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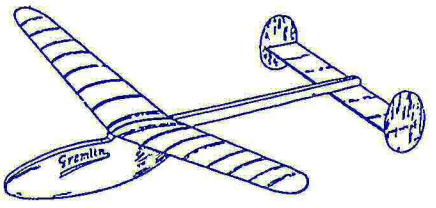

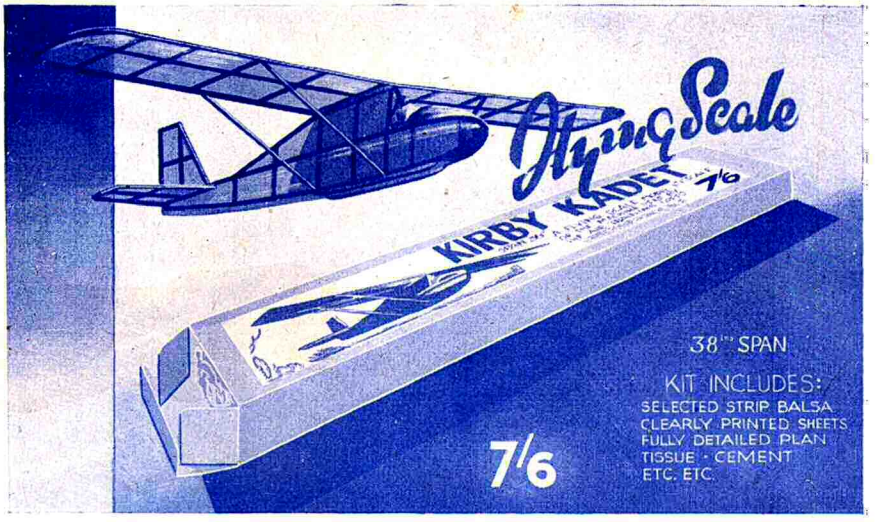

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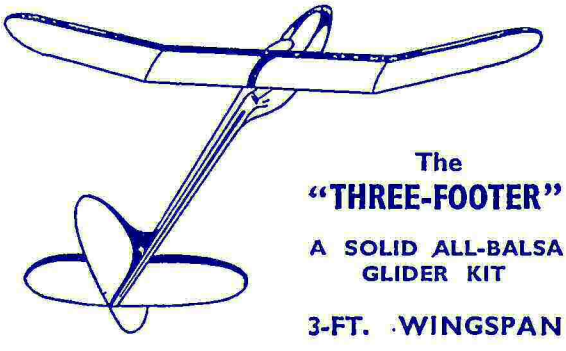

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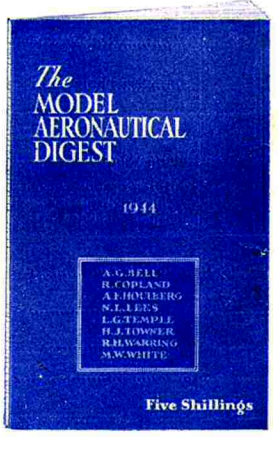

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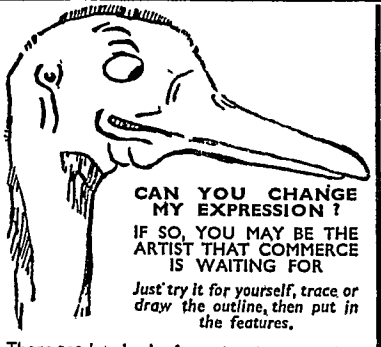

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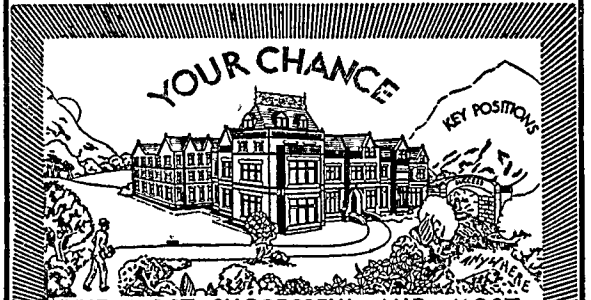

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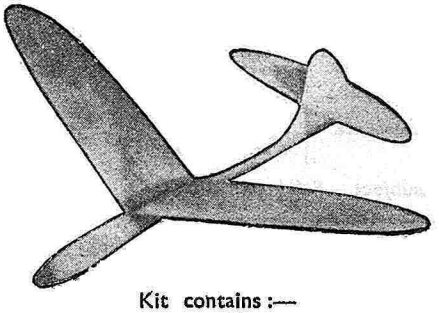

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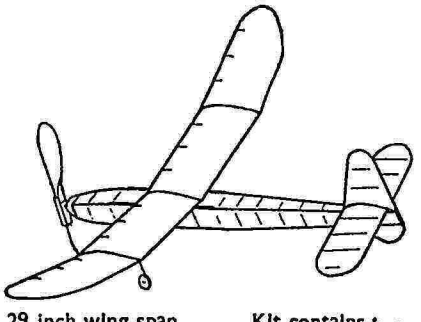

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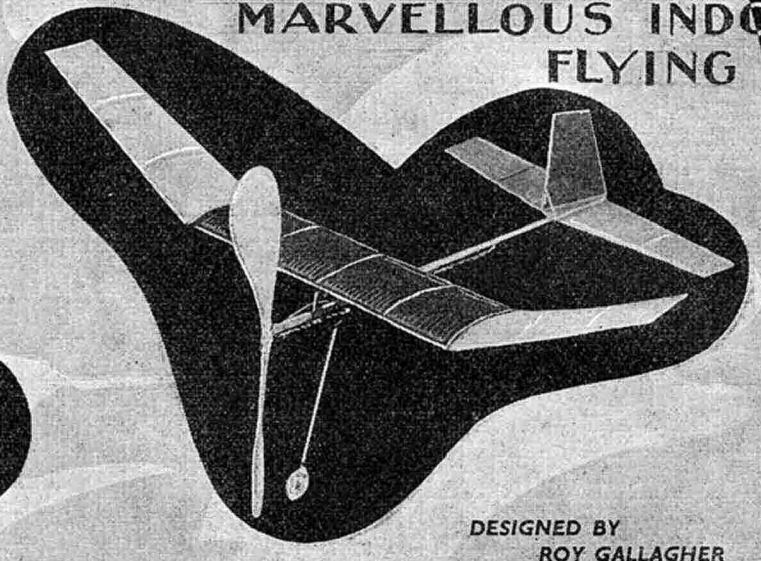

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ESTABLISHED 1935

VOL. XI No. 122 JANUARY, 1946

The Model Aeronautical Journal of the British Empire

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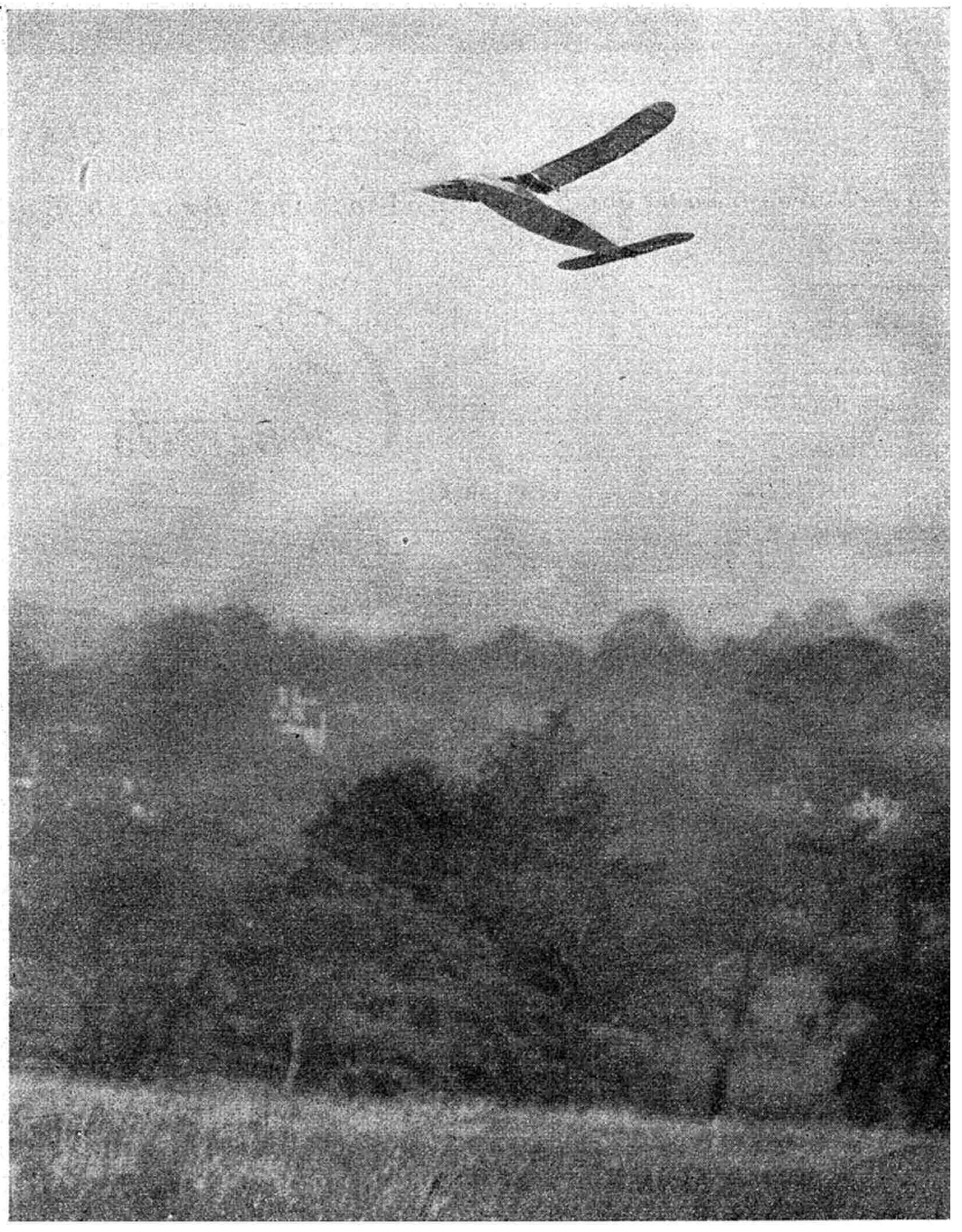
Contents



WINTER FLYING : J. R. Miller's successful Wakefield model Dusty VIII, a treat yet in store for our readers, climbs steadily into the still winter air. This machine placed second in the 1945 Gutteridge Trophy and has a maiden flight of 26 mins. 35 secs. to its credit.

EDITORIAL

10 YEARS OLD

SO swiftly have the years been fleeting by, and so filled have they been with momentous happenings, that possibly few of the thousands of regular readers of the AEROMODELLER will have realised that it is now ten years since our first number appeared. It seems appropriate, therefore, at this juncture to indulge in a " then and now " comparison. This should prove encouraging, as well as interesting, for the very considerable expansion that we are happy to record in respect of this magazine and its associated enterprises, reflects to a large extent a commensurate expansion in the aeromodelling movement generally.

Ten years ago, the AEROMODELLER began its career under auspices that were far from bright, principally because of a lack of aeromodelling knowledge on the part of the original proprietors, the Barron-Dean Publishing Company, Ltd., with the result that its acceptance by aeromodellers, despite the need for some such publication, was somewhat tardy. Further, the financial position was somewhat cramping, and was soon reflected in the irregularity of the publishing date, which further retarded its popularity.

Eventually, a critical phase was reached, and in May, 1937, the Company collapsed. It was at this point that Mr. D. A. Russell, the present Managing Editor, acquired control of the magazine, the circulation of which was then barely 4,000 copies per issue. Stepping into the breach at short notice, with very little publishing experience, but with an extensive acquaintance with aeromodelling, a sound engineering and business training and an exceptional degree of adaptability, he produced his first issue, entirely unassisted, in ten days. From that time there has been no looking back.

Meanwhile, an opposition to the Barron-Dean venture had appeared in the form of a magazine sponsored by certain enthusiasts of the S.M.A.E. under the title " The Model Aeroplane Constructor." The producers of this rival magazine found themselves in difficulties in even less time than it had taken for the Barron-Dean Company to fail, but once again, Mr. Russell came forward at what is popularly known as " the psychological moment," effected the necessary financial arrangements, and in due course the " Constructor " was merged in the AEROMODELLER.

Despite the supervention of the war years, the influence and popularity of the magazine have increased continuously, and today the circulation is well over 50,000 copies per issue, and there has been attained an international reputation that is exemplified by a huge and constantly increasing mail from all over the world.

Now that the war is over, plans are well advanced to extend the influence and usefulness still further. To that end, Mr. Russell has gathered together an editorial team well equipped to operate an aeromodelling service *par excellence*, not only in the matter of articles in the AEROMODELLER, but in dealing with readers' queries.

Here again, a " then and now " comparison should be helpful. In those almost forgotten days when Mr. Russell first took over, his staff consisted of a typist and an office boy, and the accommodation was a small room in Allen House, Leicester. Later, other premises in Leicester were obtained, and during the war, when Mr. Russell's work took him to London, offices were opened in Highgate. Other developments followed from time to time, and now, as 1946 dawns, the AEROMODELLER, the Aeromodeller Plans Service, the Harborough Publishing Company, and other associated enterprises, employing over 100 people, are in process of being gathered under one roof at the recently-opened Eaton Bray Model Sportsdrome.

The actual team which has now been organised consists, in addition to Mr. Russell himself, of 12 full-time members, whose combined experience of aeromodelling totals some 200 years ! ! Moreover, the scope of this experience and the range in their ages—the youngest is about 22 and the oldest about 50—make for balance, not only in technical outlook, but as between the enterprise that is popularly attributed to youth, and the mature judgment that is commonly supposed to be the prerogative of those of maturer years !

Coming now to the composition of this team, let us first refer to Mr. C. S. Rushbrooke, who for several years has been Editor of the AEROMODELLER. He has been a modeller since 1932, once held the indoor rise-off-ground record, but, very surprisingly, has not yet built a petrol model. Doubtless, the inviting expanse of Eaton Bray Aerodrome will speedily induce him, on leaving the R.A.F., to repair that omission ! Mr. Rushbrooke has a vast experience of the organising side, having for years been the efficient secretary of the Lancashire Model Aircraft Society and responsible for the Northern Rally.

Technical Editor is Squadron-Leader Peter Hunt, who has a record of 1,600 hours as a bomber pilot, 12 years' experience as a modeller, and eight years' experience of research in electrics, mechanics and gadgets. He has specialised in radio-controlled models and is the author of a text-book on this subject.

Mr. H. G. Hundleby, Assistant Editor, has been largely responsible for the production of the AEROMODELLER during the past two years, against a background of interruption from V.1 and V.2. Introduced to modelling some ten years ago by those stalwarts, R. Sharvell and R. J. Trevithick, he has built most types except those with compressed air motors and helicopters. He is keen to see Government recognition of our hobby, and its introduction into every school.

A recent recruit to the staff is Mr. Lawrence H. Sparey, well-known as a successful designer and constructor of petrol models and their motors, and as a prolific writer of textbooks and articles on all aspects of aeromodelling. He has been a modeller for 16 years, and his latest activity has been in connection with the development of " Diesel " motors for models. During the war he worked on Radar and other equipment.

Youngest member of the team is Mr. O. G. Thetford, a student member of the Royal Aeronautical Society. He spent several years in the technical offices of an aircraft firm, has taught Aircraft Recognition and Theory of Flight to the Air Training Corps, and has a general knowledge of full-size aircraft that should be of considerable value to the scale-modeller.

Specialising in educational subjects is Mr. Robert

Pierce. He was a flying instructor in the R.A.F. for about 12 years between the wars, and more recently has done test flying and radio control research with the R.N.V.R. He is holder of an imposing list of certificates in engineering, navigation and wireless, as well as flying.

Mr. D. Laidlaw-Dickson has 15 years' experience with most types of models, including the much neglected low-wing class, and ornithopters. Formerly a foreign correspondent of Reuter's, he has taken part in gliding in Germany. Throughout the blitz and the V.1 and V.2 offensive he was a staff officer of the N.F.S. in London, but managed to find time to be the very effective Press Secretary of the S.M.A.E. He has since been on the Continent for the N.F.S.

Mr. C. Rupert Moore, A.R.C.A., has been modelling for 25 years, and is the inventor of the Moore angular drive for rubber-driven models. He has specialised with considerable success in the large flying-scale class, and is an artist of outstanding ability. The cover designs of the AEROMODELLER for years past have been executed by him.

Another acquisition to the staff is " Robert Jamieson," who describes himself as " an aeromodeller, on and off, from the age of five." He is particularly interested in sailplanes and unorthodox rubber-driven jobs, and is the creator of that delightfully whimsical and certainly very popular " McGillicuddy."

Staff photographer of the AEROMODELLER is Mr. D. B. M. Wright, a former R.A.F. pilot who has 12 years' experience of many types of models as well as 15 years' experience of full-size. Skilled in ciné and still photography, more of his work will be seen as more paper becomes available for the AEROMODELLER.

A member of the staff with an encyclopædic knowledge of historical full-size aircraft is Mr. E. J. Riding. He can also claim 21 years' experience in aeromodelling, and has specialised in static built-up and flying-scale types.

Then there is Squadron-Leader H. E. Hervey, M.C. and Bar, whose special subject is gliders. He has been a modeller since 1911, studied aeronautical engineering at Bristol's, and has been in turn an observer and fighter pilot in the 1914–18 war, manager and pilot to an Australian firm, founder instructor of an Australian gliding club, and manager and chief instructor to the pre-war London Gliding Club. During this war he has been engaged on intelligence work with the R.A.F.

Latest additions have been several more experienced aeromodellers—until recently members of the R.A.F., whilst early in the New Year "Eddie" Cosh is due to join the staff after demobilisation. Mr. Cosh needs no introduction to our older readers, who will remember his sunny smile and competent handling of meetings, both on the flying field and at the S.M.A.E.

" Last, but not least," to use the conventional and very convenient expression, there is Mr. D. A. Russell himself. Now in his early forties, he possesses a boundless enthusiasm for aeromodelling, the initiative, foresight and disciplined mind of an engineer, considerable business acumen and an experience that now includes ten years of publishing under the most adverse conditions, sufficient finance to bring his ambitious schemes to fruition, and—what may fittingly be regarded as the cement binding all the other qualities into a unified whole—the faculty of inspiring the utmost loyalty in his associates.

As the paper supply increases, so will the AEROMODELLER expand—various new features are already planned—and with such a team as has been gathered together, the outlook for the eleventh year of publication and succeeding years is bright indeed.

DORLAND HALL DIVERSITY

On Friday, December 14th, the Second National Model Aircraft Exhibition, organised by the AEROMODELLER, opened at Dorland Hall. There are over 2,000 models on view, a far greater number and of much greater variety than previously gathered under one roof. With the exception of December 23rd–25th, the Exhibition will remain open until Saturday, January 12th.

Mr. John Lansdell, F.R.S.A., N.R.D., the Exhibition architect, has co-operated to the full with the exhibitors to put over aeromodelling in impressive fashion. On entering the Hall, one's attention is caught immediately by the huge representation of a copy of the AEROMODELLER, from the pages of which emerge a host of models, many of which have been described in past issues. To the left are painted on a large panel words spoken by Lord Brabazon of Tara when he opened the previous Exhibition: " Flight was not born in the laboratory, but arose out of the work of the hands and brains of skilled mechanics, like the Wright Brothers. We aeromodellers may continue to make important discoveries by our practical work."

Housed in large vertical showcases, and protected from the depredations of irresponsible fingers by plate glass panels, are numerous solids, flying-scale models, gliders, and duration models. In each category, prize-winners (two solid silver trophies and prizes to a total value of £300 were offered to exhibitors) are in separate showcases. The backgrounds of the cases consist of working drawings of each class. Moreover, in each section, there is a stand where construction is demonstrated. Then comes a huge case with miscellaneous types flanking the truly remarkable " Apocalypse." To the right is a large inclined model of Eaton Bray Model Sportsdrome, with sheds, take-off area, and numerous Lilliputian figures of aeromodellers, all to the correct scale.

Then up the stairs to the mezzanine floor, and we find ourselves in " Petrol Corner," where there are numerous splendid models and a large showcase filled with tiny motors, including some Diesels. Beyond are the trade stands, with models, accessories and plans in considerable variety. From this floor, we can look over the rails at the two large circular Perspex landing-strips, one above the other, from which electrically-driven tethered models are being demonstrated throughout the Exhibition. From the upper strip flies a Vickers V.C.1. Viking, and from the lower, a neat little high-wing devised by a member of the AEROMODELLER staff.

It is a show which we are intensely proud to have sponsored and organised. We defy any member of the public unacquainted with aeromodelling to go away unimpressed by what has been achieved by the movement; it would be equally difficult for any modeller to visit Dorland Hall without his enthusiasm for our incomparable hobby, and his imagination, being stimulated.

A fully illustrated report of the Exhibition will be published in the February and March issues.

AEROMODELLING AROUND THE WORLD

BY OUR SPECIAL CORRESPONDENT

CANADA

IN his last article, your newly-found friend, philosopher and guide, having introduced himself as an eagle-eyed if case-hardened observer of aeromodelling activities, proceeded to inaugurate the world tour on which we are to be fellow-hoboes for the next few months, by conducting you in the spirit to the home of flivvers, gasoline, thermals and lease-lend, to wit, the United States of America. Having arrived there, let us this month take the easy line of hopping across the 49th Parallel to the Dominion of Canada.

Canada is a land where aeromodelling seems never to have hit the headlines, which seems strange since its location is cheek by jowl with the United States, where pretty well everything seems to happen. Perhaps it is due to the unhelpful physical make-up of the country, which seems largely to consist of Hudson Bay, a stretch of water which, with its spread of over 500 miles is a little too " spready " for the convenient operation of model seaplanes, and the Rocky Mountains, which would provide for the perspiring modeller considerably more of a lug than Britain's Ivinghoe Beacon, from which, some years ago when your faithful scribe was sounder in wind and limb, creaked less in the joints, and was less impregnated with rubber " lube," he had the doubtful pleasure of hastening across several miles of country in pursuit of a model glider—only to discover on his return that the contest was over and his fellow nuts had gone home ! Of course, there are the prairies, too.

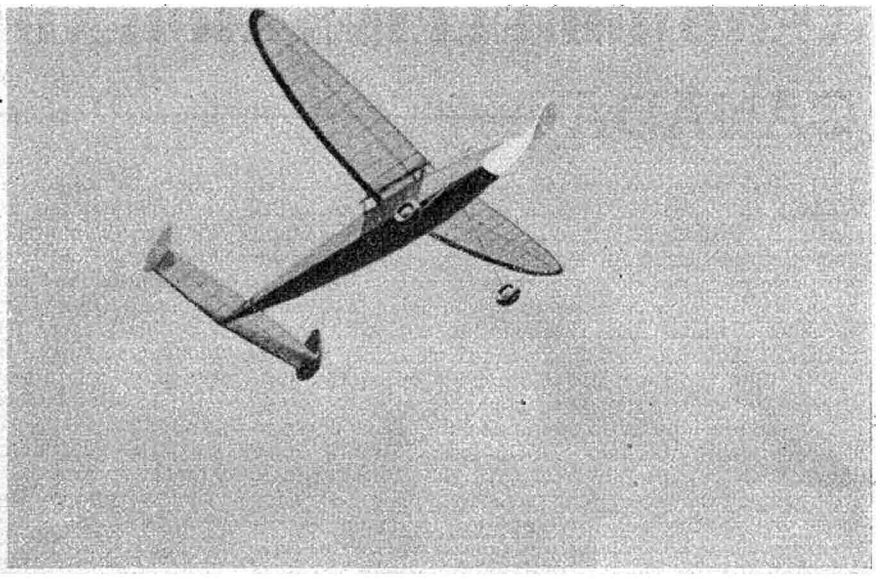
Anyway, be the cause what it may, Canada has always been somewhat quiet from the point of view of aeromodelling activity, and even now our correspondents haven't a great deal to tell us. One thing soon emerges, however, from a study of reports received, namely, that many of their modellers and ours are co-religionists in that both worship devoutly the great god Duration !

" The trend has been to the out-and-out contest model, after duration only," writes one correspondent. " You rarely see a scale or semi-scale model." The technique, he goes on, has been a very fast climb followed by the flattest glide obtainable, in preference to a long motor run and more moderate climb : in fact, this correspondent has never encountered a geared motor. Usually there is a single skein of 20–26 strands of 3/16 in. rubber strip turning a propeller with a diameter of 14–16 in., as compared with the 18 in. favoured by British top-notchers, and the resulting climb is brief but rocket-like. Modellers wishing to advance beyond the construction of published types have based their designs on fundamental theory and developed them as suggested by experience, rather than having recourse to elaborate mathematical formulæ that might conceivably have discouraged many from early original design work. Numbers are now turning to more scientific methods in pursuit of improved performance.

While the general tendency has been to keep to the broad highway of design, there has been an encouraging number of original efforts. Our correspondent does not particularise, but your scribe recalls that years before the war, the contest for the cup presented to Canada by Lord Wakefield was won by a biplane—the only outstanding contest that one can recall in which the more elaborate (from the structural and line-up viewpoints) " double-winger " has beaten the all-pervading high-wing monoplane type of model. This particular biplane, by the way, was about the slickest ever—tapered wings with K interplane struts, marked backward stagger, a multi-stringer fuselage, and well-sprung spatted undercarriage, and despite a troublesome wind and a complete absence of thermals, it achieved a duration of 72 seconds, which was pretty good going for Canadian aeromodelling in those days.

" Our annual competitions," writes the same correspondent, " have been run on American lines, with Wakefield and stick rubber-driven models and hand-launched and towline gliders, all (except, of course, the Wakefields) to American rules. Most designs follow the American trend, as the magazines available are mostly American ; *we know little of your activities over*

This Canadian " Gas job " is a fair example of contemporary " American " practice, the God of Duration being worshipped unreservedly. Note the close resemblance to " Glenelg " of the Aeromodeller Plan Service.



