wire hook as necessary.

Tow Bar.

This is made up of 1/16 in. sheet birch. The tow hooks are of 16 gauge piano wire bent to a shallow V shape. Small pieces of sheet brass are soldered into the angles and drilled to take the 16 gauge pivots. On the upper ends are soldered the small brass fittings to take the thread and wire links.

The tow bar is glued into bulkheads C, D and E and the movement of tow hooks checked with the thread and wire links, control wire and rubber band all in position before glueing the assembly into fuselage. The tow hook slots require careful marking out and cutting.

Alternative.

You may decide to simplify the model and fit a stiff hinged rudder, but this makes for more difficult towline launching if you require the model to fly in circles. The drawing shows how the copper or soft iron wire hinges are fitted to fin and rudder, using plenty of cement or glue. The fine C.G. adjustment can now be mounted in the lower half of fuselage, bulkhead E can be made solid, and of course no tow bar is required.

Fixed tow hooks should be securely bound and glued to an extended (⅛ in. by ¼ in.) bamboo landing skid.

Covering and Finishing.

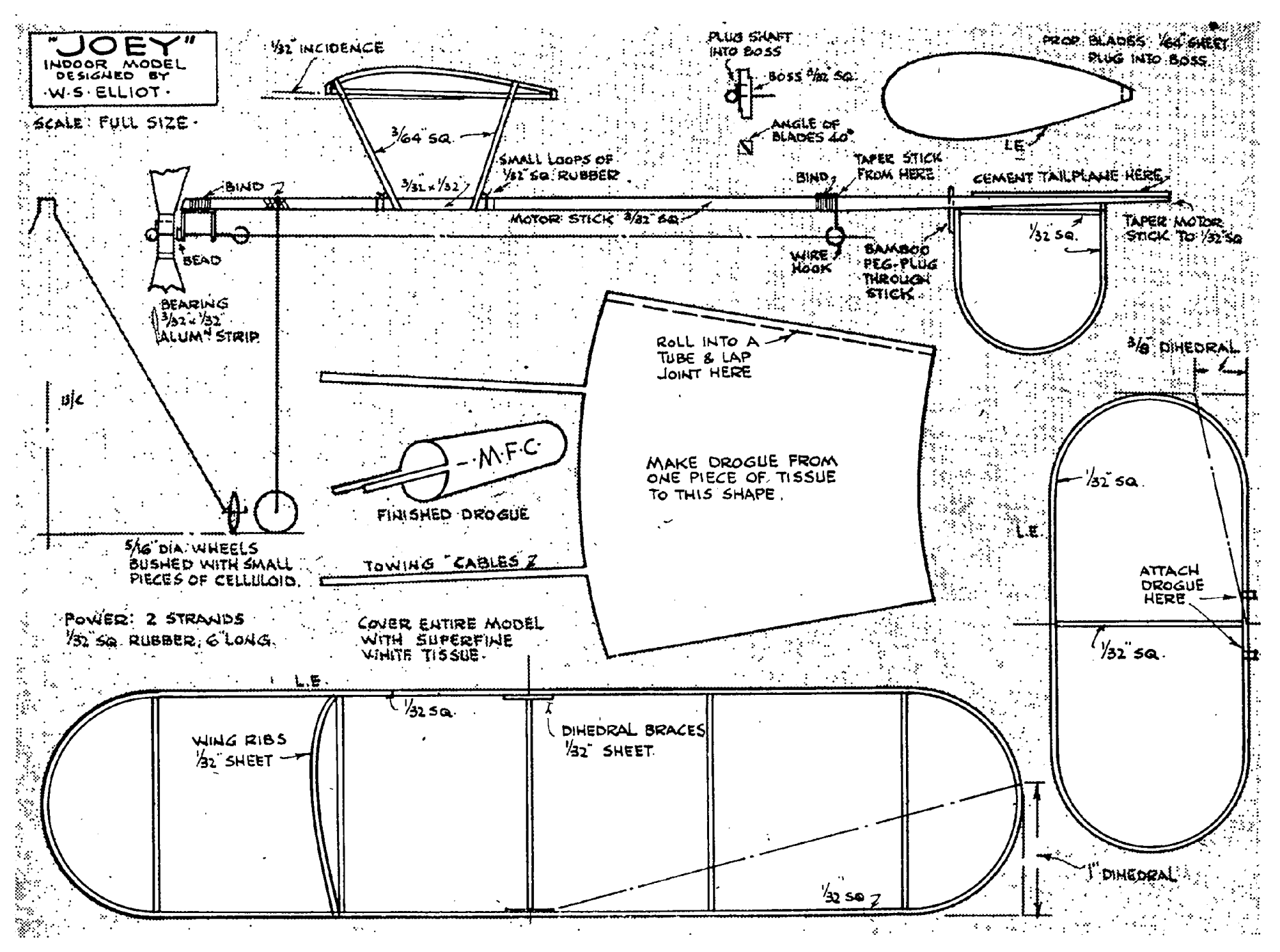
The wings, tailplane and fin are covered with tissue and doped after shrinking with water. Do not cover the wing leading edge veneers with tissue, these are finished in the same manner as the fuselage.

The fuselage has a coat of clear dope applied after making sure that everything is smoothly sanded off, no holes or rough spots anywhere. When dry use very fine sandpaper again, then apply two coats of glossy coloured dope or glossy art oil enamel. If you use enamel, wipe the gloss from the first coat with a rag soaked in methylated spirits.

"JOEY"

INDOOR MODEL
DESIGNED BY
W·S·ELLIOT·

SCALE: FULL SIZE·



MODEL NEWS

OUR POLICEMEN ARE WONDERFUL!—and their handywork is not so dusty either. The heading photo shows a 1/72nd Sunderland built by G. L. Workman and photographed by a co-member of the Gloucestershire Constabulary, J. P. Griffin.

(Top left.) **FIGHTING FOKKER:**—This time a flying scale D VIII by M. Garnett, of Bristol, which puts up a consistent duration of 35 secs. R.O.G.

(Right.) **SURPRISING SPEED**—from this little streamlined speed R.T.P. model which has clocked 33 m.p.h. Built by Major Nicholls, it was originally designed for ordinary R.T.P. duration. The span is 18.1ns.

(Left.) **DETAILED DURATION.**—Another example of H. Foden's excellent workmanship is this finely finished Aeromodeller Cabin Duration. Note the detailed dashboard.

(Below.) **AUSTER-ITY!**—Lacking only its cockpit canopy this flying scale Auster built by R. J. Bennison from A.P.S. plans is almost ready for its flying trials.

PETROL TOPICS

BY DR. J · F · P · FORSTER

IN spite of the lifting of the ban there seems little evidence of any extensive flying activities by Petroleers. I trust this does not indicate that all those models of which we heard during the blitz and blackout have failed to come up to expectations. There is, I think, a mistaken impression that the flying of petrol models is a summer-time hobby. Actually there is much to be said, in this country, for Autumn and Winter flying, for our summers are notoriously windy, except in the cool of the evening and the dewy dawn (or so I am told ; being an inveterate burner of the other end of the candle, I do not know much about the latter, especially on Sunday mornings, the only likely free dawn for most people ! !).

But quite apart from late rising and weather considerations, not forgetting those lovely golden days we usually get in October and November when the sun shines from a blue sky whose horizons fade into a wind-less haze, most fields are from then onwards in much better condition for our purposes. This is specially so with the wartime shortage of pasture, as the last blade of grass is nibbled short and growth is negligible till April and often later, while the prevailing hazards of arable land are not covered with standing crops. A further point which will appeal to many confirmed lone hands is that the average temperature does not conduce to a crowd of gaping onlookers : they may come and have a brief look, but they do not hang about for long. It is curious how warm an intractable engine keeps one ! !

I suppose this lack of activity goes to show, as does much of my correspondence, that most Petroleers of pre-war experience are too tied up in war jobs or in the services for much practical flying as yet, and there must be hundreds of good engines carefully tucked away in attics and one-time workshops, while the considerable number of younger chaps who are all itching to get cracking, many with their first petrol model finished and ready for the fray, are mostly held up for lack of engines, coils, plugs and flight timers.

The Supply Position.

Had it not been for the 1/72nd scale solids, I suppose most of " the trade " would have gone up the spout long ago, but it is certainly a pretty exasperating state of affairs six months after the ban has been lifted to look through the advertisement pages of the AEROMODELLER and still find the cupboard completely bare of any petrol model accessories. I cannot help feeling that there are some firms who never did cater much for us petroleers, who would be quite content to let matters rest, being retailers pure and simple. In the early days before mass production of kits was dreamed of, many small one-man firms started by selling the one man's products. It seems difficult to interest members of the trade in manufacturing anything themselves unless they see a guaranteed market for tens of thousands nowadays. They have acquired the mass-production disease, and we are the sufferers until they can get materials for such vast production. Surely it is time some individual had the courage to get down to the simple job of turning out half a dozen coils or condensers a week, by hand or on the family sewing machine if necessary. We cannot expect mass-production prices, but we haven't asked for them. Most of my correspondents who have asked where to get these things add that they are willing to pay " any reasonable price." I never have been, and do not intend to become, a " trade guide," though since the trade are there to serve us, I have no compunction in trying to guide them into producing what we want. In the hope of preventing further useless enquiries, *once and for all* I DO NOT KNOW where or when any of the following accessories are obtainable :—

ENGINES	COILS	8 GAUGE STEEL
AIRWHEELS	CONDENSERS	FLIGHT TIMERS
SILK	SPARKING PLUGS	MINI-ACCUMULATORS

If any gentleman of the trade with an inch of workshop space to spare from mass production of 1/72nd scale kits, will get on with the job of producing coils and/or condensers, we might soon see a number of worthwhile models airborne. For what it is worth, my guess is that, of the above list, airwheels are likely to be the last to be easily obtainable. With the recently announced Government relaxation on the supplies of aluminium and light metals, engines may not be so long in coming.