A typical Canadian Wakefield.

here." The italics, by the way, are contributed by your humble scribe.

As to club organisation, the correspondent continues, there seem to be two basic types—those for the experienced builder, and those for novices, and much time has been spent guiding the younger members (a point our clubs in Britain might well note). He himself belonged to a very successful group with 30 to 40 active members. During the war this group dwindled, somewhat naturally, but activities have been continued, and this little bunch of stalwarts is forming the nucleus of post-war organisation.

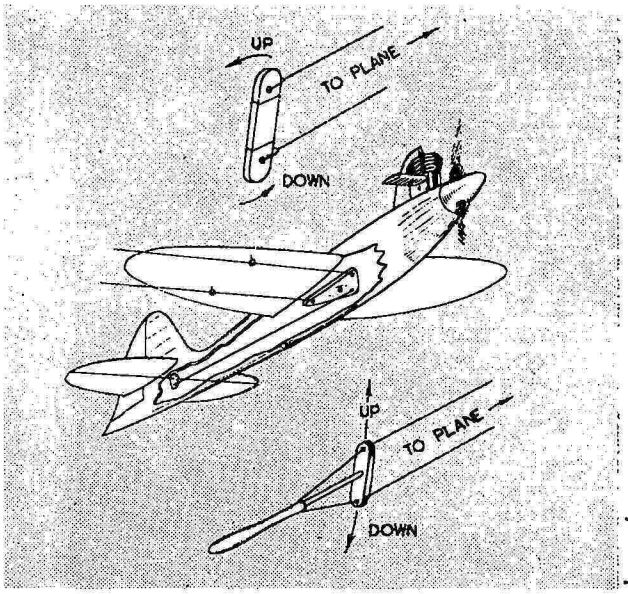
Turning to the petrol model, our correspondent says that this class was booming when war came, but war priorities soon put paid to that. Here again, the tendency has been to work on American lines, with three classes, models with motors of 2·5–3 c.c., 5 c.c. and 10 c.c. or thereabouts. The fuselage formula as applied to Wakefield types has been followed, plus a loading of 8 ozs. per sq. ft. and a minimum weight based on motor displacement. A multiplicity of " lost ships," as our correspondent poetically describes them, led to the motor run being reduced from the initial figure of 30 seconds to 20, and later to 15, near-vertical climb and flat glide being the aims. Over here in Britain, of course, it was less the fear of " lost ships " than the likelihood of hitting an air liner or the local town hall that caused a motor-run limit to be imposed.

Canadian petrol models have been almost entirely of the contest type, scale and semi-scale designs being virtually if not completely unknown. The most popular layout has been a polyhedral wing with NACA 6409 section and of fairly high aspect ratio, divided into four equal sections with the inner two of constant chord and the outer two elliptical; wing mounted well forward and high above the fuselage on a streamlined pylon; a " stabiliser " (tailplane to you) with a lifting section and and area 30–35 per cent. that of the main plane as compared with the British limit of 33⅓, and a long moment-arm. Top times with a 15 sec. motor run under good thermal conditions have been around the 30 minute mark, taken as the average of three flights.

Finally, we come to control-line flying, which the scarcity of transport has rendered hugely popular. Almost every city park is suitable for this form of activity, and once again the American formula has been followed. Flying on centrifugal force, the models often have only rudimentary wings, the idea being to fair in a big motor with the smallest possible model. Well, well; boys will be boys! But one cannot help feeling that this pretty play (meaning flying without wings, not tethered flying as such) must tend to create among the general public an impression that it has been only too ready to form anyway, that aeromodelling is nothing more than a slightly superior form of kite-flying, in short, a kid's game.

" The propeller is the real secret of high speed," writes our correspondent, " and there is a good deal of research in that field nowadays." One can appreciate that, but must confess all the same to an old-fashioned prejudice in favour of models with wings as well as props.

In flying the control-like jobs a 50–75 ft. circle is made, and as many readers are doubtless aware, the " pilot " uses a hand-stick, and by moving the wrist shortens one wire and lengthens another of a pair of wires that actuate the elevators through a bell-crank. At speeds approaching 100 miles an hour, a T control stick is proving superior to the normal U control, a finer movement being secured by pointing the hand at the T slightly up or down. The T control is shown in the accompanying sketch.



Details of T control for control-line flying.

ARMCHAIR AERONAUTICS

By Lt.-Comdr. R. Pierce, R.N.V.R. (retd.)
Manager of the Aeronautical Bookshop.

This series is for the benefit of aeronautical students, and its main object is to keep them advised of new books as they are published. All books reviewed may be purchased from the Aeronautical Bookshop, 7, Hanover Court, London, W.1.

THE power plant of the modern aeroplane represents the results of intensive research and development work. The foundations of which were laid some thirty or forty years ago, when the petrol engine was in its infancy, subsequently, with the extensive and ever-increasing use of the petrol engine for various transport purposes a vast amount of experimental work has been carried out by individuals, associated with private and official institutions and commercial firms, in order to improve the performance reliability and endurance qualities of such engines and—in the case of aircraft engines to reduce the fuel consumption and weight per horse power.

As a result of these world-wide activities, a very considerable amount of technical information on the principles underlying the design and operation of the petrol type engine has been accumulated. Unfortunately for the student and others interested in aircraft engineering, this information is widely scattered in the archives of various institutions and the technical press of this and other countries, a fact which renders reference to the results a matter of difficulty. Herewith, however, are selected titles to enable students and designers to choose their books and form the nucleus of a library that will form the basis of their studies.

ELEMENTARY HANDBOOK OF AIRCRAFT ENGINES

by A. W. JUDGE. Chapman & Hall. 226 pp. 12s. 6d. 13s. 0d.

This book is intended to fill the existing gap between the very elementary and mostly unsatisfactory inexpensive small books and the more advanced textbooks which are beyond the requirements of the aircraft student. The present volume deals with the essential aspects of aircraft engines in a clear and concise manner. The principles involved are explained and descriptions are given of modern aircraft engines and their components. The mathematical side has been kept down to the barest minimum.

AIRCRAFT ENGINE MAINTENANCE

by BRIMM and BOGESS. 470 pp. Pitman. 10s. 6d. 11s. 6d.

In this book the authors have endeavoured to present the fundamentals of engine construction, operation and maintenance in a form which may be readily grasped by a beginner, in addition, there has been included, reference material which should be of value to the expert engine mechanic.

AIRCRAFT ENGINES

Vol. 2. By A. W. JUDGE. Chapman & Hall. 446 pp. 30s. 0d. 31s. 0d.

This book has been prepared for the benefit of designers. Students, research engineers and others concerned with the theoretical, practical and experimental aspects of aircraft engineering.

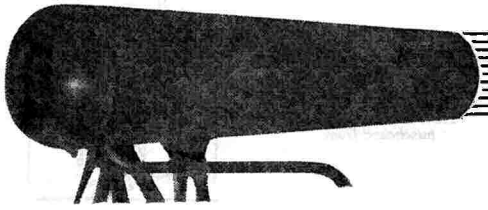
The general scheme of the book is firstly to give the reader a sound, but practical account of the essentials underlying thermodynamical theory relative to petrol engines.

THE TESTING OF HIGH SPEED INTERNAL COMBUSTION ENGINES

by A. W. JUDGE. Chapman & Hall. 463 pp. 42s. 0d. 43s. 0d. (Third Edition Revised.)

During the interval that has elapsed since the publication of the last edition there have been considerable developments in engine testing methods and appliances; these have rendered necessary a fairly complete revision of the text matter and illustrations. Certain sections of the previous edition have been re-written and expanded, whilst new chapters on Cathode Ray Indicators and Testing of High Speed Compression Ignition Engines have been added.

THE APPLICATION TO MODEL AIRCRAFT OF JET PROPULSION



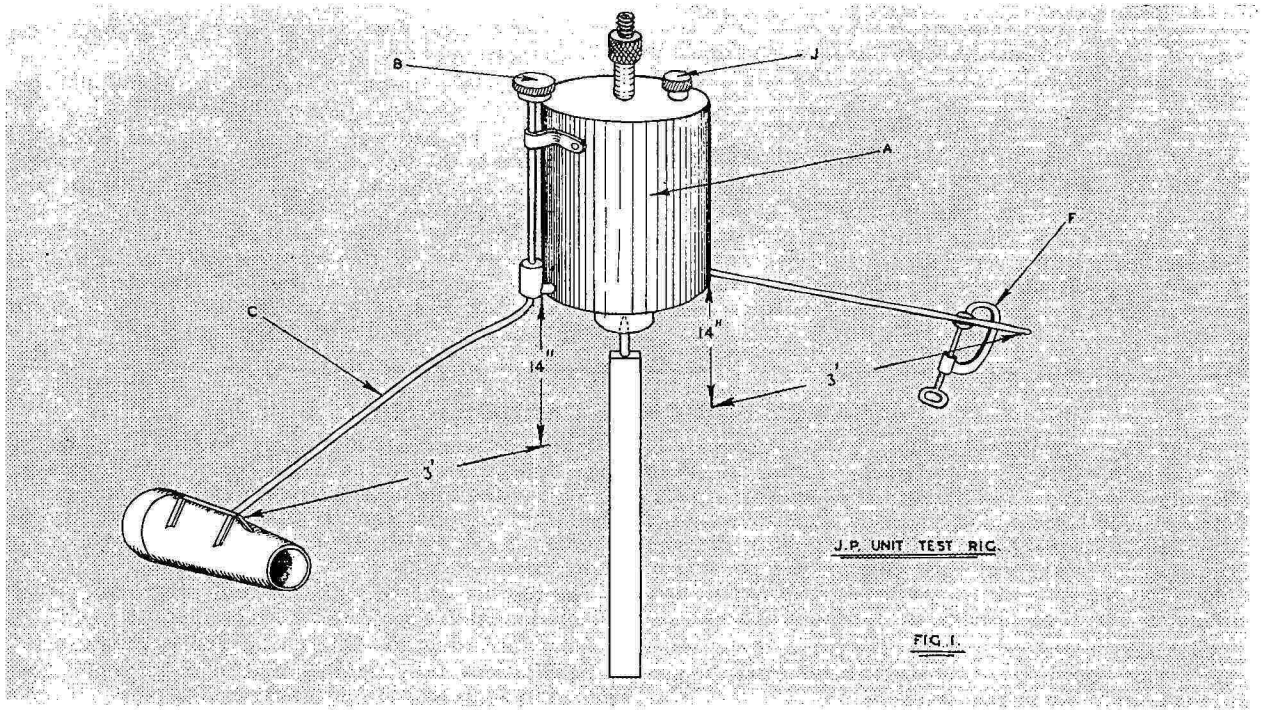
BY G · W · W · HARRIS

SOME weeks ago the Editor sent me a copy of Sgt. Henwood's article dealing with his experiments in the Jet Propulsion field, together with a specimen unit for testing. Owing to wartime contingencies, Mr. Henwood's latest units have been packed away, and so the only available unit was one of his older ones, suitably modified. Thus it was that when the unit arrived I found it possessed an extremely large leak at the valve, a voracious appetite, and a fuel tank that was much too small. This latter was due, of course, to its low position on Mr. Henwood's scale of evolution.

Because of these faults, I detached the complete burner from the tank and fitted it to the test rig shown in Fig. 1. Briefly, the test rig consisted of (*a*) a 1 lb. cocoa tin into which was soldered a cycle valve and a filler cap bush. These are best fitted to the lid before it is soldered on. (*b*) An adjustable screw type needle valve. (*c*) A ¼ in. O.D. copper tube. A pivot consisting of a brass block containing a countersunk hole, is soldered to the centre of the tank bottom. A wooden stake into the top of which a short length of steel rod is fixed ; the end of this rod is pointed to form a bearing for the block. A balance arm is formed from metal tubing and one end of which is flattened and soldered to the tank. A carpenter's clamp, the purpose of which is to balance the whole rig when it is mounted on the pivot rod, is fitted to this.

Now for the tests I carried out. The tank was half filled with methylated spirits and then pumped up with air by a cycle pump, 16 strokes being applied. The needle valve was then opened until the fuel issued from the jet ring, and this was ignited. After giving forth a flame which was more real when visible, the unit suddenly burst into a slight roar, and a little manipulation of the valve increased this to a very healthy note, whilst the combustion tube quickly turned a bright red. I then left the unit to its own devices. Without hesitation it began to move forward—first slowly—then with increasing speed, until very soon it became just a glowing streak. It continued in this state for about 40 secs. before beginning to slow. After 55 secs. it came to a standstill.

Now, either Sgt. Henwood is very modest, or the larger fuel and air tank made a lot of difference. Whichever was the cause I was very surprised at the good results obtained. Whilst I would not say it only remains to fit the Henwood unit in a plane, I do believe that it is very near to becoming an accomplished fact. As to the type of model to which it should be fitted, I would be inclined, by reason of fire risks and the fact that structural weight would have to be kept down, to pin my hopes on a flying wing (3).



J.P. UNIT TEST RIG.

FIG. 1.

Further Tests.

Since writing the foregoing I have conducted further tests on a modified Henwood unit. The chief and most important mod. was the needle valve, this being fitted with a fine taper needle and a packed gland nut, thus enabling me to increase the air pressure in the fuel tank. In addition, it permitted very fine jet settings. After several short test runs with the modified unit, I found that the combustion was improved and the thrust was greater. Flames insisted on emerging from the front end of the combustion tube, however, so I tried the effect of fitting the jet ring inside a slightly larger one. This cured the trouble, and also helped me to make a discovery. During a test run the note of the unit suddenly changed from its usual monotonous roar to a high speed, intermittent burring sound, whilst the unit vibrated in sympathy. The result was startling. It accelerated extremely rapidly, and by about the sixth revolution it got out of hand, the rig detaching itself from the pivot in no uncertain manner. After the whole arrangement had been straightened out I managed to make the unit repeat this performance, but not before improving the bearing. Subsequent runs proved conclusively that providing the high frequence roar was produced there was a step up in the thrust. I have not the faintest idea of what causes this phenomena, and I will be interested to hear from anyone who can offer an explanation, because it would not be without some value when further units are designed. I notice that Mr. C. R. Tottle experienced the same phenomena when conducting combustion experiments, which he reported in the November issue.

At last we have a simple type of jet unit that is easy to make and that definitely gives a useful thrust for its all-up weight. It now remains for the patient amateur experimenter to carry on and complete his first Henwood type unit that is just a bit lighter and gives a bit more thrust, fit it to a flying wing, and fly it.

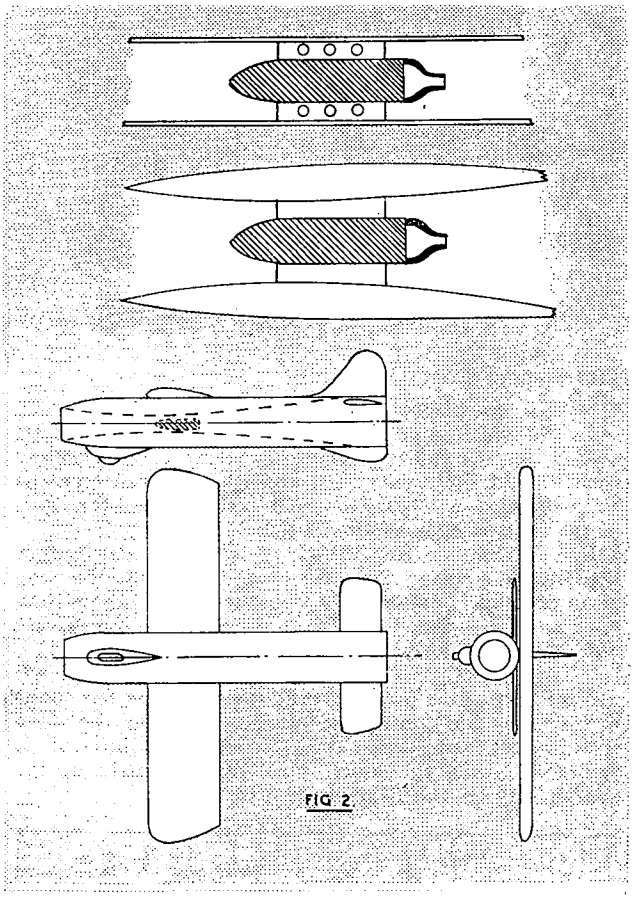


FIG 2.

Rocket Propulsion.

And now to finish up this month with something rather different. It is a letter received by the Editor some months ago by Mr. H. Dolan, who gives his address as the University of Birmingham. He begins by making several interesting observations: "On a unit as small as Mr. Harris' the friction and inertia of the moving parts, even allowing for the use of ball bearings, must be considerable, relative to the kinetic energy of the jet. . . . If, after overcoming these retarding forces, there is any residual energy, it seems unlikely that it would provide sufficient force to propel an aircraft. . . . A better method, for models, and one which offers more practical results in the combination of jet propulsion and rocket propulsion. It has been shown that the launching of rockets (November 5th variety) can be improved if they are fired from a long tube instead of a bottle. Similarly, if a rocket is secured within a long tube its dynamic thrust is improved. As a further improvement the rocket can be situated in the throat of a large venturi tube, when still greater thrust will be obtained. Such a unit could be used as a fuselage of a machine.

The venturi could be constructed from thin aluminium sheet and some provision for air cooling its outer surface should be made."

Mr. Dolan included a number of diagrams showing his idea of fitting a rocket inside a venturi type fuselage, and these are reproduced as a matter of interest (2).

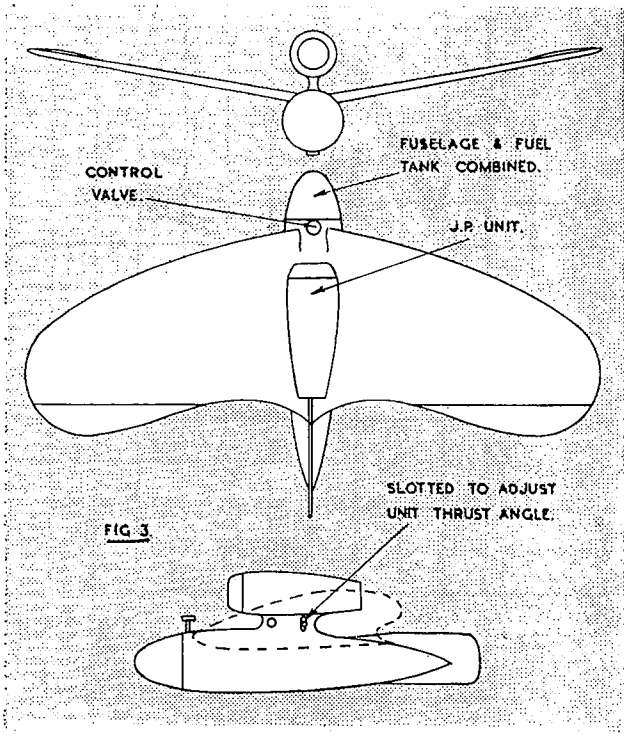


FIG 3.

ELEMENTARY AERODYNAMIC DESIGN

Very Swede! *Two very nice models from Sweden. Note the sailplanes' "stringer" fuselage is typical of Continental practice, despite its structural and aerodynamic inferiority to a monococque.*

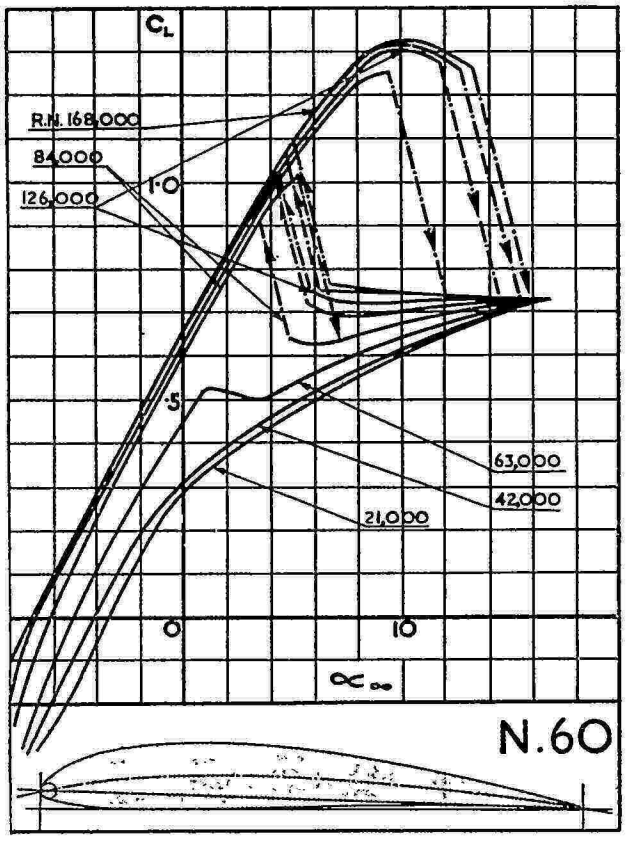
The Aspect Ratio Problem.

THIS is one of those problems peculiar to the model world which must, in the main at least, be solved by modellers. It can be stated quite simply. We merely wish to find the aspect ratio that, for a given machine and wing area, will result in the lowest drag and thus give us the best possible sinking speed.

Let us examine the means by which we can reduce the drag of a wing. As most modellers know, the drag of an aerofoil is made up of two parts—the profile drag (C_{Do}) and the induced drag (C_{Di}), or, in the more precise and embracing form of mathematics,

$$C_D = C_{Do} + C_{Di} \qquad \text{(very complex !)}$$

Now both these forms of drag depend upon the shape of the wing, but the C_{Do} is only interested in the wing section as it were, whilst the C_{Di} confines *its* interest to the plan form of the wing. Together they make up the complete three-dimensional picture.



Let us deal with the profile drag first. This is directly dependent on several quantities—the aerofoil section, as we have already stated; the Reynolds Number at which the wing is operating; and certain physical qualities of the air, over which we have obviously no control. The section was decided upon earlier in the design, for reasons of which low drag was only one, and thus we have gone as far as possible in this direction. The only quantity left is the R.N., this depending directly on the aerofoil chord (l) and the velocity (V), as we saw in Part I of this series. We obviously cannot increase the velocity as this will increase the sinking speed, and thus the only thing we are left with is the chord. The result, then, of this wondrous piece of logic is that the only way we can decrease the profile drag at model velocities is by increasing the chord of the wing.

Having dispensed with C_{Do} for the moment, we must now tackle C_{Di}. The laws which govern this form of drag are fortunately less, and more precise, as it depends upon the C_L and A.R. of the wing only. If we assume an elliptical distribution of lift all over the wing (an assumption practically correct for all wing forms in general use to-day) the formula for induced drag is

$$C_{Di} = \frac{(C_L)^2}{\pi \times A.R.}$$

Even the most ardent maths hater will see that there are two variables in this formula. If we wish to decrease C_{Di}, we must either decrease C_L, or increase A.R., and when a moment's thought has assured us that the first way out is impossible, we are left with A.R. Now A.R. is, as we all know, the result of dividing the wing span by the chord, *i.e.* $A.R. = \frac{W.S.}{C}$. Thus to increase it, we must either increase the span, or decrease the chord. Unfortunately, we are trying to find the best A.R. for a given wing area, so if we are to increase it at all, we must do both, so that the area (*i.e.* the product of the two) remains constant.

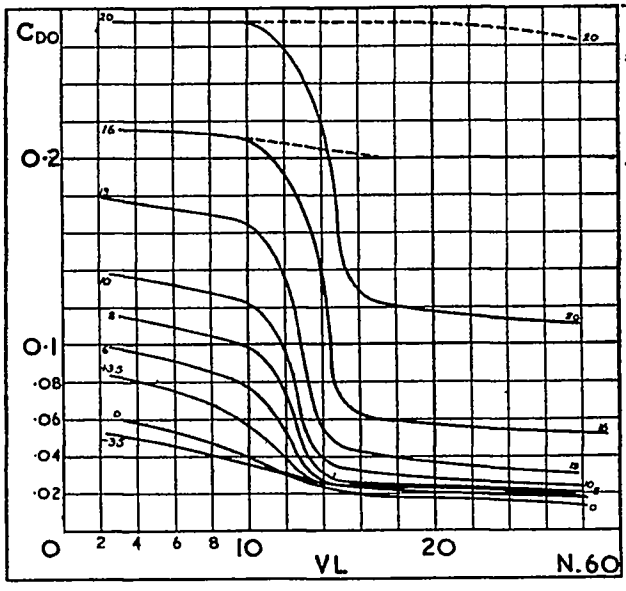
Our snag now becomes apparent. To reduce the profile drag we must *increase* the wing chord, and to reduce the induced drag, we must *decrease* it. The task that faces us is that of finding the compromise that will give the lowest overall drag.

Several methods of doing this have been put forward from time to time, but only two are practical at the moment. They are as follows :—

The "Maxwell" Method.

This method, put forward by J. H. Maxwell in the April AEROMODELLER, 1944, is unwieldy and tedious, but if full and accurate low speed data is available, it is very accurate.

For a given wing loading, and value of C_L, the velocity



Left. *Profile drag against VL. In actual fact, the curve makes a sudden jump from the high level to the low one, but as the tabulated wind tunnel results do not show precisely where this occurs, it is drawn as a steep curve. The small figures give* α .

Opposite page. *To facilitate induced drag calculations,* C_L *is given plotted against angle of attack. This latter is for infinite A.R., and to find the corresponding value for a particular A.R., calculate the induced angle from Nomograph No. 6, and add to the graph value. Also note that VL = R.N/6,300.*

is constant, so that by choosing arbitrary values of C_L, we can determine the corresponding value of V. (Nomograph No. 2.) Now from our low speed data we determine C_D for different values of Vl, for a certain value of C_L, and as V is also constant, we can plot C_{DO} against chord. In other words, when we choose a definite value for C_L, the wing loading and area already being known, the velocity is also fixed, leaving the chord of the wing as the only variable quantity. Thus, Vl can only be made to vary in value by altering l, the chord of the wing in feet. We know the area already, and as this depends on chord and span, and these are also the two factors in A.R., it is an easy matter to plot C_{DO} against A.R. (Right, top).