As to airwheels—well, P. E, Norman showed us *how* to make them some months ago, and I have had several letters expressing satisfaction with his method. Discarded cycle inner tubes *are* obtainable without much difficulty, and incidentally the black ones especially make quite good rubber bands when cut into rings.

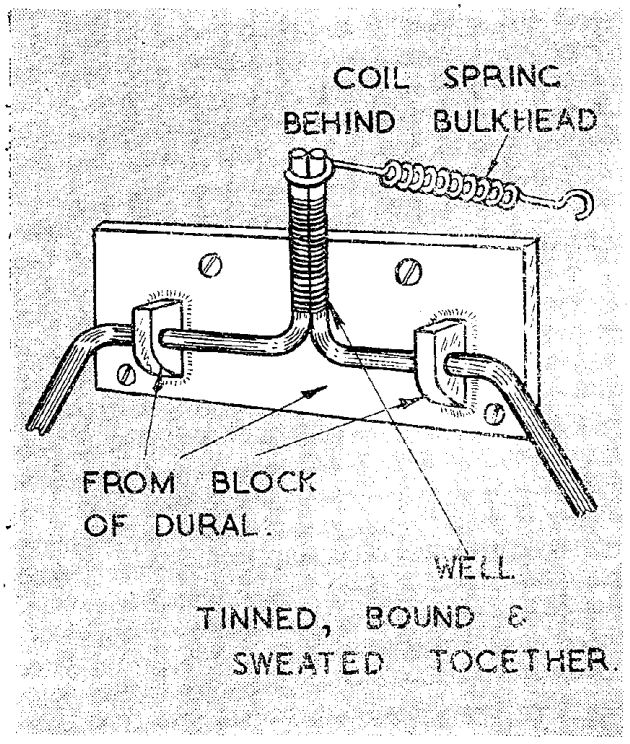
Old wireless transformers usually had secondaries of sufficiently thin gauge wire for winding coil secondaries. Here again I have to thank P. E. Norman for the suggestion of winding the coil secondary on a thin fibre or ebonite tube so that the primary (wound round the soft iron core) can be removed without damaging the secondary : a useful procedure since, if faults develop, the primary is almost always to blame by overheating and burning the insulation between its own turns. Replacing the primary is thus a simple matter.

I have not yet had recourse to home-made airwheels, but I shall now have to do so. By dint of cycle patches and injecting refills of air with a hypodermic needle I have managed to keep some bounce in most of my wheels till now, but I realise that not everyone can get these things. However, most doctors throw away at least one needle a week, and though it may be too blunt for painless use on human epidermis, it will still push through rubber easily and cleanly enough to leave no air leak when withdrawn. Ask yours to save his next throw-out for pumping up valveless airwheels ! ! ! (Do not tell him I said so ! !) Incidentally, to those it may interest, one can revive old tennis balls in the same way.

Petrol Tanks.

There still seems to be some misunderstanding of the problem of " Petrol level variation in the tanks of model aircraft in flight." As an example, the letter from B. F. Cornwall of Bucks., published in the correspondence pages of the October AEROMODELLER, completely missed the point, and suggested a tank (which was illustrated) in which the fuel pipe was supposed to be flexible rubber with a weight on the end. Incidentally, will he tell us where he can get synthetic rubber tubing anywhere near sufficiently flexible for his " fuel hunting pipe " to operate ? Cycle valve tubing seems the thickest permissible, and I have yet to meet this in synthetic rubber. There is no finer " gummer-up " of needle valves than dissolved natural rubber in one's fuel !

The problem is not merely that of petroil " swishing "



about in varying attitudes, but also, and more important, the actual *fall in fuel level as it is consumed.* With a constant partial vacuum in the venturi, jets of needle valves are extremely sensitive to an increase in the height of fuel suction. Obviously, if a fairly big tank is used whose capacity is 3 or 4 times that required for an average flight of 45–60 seconds' engine run, the fall in fuel level is ⅓ or ¼ of the depth of the tank (if a vertical cylinder) if and when the flight timer cuts out. (In the event of timer failure, the resultant fly-away is quite possibly o.o.s. with a 3 or 4 minute engine run !) Using a half-pint tank, the fall in fuel level for the timed flight would be negligible, but the unnecessary weight and disastrous results of a fly-away rule out the use of such hefty tanks.

Readers with experience of the smaller sizes of engine will appreciate that all this applies still more so to engines under 6 c.c., and in spite of, in certain instances, their phenomenal power when needle valve settings are exactly right, one of the chief snags of nearly all the "babies" is to keep them running *really steadily* for more than 1 minute. It is obviously safer to use a small capacity tank, but it has the foregoing disadvantage of a big *relative* fall in fuel level in a short space of time. This disadvantage is best overcome by using shallow tanks. Trouble due to "swishing" fuel does not arise in a small tank until nearly empty, and if it has a small well in the bottom (preferably placed as plastic tanks of Ohlsson and other engines), into which the fuel pipe descends, there will be no interruption of fuel feed until the last drop is consumed. Incidentally experience shows that in spite of careful filtering of fuel, small particles of grit and foreign bodies do occasionally get into the "very best people's" tanks, and unless these are very light fluff, tend to gravitate to the bottom of the well in spite of engine vibration. Obstructed needle valves can be largely avoided by keeping the end of the fuel pipe say 3/16 in. up from the bottom of the well (and free from its sides to avoid capillary attraction), thus always leaving a little residual petroil (and grit, if any) in the well. The well should therefore be deeper than 3/16 in. to ensure continuous immersion of the pipe.

Undercarriage Design.

Since using single heavy gauge steel undercart legs on my low-wing models and Spitfire, I am finally convinced that it is lighter in the end to use 5/32 in. to 3/16 in. diam. spring steel cantilever legs than to use the more usual 8 or 10 gauge steel requiring bracing binding and soldering. It is surprising how the latter requirement puts up the weight. The trouble with bracing is that it does away to a large extent with spring, and if the blow is really hard enough to bend the legs, they stay bent, and it is a job for vice and pliers to straighten them, sometimes calling for re-soldering too. Having little intrinsic springiness, it is almost essential to pivot this type of undercart, and if it is faired, it means pivoting the rear member to avoid damage to the fairing. The result is that except in an actual dive, practically no travel occurs. This is all right on reasonably smooth ground and with lightly loaded models, but sooner or later it usually causes trouble on heavy machines. Furthermore, internal shock elastic is difficult to arrange accessibly, and the old days of external masses of rubber bands, should I hope, have gone for ever.

One of the neatest, lightest and strongest undercarts having no dead stop to its backward shock traverse comes to hand from D. G. Brown of Tunbridge Wells, and is illustrated in the accompanying sketch. This works on exactly the same principle as my own low-wing undercarts, but in this case is for a high-wing model, and in the absence of long bearings for the horizontal portions of each leg, the two legs are very thoroughly tinned, bound and soldered together and thus are not independently sprung as are my low-wing legs. The two small bearings are simply holes drilled in projecting lugs cut from a single chunk of dural (obtained, so our contributor says, from a Jerry crash), leaving a solid backplate mounting easily bolted to a bulkhead. The original is sprung with an internal coil spring, but personally I prefer rubber as springs tend to become stretched in time, and the tension is so easily adjusted with rubber bands. Fairing legs of this type, if made of really heavy gauge steel, presents little difficulty. Using highly flexible steel surrounded by non-flexible balsa always results in fairings cracking. Hollow celluloid fairings mounted at each end only allow the steel to flex without damage to the fairing.

The photo of the Ohlsson "23" (*photo No.* 2) comes from the same contributor and shows very clearly his neat remote control of ignition timing. Neither he nor F/Sgt. D. E. Cope, who sends us the photo of his neat little Ohlsson-powered parasol (*photo No.* 1), seem to believe in knock-off engine mounting, and both installations are obviously intended for thorough engine cowling; it must be a very pretty little machine when cowled, and I hope by now it has taken the air successfully. There is a serious dearth of action photos. Will readers please get busy with their cameras, and help me to liven up "Petrol Topics." Nobody looking at the last six months' issues would know that the ban has been lifted, judging from illustrations, at least.

"Mermaid" and "Spitfire" Queries.

Readers of "Topics" will perhaps forgive me if I touch on some queries raised by two readers who are also builders of the above models from the AERO-

MODELLER Plans Service. Both have been answered in detail by post, but the Editor suggests that the points raised may be of interest to other builders of these models.

Mr. T. Keech of Kempston, Beds., drew attention to the position of the engine on the plans, and the fact that if a full-size Cyclone prop. is used it will foul the sloping cabin "windscreen." The position of the engine as arranged in the plans was that for an Ohlsson "23," and while I found the model flew quite nicely from a hand launch using this power unit, I never could get her to unstick with my own very battered "23" which I know does not develop nearly as much power as a good specimen. I therefore had to resort to a Cyclone for take-off. In order to avoid raising the thrust line to allow for the 13 in. diameter prop., I designed it as before for use with a 3-bladed prop. Actually this is unnecessary as by moving the engine forward only ½ in. there is ¼ in. clearance above the deck for a 12½ in. two-blader. Unless the tail boom is kept very light it may be necessary to move the engine forward in any case in order to get the C.G. right.

Since the plans were published over two years ago, I have modified the battery compartment, as experience has shown that it is difficult to keep the hinged "lid" in the nose watertight for long, especially if she stalls and dives deep in. The battery is now housed a trifle further back, standing vertically upright in the centre plane of the nose. An oblong opening is cut partly in the solid noseblock and partly through the deck, and this if kept watertight by covering it with a piece of sheet aluminium curved to an exact fit over the rounded top of the deck. A sheet of rubber cut from cycle tubing is clamped between this and the deck, and the aluminium plate *screwed* down with two screws into hardwood blocks placed fore and aft. This is really watertight, and is worth the trouble of having to unscrew for access to the battery. Using mini-accumulators, I do not often need access except at the beginning and end of a flying session.

Mr. Keech also asked if a Brown Junior would be suitable. Personally I think it would be gross over-powering, but using a 3-bladed prop. and thus keeping the thrust line as at present, it should be possible to get spectacular results provided the torque can be controlled. Using a Brown I should design a longer tail boom, as the moment is already on the short side in order to keep the weight far enough forward.

The other letter came from J. Moonie of Baillieston, Lanark, who, as a self-confessed newcomer to petrol models, has embarked forthwith on my Spitfire in spite of warnings that this is not a beginner's model!! He asked for (1) diam., pitch and area of the airscrew; (2) minimum and normal flying speed and other details of the model's performance, and finished up by asking for an account of the flights I am having therewith in "Petrol Topics"!

Not having a Cyclone he hopes to use a Morton Challenger 10 c.c. so I do not quite see the reason for giving him the diam. and pitch of my Cyclone prop., especially since I do not know it, having carved it myself from red fibre. It is a rough replica of the 13¼ in. diam. props. usually supplied with Cyclones, which according to the makers should be about 6–7 in. pitch. Actually these varied considerably, as do mine from prop. to prop., and one Cyclone advert. recommended a 12¼ in. prop. with a pitch of 8 in. Personally I dislike howling the guts out of my engines and usually slow them up a bit with big props. of relatively fine pitch. In any case the prop. must depend on the engine which has to turn it. I have no first-hand experience of Motor Challengers in

Photo No. 1.

action, but if it develops the 1/5 h.p. claimed and produced by a good Brown, the makers recommend a prop. 14 in. diam. and 6½ in. pitch, though most people use a 15 in. prop. on Browns.

Not having an airspeed indicator (who has?) I cannot answer his second question. I can only guess that the minimum level and gliding speeds are not much less than 23 m.p.h.: I remember being surprised during initial gliding tests that it was easily possible to hand launch her into a steady glide in dead still air from a fast walking pace, and I do not suppose I am strong enough to push 4½ lbs. overhead at much more than 25 m.p.h. I may well be miles out!! If she is the least bit stallish, I shudder to confess what speeds she is capable of in dives, and I have had some hair-raising moments before she has gained safe height.

The worst disaster came on her third flight: the only clockwork timer I had available was one which had been immersed in the sea before the war, and in spite of thorough cleaning, it had a nasty habit of stopping unless shaken! Trusting to engine vibration to keep it going I gaily pushed her off with the Cyclone fortunately not fully advanced. At the end of a minute and a half I decided that my beloved clock had ceased to function, and she was slowly climbing in about 80 yard diam. circles. I then remembered that the huge tank of a Hallam Nipper was about two-thirds full and about the same time I began to notice that as she got higher the wind drift became much faster and, yes, need I say it, straight out to sea! My flying field is about ¼-mile inland from the shore and about a mile along the coast from the harbour. It was a Spring tide, which in this

Continued on page 301.

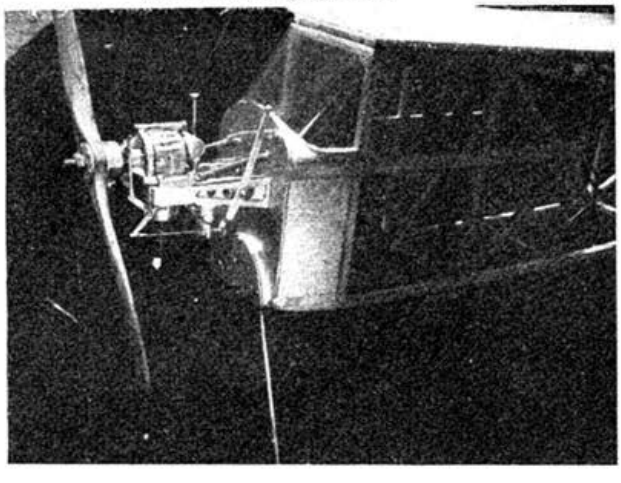


Photo No. 2

Readers' . . . . . Letters

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

DEAR SIR,

On reading your issue dated September, 1944, I was amazed to find in " Gadget Review " a formula sent in by a reader, which, to me, appears entirely incorrect.

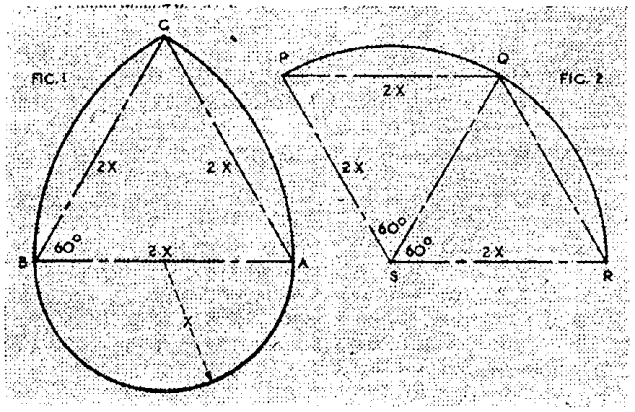
The formula referred to is for obtaining the cross-sectional area of a pear-drop former.

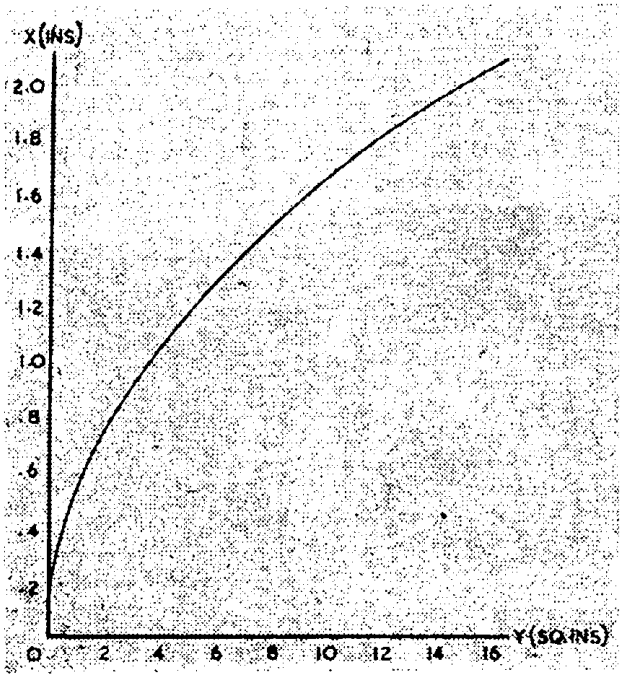
Appended are my calculations which I think are very easy to follow and simpler than the calculations sent in by the reader (G. W. Airey of Yorks.).

Fig 1 in the former cross section Y.

$\therefore Y = \frac{\Pi x^2}{2} +$ area of ABC

If ABC be laid out as in Fig. 2, area ABC = area PQRS − area △ QRS





$\therefore$ area ABC $= \frac{\pi(2x)^2}{3} - 2x^2 = \frac{4\pi x^2}{3} - 2x^2$

$\therefore Y = \frac{\pi x^2}{2} + \frac{4\pi x^2}{3} - 2x^2$

$= \frac{3\pi x^2 + 8\pi x^2 - 12x^2}{6} = \frac{11\pi x^2 - 12x^2}{6} = x^2\left(\frac{11\pi - 12}{6}\right)$

It can be seen from this that $\frac{11\pi - 12}{6}$ is a constant.

$\frac{11\pi - 12}{6} = 3{\cdot}7596$ $\therefore$ Area $= 3{\cdot}7596x^2$

Hendon. G. H. STEINBOCK.

DEAR SIR,

I have read with interest the letters and articles in recent AEROMODELLERS by Col. C. E. Bowden, Dr. J. P. Forster, etc., on their projected miniature aero engines. Their ideas of reliability and guaranteed performance have, I think, rather an important bearing on the future aeromodelling world after the war. They have been concentrating on the engine side of the picture with a large measure of success, and I wish some others with the same facilities would do some research work on the airframe side of the question.

I am putting forward this letter on the type of model and flying I would like to see after the war, in the hope that you will publish it and that it may form the basis for criticism and argument.