C_{DI} is now calculated for various values of A.R., and its value for each A.R. is added to the corresponding value of C_{DO}. This total C_D is then plotted against A.R., the minimum point on the curve corresponding to the most efficient A.R. for that C_L at the corresponding velocity (Right, bottom).

The foregoing method should be used, for best results, to complete the method of finding the best overall power factor maximum of the machine, described last month. The connection between the two is probably obvious to most readers, and thus I need not go deeply into it. Let it suffice to say that instead of choosing an arbitrary value of A.R. for the model's wing, it should be calculated just by this method for each value of C_L.

You may have been growing alarmed at these last few paragraphs, so let me hasten the assurance that it is not as bad as it seems—in fact, if you read it over once again, it will seem extremely easy.

The "Lack of Data" Method.

With many aerofoil sections, very little accurate low speed data is available, and thus we must use that method, the very mention of which causes your true theorist to squirm unhappily. In other words, we must *approximate !*

In a specimen calculation, Maxwell showed that for a certain Wakefield model, the best A.R. was 5, and voiced the opinion that for the average model the best A.R. is probably around 6. For larger models, of course, this must be increased, and, in general, it is always better to err slightly on the side of too high an A.R. rather than the converse.

It cannot be emphasised too strongly that the above method should only be resorted to if no data is available. At the best it is only an interim expedient, and one that I hope we shall soon have no need for.

Other Methods.

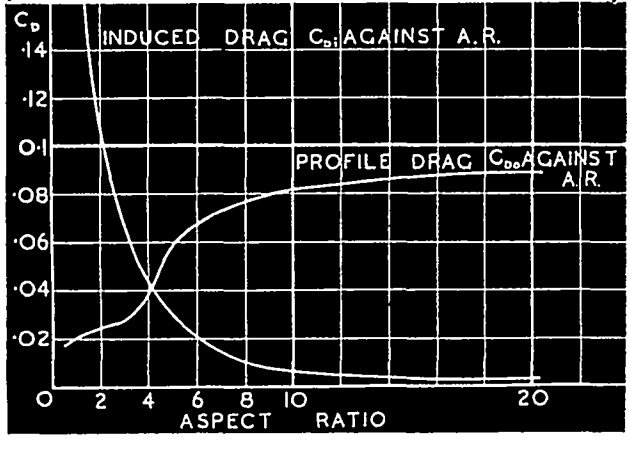
Other methods that rely on the mathematical expression for the C_D curves have been put forward from time to time, but due to the irregular nature of the C_{DO} curve, are of limited practical value at the moment. Nevertheless, we may yet see the golden age when we can find our best wing setting by using a couple of simple nomographs. And on this heartening note we will finish for this month.

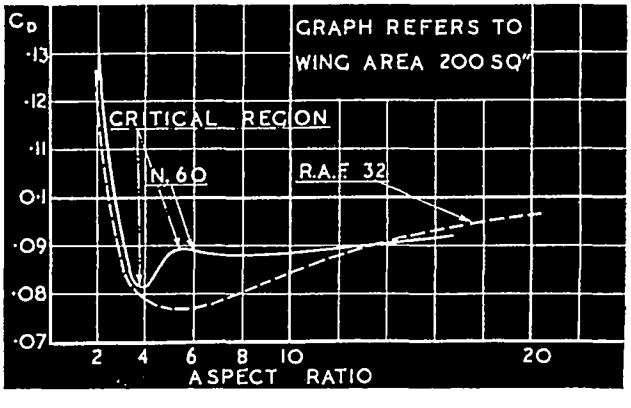
In Part IV we shall introduce ourselves to the question of stability.

ERRATUM. On page 603 of the November issue, the second line from the top : "add" should read "subtract".

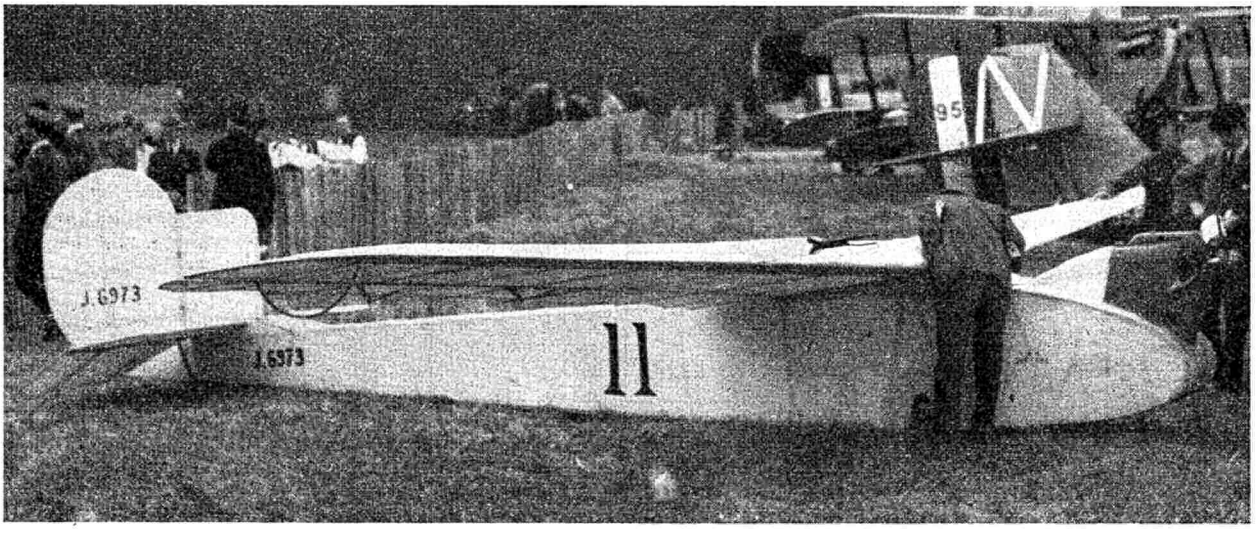
Below *(Top).* C_{DI} *and* C_{DO}*, plotted against A.R., for a wing area of 200 sq. ins. When calculating A.R. from VL, note that A.R.* $= \frac{Area}{Chord^2}$

(Bottom). Total drag against A.R. Optimum value for N.60 is obviously 4, for this particular value of C_L*. Maxwell's curve for R.A.F. 32 is also shown, by way of comparison. The absence of a "critical region hump" in his curve is probably due to a high degree of turbulence in the test tunnel.*





CIVIL AIRCRAFT No. XXVI



ENGLISH ELECTRIC Co. WREN

BY E · J · RIDING

THE first successful British-built light aeroplane to fly in this country was designed by W. O. Manning, Chief Designer to the English Electric Company's aircraft section in 1922. During the first months of 1923, a prototype "Wren," as the machine had been named, was supplied to the Air Ministry and it appeared at the Hendon R.A.F. display of that year bearing the service serial number J.6973 on its rudder.

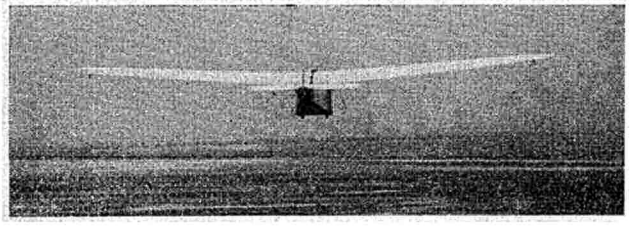
Two production "Wrens" were next laid down to the order of intending competitors in the £1,000 "Daily Mail" contest for light aeroplanes held in October, 1923. Both machines were identical and differed from the prototype only in wing layout and the shape of the rudder and fin. J.6973 had a pronounced dihedral whereas the Lympne machines had none at all.

In the Lympne competitions the two "Wrens" bore the racing numbers 3 and 4 on their rudders. No. 3 was flown by Sq. Ldr. M. E. A. Wright and No. 4 by the late Sq. Ldr. W. H. Longton, creating a great impression.

Longton on No. 4 tied for first place with J. H. James on an A.N.E.C. monoplane in the consumption trials. The prize money amounted to £1,500 and their petrol consumption worked out at 87·5 miles per gallon.

In 1924, Longton's Wren was placed in the Aeronautical Section of the Science Museum at Kensington, where it may be seen to this day, suspended alongside Sir John Alcock's Vickers Vimy.

Wren No. 3 became G-EBNV on the civil aircraft register in April, 1926, and was privately owned by Alan Smith at Sherburn-in-Elmet, Yorkshire, until its withdrawal from service in 1929.



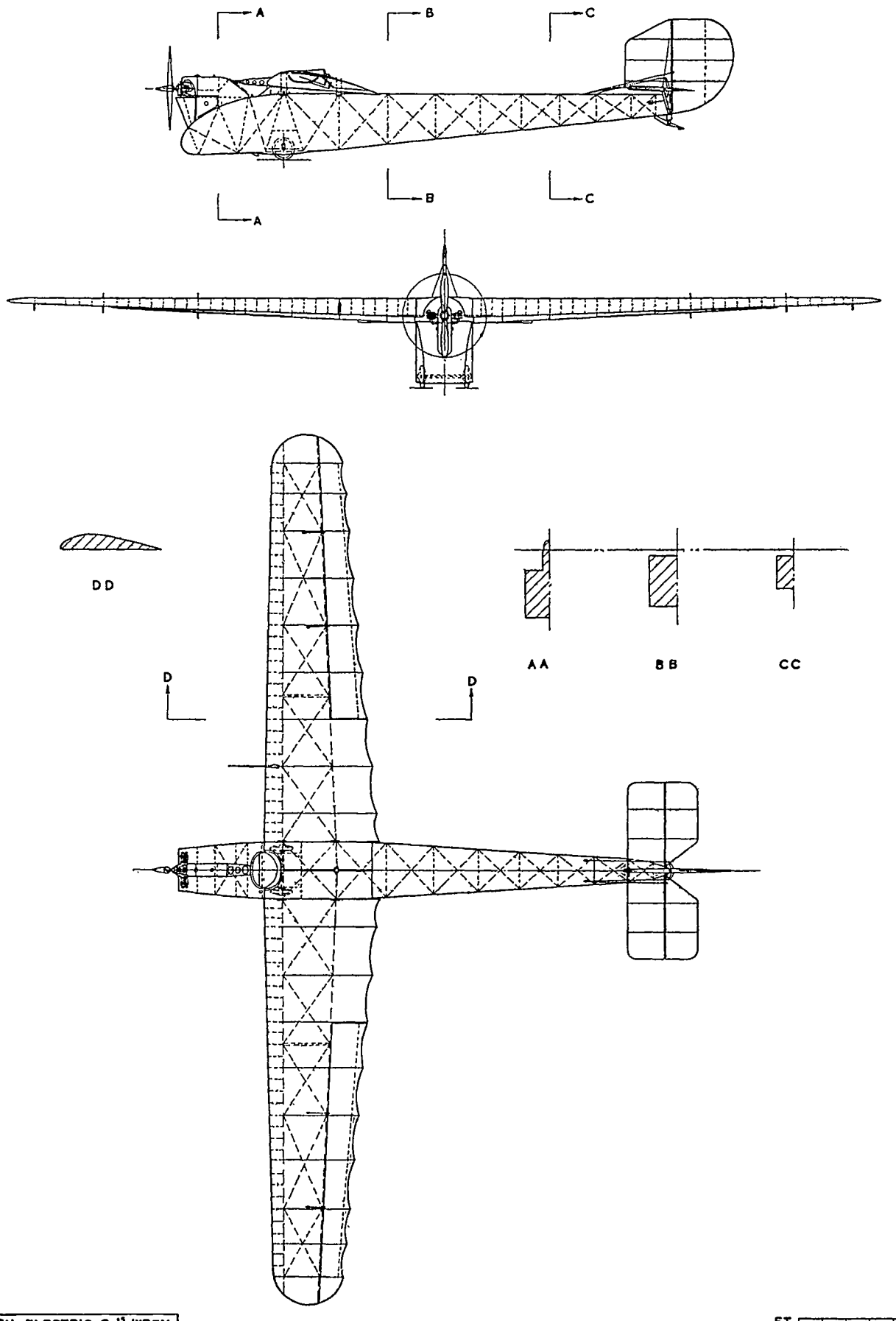
Construction:

Fuselage: ¾ in. square section spruce longerons and cross members internally braced with 14 s.w.g. piano wire attached to plywood lugs or biscuits glued and screwed to the interstices. Each bracing wire was adjustable by means of a 2½ in. turnbuckle. The 300 × 60 mm. landing wheels were housed within the fuselage, springing being obtained by lashing the axle to the bottom longerons with elastic cord. The 398 c.c. flat twin A.B.C. engine was mounted on light steel tubes bolted to the top longerons. The pilot's instrument panel was situated at the rear of the engine nacelle where it could be easily seen from the cockpit. Reading from the forward end they were 1, Altimeter; 2, Engine Speed, and 3, Air Speed Indicator. Wings: Internally wire braced with spruce and plywood box spars and ribs built up from ¼ in. square section spruce strips.

The trailing edge was formed by a length of wire joining the ends of each main rib, giving a pleasing scalloped appearance. Built in two halves and joined together by steel plates and bolts fitted to the spar ends. They were anchored to the fuselage by means of four U bolts passing round four cleats on the top longerons and secured into position by butterfly nuts on the top surface of the wings. The machine was fabric covered with the exception of the extreme nose and doped silver with a 2½ in. yellow band round the fuselage edges. A large figure 4 was painted in black against a white background on the rudder. We have been unsuccessful in tracing a photograph of the "Wren" carrying civil registration letters—perhaps some reader will oblige?

Specification: Length, 24 ft. 3 in.; span, 37 ft. 0 in.; wing area, 150 sq. ft.; total loaded weight, 420 lb.; tare weight, 232 lb.; max. speed, 50 m.p.h.; landing speed, 25 m.p.h.; duration, 1½ hours.

Photo of machine in flight was taken a few seconds after taking off from the sands at Lytham on its first flight.



ENGLISH ELECTRIC Co^LD. WREN

FT.

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OVER TO YOU

THE BOFFIN'S NEWS OF MODELLERS OVERSEAS

"The voice of the Boffin is heard o'er the land
Exclaiming so shrilly : 'I can't understand,
Things aerodynamic
Put me in a panic,
And formulæ all should be banned."

READERS have rallied with information of "goings-on" in odd spots, so the Boffin is contentedly preening himself.

Ultimate R.T.P.

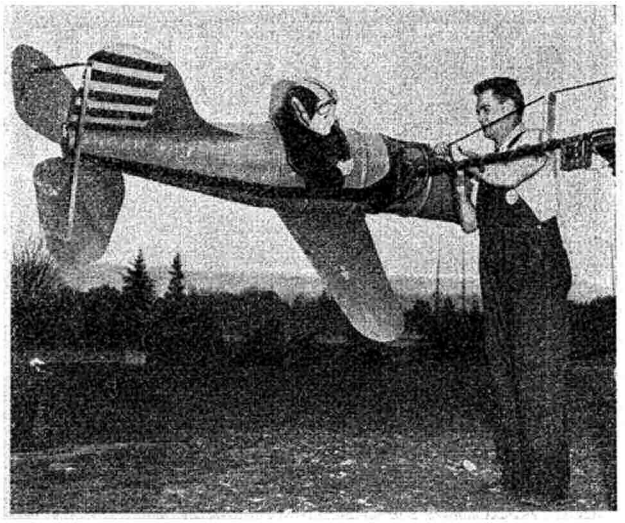
The last word in R.T.P. from the U.S.A. is surely that provided for the younger generation by Harold T. Austin, who works in the Boeing shops. Young Alvin is all in favour of the scheme : so is the Boffin. Next summer we may see a similar device secretly installed at Eaton Bray for youngsters of all ages. The mock-up is most ingenious, being mainly old oil-drums, and driven by a small electric motor. Banking and elementary manœuvres can be effected from the cockpit, while Mark II is already on the board featuring additional longitudinal controls, though atomic propulsion is still only a beautiful thought !

Good News from Ghent.

Pierre Maes, a Belgian enthusiast, gives an account of wartime activities. The local club secretary was hauled off to jail because the S.S. could not be convinced his list of members were not the nucleus of the Resistance Movement ! Subsequently, meetings were forbidden, and even individual flying had its dangers. Raymond Segers, of Mechelen, tells us, however, that the official Aero Club journal, "Conquête de l'Air," is coming out again and the movement settling down happily, though materials are in short supply still.

Balsa in the Boiler.

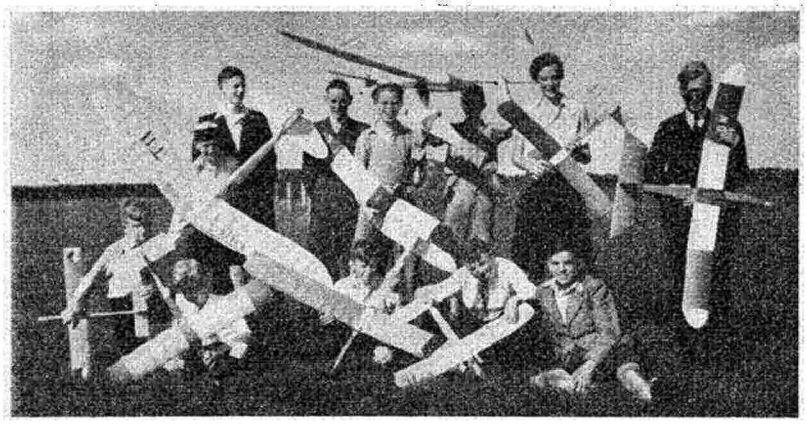
Things were even worse in some parts of Holland, where the modeller had to decide between finishing his glider or keeping the fire in. Light-weight enthusiasts were unpopular in the family circle ! By 1941 materials were organised by the Royal Aero Club of Holland and a proper rationing system worked out whereby all distribution was arranged through the clubs. This worked well, though J. Bierens mentions the enthusiasm with which the local club cannibalised a shot-down Mosquito for its balsa ! In spite of handicaps "loyal" contests were held secretly—only "safe" members being invited. At one such meeting a petrol model flew over 11 mins. with a 16 sec. motor run, while a restricted rubber power event, where only 30 g. (approx. 1 oz.) weight of rubber was allowed, showed more than ten flights of over 3 mins. out of thirty entrants.



A very junior aeromodeller who will hardly want for playmates while ingenious father Harold T. Austin can arrange mock-ups like this.

Stretching it a Bit !

Catons, the Rubber People, have been doing their best to stretch their stocks during the lean years, but letters do come in occasionally from all parts protesting that their customers cannot. The position is that from time to time offcuts of SYNTHETIC strip *do* become available, and in the belief that, in these times, less than the best is better than none, it has been distributed. It is NOT the genuine Super Power we used to know and must not be treated as such—all they ask is treat it gently and it will keep you flying until the real stuff comes back again. . . . Meanwhile, don't complain too bitterly . . . it won't be long now.



"Underground" Meeting—Dutch aeromodellers taken at a meeting during the occupation, held in spite of the official ban on such "unsponsored" events.

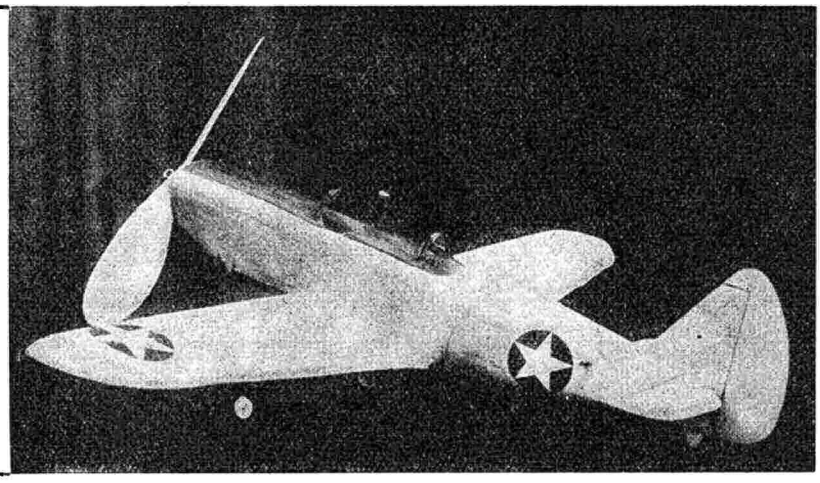
Belgian Experimenter—A. Watteyne about to launch one of his "pushers". He is a leading exponent of this formula; his pusher Wakefield "Velivolve" is a popular A.P.S. plan.

FLYING SCALE INDOOR R.T.P.

RYAN PT-25

BY

M · A · HETHERINGTON



THIS model is a departure from the orthodox method of construction in the fact that it is constructed mainly of thin paper. I remember a few years ago making a couple of low-wing scale type models from paper. These were intended for free flying, as pole flying was then in its infancy. The duration of these models was not high but they flew, which was all I was concerned about at the time. With the coming of the winter months last year pole flying was introduced into our club (the Doncaster and District M.F.C.) and I was prompted to build up this type of model again specifically for R.T.P. flying. This resulted in the model about to be described.

When first taken down to the club it was received rather dubiously, but when the other fellows saw it flying this cleared away any doubts they had about its capabilities and, in a short time, they had produced quite a collection of paper flying scale models, including Henschel 123, Lightning, Helldiver and Piper Cub, etc. Practically every type of aeroplane can be reproduced with paper construction. The only difference there is from the normal tissue and balsa type is the slightly angular appearance they present. This is not normally very noticeable and detracts very little (if any) from the general appearance of the machine. How much better is this though than the normal flying scale one sees with the stringers and formers, etc., prominently emphasised by taut tissue ? (I am referring now to models whose prototype is covered with a stressed skin.) Where it occurs that the machine is covered with fabric the ribs and stringers, etc., can be imitated by thin lines drawn in indian ink or black dope on the wings and tail, etc., before they are assembled. These lines can be drawn with a mapping pen, although the ideal is, of course, a draughtsman's ruling pen. A pair of sharp scissors will be found useful for cutting out the various pieces of covering, though a razor blade will do just as well.

The author's model was covered in a smooth paper, thinner than foolscap, which can be used if desired, but the finished machine will be heavier than mine and the performance will invariably suffer. Anyway, whatever paper you use see that it has a nice smooth surface as it " handles " better. All the wood stated on the plan and as used in my machine was balsa, and the amount used is very modest. (A favourable point in these days.) If, however, this is unprocurable, hardwood will do just as well, providing the sizes are decreased slightly so as not to increase the weight unduly.

The fuselage formers are first prepared : Nos. 2, 3 and 4 being built from ¼ in. strips of 1/16 in. sheet. Nos. 1 and 5 have to be made from a slightly larger size. The wood is first cemented into " frames " the overall size of the former. The outlines are then traced on to these frames and they are then cut out. Be sure to add the little gussets in the corners where shown. Next cut out the two main longerons and lightly mark in pencil the positions of the formers. Assemble by cementing the first and fourth formers in position after cracking the longerons at former 4 so as to get the taper of the fuselage. Now cement the ends of the longerons together at the rear and add the remaining formers. Before leaving the fuselage for the present, apply several coats of cement on both sides of the longerons in the region of the motor peg. This is important, so do not forget it.

The Wings.

Procure a sheet of the paper you have decided to use, approx. 13 ins. by 8 ins., and give this a coat of thin banana oil or dope on one side and pin it down on a board. When it is dry turn it over, apply one or two coats of silver dope and then pin it down again. With dope on one side only the paper tends to curl up, so doping it on both sides helps to equalise the pull as well as stiffening the paper. Cut out the spars and ribs as shown on plan and assemble together. When the wing sheet is dry lightly draw in the wing outlines on it. This is shown in sketch or plan. Make sure that you get a port and starboard wing. Cut them out and note that the top of the tip is cut out separately and is stuck on afterwards. Now take one wing pattern and crease it along the leading edge so that the top and bottom are at 20 degrees. Lay it on a board with the inside upwards and the T.E. towards you. Smear the underside of the correct wing frame with seccotine or some similar glue. (Glue is used here as cement on contracting tends to distort the paper.)

[*Continued on page* 112.

The Full-size Aircraft.

RYAN PT-25.

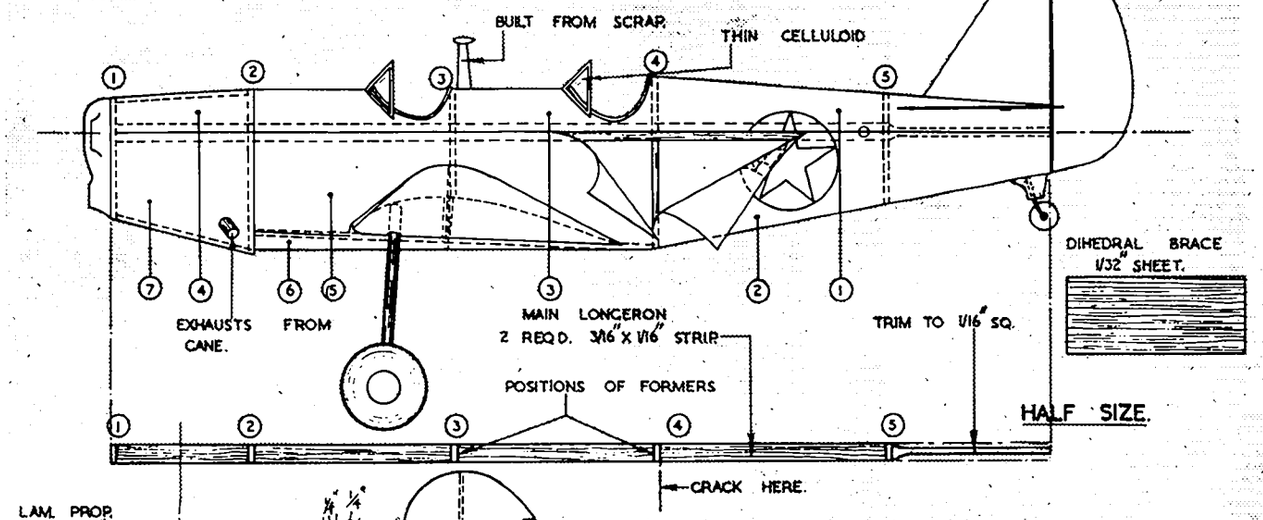
DESIGNED BY

M. A. HETHERINGTON.

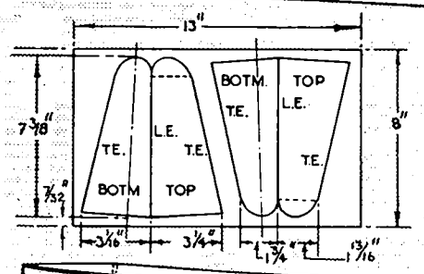
3 FUSELAGE VIEWS
1/2 ACTUAL SIZE

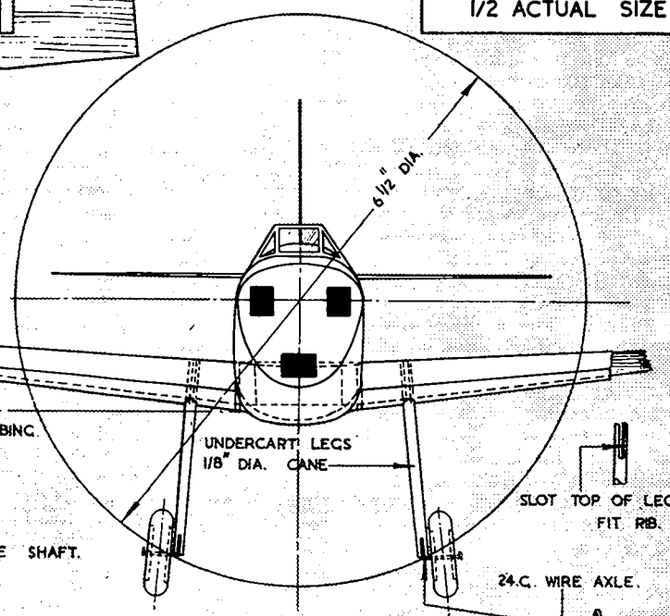
FULL SIZE MAIN SPAR 1/32" SHEET 2 OFF.