First of all, models are once more increasing in size in preference to the very small type which has been the rage for so long now. This, I think, means that balsa wood is soon going to lose a great deal of its popularity and birch and spruce will once again come into their own to build a more durable and airworthy model. In actual fact, I would like to see all metal models constructed as in real aircraft practice, on the jig system and with engineering accuracy. These would, of course, be covered with dural or aluminium sheet to act as a stressed skin, giving an almost wholly monocoqué structure. This may sound rather impossible and far-fetched, but in view of the developments during the war I think it quite feasible from all points of view. The only point requiring real investigation is the attachment of the skin to fuselage formers, wing ribs, etc. Many parts could, of course, be completely monocoque. A good example of this true-to-scale construction is to be found in Cpl. Welsberg's models.

Radio control is essential, not just an afterthought, or experimental idea. The model should be true to scale, engine-powered and, I think, able to carry a certain payload. Radio control should be of rudder, aileron and elevators, throttles, flaps and undercarriage. Quite a proposition, but with wartime advances again in radio, I think it may prove easier than it may at first appear. A fairly large model will be able to carry a fair weight, and should be ample to contain all the radio equipment, batteries, etc.

All this suggests that models will be extremely complicated, and therefore there will be more to go wrong. This is true, but the chances of this equipment going wrong are infinitely less than the present breaking motors, threads, wires, hooks, etc., with which we attempt to work different gadgets on rubber-powered models.

Altogether this idea takes model aircraft more into the realm of engineering than anything else, but with a few specialised tools and the correct metals, it should not be beyond the limits of any average modeller to work in metal instead of wood and silk as at present.

I foresee in the next five years or so each club having not its own flying field, but miniature aerodrome, with small runways and night flying equipment. An aerodrome of this type would not need to be nearly so big as present-day flying grounds, as the model's flight would be controlled from run-up to landing and taxying.

I know that all the foregoing sounds very idealistic and perhaps impossible, but looking back on the developments of the *past* five years, I think it very possible. It would be interesting to hear the comments of others on this type of flying, which would be reliable and consistent in many different types of weather conditions. It would certainly eliminate the present-day type of duration model thermal flights, etc., and introduce competitions for control, load carrying, aerobatics, etc.

Wales. L.A.C. J. MAY.

Model aircraft of metal construction built on the jig system were constructed in Germany before this present War.—Editor.

DEAR SIR,

As one who has had some experience of the enormous amount of work involved in building a wind tunnel, I offer my congratulations to the Prestatyn fellows on their enthusiasm and tenacity. At the same time I should like to voice a doubt which I have concerning turbulence in the Prestatyn wind tunnel.

A certain amount of turbulence is present in the air-stream of most wind tunnels, particularly in the closed-return type. This has the effect of encouraging a turbulent boundary layer over the aerofoil being tested, with the result that the airflow conditions correspond to those which would be observed in a turbulence-free stream at a much higher Reynold's number. For example, the effective Reynold's number of tests conducted in the N.A.C.A. variable density tunnel are 2·64 times greater than the apparent test Reynold's numbers. This 2·64 is known as the turbulence factor of that particular tunnel, and, no doubt, Mr. Walker could produce a turbulence factor for the Prestatyn tunnel. However, the snag is that such a turbulence factor is reliable only so long as the boundary layer of the aerofoil is turbulent both in the tunnel and in free flight. Should the boundary layer be predominantly laminar in free flight—as may well be the case with the majority of models—then the wind tunnel figures may be wrong by as much as 100 per cent.

This is an important consideration, and I should very much like to have the opinions of Mr. Walker and Co. on the subject.

It would seem that freedom from turbulence is one of the main requirements in a wind tunnel intended for model work, and perhaps, after all, there is something to be said for the old open-return type—such as Mr. Russell's—although the Eiffel open-return open-test-section style is probably the best.

Bristol. J. H. MAXWELL.

DEAR SIR,

Being very interested in an article, in the April, 1944, issue of the AEROMODELLER, by J. H. Maxwell, I have used his methods and data to calculate the best aspect ratio for model wings.

My results, for V = 20 ft./sec. and a wing section N.A.C.A. 6409, gave :—

Wing Area.	Best A.R.
1,000 sq. ins.	14
500 sq. ins.	10
200 sq. ins.	6·3
100 sq. ins.	—

Here the graph of total drag co-eff. for A.R. = 4½, and so no best A.R. was evident. From the shape of the corresponding graphs for the other areas, I was expecting a distinct minimum at about A.R. =5, so the result rather disconcerted me.

I would like to know if anyone else has obtained results like this, and also if I could obtain for a short time data regarding Cd, perferably for N.C.A.A. 6409, for values of Reynold's number between 15,000 and 200,000 (say).

Surrey. J. F. HOLFORD.

PETROL TOPICS (*continued from page* 299).

part of the Bristol Channel runs at about 6 knots. I then started running and had to negotiate three coils of anti-Jerry barbed wire entanglements *en route* for the harbour, across country. As luck would have it, it was exactly high water and at last the engine cut at about 1,000 ft. and well out to sea. The glide was fortunately not too good, being trimmed a bit nose heavy and she lost height a great deal faster than she had gained it and so didn't drift much further out before finally touching down. She was invisible except when gliding sideways on to my line of vision, and then only the faintest speck. I leapt into a dinghy, yelled for oars and was lucky to find a friend willing to share the exertion of rowing out into the blue after an invisible object. I was already gasping after my cross-country run! I am sure no member of a University Boat Crew ever felt as I did for the next quarter of an hour. We had only the vaguest line on a Welsh lighthouse to guide us, and several times what we thought might be the Spit.'s tail, turned out to be gulls or parties of wild duck. Fortunately there was hardly a breath of wind out there with practically a flat calm on top of the long, low swell. The difficulty was that any floating objects came into sight for perhaps one second and then disappeared for several in the troughs, but finally we spotted it quite near us, the camouflage painting being extremely difficult to see in the evening light (which forms the frontispiece of the latest edition of D..A. Russell's and my own books), which meant that we were more than a mile off shore! She had made a perfect landing; the fin was not even splashed with spray, and she was floating with both wing tips clear, the nose just awash and the whole fuselage aft of the cockpit clear of the water. We took her out, keeping the nose down and first taking off the wings, which were, of course, nearly full of water, and thus managed to prevent any water ever getting into the rear half of the fuselage. After a week in the airing cupboard, the engine and clock having meanwhile been dismantled, washed in petrol and reassembled, I flew her again (this time with a very much reduced tank!) and apart from a slight increase in wing loading and speed, she seems none the worse. In short, I think this proves that the model will fly!

WANTS AND DISPOSALS

EXCHANGE——

(1) AEROMODELLERS, Aug. 1941–March, 1942, and copy "Solid Scale Model Aircraft" for copy "Frank Zaic's Year Book."—T. C. Tait, Lawhead Farm, Penicuik, Midlothian, Scotland. (2) Reconditioned Diana air rifle (·177) for 2·5 c.c. petrol engine with plug, cash adjustment if necessary.—T. Archer, "The Caravan," Station Road, Allerighton, nr. Wolverhampton. (3) Baby Atom 1·47 c.c. and Rogers "35" petrol engines, both for small four stroke engine 15 c.c.–30 c.c.—R. C. Jude, "Sinclaire," Broadway Road, Bishopsworth, Bristol. (4) "Air Stories," Jan., Feb., March, June, 1937, for same number of any American model aircraft magazines.—M. Cockton, 87, Gown Lane, Bromley, Kent. (5) Pair 2½ in. airwheels and flight timer for 3½ in. M.S. airwheels and/or cash.—Mr. Hughes, 8, Hoscote Park, West Kirby, Cheshire. (6) Very good condition, ·22 cal. Webley service air rifle and case, for complete petrol engine.—E. P. Steele, 57, Sallows Road, Garton End, Peterborough.

DISPOSALS——

(1) "Radio Control," "Nomographs," "Simple Aerodynamics," "Design of Wakefields," "Airfoil Sections," "Airscrews," "Model Gliders," and technical books, 10s. 0d. complete; AEROMODELLER, 1944, eleven for 5s. 0d.; 4 : 1 handrill 6s. 0d. All excellent condition.—E. Raynes, 89, Lower Rushton Road, Thornbury, Bradford, Yorks. (2) 10 c.c. Ohlsson "Gold Seal" aero engine, complete with coil and condenser, transparent tank, prop., etc., perfect condition, ready to run; AEROMODELLER, Jan., 1939–Dec., 1944 for sale or exchange. What have you, or offers to R. Wallen, 57, Elixton Drive, Wistaston, Crewe, Ches. (3) A.F.P., Vol. I, 16s. 6d.; Civil Aviation Year Book, 1943 8s. 0d.—C. E. Yearsley, 61, Guiness Trust, King's Road, Chelsea, S.W.10. (4) AEROMODELLER, 1940–1944, cheap.—I, Sercombe, "Harmony," Eastleigh Road, Devizes, Wilts. (5) AEROMODELLER, May, 1943–Nov., 1944, 8d. each; "A.B.C. of Model Aircraft Construction," 2s. 6d.; "Model Gliders," 2s. 6d. Good condition.—M. Duncan, 57, Ashridge Gardens, Palmers Green, N.13.

MONTHLY MEMORANDA

BY O · G · THETFORD

All-Black "N.F." Camouflage Abandoned.

Of recent months night fighter aeroplanes of the Mosquito and Beaufighter type (the former largely predominating) have been operating in normal day fighter camouflage. No official reasons have been given for this change in policy, but it seems likely that it has been influenced by the increasing speed of aircraft operating by night, enabling them to operate by day, too, so that day camouflage can be used for both purposes.