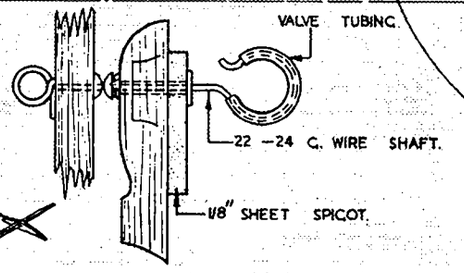
POWER 22"-24" LOOP OF 3/16" FLAT
WEIGHT COMPLETE 65 OZS.
PERFORMANCE. AV. 45 SECS ON 1,200 TURNS BEST FLIGHT 5-7 SECS R.O.C.



HALF SIZE.

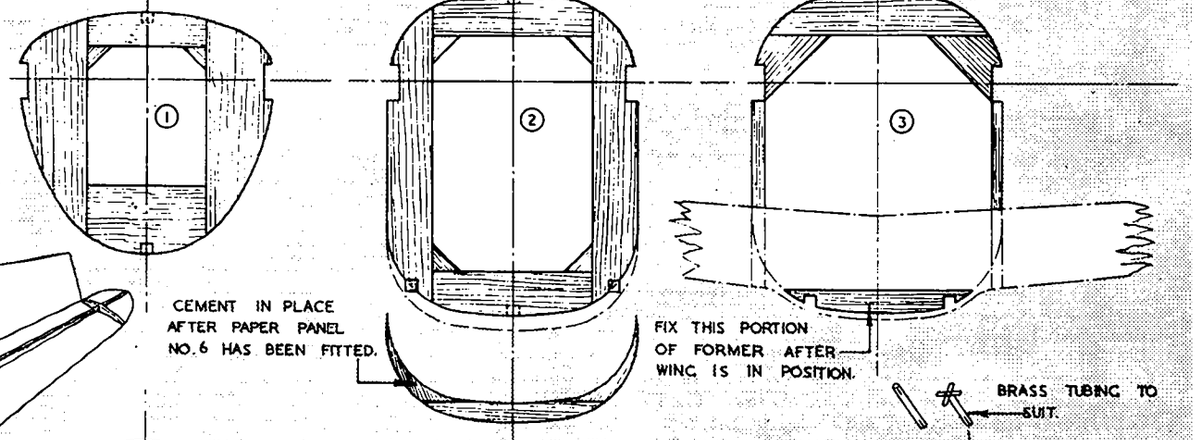


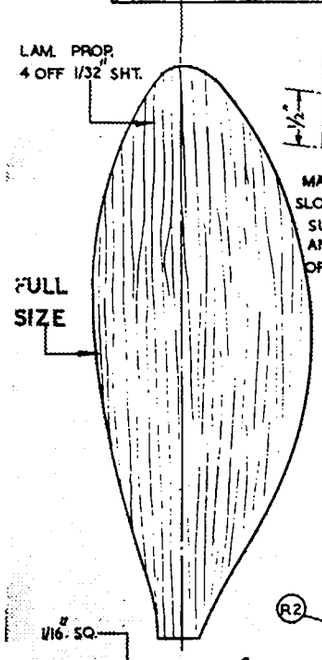




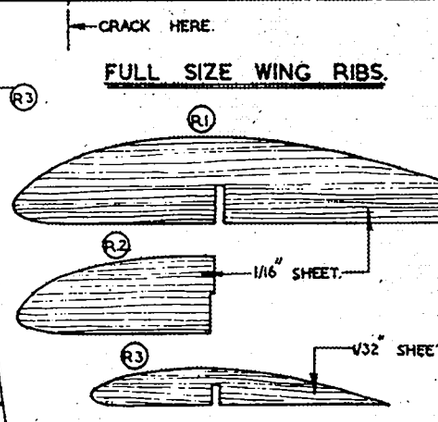
DETAIL OF NOSEBLOCK.

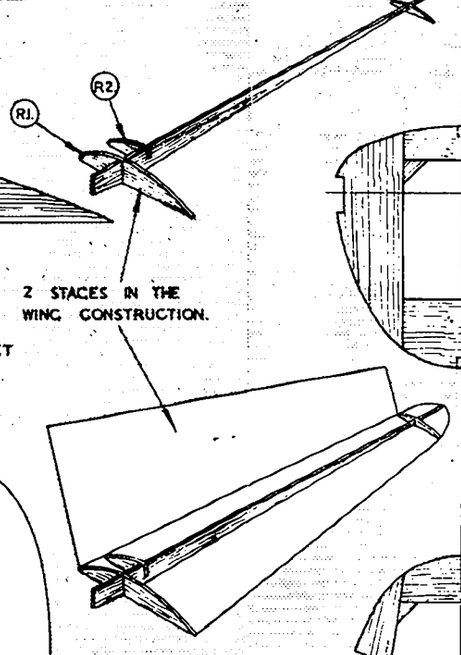
FUSELAGE FORMERS
FULL SIZE.

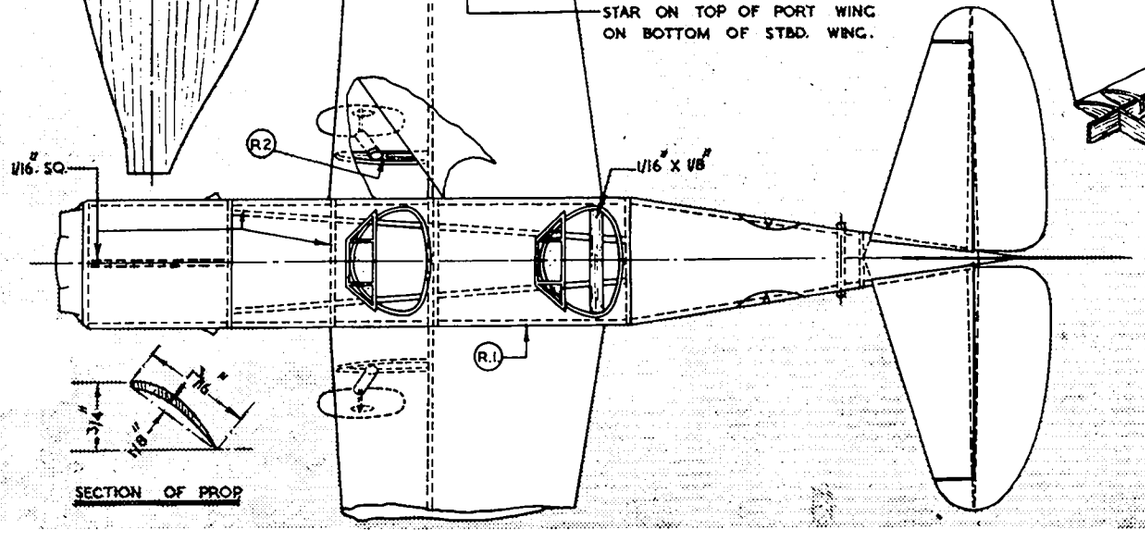




FULL SIZE WING RIBS.







SECTION OF PROP

Then press the wing frame gently into place, put it on one side for a few minutes and repeat for the other wing. Next take the first wing and smear the spar and ribs with glue, spreading it also along the T.E. in a strip about 1/16 in. wide. Then (now comes the tricky part), keeping the whole unit pressed flat on the board, bend the top wing half gently down on to the wing frame, working from the L.E. and finally finishing up at the T.E. Endeavour to get the paper stuck down to every part of the wing frame, especially along the main spar. This is the secret of the wing's strength. Note that no L.E. or T.E. is necessary. The T.E. will dry quite straight if you keep some heavy object pressed on to it until the glue has set. The strength of these wings is surprising and they compare favourably with their orthodox equivalent. Do the same with the other wing and then add the top of the tips. When everything is set, trim the wing along the T.E. and tip if necessary.

Join the two wings with the dihedral brace shown on plan. Scale dihedral is incorporated in the spar, but check this on assembly. Finish by cementing pieces of balsa at the L. and T.E. as shown on the plan, and then finally mark the ailerons on with indian ink.

To return to the fuselage. The paper covering is cemented on in the sequence shown in plan. No patterns are given for these as the different shapes can easily be found by a little experiment. Notice that there is no post at the rear of the fuselage : the paper is simply stuck edge to edge. Cement can be used for fixing the paper as the curvature of the fuselage makes it stiff enough to resist contraction. Cement panels Nos. 1, 2 and 3 in position. Now cement the wing into position on the 1/16 in. sq. runners, and then add the two pieces of 1/16 in. sq. to complete former No. 3. You can now finish covering the fuselage. Panels Nos. 4 and 7 are cut from ordinary foolscap, as a bit of extra strength is needed here. Before adding panel No. 7 do not forget to add the 1/16 in. sheet on to the bottom of former No. 2. This is stuck on top of the paper panel No. 6. Note that the cockpits should be cut out of panel No. 3 before cementing it in place. Panel No. 5 is in one piece and extends over the wing L. and T.E., where it is finallly cemented down on to the incidence runners. The edge of this pattern where it passes over the wing is simply fastened down by a small fillet of cement.

The fin and tailplane are cut out from thick foolscap previously silver doped on both sides in the manner described for the wings. A bracing strip of a 1/64 in. hardwood or 1/32 in. balsa is cemented on the underside of the tailplane. No bracing is necessary on the fin. Mark the control lines in with indian ink. Then fit the tailplane by carefully cutting a slot in the rear of the fuselage with a razor blade, smearing around it with cement and slide the tailplane into position. The fin is simply cemented on top of the fuselage. This may seem rather flimsy but it is quite strong enough and has given no trouble in practice.

The undercarriage can now be made and fitted. This is very simple and should give no trouble. To fit, make two pin holes in each wing, one on either side of rib 2 and gradually enlarge these to fit the legs. Then, just squeeze cement in and around the slot and push the leg into place. The wheels are two laminations of 1/8th balsa sheet cross grained, and sanded to shape. Dope black and finish by sticking two discs of paper doped silver on either wheel. (These wheels by the way, are lighter than celluloid ones and are to be preferred.) The tail wheel is made from a disc of hardwood or balsa nipped in a thin wire fork. It does not revolve and is simply cemented on to the bottom of the fuselage. The nose block is quite orthodox and needs no explanation except that the bush is left protruding slightly to provide clearance between the prop and the air inlets. This should not be necessary, of course, on the " false " noseblock with the inlets painted on.

The propellor can be tackled next. I should like to say here that any extra time expended on this unit will be well spent. I believe that the airscrew is the most important part of any model and is the secret of long duration. Cut four blades from 1/32 in. sheet to the pattern shown on plan. Next procure a strip of sheet lead, soft brass or tin about 4 ins. by 1½ ins., and bend a camber in this with a max. height of ⅛ in. and about ½ in. from one edge, forming a crude jig on which to make our airscrew. Now, hold the strip in the middle with a pair of pliers with L.E. of the jig on your right. Then, gripping the tip nearest to you with another pair of pliers, twist it in a clockwise direction until the tip is inclined at 10 to 15 degrees to the middle. Check the camber when you have done this and see that it has not got flattened out during twisting operations. Next, take two blades and coat the entire surface of one with cement, spreading it on with the finger tips. Now quickly place the other blade on top of this, then bind the whole unit on to the convex side of the jig, making sure that you get the prop tip and the jig tip together and that the prop is pressed on to the jig along the whole of its length. Cotton or wool can be used for the binding operation. Let the cement harden, remove, and do the same for the other blade. An alternative for the jig is to use a standard duration prop of about 9 to 10 ins. diameter, in which case both blades can be made at once instead of singly. The two blades can now be trimmed to shape and sanded down to an airfoil section. When sanding the convex side of the blade rest it on a bottle or some cylindrical object. This will prevent any undue pressure on the camber. Join the two blades as shown on plan and finish in the usual way. Propellors made by this method (in the smaller sizes at least) are as efficient as the carved type and are definitely superior to the steamed propellor.

The model is now complete except for minor details, and these are all shown on the plan.

Power is supplied by a 22 in. to 24 in. loop of 3/16 in. flat. This may seem excessive for the length of fuse, but it can be handled. A little care is needed, however, during winding to avoid any bad bunching. The rear motor peg is a match stick sanded round and smooth. Complete with rubber the model should balance along the main spar. No trouble should be experienced in this direction. (In fact, the author's model was slightly nose heavy.) Anyway, unless the C. of G. is very far out do not use ballast but trim by tail. On 1,200 turns the machine will consistently average 45 secs., but best time being 51.75 secs., and as such it holds the R.T.P. scale record for the club. The 1,200 turns referred to is not maximum turns, but rubber being so precious these days the author did not want to tempt any gremlins that might have been hanging about!

Seriously, though, the whole model is quite robust and the fuselage will easily withstand the effects of a broken motor. One point I forgot to mention in regard to the paper covering of the fuselage. This is cemented on in its natural state and apply two coats of silver dope after completion. I should like to point out that the original model is not yet fully tested out, and no doubt that further experiment in the right direction (*i.e.*, prop and power) will produce durations of well over the minute.

MAKING THREE-BLADED AIRSCREWS

BY H·E·WHITE, B.Sc.

IT is often desirable to restrict airscrew diameter for many reasons. Indeed it might be said that it would always be desirable to use as small an airscrew as possible provided that the rubber power available could be used efficiently and economically. In the design of rubber-driven flying boats, for instance, the use of very small two-bladed airscrews means restricted power duration unless gears are used, with their consequent added weight and friction losses. On the other hand, if duration of flight is one of the objects of the design, then the use of "Wakefield" type airscrews should be a desirable feature. Large airscrews of the "airscoop" variety, however, are very difficult to incorporate in any design in which a normal tractor airscrew cannot be used, and some method of increasing the effective diameter of the propellers must be sought. Of course, gears are a possible solution to the problem, as by gearing up from the rubber motor to the propeller shaft, the airscrew speed may be increased without increasing the rate at which the rubber-power is given out. This has been tried extensively in the past but, as the "Wakefield" competitions have proved, mechanical losses due to the use of more or less complex power transmission systems do not favour the use of gears where maximum efficiency is necessary. The problem of restricting the diameter of the airscrew has arisen in full size practice in recent years, and the solution to the problem has been found in the use of multi-bladed propellers. Although it is obvious that the same principle can be applied to models, it has always been considered so difficult to design and make multi-bladed airscrews which were as simple to carve, and which *would stand up to the rough usage* which an airscrew normally encounters in model flying that the normal one-piece two-bladed propeller has hitherto enjoyed an almost undisputed monopoly.

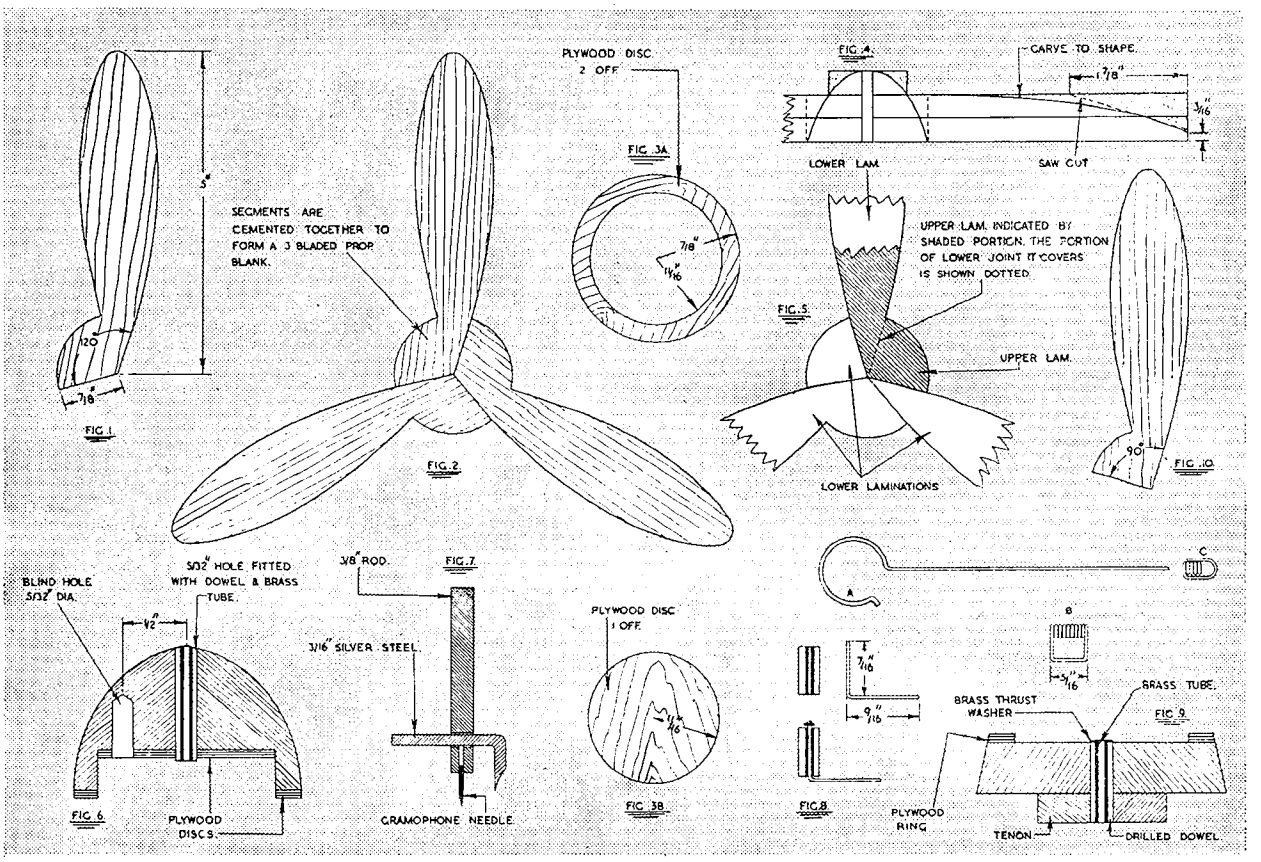
The following description of a three-bladed airscrew deals with one of a pair of propellers which have been fitted to a recently designed model flying-boat of the "Catalina" type, and were intended to replace a pair of 12 in. diameter normal airscrews. They are 10 in. in diameter, and made of balsa, although any other wood could, of course, be used.

In order to ensure that the grain of the wood shall run in the most effective direction some method of laminating is necessary to secure maximum strength at the centre, and the following simple and robust arrangement was devised. For each propeller *six* blanks were cut from 3/8 in. thick balsa with a fretsaw. As accuracy is essential, and balsa is often too soft for accurate marking-out, a 1/16 in. plywood template was made, as in Fig. 1. The angle of 120 degrees must be carefully marked, either by using compasses, as shown, or with a protractor, and it is best to cut it out with a steel rule and a sharp knife. Before the blanks are cut out it is advisable to go over the balsa stock to be used with a gauge to make sure that it is of the same thickness throughout, as unless this is fairly accurate, gaps will occur between the laminations, and the gluing will not be sufficiently strong when the blank is made up. I used some boards from a small packing case which I discovered to my delight to be made of balsa. This material certainly was not of even thickness, and coarse grade glasspaper was used to correct this. Glue three of the blanks together as shown in Fig. 2, and place the assembly on a flat board, resting on a piece of tissue to prevent the joints sticking to the block. With balsa, quick-drying balsa cement or "Durofix" may be used. I use the latter, in tins, as it is much cheaper. When this first assembly has had a little time to set, glue the second group of three blanks on top of the first, *one by one*, as shown in Fig. 3. Note particularly that *the blanks are reversed*, so that each joint in the lower assembly is covered by a blank in the upper layer.

When the glue has set hard, mark out the side of each blade as shown in Fig. 4, saw off carefully to the line, and with a sharp 1 in. chisel, carve the top surface of each blade to the curve shown. Now find the centre of the boss, and drill a 5/32 in. hole through, making sure that it is perfectly square with the plane of the airscrew blades. I use a drilling machine for this job. If you use a hand drill, make sure that the drill is being held perfectly upright. The blank is now ready for carving. Instructions for propeller carving have been given so often in this journal that there is no need for me to repeat them. One or two points regarding balsa carving, however, may be useful. My favourite tool is a small (6 in.) rasp, and a coarse "riffler" file; both of which may be bought at any tool shop. With these two tools at hand it is hardly necessary to do any actual carving with a knife or chisel, and the surplus balsa can be removed quickly, and without any risk of splitting the wood.

When the blades have been roughed out, coarse glasspaper "files" can be used for the next stage. These are made by gluing strips of coarse glasspaper to sticks of wood, both flat and half-round, and they are surprisingly effective for use with balsa-wood. Final finishing is, of course, carried out with fine glasspaper.

I make it a regular practice to balance the propeller roughly at every stage, *i.e.* first at the "rough" stage, and then at the coarse glasspaper stage, and finally at the finishing stage. If this is not done, it will probably be found when the fine glasspaper stage is reached that one of



the blades still needs more wood removed than the others.

The shaping of the boss should be carried out by drawing a 5/8 in. diameter circle on the top of the central part of the block, and carving the blades back to this circle at the top, shaping the boss so that it will appear in section as shown in Fig. 4 without the capping piece. Now either make or otherwise procure a piece of hardwood dowelling 11/64 in. diameter, $1\frac{1}{8}$ in. long, and drill a 3/32 in. hole through it. This is a bit difficult with a hand drill, but if you start at each end and drill half-way through it is quite easy to produce a reasonably accurate hole. Glue this dowel into the central hole, so that it projects 3/8 in. upwards. Now cut out a disc of 3/8 in. thick balsa, $1\frac{1}{4}$ in. diameter, drill a 5/32 in. hole in the centre, and push it on to the projecting dowel with plenty of glue. When the glue has set, carve or glasspaper this capping-piece to form the front of the propeller boss or spinner, as shown in Fig. 4. Now, by inserting a knitting needle in the central 5/32 in. hole, carefully balance and finish the blades and boss with fine glasspaper.

For the next part of the job we shall need some plywood discs and rings, and by far the quickest and most accurate way of making these is to use a washer-cutter, shown in section in Fig. 5. It can be made quite quickly from mild steel or brass rod, particularly if a lathe is available. All that is really necessary, however, is a hand drill, a file, a 1/8 in. Whitworth tap, and commonsense. The body of the cutter A is a piece of 3/8 in. round steel or brass rod, drilled at one end to take a steel pin B—a large gramophone needle will do quite well—and fitted at the other end with a file handle. A 3/16 in. hole is drilled to take the cutter C, which is forged from 3/16 in. diameter silver steel, and sharpened to a keen cutting edge, after hardening by heating to bright red and plunging in water, and tempering to a light brown colour. The cutter is held in place by means of a 1/8 in. Whitworth set-screw.

For each propeller and its nose-block we shall need two rings and a disc, as shown in Fig. 6, cut from 1/16 in. plywood. Glue one of the rings to the underside (now the " back ") of the boss, and using the washer cutter as a guide, cut out a recess in the boss to a depth of 5/16 in. with the aid of a sharp 3/8 in. chisel, and glue the smaller disc in the bottom of the recess. Now very carefully drill a 5/32 in. hole about 1/2 in. deep at a distance of 1/2 in. from the centre hole, as in Fig. 7, avoiding drilling right through the boss if possible. If, however, an accident does occur and the drill breaks through, it is a simple matter to glue a little balsa plug into the outer end of the hole. Finally fit a piece of 3/32 in. brass tube with a 16 s.w.g. bore as a bearing for free-wheeling.

The free-wheel clutch is made by drilling a 3/32 in. hole through a 3/8 in. length of 11/64 in. dowelling, and inserting a 3/8 in. length of 3/32 in. brass tube as a bearing. A piece of 18 s.w.g. steel wire is then bent to a right angle as shown in Fig. 8, cut to size, and fitted into the tube, being prevented from coming out by soldering a few turns of fuse wire on the inner end of the wire. Note particularly that *the wire must be an easy fit in the tube*. The complete assembly can now be pushed into the blind hole in the boss, leaving the bent wire projecting so that it is about 1/8 in. from the bottom of the recess. The propeller itself is now complete.

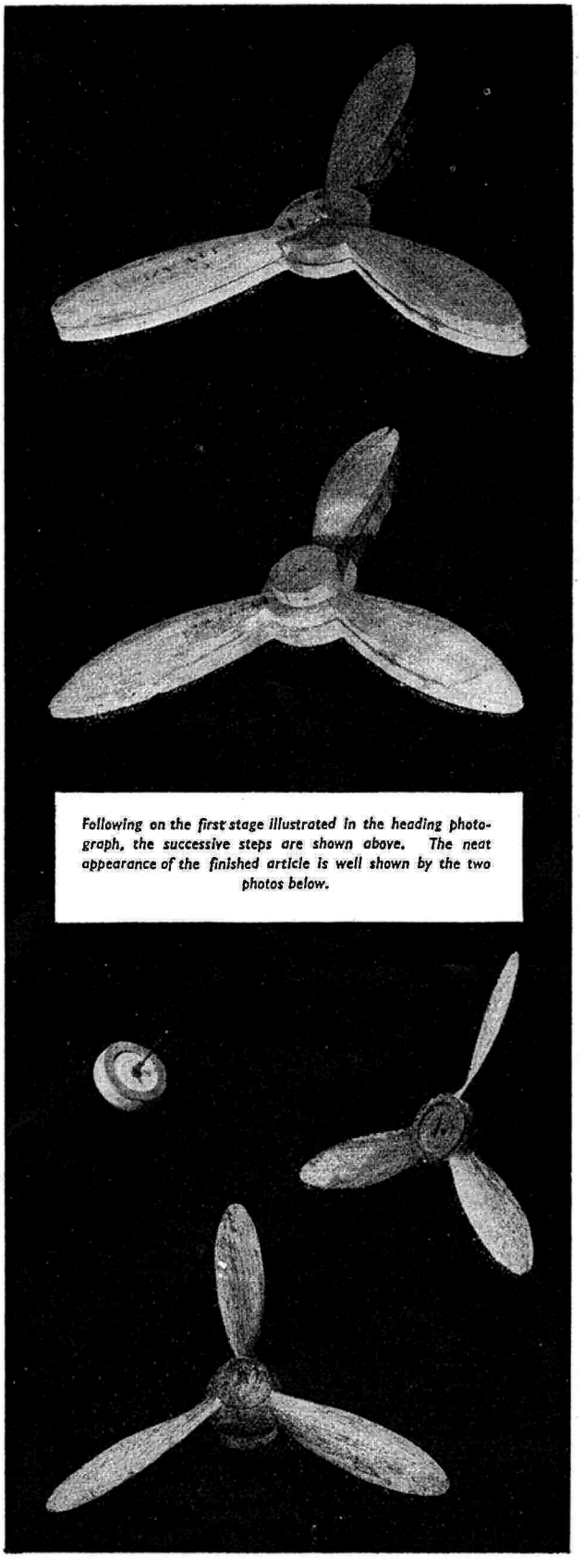
The nose block may be made from the same 3/8 in.

material. Cut a disc 2 in. in diameter, and glue the 1¾ in. diameter plywood ring (Fig. 6) on one face, taking care to centre it correctly. Glasspaper or cut the block to its slightly tapered shape, using the original diameter at the base and the plywood ring as guides, cut out and glue on the rectangular tenon to suit the hole in your fuselage front former and drill through the centre of both block and tenon with a 5/32 in. drill. Drill a suitable length of dowel and fit it with a brass tube to suit the shaft, which should be of 16 s.w.g. steel wire. Glue the dowel into the hole in the block and solder a small brass washer to the top of the brass bearing tube to act as a thrust bearing (Fig. 9). Bend up the hook and cut off the shaft to length (Fig. 9) and make up the driving loop B and winding hook C of 18 s.w.g. steel wire. These two components should be wound, in the absence of a lathe, by making use of a hand drill held in the vice so that the axis of the chuck is horizontal.

Insert a short length of 16 s.w.g.—or better still, 17 s.w.g.—steel wire in the chuck, and wind on the 18 s.w.g. wire under tension for the number of turns required. Bend up the hooks, etc., as shown in the sketch. Now push the shaft through the main bearing, fit the driving loop, and solder it in position so that the loop faces the same way as the open side of the hook. It is important to make sure that these relative positions are correct, in order to enable rapid and certain engagement of the free-wheel clutch to be made after winding. Now, making sure that the clutch-wire in the propeller boss is on the correct side of the shaft, fit the propeller to the shaft and test the engagement of the free-wheel, making any necessary adjustments. It will be found that if the hook is held horizontally, the free-wheel will engage with ease and certainty when correctly adjusted. Finally, after making sure that there is sufficient—and only sufficient—clearance between the propeller boss and the nose block (use thin washers on the shaft to make any necessary adjustments of this clearance), fit and securely solder the winding hook on the front end of the shaft.

The sizes given are for a propeller of 10 in. diameter, with a medium pitch (about 7 in.), the diameter of the spinner being 1¾ in. at the back. These dimensions may, of course, be varied to suit individual requirements, the spinner diameter depending upon the size of the front former of the fuselage, but, of course, the basic principles of the design are the same for airscrews of any diameter or pitch. Furthermore this simple laminating method may be applied to airscrews having any number of blades, the essential principle being that the central portion of the hub is not cut symmetrically about the blade, but cut as a "wing," so that the upper laminations may be reversed to cover the joints in the lower set of laminations. A design for a blank for a four-bladed propeller is given in Fig. 10. The pitch of the propeller may be varied by using thicker or thinner wood from which to cut the blanks, and the diameter of the hub or boss may be varied to suit individual requirements. In all cases, however, the principle of reversing the top set of laminations so as to cover the joints in the lower set at the centre must be followed exactly, otherwise the essential strength of the propeller boss will be practically lost. A further advantage of making laminated airscrews, irrespective of the number of blades, is that it is unnecessary to use large blocks of wood and, particularly in the case of balsa, this is of great help in these days.

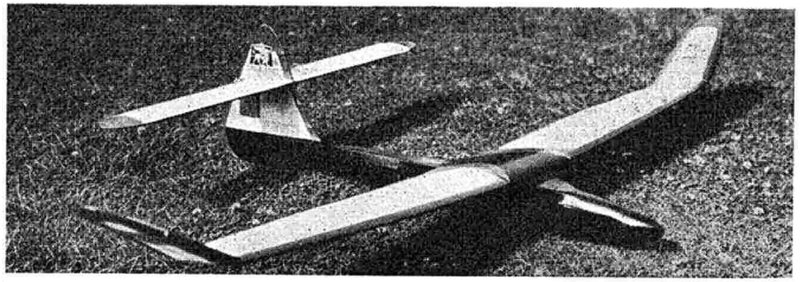
Only comparatively thin sections of wood are needed, provided the material is of even grain and of uniform thickness. Cellulose cements are of course not generally suitable for laminating hard woods: for these, ordinary carpenter's glue is the most satisfactory.



Following on the first stage illustrated in the heading photograph, the successive steps are shown above. The neat appearance of the finished article is well shown by the two photos below.

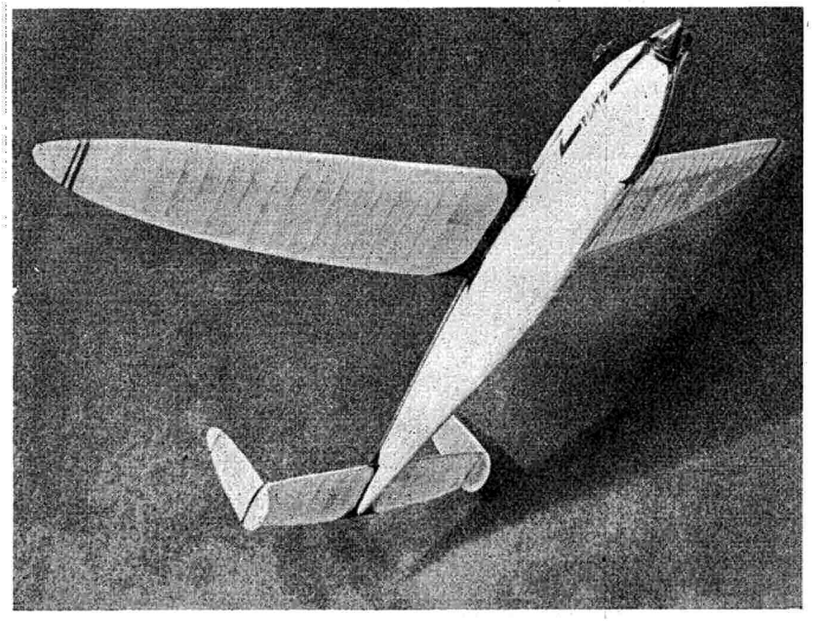
1945/46 MODEL NEWS

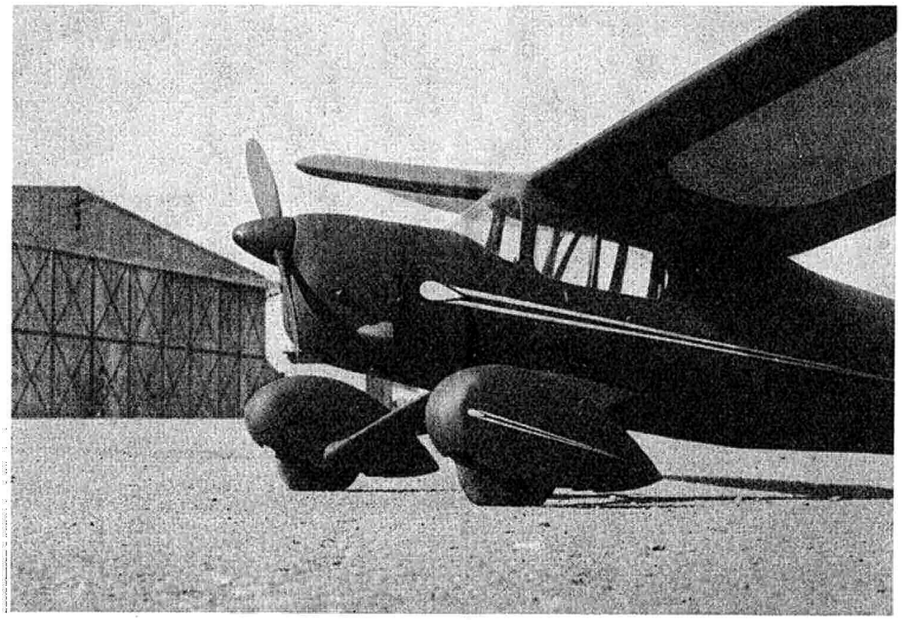
MALMSTROM



(Above) **Plastic Surgery.**—*Who would recognize this elegant sailplane as having started life as a model of Frank Zaic's "Floater"? However, that's what it was when R. B. Selwyn of Bounds Green first started work on it; much modification resulted in this greatly improved version.*

(Below) **What goes up doesn't come down**—*at least, not in this case. An efficient retracting undercarriage is incorporated in this new Wakefield by G. Saxby of Aldershot, other interesting features being a folding single-blade prop and tubular mainspar.*

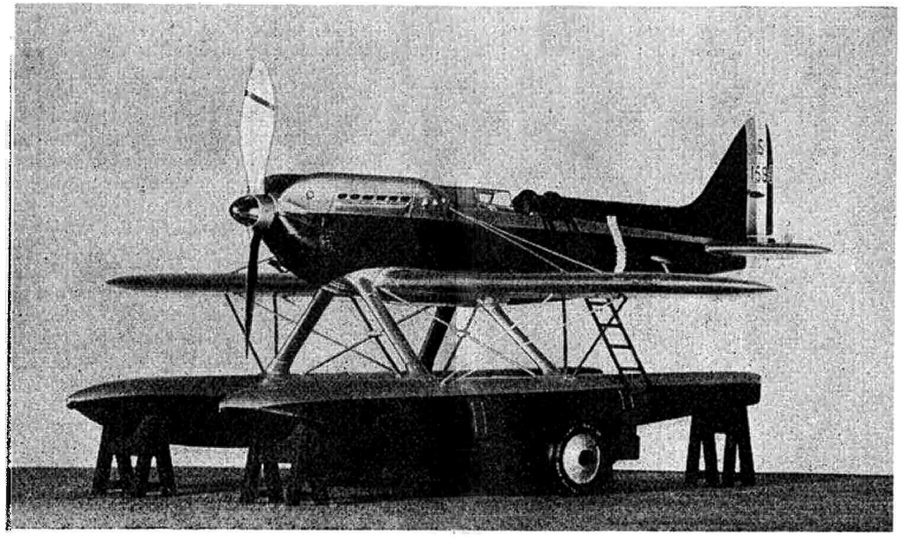


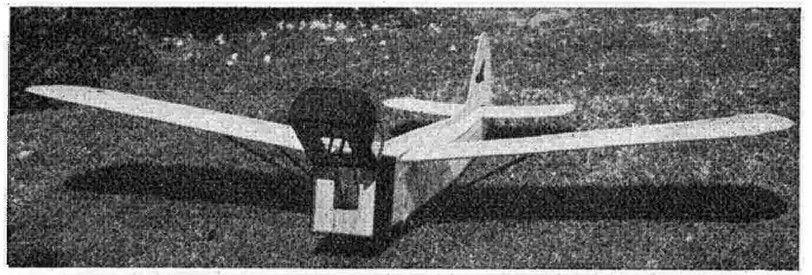


(Above) **Model of the month.**—*A superb constructional effort by B. H. Orchard of Norbury, London, late of Southern Rhodesia, takes first place in this month's Concours d'Elegance. The model is a "Mercury II," 8 ft. span petrol model designed by Mick Smith. Powered with a Forster 99, it has gained several places in Rhodesian competitions. Too seldom do we see petrol models with this "solid" finish.*

(Left, bottom) **Mirage.**—*Yes, it's all an hallucination! Neither the 1/72nd scale Horsa or the background got that way by themselves. Just a very clever piece of photographers' wangle by a professional friend of P. Semmons of Barnstaple, who made the model.*

(Below) **Schneider Superior.**—*Another appreciative murmur from the solid fans will undoubtedly greet this outstanding 1/24th scale Supermarine S.6B built by I. W. Moore of Derby, and which took 2nd Prize in the S.M.A.E. Solids Contest No. 2 in 1944. Accuracy and attention to detail make this model a delight to the eye, and Mr. Moore is to be congratulated on a very fine piece of work.*

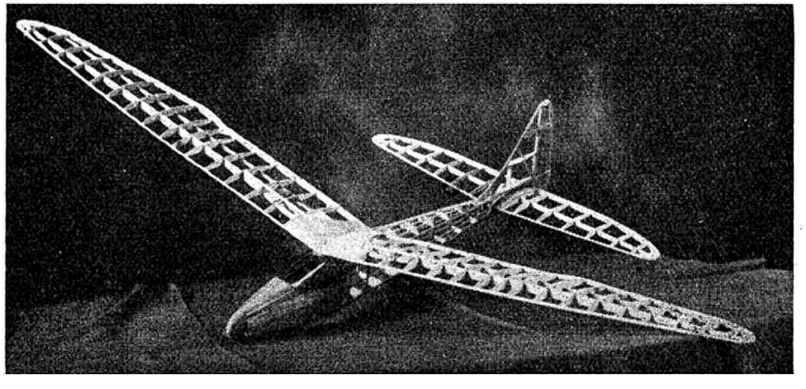




(Above) **Oh, Granny, what big teeth you've got!** *An excellent flying scale Hadrian, built from A.P.S. plans by K. Wilkinson of Grantham. The nose opens realistically as shown, and the standard of workmanship is highly commendable, especially as Reader Wilkinson built the model at the age of fifteen.*

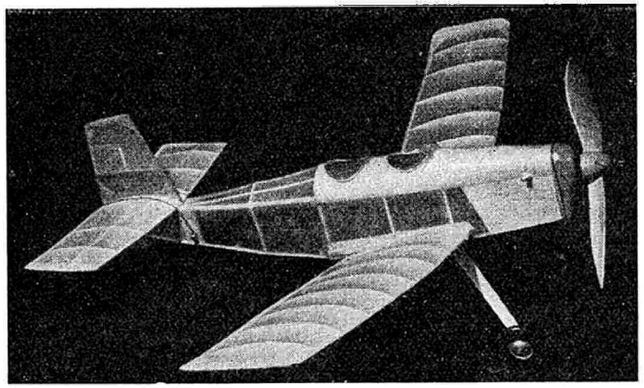
(Above) **They're neither too young or too old**—*for all boys from seven to seventy aeromodelling seems to have an irresistible attraction, as witness this photo. The model is an interesting Italian compressed air driven type, in this case more likely the work of Grandpa than Grandson, we think!*

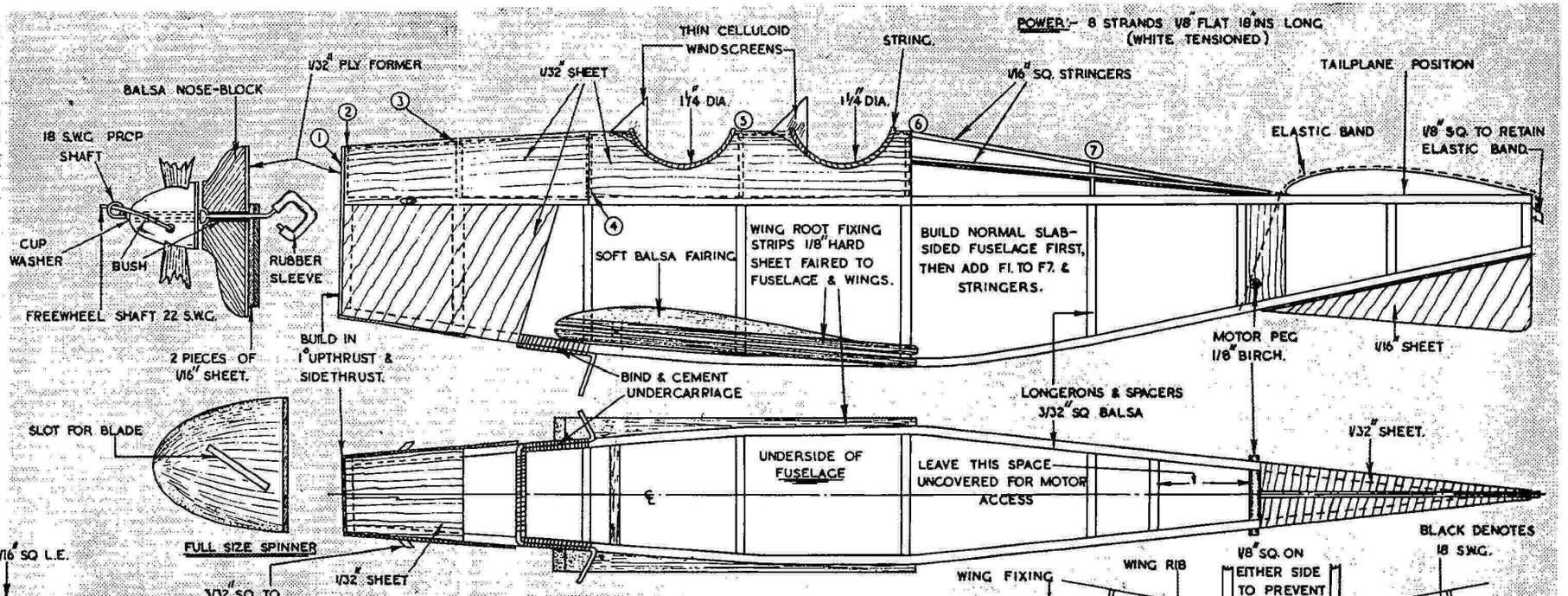
(Below) **More modifications**—*this time to a model of the ever-popular Thermic 50, built by Spr. H. Smith at present of Clitheroe, Lancs. His version incorporates automatic rudder control and a planked nose.*



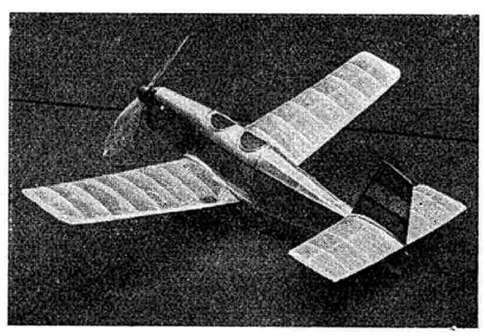
THE GOBLIN

DESIGNED BY J. EVANS.





SCALE :- 1/2 FULL SIZE



OLD NOG

A HIGH EFFICIENCY SAILPLANE OF 90" SPAN. BY P·E·NORMAN

THIS sailplane has been designed with a view to producing a machine having graceful lines and at the same time possessing a fine performance. In flight it has proved to be very stable and these qualities together with its robust construction, should repay anyone who decides to build it.

Commence by cutting out formers from ⅛ in. hard balsa. The centres may be cut away to reduce weight but I have not found this necessary on the original model. Cut No. 1 former from ⅛ in. 3-ply wood.

Next cut the longerons, ⅛ in. by ⅜ in., from ⅛ in. sheet hard balsa, and also the ⅛ in. plywood keel and hook combination, which extends to between formers 4 and 5. Glue the longerons and plywood heel to No. 1 former. Place the other formers in position, and ensuring that they are in true alignment when viewed from the front, glue firmly in position.

Cut the trailing edge of the rudder, which also forms the rear of the fuselage, and glue in position, bringing the longerons together and pinning them in place until the cement has set, again ensuring that this unit is in true vertical alignment.

Cut out from ⅛ in. sheet balsa, the two sloping platforms on which the centre section of the wing is located, and cement firmly in position.

Add the longeron which forms the back of the fuselage (the curved part is obtained by cutting from ⅛ in. sheet). Firmly cement a piece of ⅛ in. by ¼ in. hard balsa between this longeron and the trailing edge of the rudder. The platform on which the tail sits (⅛ in. sheet balsa) is now securely glued and pinned in position.

Make hooks as shown on the drawing and bind with thread to small pieces of 1/16 in. plywood which are then glued and bound in the positions shown to form the tail fixing hooks.

Add two blocks of soft balsa and, when dry, sand them to fair the platform into the sides of the fuselage.

Next take a block of balsa and cement between the front sloping platform and No. 1 former.

Allow to set, and shape and sandpaper to conform to the lines of the fuselage

Make two paper tubes, from strip gummed paper, about 2½ in. long to take 3/16 in. diameter dowels. Drill holes large enough for these tubes to press into in pieces of balsa ½ in. square by 2½ in. long, cement them securely in the position shown on the drawing; these tubes are to locate the wing fixing dowels and as the machine has such a large span must be secured as firmly as possible.

Take a block of hard wood such as pine, and shape roughly to form the noseblock, see plan.

Make a hole in the top of it to accommodate lead shot when trim is being obtained.

This block is then securely glued and dowelled on to No. 1 former and the shaping completed.

This block may seem exceptionally heavy, but even so my original model needed ¼ lb. of lead as well to obtain correct trim. Now the whole fuselage is covered with 1/16 in. by 3 in. sheet balsa wood, which should be glued and pinned and held in position with elastic bands till the cement has set.

Carefully sandpaper when dry to remove any inequalities and dope with clear dope.

Fill in the spaces between the sloping platforms, where the wing rests with ⅛ in. sheet balsa.

Cover the complete fuselage with two layers of bamboo paper, using photo paste or gripfix as an adhesive and carefully work out any wrinkles. When dry, dope with clear dope, and finally with two coats of colour, rubbing down to obtain as smooth a surface as possible.

The fuselage of my machine is a pale blue, and this, together with semi-transparent aluminium wings and tail and rudder makes a very pleasing colour scheme when in flight.

Tail.

This is of 27 in. span, elliptical and cambered section, modified "Clark Y;" commence by cutting out the ribs from 1/16 in. hard balsa. Cut the notches for the main spar, leading and trailing edges. Cut the main spar from ⅛ in. hard balsa. Notch the top surface for the ribs. Damp the main spar and carefully bend,

while holding over a gentle flame. (The leading edge is curved in the same manner.)

The leading edge is cut from ⅛ in. sheet balsa, ⅜ in. by ¼ in.

The trailing edge is cut from ⅛ in. sheet in two halves, the curve in this case being obtained by cutting from 3 in. wide sheet.

Assemble the main spar and ribs on the plan. Add the leading and trailing edges, and cement all joints. Allow to set.

Add the 1/32 in. sheet capping which extends from the leading edge to the main spar on the top and bottom surfaces, cement and pin in position until set.

Fill in the space between the two centre ribs at the top and bottom surfaces with 1/16 in. sheet (grain spanwise). Cover completed tail with bamboo paper, water shrink, and dope with one coat clear dope and one coat colour, pinning the tail down during the drying process to prevent warping.

Rudder.

This small unit should present no difficulty.

Commence by cutting a strip of 1/16 in. by ½ in. balsa, and damping, carefully bend, so that it follows the contour of the upper surface of the centre of the tail.

From a piece of ⅛ in. sheet, cut a reinforcing strip to the same curve and cement it to the 1/16 in. piece.

Cut the leading and trailing edges from ⅛ in. sheet balsa and also the short main spar. Insert these units in position and cement thoroughly. Make two hooks similar to those made on the tail end of the fuselage, and bind and glue in position. Cover the whole rudder with 1/32 in. sheet balsa and one larger of bamboo paper. Dope in the usual manner.

Wings.

The wing is in two halves to facilitate portability.

Main Spar.

Cut this from ⅛ in. hard balsa, which is reinforced with 1/16 in. 3-ply wood glued and fastened to the balsa with strip gummed paper. This forms a very strong main spar which is necessary for a machine of this span.

Study the plans, and note the various rib forms. (The section I have used is not one of any particular section but I find that it is advisable to select one which has a good undercamber and a reflex trailing edge. Readers may like to introduce their own favourite section, and I should like to hear from anyone who builds this model, and who tries other sections.)

Cut ribs Nos. 1, 2 and 3 from ⅛ in. sheet balsa. Cut notches for the main spar, leading and trailing edges.

Cut the rest of the ribs from 1/16 in. sheet hard balsa.

Slip the ribs in position on the main spar after carefully covering the main spar back to the amount necessary shown on the plan.

Check them up for true fore and aft alignment, and cement lightly in position.

Cut the leading edge from ¼ in. by ¼ in. hard balsa, and the trailing edge from ⅛ in. hard sheet. It will be seen that each of these are made in two pieces, cut to shape, glued and bound with strip gummed paper.