This is a reversion to the system in force at the outbreak of war in 1939 and which was in force until late in 1940. The all-black scheme for night fighters was first introduced in the winter 1940–41 and was applied to Douglas Havocs, Boulton Paul Defiants, Hawker Hurricanes, Bristol Beaufighters, and Blenheim Intruders. A few Mk. II Mosquitoes were also painted all-black at a later stage in the war.

The second variation in the scheme came with the widespread use of the Mosquito as a night fighter and night intruder in 1943, when it virtually superseded all other types. Mosquito II night fighters and Mosquito VI night intruders were painted in the normal day camouflage on the upper surfaces and night black on the lower surfaces.

The colouring of code squadron letters and airframe serial numbers has also altered on night fighters from time to time. When all black was first introduced, code letters were in grey and the serial number in white. This was very soon altered (presumably for operational reasons) to code letters and serial number in dull red.

The standard night fighters now in service with day camouflage are the Mosquito XII, the Mosquito XIII, and a later Mark which is not yet released. All versions can be distinguished from the original Mk. II and VI by the "bull nose" which houses special radar equipment and entails the deletion of the machine guns, leaving only the cannon.

The Mosquito XIII has two Merlin 21 or Merlin 23 motors of 1,460 h.p. each, and a loaded weight of 18,500 lb. No other details are released.

Batches of Mosquito XII aeroplanes in service are serially numbered HK 238, HK 239, HK 240, etc., HK 299, HK 300, HK 301, etc., HK 910, HK 911, HK 912, etc. Mosquito XII fighters in service with one squadron have the code letters "VA" on the aircraft and two machines in the squadron, "VA-D" and "VA-Q," are numbered HK 346 and HK 318 respectively. This squadron at one time operated Blenheims.

British Roundel Changes.

Certain changes have recently taken place in the roundels of British aircraft in this country and on the Western front. Typhoon and Tempest fighters of the Second Tactical Air Force are now flying with red, white, blue and yellow roundels *above* the wings, *below* the wings and on the fuselage. Similar markings have also been observed on Oxford trainers in this country. It is hoped to publish further details in a later issue.

"Five Grand" B-17 in Service. *A.T.P. Photo.*

Shown on this page is the tail assembly of the 5,000th B-17G Fortress, "Five Grand," now in service with a regular Bombardment Group of the Eighth Air Force in this country. "Five Grand," Boeing built, is covered with thousands of initials and names of the workers who built her, and these are retained in service. Carrying the Army number "337716," "Five Grand" has now done over fifty missions over Europe. Group recognition stripes seen on the tail are red, the group letter "C" is white on a black ground. Squadron letters carried by "Five Grand" are BX-H grouped aft. Note the revised type of tail turret.

Thunderbolts of the R.A.F.

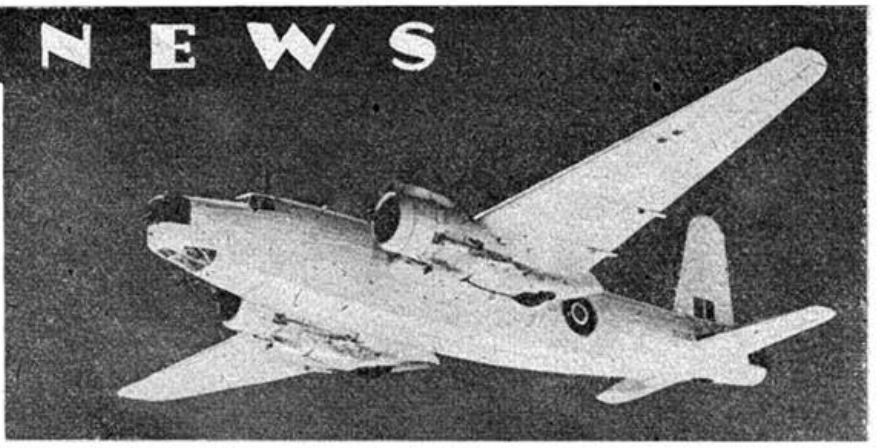
Republic Thunderbolt II fighters of the R.A.F. in Burma with S.E. Asia camouflage and roundels are operating with the squadron letters "RS" in white just below the pilot's canopy. Batches of these machines are numbered KJ 140, KJ 141, KJ 142, etc., and Thunderbolt II "RS-B" is numbered KJ 140. Wide white recognition bands appear across the wings near the roots, across the tailplane and elevators, and across the fin and rudder. The blue and white roundel is reproduced to a very small diameter of about 24 ins., this now being standard practice on all aircraft of S.E. Asia Command. It is interesting to note that "RS" Squadron formerly operated Curtiss Kittyhawk fighters in Africa.

R.A.F. Flashbacks—6.

This month—the Gloster Gauntlet fighter. Gauntlets, predecessors of the more famous Gladiator, were first used by No. 19 (F) Squadron at Duxford as replacements for Bulldogs, and they retained the famous blue and white checker-board markings. No. 56 (F) Squadron (illustrated) had red checkerboard. Other squadrons, flying Gauntlets between 1936 and the outbreak of war, or Hurricane replacement, included Nos. 17, 32, 46, 65, 66, 74, 79, 111, 151 and 213 (F) Squadrons. Many Gauntlets were camouflaged just before the outbreak of war and had red and blue roundels.

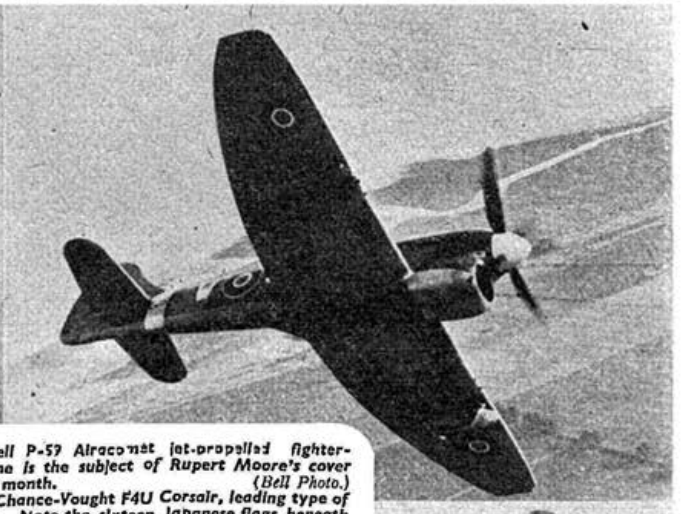
PHOTONEWS

(Right.) **GHOSTLY WARWICK**:—A Vickers-Armstrongs Warwick wearing the white camouflage paint of Coastal Command. Warwicks serving with Coastal are employed both as anti-submarine patrol bombers and as Air-Sea Rescue aircraft. (*Photo: Chas. E. Brown.*)



(Below left.) **A BIPLANE ARISTOCRAT**:—A Gloster Gauntlet II fighter as flown by No. 56 (Fighter) Squadron, R.A.F., from 1936 to 1938. See "Flashbacks" on opposite page. ("*Flight*" Photo.)

(Below right.) **TACTICAL TEMPEST**:—A Hawker Tempest V of the Second Tactical Air Force. Many Tempest Squadrons are serving on the Western Front. Note long-range tanks beneath the wings. (*Photo: Barratt's Press, Ltd.*)



(Below left.) **BELL'S LATEST**:—The Bell P-59 Airacomet jet-propelled fighter-trainer of the U.S. A.A.F. This aeroplane is the subject of Rupert Moore's cover painting this month. (*Bell Photo.*)

(Below right.) **SIXTEEN VICTORIES**:—Chance-Vought F4U Corsair, leading type of U.S. Navy land-based fighter in the Pacific. Note the sixteen Japanese flags beneath cockpit, indicating victorious air combats. (*O.W.I. Photo.*)

(Bottom.) **BACK FROM TOKYO**:—A Boeing B-29 Superfortress coming in to land. Japan is now under systematic attack by these bombers. (*Photo: Planet News.*)

AEROPLANES DESCRIBED XXVII

The GLOSTER GAUNTLET I

BY H · J · COOPER

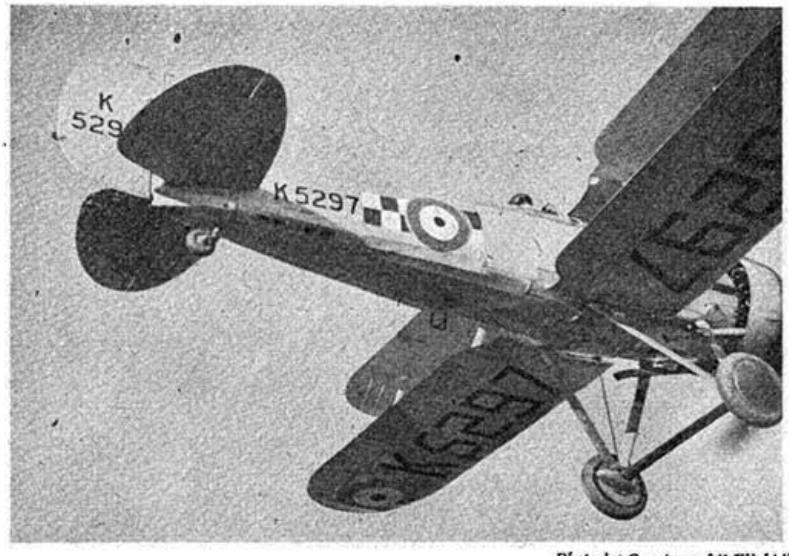


Photo by Courtesy of "Flight."