Place the leading and trailing edges in position and glue.

The leading edge continues into No. 1 former and is strongly glued here. The trailing edge finishes at No. 2 rib but a reinforcing piece of ⅛ in. balsa should be cemented and bound to the trailing edge and continue to No. 1 former, for maximum strength.

Carefully insert auxiliary spar in position and cement. Now add the trailing edge fillet, cut from ⅛ in. sheet.

The half wings are held together by two sets of hooks bound together for flight on the upper and lower sides. These hooks are bent from 1/16 in. diameter spring steel wire, securely sewn with thread to pieces of 1/16 in. plywood, which in turn are glued, pinned and bound with strip gummed paper to the main and auxiliary spars in the manner shown.

Make a good job of these, as they have a heavy amount of work to do.

The wing tip is now finished with ⅛ in. sheet balsa.

Wing tip slots are fitted and may be made as follows.

Between ribs Nos. 11 to 16 cement pieces of ⅛ in. balsa cut to the section shown. Allow to dry.

Build up the slot with light balsa cemented to the top of the leading edge, and sanded off to the correct section.

The slot is completed when the 1/32 in. sheet balsa covering is added to the leading edge, and extending back as far as the main spar.

The 1/32 in. sheet is carefully cut to fit between ribs Nos. 11, 12, 13, 14 and 15 and is then curved round the ⅛ in. balsa leading edge, glued and pinned in position till set.

This 1/32 in. sheet covering is fixed to both the top and bottom surfaces. Fill in the space between former No. 1 and rib No. 2 on the bottom surface with ⅛ in. sheet balsa.

Add two pieces of ⅛ in. balsa at the front and rear of No. 1 former, cut to the same section as the sloping platforms on the fuselage. Cement thoroughly.

Fair in the space at the top surface between No. 1 and No. 2 ribs with 1/32 in. sheet balsa grain spanwise, and fillet the centre sections at the roots to conform to the lines of the fuselage. Sandpaper the wings carefully all over and examine to ensure there is no warping. The two halves should now be bound together, and the wing placed in position of the fuselage to see that it fits in the space correctly.

It will be appreciated that, because of the sloping platforms, the wing may slew round and move forwards and backwards with no damage.

Cover the wings with strong bamboo paper.

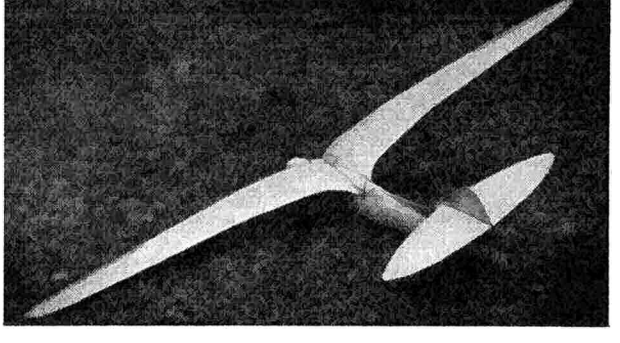
Cover the bottom surfaces first, ensuring that the covering is glued to the undercamber with waterproof adhesive. Water-shrink the bottom cover and allow to dry.

Cover the upper surfaces, water-shrink and allow to dry. Dope two coats clear and two coats coloured dope on the upper surfaces, weight the wings down on to suitable rests when drying out to prevent warping.

The machine is now complete except for trimming.

It should balance at a point *one third* of the chord *forward from the trailing edge* and lead shot should be poured into the hole provided in the noseblock until this is obtained. Cover in hole with a balsa wood plug.

(*Continued on page 124.*)



"OLD NOG"

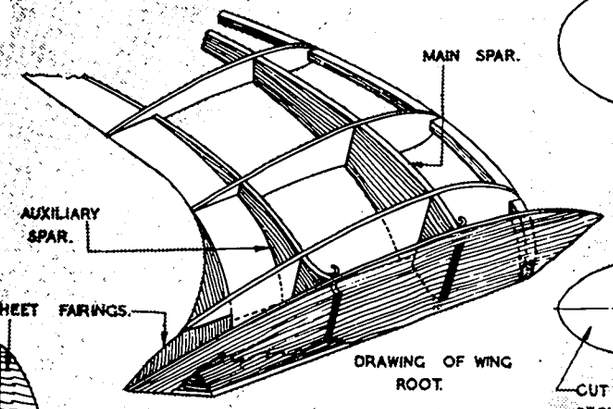
HIGH PERFORMANCE SAILPLANE

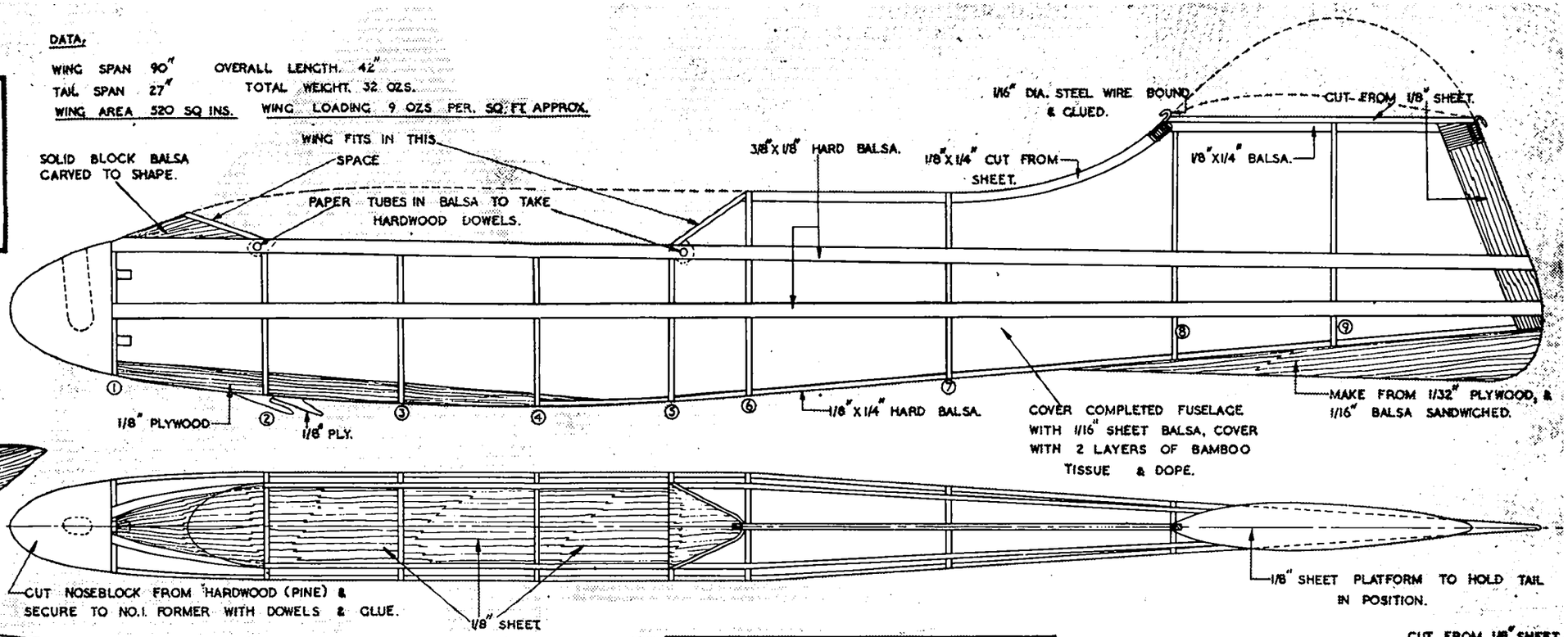
DESIGNED BY —— P. E. NORMAN

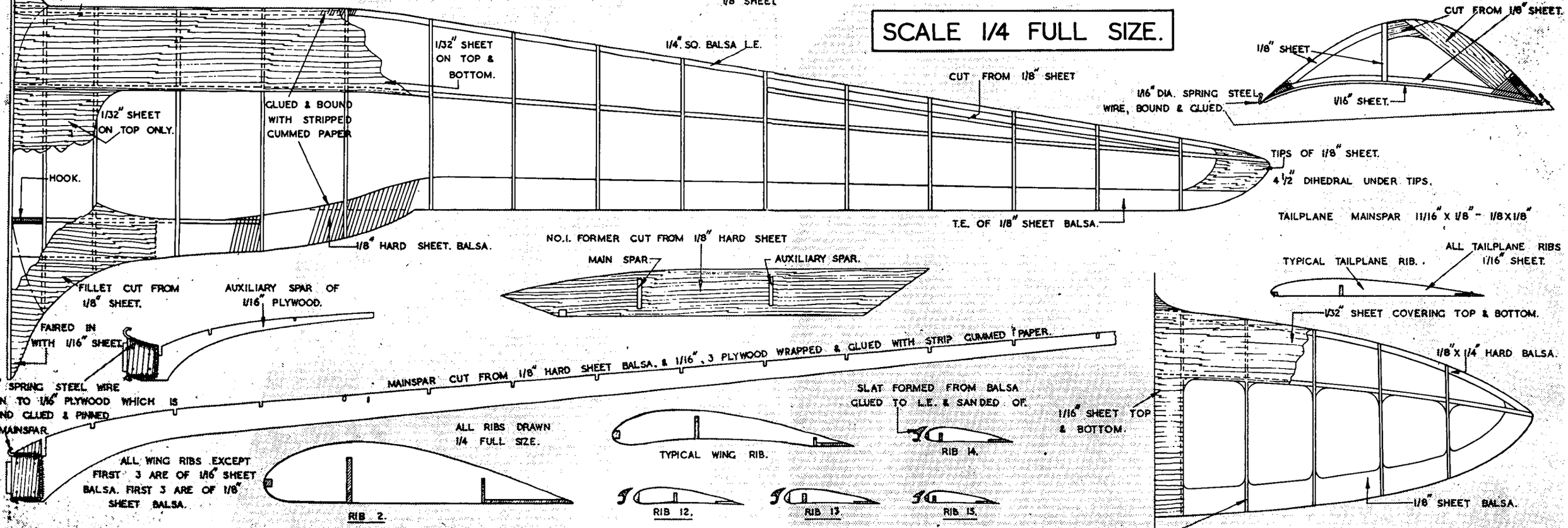
DATA:

WING SPAN 90" OVERALL LENGTH. 42"
TAIL SPAN 27" TOTAL WEIGHT. 32 OZS.
WING AREA 520 SQ INS. WING LOADING 9 OZS PER. SQ. FT. APPROX.

SCALE 1/4 FULL SIZE.







Test Flights.

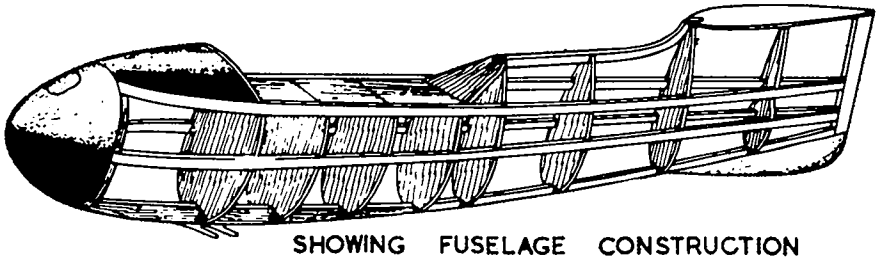
Hand launch on to long grass, nose slightly down, and correct for trim by packing the leading or trailing edge of the tail up or down. The incidence of the mainplane should not be altered.

I should add here that assembly is by means of elastic bands cut from old motor cycle and cycle inner tubes.

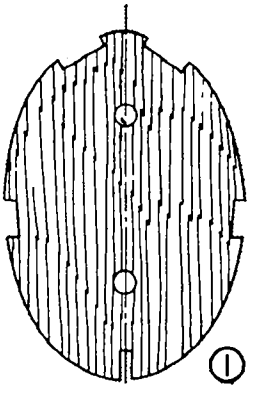
When perfect gliding trims are obtained the machine may be tow launched, using the rear hook for light winds, and the front one for stronger winds.

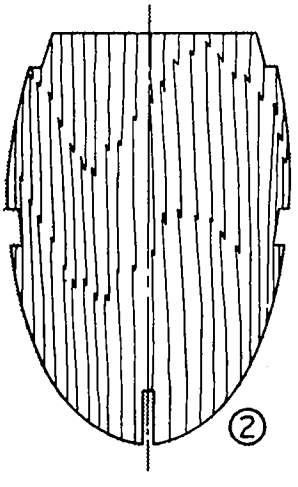
Any turning trim may be obtained by slightly offsetting the small upper fin.

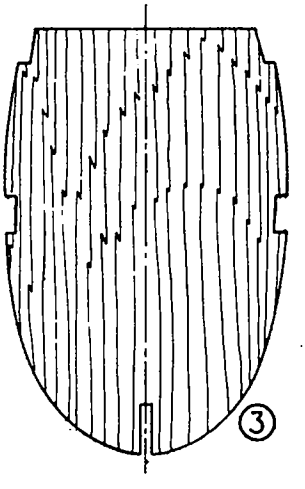
A large space should be found to fly this model as it possesses a really fine performance, and looks exceptionally graceful in flight.

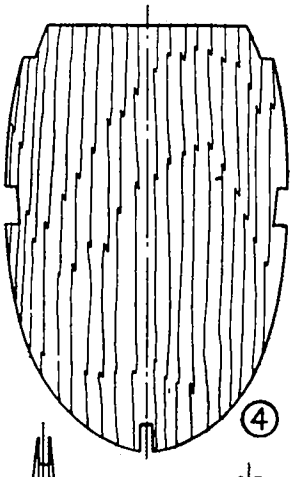


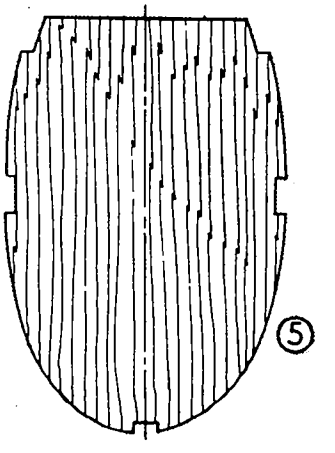
SHOWING FUSELAGE CONSTRUCTION PRIOR TO SHEETING.

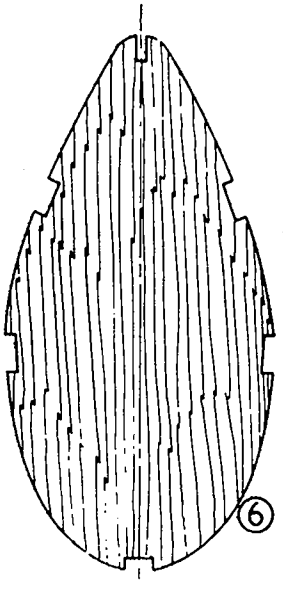


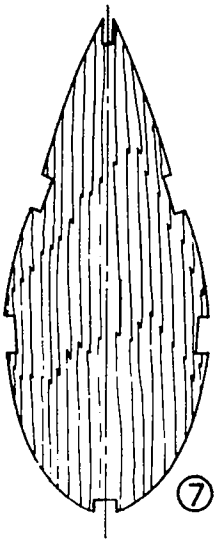


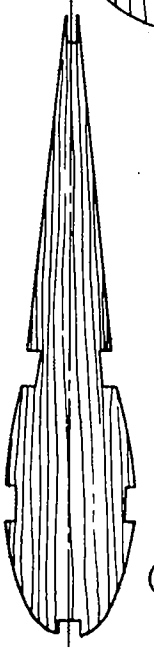












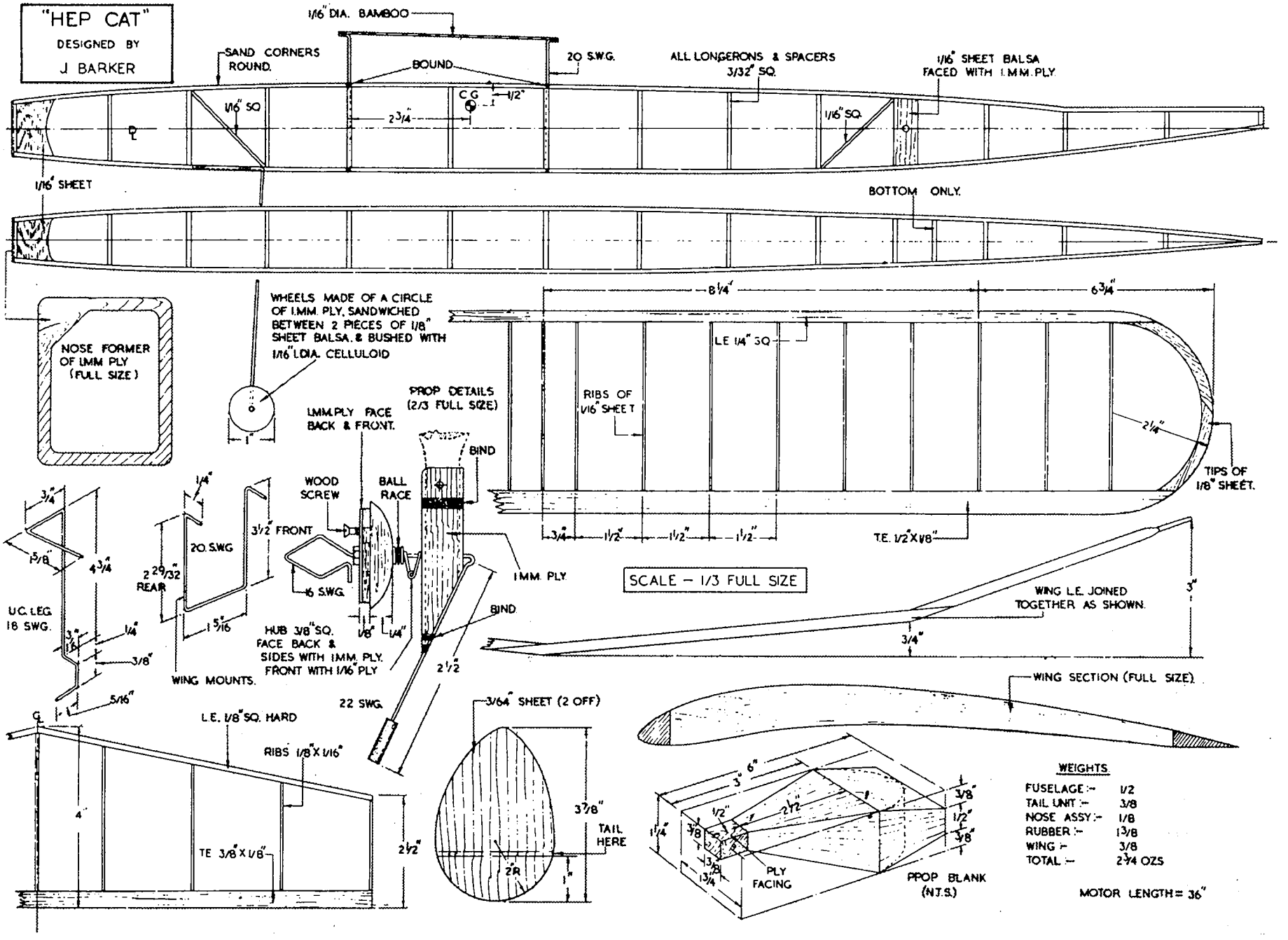
ALL FUSELAGE FORMERS DRAWN 1/2 FULL SIZE.

ALL FORMERS CUT FROM 1/8" SHEET BALSA. EXCEPT NO.1 WHICH IS CUT FROM 1/8" 3 PLY.

"HEP CAT"

DESIGNED BY

J BARKER



WEIGHTS

FUSELAGE :–	1/2
TAIL UNIT :–	3/8
NOSE ASSY :–	1/8
RUBBER :–	1 3/8
WING :–	3/8
TOTAL :–	2 3/4 OZS

MOTOR LENGTH = 36"

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,

In the November issue of the AEROMODELLER there appear two references to Control-Line petrol models which, to my mind, show that modellers in this country do not fully understand the problems concerning this type of flying.

In the "World News" column it is rather caustically stated that ". . . stones, provided they are firmly tied to a piece of string, are much cheaper." Also, in a letter, Brigadier Parham evidently does not much care for control-liners, except for the scale type of model. Doctor Forster views this sport as a "confession of abject failure".

Well, well! It is never my wish to start civil warfare, but I feel that, having a considerable knowledge of the wiles of the control-line breed, I ought to state a few facts (this is quite different from laying down the law!).

Item one, the speed model. This little brute does not, contrary to popular opinion, fly solely, or even partly, due to centrifugal force. To obtain sheer speed, a model must employ an extremely efficient airfoil of very low drag, but of high life characteristics. Sticking a couple of little boards on the fuselage definitely isn't enough. The reason why speed models fly round at very low altitudes is obvious, because they create more lift when flying horizontally or nearly so. They need all the lift they can get, a fact which becomes apparent when you realise that in most cases the drag of the control-lines is *greater* than that of the actual aircraft itself (strange, but true none the less). Were centrifugal force an important item, these models could not fly at all. The facts are that, to obtain good consistent speed flying, you must go all out on these phases of design: airfoil research, airscrew pitch and blade area, drag reduction, and motor r.p.m.—this last embracing the whole gentle art of tuning, from contact-breaker design and H.C. heads, to dope fuels. No, there really is a great deal in this speed-model business and it takes more than an idiot to get results.

Item two, the scale model. You can fly almost anything in this line if you know how. The point is that, like speed flying, there's more to it than one would think. If you dream of success, ponder over these points and use them as a basis for your daydreams:

(i) I think we all agree that a scale model should be capable of a certain amount of action, climbs and dives, banks, loops and so on, not just a sedate (or otherwise) orbit at 10 ft.

(ii) Models should emulate their prototypes: a Spit would be expected to fly quickly, a Camel quite slowly.

Now then. The fast, manœuvrable fighter must be built with a powerful motor, and should be kept lightly loaded although it must remain quite fast. Not so easy, is it? When you start planking and painting, up goes the weight; and why not, when I've just said that "anything can fly" in the scale line. Well, if you've flown a fighter—full-sized—you may have had a little experience called a high-speed stall; nasty things, which occur when a banking machine tightens its turn so much that its increased wing loading (due to G) becomes too high and the lift ceases to be enough for the speed. Models have these high-speed stalls, too, so look out when you bank them over in high, tight turns.

The dear old biplane looks lovely, but she is a devil to fly "on a string". You have to keep her fast enough to overcome her enormous drag, but slow enough to look right. Also, her vast array of bits and pieces have a nasty habit of coming adrift if not fastened with extreme ingenuity. Altogether she is a foully delightful little baggage if you aim for real consistency and a minimum of cuss-words.

Does this all help to convince you, my British aeromod, that control-line flying is more than just another Yankee stunt? Because it is a whole lot more. Not many of you have tried it; I have, and I know a little of what it takes to get results.

For the jam on Brigadier Parham's bread and butter, here's a true tale: a scale model of a 1909 box-kite pusher has actually been built, flown on control-lines, and lives to fly again. For those of you who don't like jam, let's go all modern with this one: a scale model Superfort, 6 ft. and with four motors all howling happily, has flown time and again under perfect control.

So *please*, don't condemn control-line models just because they're. American, or because you are true-blue Tories, or even because you think it's a silly idea. You can have bags of joy at it, and it's not so simple that you can disdain it.

East Mersea. L. G. TEMPLE.

There are two sides to every question and now that readers have had the opportunity of hearing both sides, we intend publishing in the near future complete plans and building instructions for a typical American control line model. Readers can then find out for themselves and we shall be pleased to hear of their experiences with this type of model. (ED.)

DEAR SIR,

I feel I ought to add a few remarks to the notes in the November issue of the AEROMODELLER concerning Rockets.

A rocket used for propelling a model aeroplane must have been designed and manufactured for that purpose. According to the law it is an infringement to modify a firework, and to put an ordinary firework on a model aeroplane is considered by the authorities to be a modification.

The authorities have been quite sympathetic and were kind enough to give permission for the experiments necessary for developing suitable rocket units. Messrs. Brocks were given permission to make units for me to try in my entry in the Handley-Page competition. I cannot speak too highly of the way Messrs. Brocks helped. They persuaded the Home Office to grant permission, and they spared no pains to provide a suitable unit for the model.

Suitable units for propelling model aeroplanes will be put on the market as soon as conditions permit, and will be sold either through clubs or firework dealers. I will let you know as soon as they are available, and perhaps a few notes on the safe handling of them.

I like the photograph of my model at Eaton Bray, and could not help laughing at the people getting out of the way. Of course, I am used to them now, but the first time this large model flew with a rocket it did three loops straight off in eight seconds and it nearly frightened *me*.

Weedon. HOWARD BOYS.

DEAR SIR,

During last year I attended several National Contests for petrol-engined models, organized by the S.M.A.E. I was forcibly struck by the futility of the "nominated time" systems upon which the present series of competitions are being run. To use a specific motor-run followed by a specific glide of equal length or a little longer is quite obviously achieving nothing. As it was put by one spectator, a very well-known competition aeromodeller: "You might just as well tow it up and down on a line!"

Now surely these contests were originally designed to further the development of petrol models, and should therefore still be run on lines which would do so. The present system leads only to stagnation!

Wandsworth. ROBIN BANKS.

Destructive criticism is not enough in this case. Just what is to be done to improve petrol model contests is quite a complex problem. Certainly the nomination system is not good enough especially for international events such as the Bowden Trophy. We shall be glad to publish one or two constructive suggestions from readers who care to send them in. (ED.)

Jet Recco. *The Arado Ar 234B-2 jet-propelled high-speed reconnaissance monoplane; also used for low-level bombing of Allied troops during the final phases of the European War. This aircraft has the R.A.F. serial number VK 877. (A.T.P. Photo.)*

Welkin Rival. *High-aspect ratio wings distinguish this Focke Wulf Ta 152 high-altitude fighter from the closely-related Fw 190D. The new designation "Ta" signifies Kurt Tank, the designer of the Fw 190 series. (A.T.P. Photo.)*

Ahead of its Time. *Fairey Hendon night-bomber as used by No. 38 (B) Squadron of the R.A.F. from 1937 to 1939. First built in 1930, the Hendon was delayed by an accident to the prototype. See R.A.F. Flashbacks opposite. ("Flight" Photo.)*

MONTHLY

BY O·G·

Farnborough Exhibits.

Space does not permit of a complete description of the magnificent Exhibition of British Aircraft and captured German Aircraft at Farnborough in November last, but it is believed that the following list of aircraft with their Service numbers will prove of interest to collectors and modellers. The accompanying pictures of some of the enemy aircraft on show will be followed by a selection of British types in the next issue.

FIGHTERS: Hawker Tempest VI (NX 117); Hawker Fury I (NX 802); Hawker Tempest II (PR 739); Martin-Baker. M.B.5 (R 2496); Gloster Meteor IV (EE 360/G); De Havilland Vampire I (TG 285); De Havilland Hornet I (PX 237); Vickers-Armstrong Spiteful XIV (RB 521). FLEET TYPES: Blackburn Firebrand IV (EK 680); Fairey Firefly IV (Z 2118); Fairey Spearfish I (RA 356). BOMBERS: Bristol Brigand I (MX 991); Vickers-Armstrong Windsor I (DW 512); Avro Lincoln II (RE 325). RECCO.: De Havilland Mosquito P.R.34 (RG 307). TRANSPORTS: Handley-Page Halifax VIII (PP 328); Avro Lancastrian (VM 702). CIVIL: De Havilland Dove (G-AGPJ); Vickers-Armstrong Viking (G-AGOL); Avro Tudor I (G-AGPF: R.A.F. TT 176).

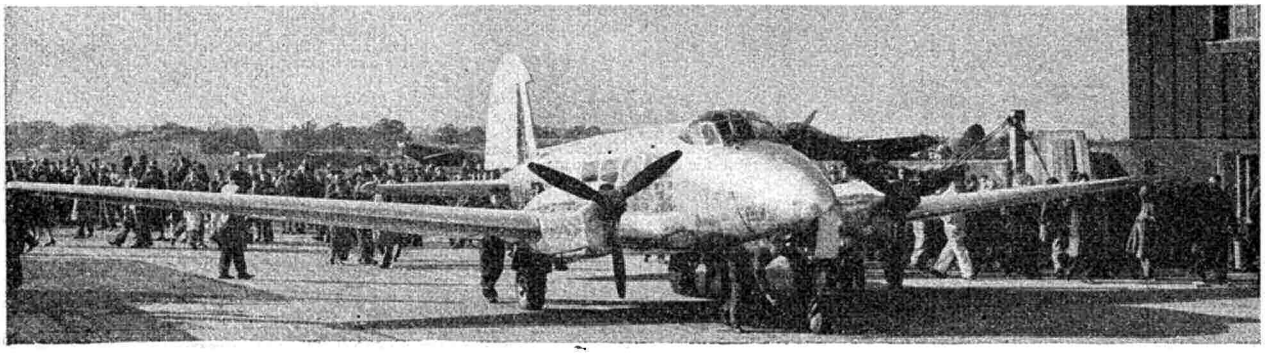
Rapide Replacement.

Announced as the successor of the veteran Dragon Rapide is the De Havilland 104 Dove monoplane (two 170 h.p. D.H. Gipsy Queen 71 six-cylinder inverted in-line air-cooled motors). Features of the Dove include all-metal stressed-skin construction and tricycle undercarriage. Pilot and co-pilot sit side-by-side in the nose and there are seats for eight passengers. The prototype Dove flew on September 25th, 1945, and with the registration letters G-AGPJ appeared in public for the first time on October 29th. The Dove has a span of 57 ft., a length of 39 ft. 4 in., a height of 13 ft. and a loaded weight of 8,000 lb., giving a 2,000 lb. payload. Maximum cruising speed at 5,000 ft. is 194 m.p.h.; initial climb, 850 ft./min.; service ceiling, 21,500 ft.; and the take-off run, 500 yards.

Auster News.

We learn from the British Taylorcraft concern that all Austers prior to TJ 599 were camouflaged, whereas all machines after this number are flying with silver finish. Civil Austers are now to be seen once more and three

For Internal Routes. *De Havilland's replacement type for the well-tried Rapide—the D. H. 104 Dove. The Dove is unusual amongst British transports in employing a tricycle undercarriage. (De Havilland Photo.)*



MEMORANDA

THETFORD

aircraft are registered G-AGOH (Mk. III), with green letters on silver; G-AFWN (Mk. V), with green letters on cream; and G-AGLK (Mk. IV), the latter machine belonging to the Department of Civil Aviation, Air Ministry.

New Netherlands Insignia.

In view of the troubles in the Netherlands East Indies at the time of writing, the accompanying photograph of a Dutch Catalina amphibian is of especial interest. This aircraft, photographed in India, is displaying the new Netherlands national markings, consisting of spanwise red, white and blue bars above and below the wings, midway between the wing tip and the wing root, and a similar marking on the sides of the fuselage. The red bar is foremost on the wings and uppermost on the fuselage.

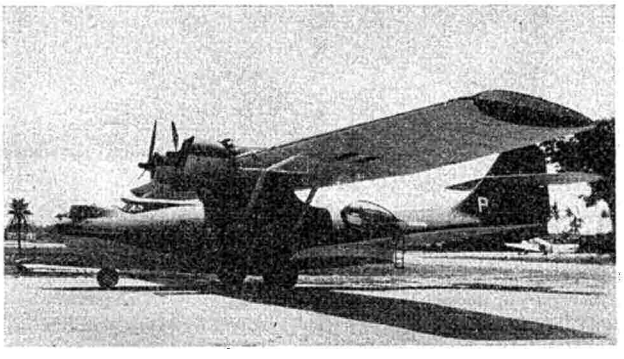
Tailplane Squadron Letters.

Most unusual markings were observed at a recent air display on an Avro Lancaster III of No. 83 (B) Squadron, R.A.F. This Lancaster bore normal night bomber camouflage and displayed the code letters OL-A on the fuselage and also *above the tailplane and elevators*. The letters were in red, outlined in yellow, and the "OL" was above the port tailplane and the "A" above the starboard, the tops of the letters being foremost. The Service number of this machine was ND 591, in red on the rear fuselage and in white beneath the wings.

R.A.F. Flashbacks—14.

The Fairey Hendon night-bomber was supplied to only one squadron of the R.A.F., No. 38 (B) Squadron at Marham, which unit received them in 1937–38. The Hendon first appeared so early as 1931 but production was delayed by an unfortunate crash with the prototype. In many respects ahead of its time, this cantilever monoplane was of metal tubular construction with fabric covering and was fitted with two 600 h.p. Rolls-Royce Kestrel VI motors. The Hendon had a span of 101 ft. 9 in., a loaded weight of about 20,000 lb. and a crew of 4–5. The bomb-load at a range of 1,360 miles was 1,660 lb. Top speed was 156 m.p.h. at 15,000 ft. Hendons were drab green all over with red and blue roundels. Prototype was K 1695; production aircraft were numbered K 5085, K 5086, K 5087, etc.

Winter Operation. *First tested in France early in the War, this Auster on skis demonstrates still further the amazing versatility of this little aircraft.*



New Insignia. *A Dutch Consolidated Catalina amphibian carrying the new Netherlands insignia. This machine was photographed in India on its way out to the Dutch East Indies.* *(Photo: Peter M. Bowers.)*

Quick-change Artist. *In yet another role, this time as a twin-float seaplane, this Auster was first tested on Lake Bala, in North Wales.*

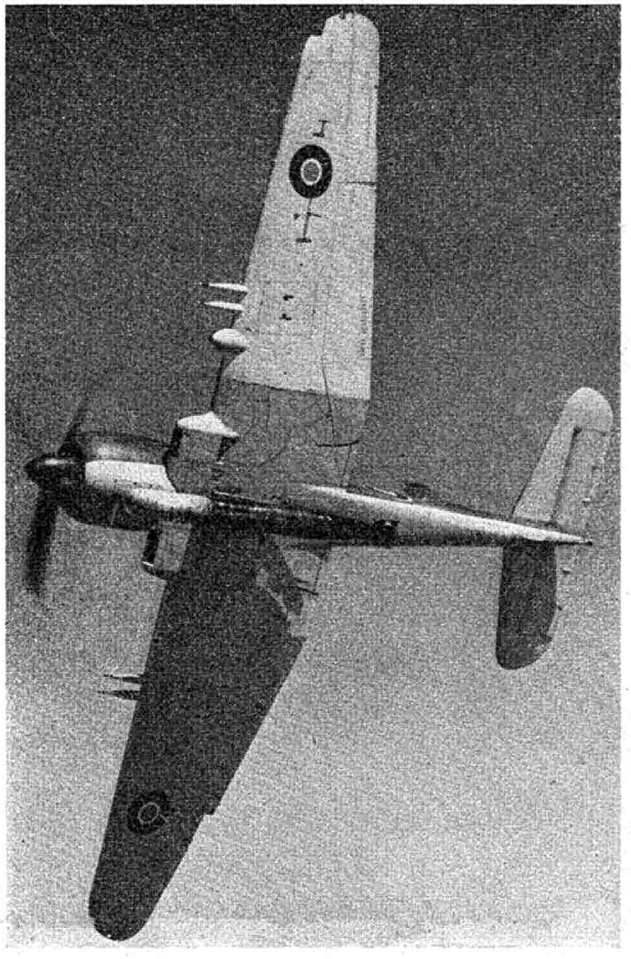
Cosmopolitan Heinkel. *A captured Heinkel He 111 at the Farnborough Display bearing German, British and American markings. The letters on the fuselage and the fin were outlined in silver.* *(A.T.P. Photo.)*

AEROPLANES DESCRIBED XXXIV

THE BLACKBURN T.F. IV FIREBRAND

THE wheel of British naval torpedo-plane design has now turned the full circle. Back in 1918, when the species made its debut with the Sopwith Cuckoo, and again in the early twenties with the emergence of the Blackburn Dart, standard practice was to employ a single-seater, a sort of scaled-up fighter. Then between the wars the tendency was towards two-seaters and three-seaters (including a radio-operator),

Photos: Chas. E. Brown.



Even with the advent of the monoplane for torpedo work (the Barracuda) the three-seat layout was retained. Now, with the introduction of the Blackburn Firebrand, the single-seater reigns once more and a notable improvement in performance results.

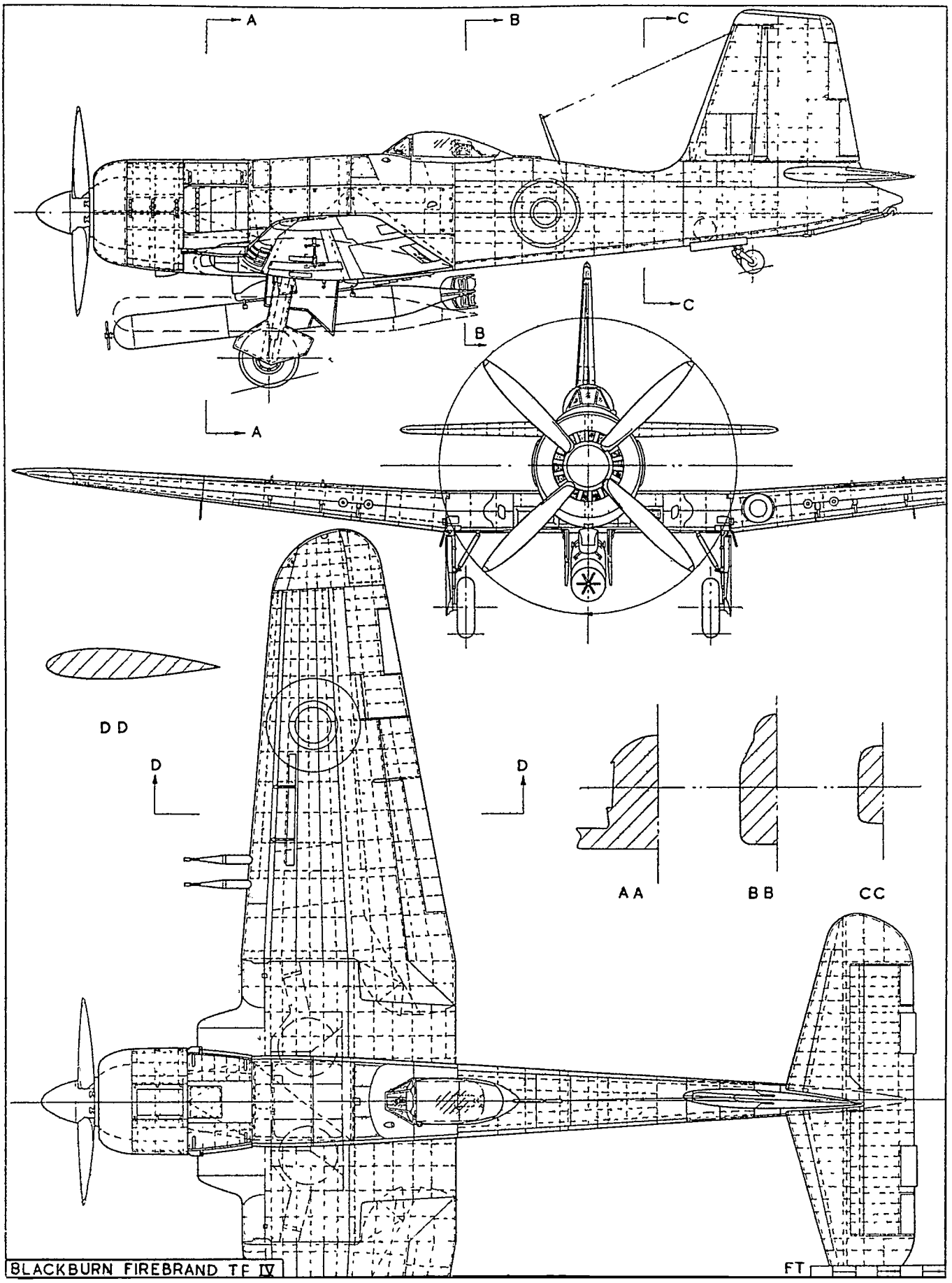
Claimed to be the fastest single-motor torpedo aircraft in the world, the Firebrand is in quantity production for the Royal Navy and is capable of operating as a "strike" aircraft with torpedo, or as a dive-bomber. The Firebrand was initially projected as a single-seat carrier fighter in 1940, and the prototype Mk. I, DD 804, designed to Spec. N.11/40, was fitted with a Napier Sabre and made its first flight on February 27th, 1942. The second prototype, DD 810, flew in the following July. The first torpedo version, Mk. II (Sabre III), NV 626, first flew on March 31st, 1943.

First version with the Centaurus was the Mk. III, DK 386, which was flight-tested on December 21st, 1943. The first Mk. IV, current production version, made its initial flight on May 17th, 1945. The Mk. IV incorporates several improvements over the Mk. III, including larger fin and rudder and a Centaurus IX motor in place of the Centaurus VII.

The Firebrand IV, of all-metal construction, has several novel features, including a two-position mounting for the torpedo (facilitating high-speed drops) and spring-tab aileron control for fast rolls. Other features include folding wings, dive-brakes, and the ability to execute aerobatics with torpedo in place. Provision is made for R.A.T.O.G. (assisted take-off).

Mr. C. Rupert Moore's cover painting shows Firebrands engaged in a practice "drop," using torpedoes with "Mat. 4" tail fittings.

Specification: One 2,500 h.p. Bristol Centaurus IX motor. Rotol four-blade airscrew. Span: 51 ft. 3½ ins. Length: 39 ft. 1 in. Gross wing area: 381½ sq. ft. Loaded weight: 15,671 lbs. Max. speed (with torp.): 342 m.p.h. at 13,000 ft., 350 m.p.h. without torp. Cruising speed: 256 m.p.h. Climb (with torp): 2,200 ft./min. Armament comprised of 1,850 lb. torpedo or bombs, four fixed 20 mm. cannon and rocket-projectiles.



BLACKBURN FIREBRAND TF IV

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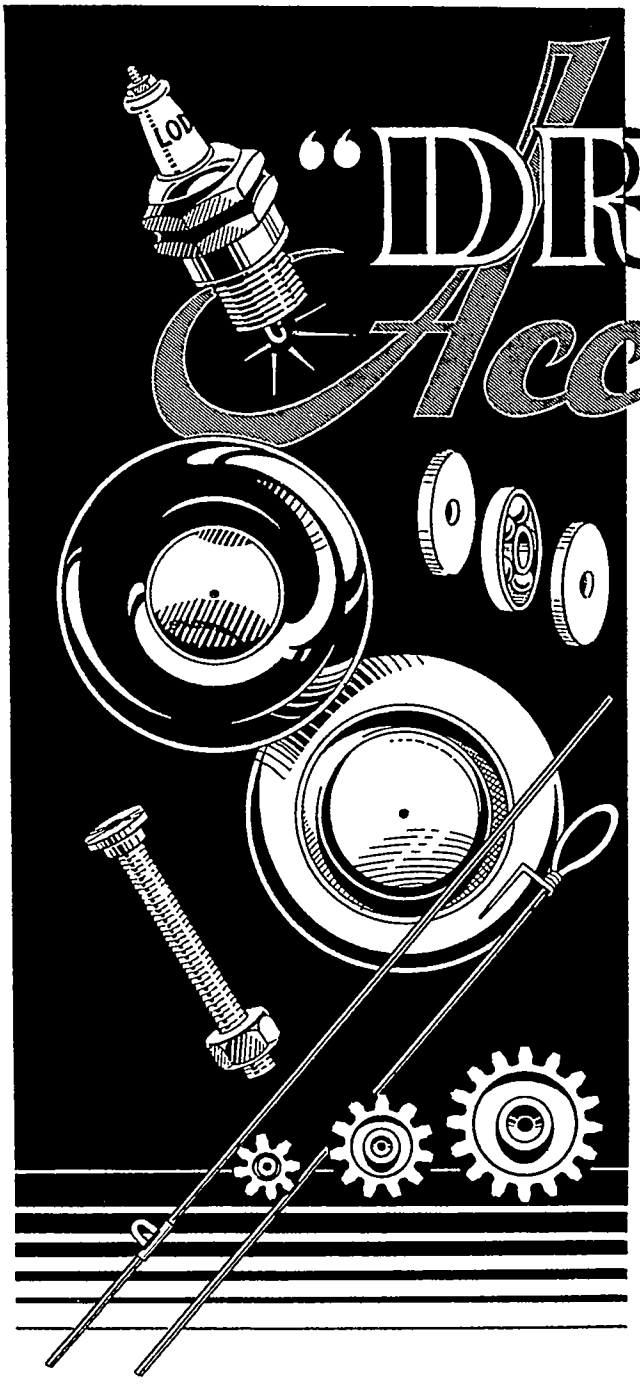

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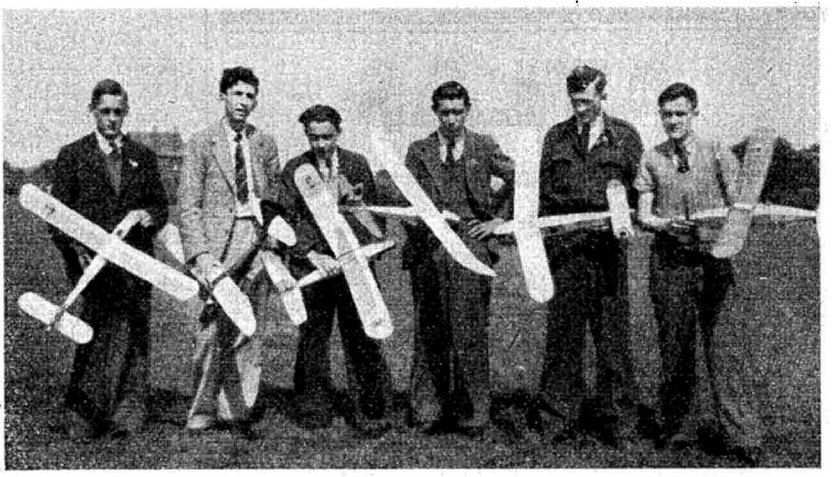
CLUB NEWS

BY CLUBMAN



Members of the Burton-on-Trent M.A.C.

WHAT constitutes a good clubman? I raise this point following an argument-cum-chinwag with a number of Service chaps the other day, during which some interesting viewpoints were aired—and some of which I pass on to you for consideration.

"Nobby" claimed that the best type of clubite was the competition hound, a consistent entrant into all club and national events, and of course collecting a number of "scalps" *en route*. He claimed that a member of this calibre brought fame to his club, and increased membership from those who liked to be connected with a successful group.

"The Irk" didn't subscribe to this view, and gave his opinion (in no uncertain terms) that such a type was a menace, in so far as it tended to put off newcomers who took the view that they didn't stand an earthly against such experts. He was all for the social side of club life, and advocated a regular programme of inter-club visits, dances and bun-fights—particularly the latter! And . . . "oh yes, an occasional lecture or something to keep the formulæ fans amused."

"Blinkers"—glowering from behind the enormous glass lenses that account for his nickname—poured vitriol on the "Irk," and stated that in his considered opinion (cheers from the common types) the only reason people joined a club was to gather technical information with which to improve their own models. Therefore, a well thought-out programme of technical lectures—bringing in where possible outside experts in order to get an all-round opinion—was the ideal way to conduct what is after all a technical hobby.

On being pressed for a judgment on such matters, I blushingly stated that they were all right . . . up to a degree!! The best clubs in my opinion are those that cater for all types and tastes, though I admit it is a very difficult proposition.

The ideal club is surely one in which the out-and-out contest fan can fully occupy his abilities, combined with a modicum of technicalities and due attention to the social side of any gathering. A clubroom, while not absolutely essential, is definitely an asset, and should be the aim of all groups no matter what the effort. All classes of activity can then be conducted under sub-committees appointed for the purpose—as long as all activity is properly controlled by the club executives.

This last requirement is most important, and brings up a point I have always tried to drum into modellers and clubs whenever I meet them. The club executives—by which I mean such officials as chairman, secretary, treasurer, etc., etc., MUST be persons who are willing to put their job before their own particular preferences. It is no good appointing an expert flier as competition secretary—he is usually too busy himself with his models to give the requisite attention to the running of the contest. Likewise the secretary does not necessarily mean one of the club experts—willingness to carry out the instructions of the executive, and attend to routine matters promptly are the essential virtues of a secretary, and these attributes may be found in the poorest model builder and flier.

So, employ great care in the selection of your club officials, elect the right men for the job, and once elected see that they carry out the wishes of the club. And one final word—if there is something you do not approve of in either the club management or membership, state your case to the proper persons at the proper times, and don't conduct a grousing campaign that gets no one anywhere.

Well, these are my views on club life, and I shall be pleased to hear from my readers any other views on the matter. Club life is the mainstay of aeromodelling (or at least so I maintain!) and any means by which ideas can be passed on for the benefit of all will be heartily plugged by yours truly. Let's hear from you!!

Great news comes from the Air Ministry, who have now lifted all restrictions on the flying of models of all types. This will I am sure boost up interest in larger models, particularly in sailplanes, and bring about an even greater interest in petrol jobs. All that remains is for supplies to get back to normal—and then, oh boy, won't aeromodelling go places! Roll on the day.

The MANCHESTER & DISTRICT COUNCIL OF MODEL AERO CLUBS is doing great work in conjunction with the Northern Area Council of the S.M.A.E. in arranging lectures, rallies, indoor meetings, etc., for, and to the enjoyment of, aeromodellers in general, and to the North in particular. An area r.t.p. contest is arranged to take place in February, and I understand that the Editor (for many years a doughty fighter for North country recognition) is to give a lecture in the new year.

An interesting proposal was made at a recent meeting of the NORTHERN AREA COUNCIL (S.M.A.E.) by the Bradford club, viz.: "That four main contests for Plugge Cup points should be held in the four areas on the same day, the remaining competitions to be organised as usual." I take it that the Bradford club mean four competitions be designated for flying during the season, and not all four comps. to take place on the same day?

M/s. Cookson, Whittle and Wakefield, all members of the WHITEFIELD M.A.C., cleaned up the October decentralised Glider contest held by the Northern Area clubs, times being 8 : 12, 6 : 32 and 6 : 30 respectively.

Considerable progress has been made since the reforming of the SOUTHAMPTON M.A.C. in August. By a little flattery (!) use has been secured of a large Assembly Hall, in which three 12 ft. pole-flying circuits can be conducted, so much r.t.p. work has been done, and a lot learned. Trophies in memory of two past members of the club, killed in ops. over Germany, are being purchased, and an American major, an honorary member of the club, has been giving some useful " gen " on control-line flying in the States.

The SURBITON & D.M.A.C. wish to announce that their Annual Glider Gala will be held on Epsom Downs on March 24th, 1946. All clubs are invited to enter a team of four gliders, the only restriction being a maximum towline length of 300 ft. One team per club, each member to make three flights. Flying will commence at 2 p.m. sharp, and assistance with timekeeping will be appreciated.

Despite difficulties with flying fields, the COVENTRY M.A.C. had quite a successful season. Good flying was experienced, and records to date are :—

Rubber driven	R. Toms	1 : 25
F.A.I. Glider	A. Turner	4 : 00
Lightweight Glider	R. Toms	3 : 45
Scale Glider	R. Hollis	4 : 21

Members are already getting cracking on indoor flying, and the r.t.p. record has been broken twice recently, first by A. J. Barr, who set up a time of 1 : 27·2, and later by R. Toms, who raised the figure to 1 : 42.

The BATH & DISTRICT SOCIETY OF MODEL & EXPERIMENTAL ENGINEERS has a sub-section which caters for the aeromodeller, and any unattached enthusiasts in the district are invited to communicate with the secretary, Mr. J. R. H. Cade, 25, Upper Borough Walls, Bath, or visit the club rooms at 23, High Street, any Monday or Friday evening.