NEXT MONTH :

The Republic P.47D–25 Thunderbolt II.

THE Gloster Gauntlet, erstwhile standard Royal Air Force fighter, had its genesis in the S.S.18 fighter produced in 1929. This aircraft, a two-bay equal-span biplane, was powered by an air-cooled Bristol Mercury IIs radial motor and was one of the fastest aeroplanes of its day. The prototype was numbered J 9125, and this aircraft was used for all subsequent development until the first production Gauntlet I, K 4081, was issued to the R.A.F. in 1935.

The S.S.18 was armed with two synchronised Vickers guns mounted in the fuselage.

The next development, known as the S.S.19, appeared early in 1931. This aircraft was essentially like the S.S.18 but had its 480 h.p. Jupiter VIIF motor cowled in a Townend ring. It was armed with the (for then) very heavy defensive armament of six machine-guns—two Vickers in the fuselage as on the S.S.18, and four additional Lewis guns, one in each upper and lower plane on each side. There was also provision for four 20 lb. bombs below the wings.

The maximum speed of the S.S.19 was 188 m.p.h. at 10,000 ft. and the landing speed was 57 m.p.h. The initial rate of climb, was 1,800 ft. per minute, and the climb to 15,000 ft. occupied 9½ minutes. The service ceiling (the height at which the rate of climb drops to under 100 ft. per minute) was 26,100 ft.

The S.S.19a and S.S.19b were the next developments. The latter had a modified fin and rudder and wheel spats, and reverted to the lesser armament of two Vickers guns in the fuselage. This type was accepted by the R.A.F. and was put into production in 1933 as the Gauntlet I.

The Gauntlet I is equipped with a 600 h.p. Mercury VI S.2 motor and has a top speed of 230 m.p.h. at 15,800 ft. and a landing speed of 59 m.p.h. The climb to 20,000 ft. takes 9 minutes, and the service ceiling is 33,500 ft.

No. 19 (Fighter) Squadron, then stationed at Duxford, in Cambridgeshire, was scheduled as the first unit to be equipped with the Gauntlet, but it was not until 13th May, 1935, that the first flight was formed. The squadron was then flying the Bristol Bulldog II (see the AEROMODELLER, March, 1945) and the Gauntlets proved considerably faster and about as pleasant to fly. They were not replaced until Spitfires arrived in 1939.

No. 19 (F) Squadron was selected to execute the Air Drill at the R.A.F. Display at Hendon in 1935, only six weeks after they had received their Gauntlets, and gave a neat and precise performance.

Other squadrons to receive the Gauntlet were Nos. 17, 32, 46, 54, 56, 66, 74, 111, 151 and 213 (Fighter) Squadrons, and details of their markings are given in this month's "Monthly Memoranda."

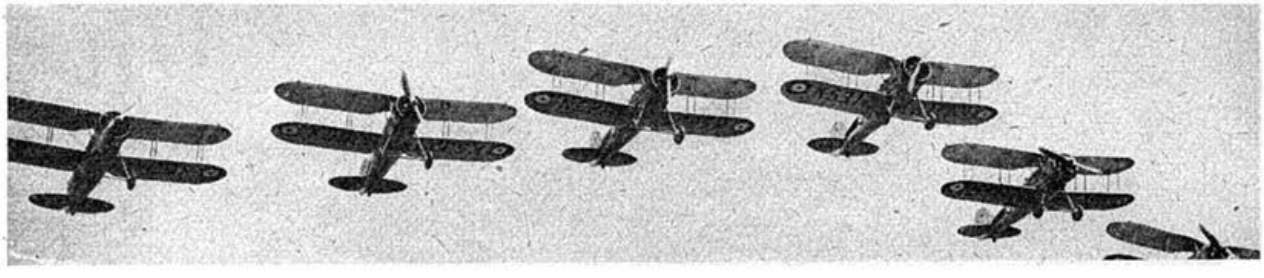
A Gauntlet II of No. 56 Squadron, formerly stationed at North Weald, Essex, is shown in the photograph above, and below is a flight from No. 111 Squadron.

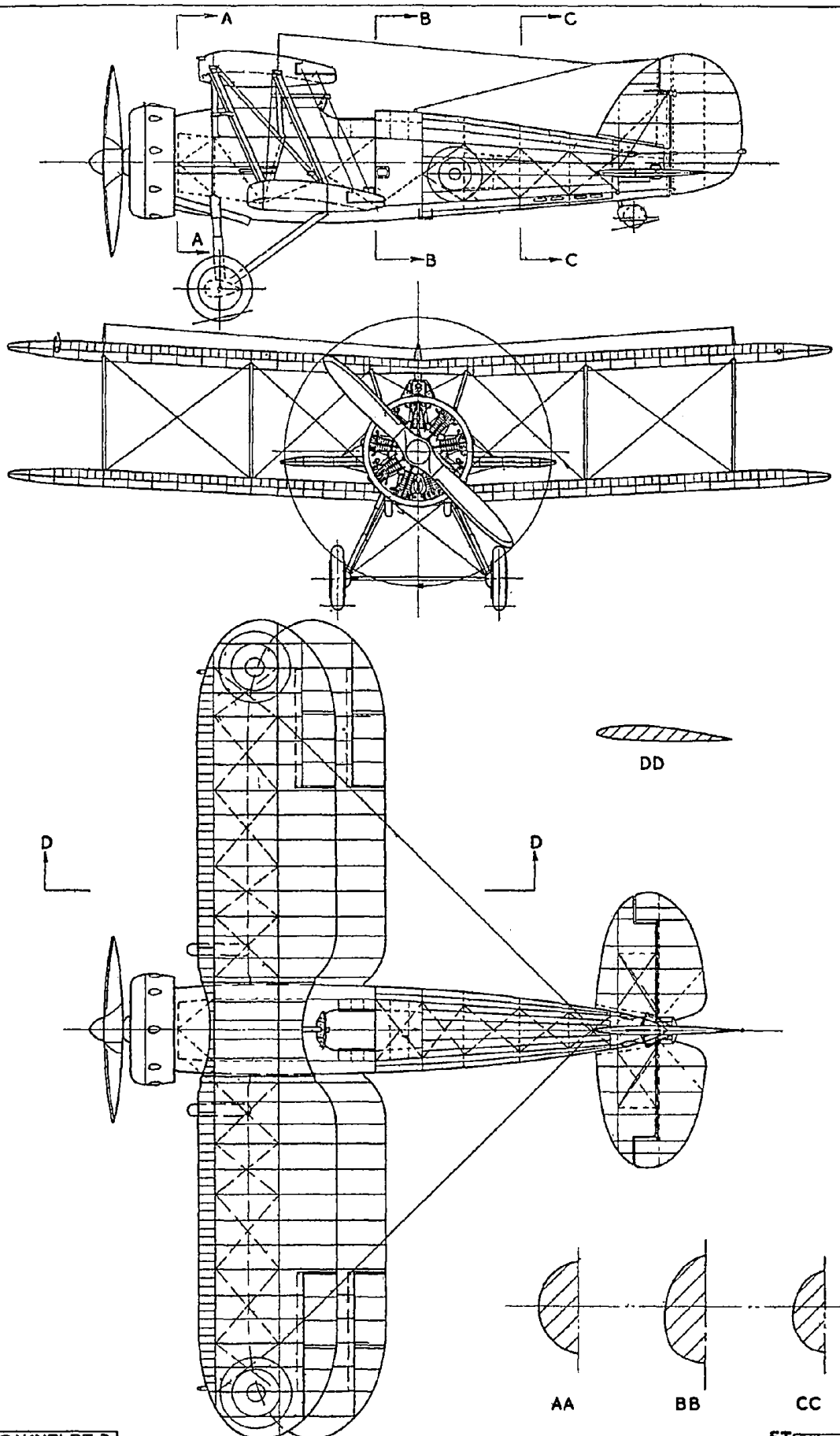
The Gauntlet I is built on the Gloster steel-tube principle, and is fabric-covered. The wings and tail unit are of metal construction, and are fabric-covered.

The Mk. II was outwardly similar to the earlier model, but had a slightly modified form of construction. One of the first Gauntlet IIs was registered K 5265 and was issued to No. 111 Squadron. The Mk. I was issued only to No. 19 Squadron.

The Gauntlet weighed 3,900 lb. when fully loaded. The main dimensions are : Span, 32 ft. 9½ ins. ; chord, 5 ft. 6 ins. ; length, 26 ft. 2 ins. ; tailplane span, 11 ft. 0 ins. ; track, 6 ft. 6 ins. ; airscrew diameter, 10 ft. 9 ins. ; wing area, 315 sq. ft.

Keystone Photo.



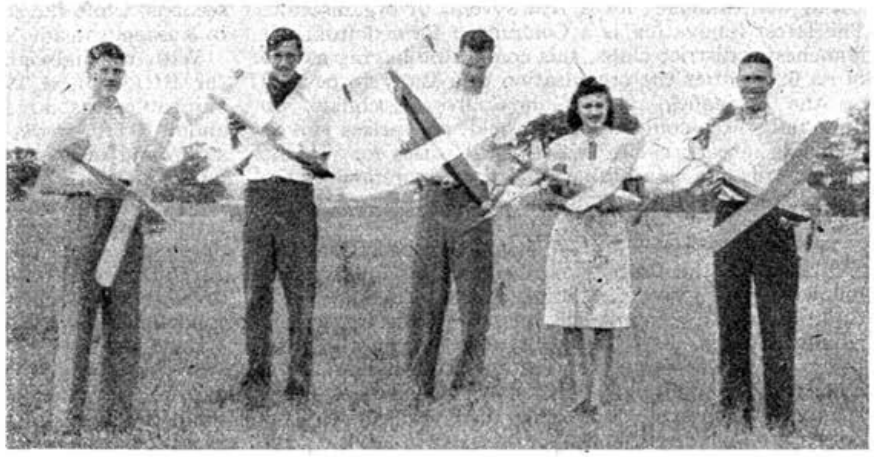


GLOSTER GAUNTLET I

FT

CLUB NEWS

BY CLUBMAN



A group of members (including a Miss) of the Halstead and District Model Flying Club.

A VERY welcome feature of recent months is the large number of new aeromodelling clubs starting up all over the country. This augers well for the furtherance of the movement as a whole, and confirms the optimism of yours truly in stating right at the beginning of the war that there was no need to panic and close down on all activities, and that in fact the interest in aeromodelling generally would be stimulated as a direct outcome of the war.

That this latter statement is true has been proven time and again, and one only requires the slightest contact with the organised groups to realise that aeromodelling is enjoying the greatest boom known in these little islands.

Whilst I am delighted to see all these new clubs springing up, and wish them all success, I would like to sound one word of warning to certain elements. A case recently came to my notice whereby we published — in all good faith—the title and secretary's address of a new club. Immediately following publication a letter was received from the secretary of a club in the same district, complaining that this new group were using exactly the same title as the writer's club, this group having been formed some twelve months earlier. Apparently the newer group were an offshoot of the older club, and comprised some disgruntled elements who had broken away and regrouped. This, of course, often happens, and I am not proposing to judge the pros and cons of the breakaway, but I do think it reprehensible to use the same title, as this can only lead to confusion and ill feeling.

One other word *re* new clubs. Don't be too ready to form more than one club in a district. One good club, enjoying the combined membership and finance of the enthusiasts in that area is surely better than multiplicity of groups more or less in competition with each other. I speak here of small districts, fully realising that the larger cities, etc., can—and do—support more than one club quite successfully. I do know, however, of smallish towns running two or more clubs, the combined membership of which would only produce an average-sized group. So, think before forming a new group—is there another group already operating in and catering for the district—if so, is it worth while conducting a competitive club, and will membership of both groups suffer in consequence.

Unfortunately press requirements compel me to write these notes before attending the S.M.A.E. Dinner and Dance on Easter Saturday, so I shall have to give you the gen. in next month's issue. I'm quite looking forward to meeting some of the old gang to discuss post-war plans, etc., etc., and fully expect to thoroughly enjoy myself in the traditional style !!

The latest S.M.A.E. news sheet gives word of a special new contest for those enthusiasts who favour unorthodox and experimental models. " This contest will probably be for tail-less or flying-wing models, and will be for open power, which means that in addition to rubber or petrol motors, jet or rocket propulsion units may be installed. The rules will probably be formulated so that a minimum flying time will be required, and the models must prove that they can be controlled by making right and left-hand circuits, etc." I welcome this progressive outlook, and would suggest that in this instance the Council adopt the procedure of a centralised contest. Yes, I know that I have plugged for de-centralisation to the utmost, but for an event of this nature, which will attract a comparatively modest entry from out-and-out enthusiasts, an attempt at conducting a centralised event will be well worth trying. What are your views ?

Pte. W. E. Alcock of the Canadian Army, home address, 54, Westlake Avenue, Toronto, Ontario, wishes to find someone who will write and exchange ideas, plans, etc. He states : " I am the proud owner of two motors, both Ohlsson's. I have had considerable success with them lately. The weight of my 'plane, believe me or not, is 8 oz. per square foot of wing area, total area 448 square inches, span 64 inches. Fuselage is all sheet covered, and flights out of sight are made even on cold winter days. I belong to the Toronto Gas Model Club—the membership of which has gone up from five original members to nearly 150."

Still on the subject of pen pals, D. M'Cutcheon, Box 35, Berri, South Australia, would also like someone over here to open up a correspondence on model matters with him.

1416373 A/C2 E. B. Jones, 131 Repair and Salvage Unit, R.A.F., South East Asia Air Forces, asks if any reader has any aeromodelling books he has finished with. Any offers ? He states : " Whilst in the R.A.F. in Blighty I built a 'Beauglider,' testing it by running into the wind. After that bit of P.T. I was determined to construct a winch—next day I was posted overseas ! " A surprising number of aeromodellers still carry on their hobby in all sorts of out of the way places, even though it sometimes savours of a busman's holiday at times.

The S.M.A.E. NORTHERN AREA are still going

ahead with schemes for a real system of organisation. The latest innovation is a Committee formed from the Manchester district clubs, this committee having as one of its first duties the organisation of a Rally to be held on the Springfield Park Golf Course, Rochdale, on July 1st. Five contests will be held, and prizes will be available in each event, with special prizes for juniors. Full details can be obtained from the secretary of the Committee, W. Titterington, 13, Lakes Road, Dukinfield, Cheshire.

The WEST COVENTRY M.A.C. is promoting an exhibition at the leading local cinema at Easter, this following the success of a stand at the local Air Scouts Exhibition. In consequence, an astonishing increase in membership has been seen this past month, the total being 30, with many more prospective members. A craze to build solid gliders of their own design has swept the junior members. It is a pity their performances are not as astonishing as their appearances!

A new club, the GARTCASH & D.M.A.C., has been most fortunate in obtaining facilities. It has the use of a school with large hall for indoor flying, also a clubhouse on the flying field. Poor weather has prevented much flying, but the secretary has raised the glider record with a "Thermic 50"

At long last the HARROW M.A.C. have obtained a hall for indoor flying, and meetings have been held fortnightly, with most members putting in an appearance. R.T.P. and microfilm are all the go, records for the types to date being :—

R.T.P.	D. Shepard	2 : 40
R.O.G. Mic.	D. Spence	54
H.L. Mic.	D. Taylor	2 : 10

The WILLESDEN & D.M.A.C. microfilm record has again been broken, the latest time being 3 : 00. In an attempt to buck up interest in the building and flying of outdoor contest types, the chairman of the club has challenged the whole club that "he will beat anyone in flying of any type." Now then, who's taking him up on it? A few twin-engine 'planes are causing a sensation among members and onlookers.

NORTHERN HEIGHTS M.F.C. are to be congratulated on winning the S.M.A.E. Indoor R.T.P. Contest, also Bob Copland for winning the Individual Contest with an aggregate of 1104 seconds. He recently regained the British Indoor R.T.P. record with a flight of 4 : 39, beating R. Rock of Streatham's record of 4 : 30·2. Mr. Jeffreys gave a talk on Wakefield models, using for illustration his finely built model which won the prize at the S.M.A.E. Bristol Exhibition. A. C. J. Turner, who specialises in R.T.P. Speed models, gave a talk on the subject, clearly illustrating theory in a simple manner easily understood by the beginners in the club. Mr. Turner's models are all-scale or semi-scale, and he obtains consistent speeds at least equal to those obtained by specially designed "freak" speed models, and won several contests.

The ISLINGTON M.A.C. which was founded in 1944 is going strong. At present activities devoted to outdoor models, and it is hoped to get at least 60 'planes into the air for this season's competitions. K. Tansley, who recently joined the club, holds the club record for R.T.P. flying with his model "Peg Leg Pete," time being 1 : 17. He recently demonstrated his R.T.P. Speed model, but as many of the members had never seen this type of model before, they took cover behind the piano and rolled up mats in the School Hall, just in case the line should break! The speed attained was 90 m.p.h., using a 9 ft. line. The first flight made seven laps in 3⅓ seconds, while the second attempt completed seven laps in 3 seconds dead. Two stop watches were used.

With the indoor season rapidly drawing to a close, the BRISTOL & WEST M.A.C. look back on a most enjoyable season. Although they have a lot to learn about R.T.P. work, they have at least made a serious start, and interest has been aroused. Mr. Hurley has built an Ornithopter, the first to be seen in the club for some time, and with a bit more trim it should be quite satisfactory. Mr. Morgan has been flying a helicopter, but while the "up" part is all right, the descent is anything but stable! Several members have been testing new gliders on the Downs, Mr. Jones unfortunately losing his brand new job after being timed for 4 : 39·4 o.o.s. This machine was a diamond fuselage job, span 50 in., 6 in. even chord pylon mounted, with auto-rudder control. Mr. Middleton did everything he could to lose his model, even using a 450 ft. line, but as usual it finished the day well and truly treed!

Since 1942, the FIFE M.A.C. existed in name only as practically all its members were called to the Forces. Last year, however, the club was reorganised under a new secretary, and meetings were held regularly every fortnight at the Y.M.C.A., Kirkcaldy. A fairly successful outdoor season was completed, in which several comps. were held, while R.T.P. flying has been a feature of the past winter. Records are as follows :—

Open Rubber (H.L.)	A. Duncan	1 : 13
Open Glider (Winch)	J. Wedderspoon	2 : 05
R.T.P. (R.O.G.)	P. Montgomery	1 : 18

Another change has taken place in the Derby Model Aero Engineers, this group now having affiliated with the Derby Short Wave & Experimental Society. This group will now be known as the DERBY EXPERIMENTAL SOCIETY, secretary being Mr. Turner, 11, Alvaston Street, Alvaston, Derby. One of the main functions of the Society will be the design, construction and development of radio controlled models, both petrol driven and gliders.

March 11th saw three new records set up in the NORTH KENT M.A.S. A. R. Perker made a flight of 11 : 06 with a modified "Smith" Wakefield, R. J. Wilkins "Hadrian" glider flew for 2 : 20, and J. Knight timed 16 seconds with his scale "Auster."

B. S. Simmons, of 7, Bourne End, Cranfield, near Bletchley, Bucks., would appreciate news of his modified "Beauglider III," lost on Sunday, March 11th. Last seen at 4·10 p.m. at about 5,000 ft. circling toward Lillington, having been airborne for some 30 minutes, the model is coloured all white, with R.A.F. insignia, the letters 29 and a small A.B.A. transfer on the starboard wing, and the name "Valkyrie" in grey letters on each side of the fuselage.

The Scottish Aeromodeller's Federation has changed its title to the SCOTTISH AEROMODELLER'S ASSOCIATION, and a full executive were elected at a recent meeting held in Glasgow. Clubs are affiliated at a fee of £1. 1s. 0d. per annum, whilst individual fees are Seniors 5s. 0d. and Juniors 2s. 6d. All clubs and individuals interested in Scottish aeromodelling are asked to contact the secretary, Mr. J. M'Aleese, 43, Holnhead Crescent, Cathcart, Glasgow, S.4.

For the first time in ages the BLACKPOOL & FYLDE M.A.S. report "fairly reasonable" weather conditions for their efforts in the Northern Area February Consistency Contest, the St. Annes members showing what they could do in the way of consistent flying. This type of contest requires three flights, the middle time being counted as the "average" figure, the

duration over and or under this figure on the other two flights being counted as the margin of error. P. Uttley got as close as 4·6 secs., which is certainly consistent flying at any time. R.T.P. speed models are enjoying a boom, though to date no one has been able to complete the necessary ten laps.

An S.M.A.E. Northern Area Rally will be held on Baildon Moor (home of the BRADFORD M.A.C.) on September 9th, when a full popular type of programme will be contested. Flying has been restricted owing to poor weather lately, but the Bradford lads have been doing their stuff with petrol jobs since the lifting of the ban, and do not let even snow deter them from a spot of flying. Norman Less has a "pay-load" Wakefield model all ready for flying, this machine carrying a 4 oz. "dead" weight, utilised for trimming purposes—and will not fly without its ballast!

The Anderton Cup for the 1944 LEEDS M.F.C. season was won by K. Lloyd with 23 points, C. Furse with one point less being the runner up for the second year running. M/s. Hempsall and Vauvelle have been taking full advantage of the lifting of the petrol flying ban, great things being expected of the latter's S.E.5 biplane, which has shown great promise in gliding tests. Better weather has allowed some outdoor flying recently, the best times this year so far being :—

Tow Launch Glider	A. Thompson	3 : 27
Catapult Glider	K. Lloyd	2 : 10
H.L. Glider	K. Lloyd	1 : 22·4
H.L. Duration	K. Lloyd	2 : 00

As the WALLASEY M.A.C. is getting so large, it has been decided to appoint eleven teams to compete for the various club trophies. Mr. Molyneux was presented with a medal for the first club flight of over 12 minutes, he also taking the W.M.A.C. Silver Cup for the best all-round performance in the past season.

Undoubtedly, most clubs are going ahead well, and I hope—who doesn't!—for a fine weather season, which I am sure will make 1945 one of the best yet from a modeller's point of view. The only thing we want now is the end of the war (which as I write seems to be going all our way, and may even be over by the time this appears in print!), and some rubber for general contest work. Anyone like to hazard a guess when this vital material will again be in good supply?

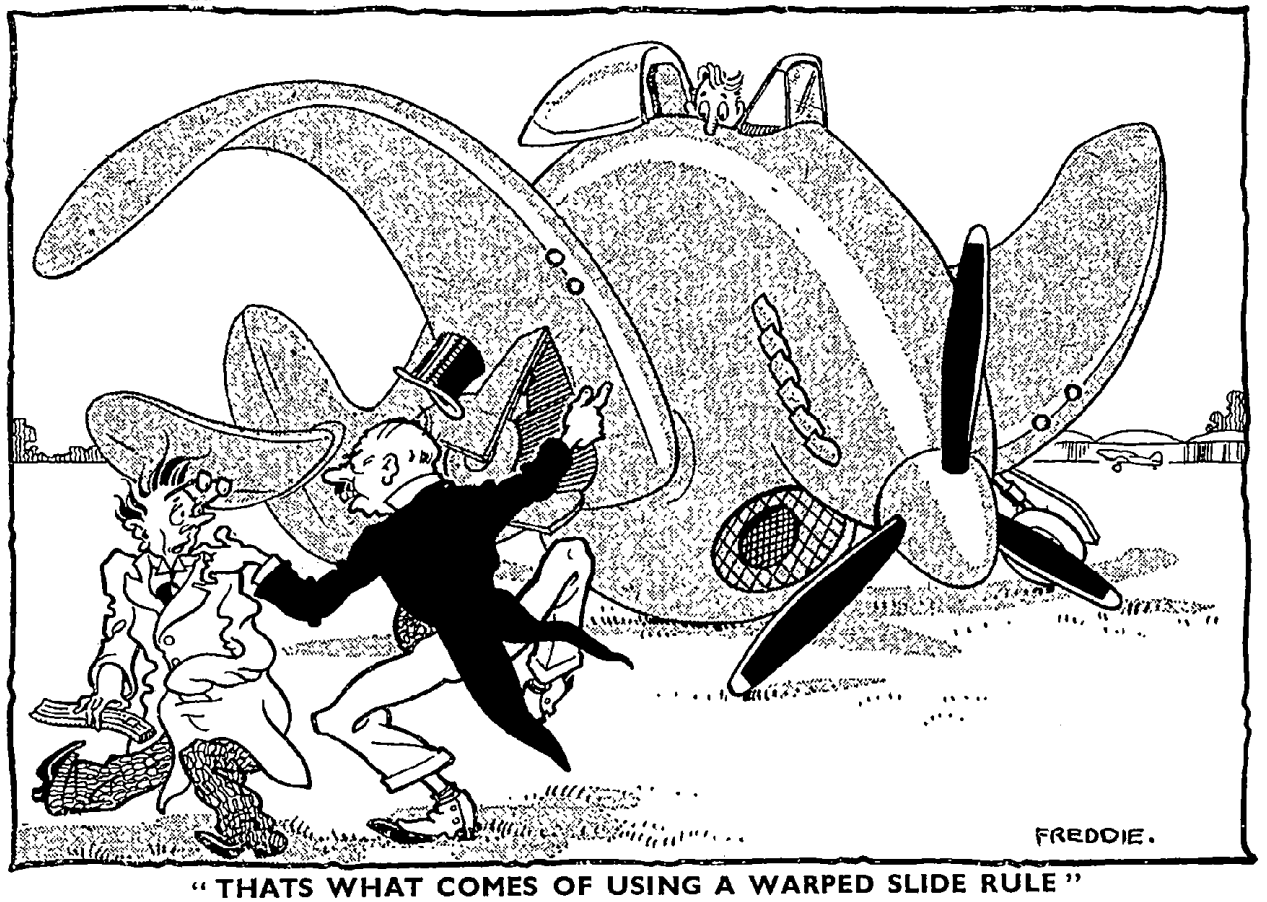
THE CLUBMAN.

NEW CLUBS

SALFORD M.A.C.
A. Parry, 52, Fairfield Street, Irlams o'th Height, Salford, Lancs.
OSWIN AVENUE (BALBY) M.A.C.
A. McBurnie, 48, Carr Hill, Balby, Doncaster.
KERRISON M.A.C..
L. J. Reed, Kerrison School, Thorndon, Eye, Suffolk.
AIREBORO GRAMMAR SCHOOL M.A.C.
M. Tomlinson, 124, Stanhope Drive, Horsforth, near Leeds.
GRAVESEND A.C.
C. C. Pinder, 22, Darnley Street, Gravesend, Kent.
PAISLEY & D.M.A.C.
G. Fudge, 19, Cochran Street, Paisley.
KEMPSTON M.A.C.
D. L. Roberts, 86, Spring Road, Kempston, Beds.
SANDHURST & D.M.A.C.
D. Bartlett, The Birches, Wellington Road, Sandhurst, Surrey.
EXMOUTH & D.M.A.S.
J. Saturley, "Elmside," Withycombe, Exmouth, Devon.

SECRETARIAL CHANGES

THAMES VALLEY M.A.C.
B. Mullins, 89a, Cambray Road, Balham, London, S.W.12.
NEWPORT & D.M.A.C.
B. Morris, "Nord," Halberry Lane, Newport.



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Place X in 1st column against item required and fill in price (where required) in second column.

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(d) Transfers: Large, 1d. each quantity..... Small, 2 a 1d. each quantity.....		
(e) Models insured for O.O.S. Number of models.....at 2/- per model. The following details to be given on separate sheet for each model:—Type; span; length; rubber-driven or glider; colour; and any special feature.		

I enclose P.O./cheque No..... .....to cover the above items for _____

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