At the end of another season, the BUSHY PARK M.F.C. look back on a year's experiences which show a strong trend in favour of large gliders and petrol-engined models. This is undoubtedly due to rubber shortage,

H. Joyce and E. W. Bult, of the Halstead M.F.C., engaged in "winding operations" with an Optimistic III. Mr. Joyce's face seems to indicate a marked lack of confidence in war-time rubber.

but the new types have come to stay. Their winnings include the Gamage Cup, M.E. Cup No. 1, Frog Senior Trophy, and the Bowden Trophy—thus representing each of the four main types of flying models. First prizes were taken at every gala visited, and the season culminated in winning the London District Cup from Northern Heights M.F.C. Interesting developments during the season include advances in dethermalisers, the use of which is now universal in the club. Great strides have been made in the general standard of glider flying, while interest in petrol models has increased so enormously that they hope to have nearly twenty models by next season.

A club has been operating in Devizes for the past few months, with fairly good facilities including clubroom at the local A.T.C. Headquarters, where meetings are held on Wednesday and Saturday evenings from 7–9.30 p.m. Club records to date are :—

Gliders, H.L.	J. Underwood	1 : 57
Gliders, Chuck	D. Neate	1 : 30
Rubber, H.L.	D. Woodward	: 46
Rubber, R.O.G.	D. Woodward	: 40

Mr. J. H. Wilson, hon. sec. of the MERSEY M.F.C., informs me that now he and several other old members of the club have been demobbed, they have decided it is high time to re-form the club. Will old members (and any other modellers in the Wirral area) please contact him at 24, Hall Drive, Greasby, Upton, Wirral, Cheshire.

The CARDIFF M.A.C. has obtained use of a clubroom, and meetings are held every Sunday afternoon commencing at 2.30 p.m. The last outdoor contest of the season resulted in a win for B. Morgan with a time of 2 : 48.

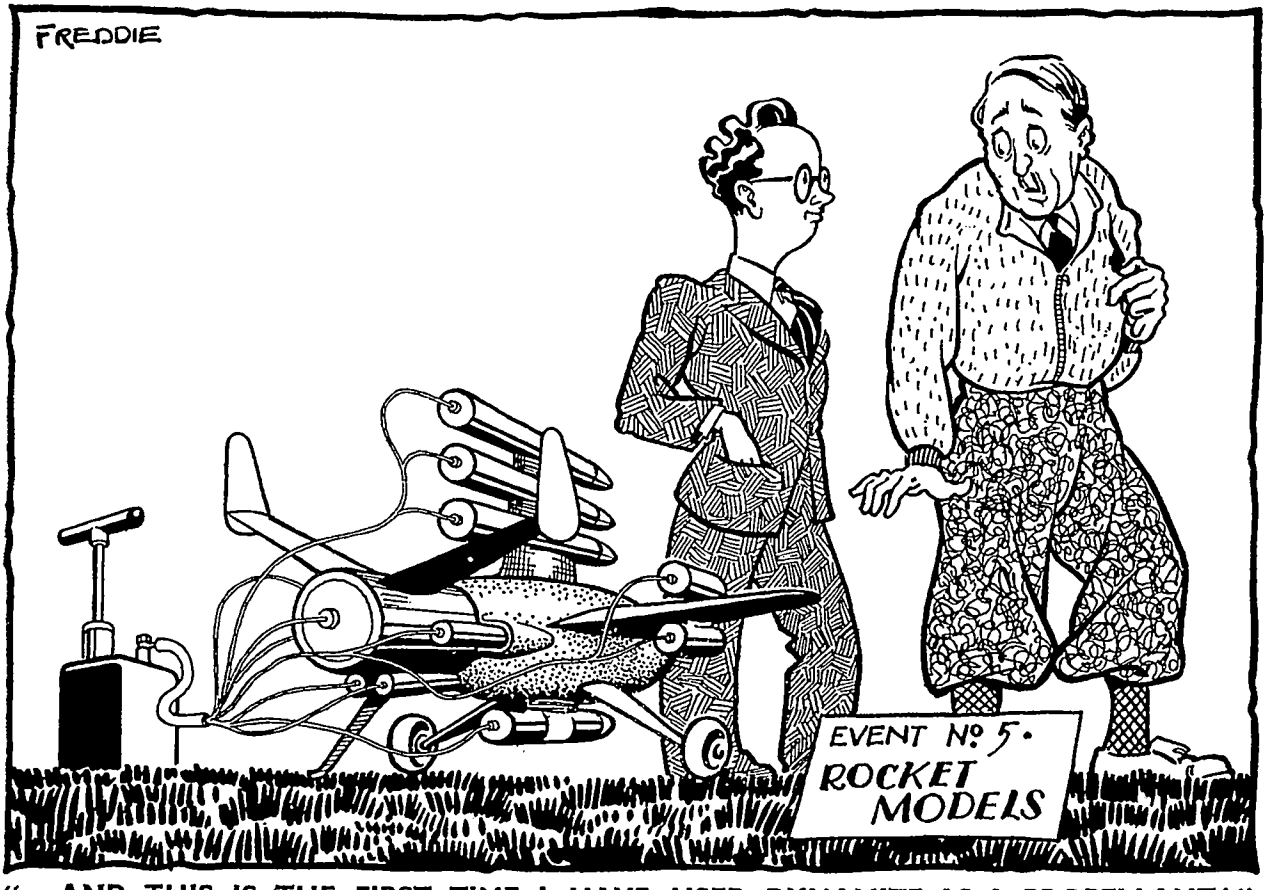
The BLACKHEATH M.F.C. now runs a monthly Indoor Meeting for R.T.P. models, and the first round of the London Area Cup Indoor Championship takes place in December at the clubroom, opponents being Chingford.

SWADLINCOTE M.A.C. has just become a branch of the Swadlincote Model Engineers Society, and now share a clubroom. The club record has been pushed up further by B. Springall, whose "Thermic" did 3 : 19, remaining aloft for another unofficial 7 minutes.

The NORTH HULL M.A.C. holds its meetings in St. Albans Church Hall on Sundays at 3.30 p.m., and an extensive programme has been arranged to suit all tastes.

Bad weather has marred the outdoor activities of the TWICKENHAM & D.M.A.C., but indoor flying is progressing. Club membership is increasing each week, latest figures being 106. Who keeps 'em all in order ? ? Several free-flying models have been tried out recently, best time to date being 60 seconds, quite good considering the low ceiling.

WEST COVENTRY M.A.C. have now located their Headquarters at the Coventry Sports and Social Centre, and enjoy all the amenities any club could wish for—a



"—AND THIS IS THE FIRST TIME I HAVE USED DYNAMITE AS A PROPELLANT!"

large hall for indoor flying, many rooms for the holding of lectures, talks, film shows, etc., and to round off, a café. Now that the club has been settled on a firm basis, attention is being paid to the technical side, and a committee has been set up comprising only experienced members in both practice and theory.

Mr. D. Shirley, of 19, Tresluggan Road, St. Budeaux, Plymouth, is making great efforts to get a club going in the Plymouth district. All interested are asked to contact him without delay.

The BLACKPOOL & FYLDE M.A.S. made a good showing in the Northern Area Glider contest for October, being beaten, however, by the Whitefield lads as recorded earlier. F. Mitchell made two good flights of 1 : 39 and 4 : 18·5, while other good flights were by M. A. Rowles, 3 : 29·5, and J. Pennington, 2 : 17·9.

R. W. Moore, of 6, Bank Street, Castletown, Isle of Man, wishes to get in touch with any modellers in the Isle of Man with the object of forming a club. Any takers ?

And so, we reach the end of this month's reports, and it only remains for me to wish all clubs and my many readers (all two of 'em) all the very best of luck and flying in this first year of Peace (!), and may we soon have bags of rubber, engines, and unrationed petrol.

THE CLUBMAN.

NEW CLUBS

BELFAIRS (Leigh-on-Sea) M.A.C.
M. A. King, 156, Marine Parade, Leigh-on-Sea, Essex.

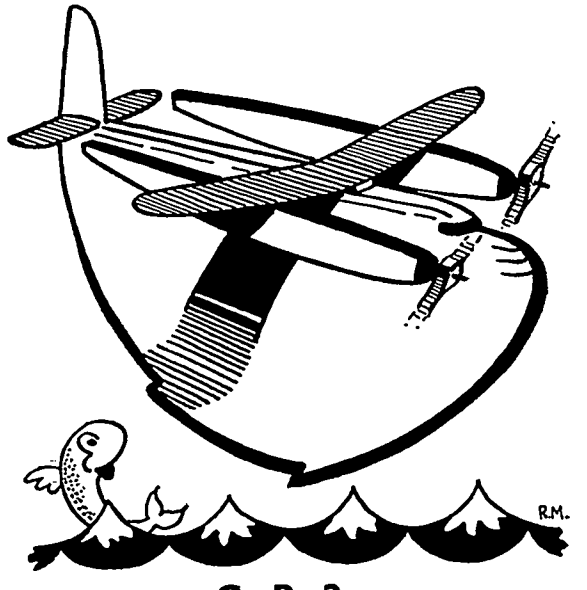
LEAMINGTON (1048 Sqdn. A.T.C.) M.A.C.
N. Grant, 20, Waller Street, Leamington Spa, Warwickshire.

SECRETARIAL CHANGES

GRANTHAM M.A.C.
P. Spalding, 99, Walton Gardens, Grantham, Lincolnshire.

CHINGFORD M.F.C.
C. Cox, 456, Lonsdale Avenue, East Ham, London, E.6.

CARICAPLANES No. 8



G. B. 2.

HOLDER OF THE BRITISH FLYING BOAT RECORD. DESIGNED BY MR. SAYERS.

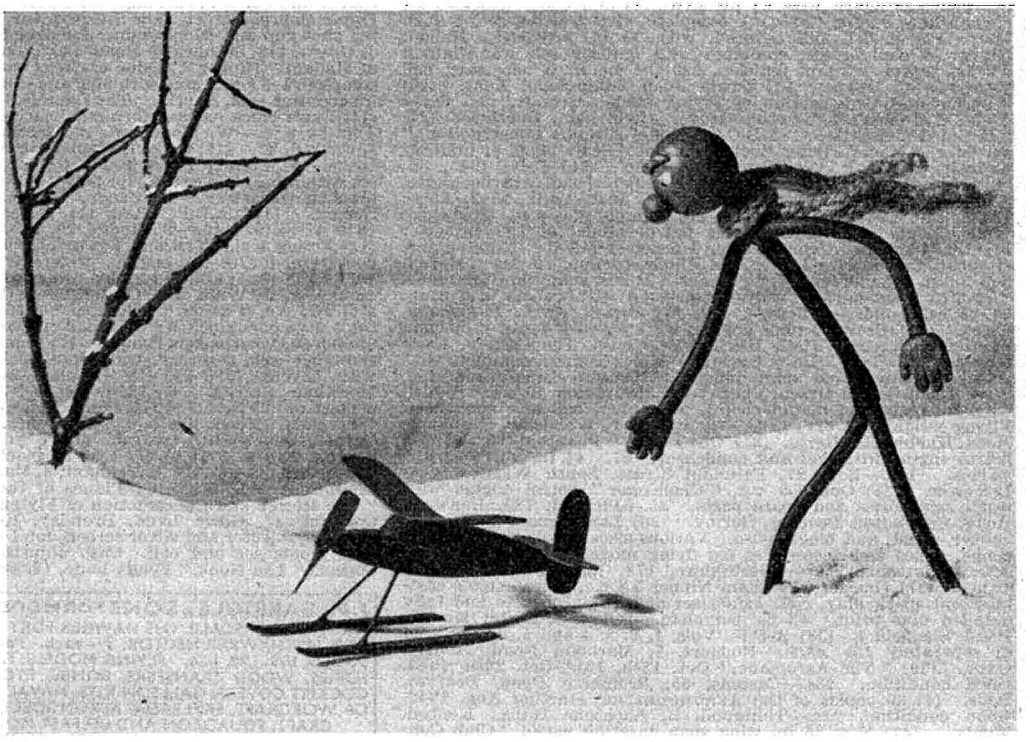
BEN TWYRE • By J. H. MAXWELL

A fierce wind howls through the naked trees,

Snowdrifts deep as a tall man's knees.

But Ben cares not if fingers freeze,

— It's his first chance to try those skis.



WANTS AND DISPOSALS

This is the last issue in which "Wants and Disposals," a war-time service to our readers, will appear. Every effort has been made to include the maximum number possible, and we regret that it is impossible to publish all those outstanding. A series of Classified Advertisements commences with the February issue as announced in the Christmas AEROMODELLER. Readers whose "Wants and Disposals" have not appeared can, if they wish, re-submit their copy, together with the necessary remittance.

All Copy for CLASSIFIED ADVERTISEMENTS should be sent to the Classified Advertisement Dept., The AEROMODELLER, The Aerodrome, Billington Road, Stanbridge, Beds.

Advertisement Rates are as follows :— Minimum, 18 words 3s., and 2d. per word for each subsequent word. Box Numbers are permissible—to count as 6 words when costing the advertisement.

PRESS DATE FOR THE MARCH ISSUE, JANUARY 30TH, 1946

LAST INSTALMENT

DISPOSALS

(1) A.F.P., Vol. 4. Good condition. 15s. 6d.—Miller, 42, Styal Road, Wilmslow, Cheshire. (2) New Pawlowina props. : one 10 ins. 6s. 6d. ; two 14 ins. 4s. 4d. (each), one 13 ins. 3s. 6d. All varnished. —Ridley, 7, Brownhill Drive, Padgate, Warrington, Lancs. (3) G.H.Q. petrol engine, 8·5 c.c. £6 or nearest.—White, 150a, Lynchford Road, Farnborough, Hants. (4) Two 10 c.c. petrol engines, complete with condenser coil, etc. £8 each.—Hardacre, Reridge, 12, Muncastergate, Malton Road, York. (5) A.F.P., Vols. 1, 2, 4, 5. Tools, balsa, rubber, solid accessories, transfers, aeromodelling books, plans, photos, etc. £25, or exchange for finished petrol model with engine, timer and cash.—Fellton, 41, Ashton Street, Trowbridge, Wilts. (6) One Ohlsson "60" engine with coil and condenser. Perfect condition. £9. One Ohlsson "60 Special" with coil and condenser. Perfect condition. £8 10s. One pair 4½ in. M. & M. airwheels.—Thompson, 88, Forest Road, Burton-on-Trent, Staffs. (7) 1/72nd scale solids. Assorted magazines, AEROMODELLERS, and books. Details from N. J. Wilson, "St. Gothard," Bellevue Drive, Lisburn, N. Ireland. (8) Solid Whitley Beaufighter, dope, fretsaw, solid plans, tools, etc., morse set, including tapper, buzzer and battery on base. Will sell or exchange for rubber strip and 6—7 in. flying finished prop. (with cash).—R. Foster, 1, Sussex Road, Southport, Lancs. (9) Hallam 10 c.c. petrol engine complete with coil, condenser, plug and hardened contacts, £4.—R. L. Brown, 19, Vadeville Avenue, Chadwell Heath, Essex. (10) "A.F.P.," Vols. I–IV, perfect condition, £3. Also other Harborough books.—G. Ward, 119, Craig Street, Darlington. (11) AEROMODELLERS, July–Sept., 1942, Nov., 1942–Jan., 1943, March, 1943, May, 1943–March, 1944, Sept., 1944–Jan., 1945, 10s. the lot or 6d. each.—R. Horsley, 2, South Avenue, Rainworth, Notts. (12) Plan of 1 in. scale Typhoon, 20 yds. of 3/16 in. by 1/30 in. rubber.—R. L. Dymock, 107, Halton Road, Lancaster. (13) 45 boxes of balsa, 9 in. by 9 in. by 15 in., 100 "Aeroplanes" and box of assorted dopes, £4 the lot, or would sell separately.—D. Buckman, Biddenden Green, Smarden, Kent. (14) Approx. £3 worth of hardwood and balsa sheet and strip, 25s. 10 glider plans 10s. "Airfoil Sections," "Petrol Engines," "Simple Aerodynamics," "Nomographs," and "Model Gliders," 5s. complete.—K. Simmons, 87, Greenway Road, Taunton, Somerset. (15) 7·5 c.c. Gwynn aero engine, complete, less plug. Set of plans for Dr. Forster's "Spitfire," Quantity of balsa. 30 back numbers of the "Aeroplane." £8 the lot, or will sell separately.—K. H. Burdett, 157, Common Rise, Hitchin, Herts. (16) "Grayspec" 18 c.c. 2-stroke aero engine, with condenser, prop. Mounted ready to run. Perfect condition.—L.A.C. Petch, E.T.P.S., R.A.F., Boscombe Down, Amesbury, Wilts. (17) Set castings complete with plug for 5 c.c. Kestrel engine, 16s.—A. E. Sweetman, 3, White House, Nash Road, London, N.9. (18) 14 clean copies AEROMODELLER, June, 1944–July, 1945. "Airspeed Horsa" plan; small amount of rubber and Obechi strip, 1 copy "Popular Aviation," 16s. the lot.—R. Strong, 39, Telford Street, East Howdon-on-Tyne, Northumberland. (19) Vol. III "A.F.P." 17s. 6d.—D. J. Lee, Rosegarth, London Road, Swanley, Kent. (20) AEROMODELLERS, Jan., Aug., 1939, June, 1940, March, 1941, Oct. and Nov., 1942, April, Sept.–Dec., 1943, Jan.–Dec., 1944, Jan.–July, 1945. 8d. each. 2 "Model Aeroplane Constructors," 4d. each.—K. W. Pipe, 29, Tremadoc Road, Clapham, London, S.W.5. (21) AEROMODELLERS, Aug., 1942–Sept., 1943, Feb., 1944–July, 1945, disposal wholly or in part. Good condition.—B. A. Rimmer, 4, Richmond Road, Catterick Camp, Yorks. (22) "Model Gliders," "Solid Model Aircraft," "Scale Model Aircraft that Fly," "An A.B.C. of Model Aircraft Construction," "Camouflage 14–18 Aircraft," "Solid Scale Model Aircraft" and Vol. I "A.F.P."—S. K. Scarratt, Ashfield Farm, Neston, Cheshire. (23) Baby Cyclone petrol engine, almost unused. Complete with spark plug,

condenser, coil, airscrew, £3. 8s.—Flt./Lt. H. C. Grice, 70, Westpole Avenue, Cockfosters, Barnet, Herts. (24) 6 ft. span Cavalier Standard, complete with timer, Brown Junior engine, M.M. airwheels, new, £20.—W. G. Lilleystone, 325, Upper Elmers End Road, Beckenham (Phone: Bec. 2420). (25) 1 bunch Super Scorpion gas model with 3½ in. airwheels and timer (clockwork), Gwynn aero motor (7·5 c.c.), complete with ignition set, 1 T.D. Coupe gas model, silk covered, with 3½ in. airwheels, Hallam Nipper (6 c.c.) motor, complete with ignition set, and Hallam 2·5 c.c. motor, without ignition, £20 the lot, or if necessary, sell separate.—C. Mayhew, 91, Edwin Road, Gillingham, Kent. (26) "Design and Construction of Flying Model Aircraft," 7s. 6d.—J. B. O'Mulloy, 11, Lynton Grove, Altrincham, Cheshire. (27) "Model Gliders," 3s.; "A.B.C. of Model Aircraft Construction)," 3s. 6d.; "Model Flying Boats," 1s. 6d.; Scale plans of military aircraft, 3s. 6d.; AEROMODELLERS, Dec., 1945-July, 1945, 8d. each.—A. Coull, Lonmuir, Ugie Street, Peterhead, Aberdeenshire, Scotland. (28) AEROMODELLERS, Aug., 1942-April, 1943, June, 1943-June, 1945.—M. Berrett, 85, Mount Pleasant, Tunbridge Wells, Kent. (29) Flying scale petrol model of the Brewster Fighter, 4 ft. span. Suitable for Hornet or Mighty Atom engine. Beautiful model, £7.—Hobbs, 14, Maple Avenue, Yiewsley, Middx. (30) 38 in. span glider "Kirby Cadet," 21 ins. span duration model "Halifax Commando," fully constructed with rubber and prop. £3 or near offer.—Jeffereys, 147, Woodward Road, Dagenham, Essex. (31) Brown Junior engine, 9.8 c.c., with tank, prop. and dural mount. £6.—Hall, Blackwater House, The College, Eastbourne. (32) Two "Baby Cyclone" 6 c.c. engines, complete with coils, condensers and spare plugs. £10 each.—Brandwood, 185, Styal Road, Heald Green, Ches. (33) Brand-new 10 c.c. "Whirlwind" (Australian manufacture), with plug, coil and condenser. Flying weight 14½ oz. £10.—Thompson, 1, Woodside, Stevenage Road, Knebworth, Herts. (34) One 4.5 c.c. "Phantom" high-speed petrol engine with coil and condenser. £7. 4½ in. valveless airwheels. 15s.—Ben, 27, Fairchild Street, South Wigston, near Leicester. (35) One 7.5 c.c. "Challenger" petrol engine with usual accessories and spare parts. £5.—Pickard, 185, Banstead Road, Carshalton Beeches, Surrey. (36) Large quantity of strip rubber, sheet, and block balsa. Various sizes of wheels and balsa props, dopes and accessories for flying models. Also 15 various AEROMODELLERS. £5. — Derbyshire, 173, Eglin Street, Bolton, Lancs. (37) One set of Hallam Nipper 5.8 c.c. petrol engine castings and spark plug, coil, condenser and B.A. contacts and fully detailed blue print. £3 3s. complete.—Pilley, 3, Carter Knowle Road, Sheffield 7. (38) A.F.P., Vols, 1, 2, 3, 4 and 5, as new. £4 or separately 15s. each.—Rodgers, 7, Marmion Road, Henley, Oxon. (39) "The Aeroplane," Oct, 13th, 1944-Oct. 26th, 1945. Good condition. 28s.—Castens, 65, Bromham Road, Bedford, Beds. (4) 39 copies of the AEROMODELLER, starting Aug. 1942. Good condition, 25s.—Thurgood, 3, Lapstone Gdns., Kenton, Middx. (41) New 36 in. wing span duration model "Club Contest," complete with rubber.—A. Gardner, 26, Hugendin Road, Weston-super-Mare, Somerset. (42) A.F.P. Vols. 1, 3 and 4. Excellent condition. £2 10s. or 17s. 6d. each.—D. S. Gray, Ashtree House, Town Street, Upwell, Wisbech, Cambs. (43) Baby Hallam engine, complete with plug, coil and condenser, less prop. and tank.—Longhorn, Drax Grammar School, Selby, Yorks. (44) A.F.P. Vols. 1, 3, 4. 17s. 6d. each. Vol. 5, 27s. 6d, or £3 10s. the lot. "Solid Scale Model Aircraft," 2s. 6d. "A.B.C. of Model Aircraft Construction," 2s. 6d.—Cope, 61, Blackledge Street, Daubhill, Bolton, Somerset. (7) Large quantity of balsa in exchange for 2,5 c.c.–6 c.c. petrol engine with all accessories. Must be in perfect condition.—R. Difazio, 25, Catherine Street, Frome, Somerset. (8) 30 "A.T.C. Gazettes," 148 "Aeroplane Spotters," 88 "Hobbies Weekly," 27 1/72nd scale plans, 4 flying model plans, plenty of rubber and balsa, in exchange for a petrol engine.—H. Goundry, 44, Upper Church Street, Low Spennymoor, Co. Durham. (9) Fourten shot gun and 80 cartridges for complete 6 c.c. petrol engine.—J. Oliver, 142, Stanbridge Road, Leighton Buzzard, Beds. (10) Set of Hallam "Nipper" engine castings with plug and condenser for complete 4–5 c.c. engine with plug and condenser. Cash adjustment if necessary.—M. Averill, "The Laurels," Dunchurch Road, Rugby. (11) Balsa block or cash for model carrying case at least 33 in. by 8 in. by 8 in.—W. Blanchard, 12, Gardner Avenue, Orrell, Bootle, Liverpool, 20. (12) 6 c.c. Hallam, for 2·5 c.c. or 3 c.c. engine.—K. Green, 144, Stanley Road, Teddington, Middx. (13) No. 7 Meccano set with motor and extras, for petrol engine, 1–15 c.c. Cash adjustment if necessary.—R. Bacon, 124, Hillgrove Road, Saltdean, Sussex. (14) "A.F.P.," Vol. III, for set of AEROMODELLERS for 1940–41 or 1941–42.—H. Rudge, 20, Rosslyn Road, Newport, Mon. (15) Flying scale Westland Lysander, 50 in. wing span, in perfect condition, for 10 c.c. engine, preferably Super Cyclone, complete with flight timer and in running order, with or without cash adjustment.—A. J. Wills, 240, Carterknowle Road, Sheffield, 7, Yorks. (16) 9·25 c.c. Ohlsson "Gold Seal," with plug, coil and condenser, for 2–2·5 c.c. engine with plug, coil and condenser.—C. C. H. Burne, Mosshead, Winchester, Hants. (17) Enough parts to build a crystal receiving set together with loudspeaker for AEROMODELLERS with covers, 1939–41.—R. Bradley, 34A, Albury Road, South Merstham, Surrey. (18) 135 copies of "Aeroplane," 1943–4–5; 23 copies of "Flight," 1943, for copies of AEROMODELLER and "Practical Mechanics."—D. A. Jones, The Lodge, Bayworth Corner, Boar's Hill, Oxford. (19) 8 yds. ¼ in. by 1/30 in. and approx. 25 yds. 1/16 in. by 1/20 in. black rubber (unused) for Jap tissue, any colour.—D. A. Tennant, 8, Manor Close, Cheadle Hulme, Cheshire. (20) "Fighting Planes of the World," 616 pages, for "The Design and Construction of Flying Model Aircraft."—M. G. Cockton, 87, Gown Lane, Bromley, Kent. (21) 9·5 mm. Cine camera-projector and silver screen, for 1 c.c. to 4 c.c. petrol engine with condenser and coil. Cash adjustment if necessary.—J. A. Cowan, "The Nook," Foads Lane, Cliffsend, Nr. Ramsgate.

EXCHANGE

(1) Good kit of woodcraft, tools, books on Aircraft Recognition, AEROMODELLERS, Valor stove, books on Model Aircraft, for petrol engine, 3–6 c.c.—K. Smith, 23, Clifford Street, Wilmorton, Derby. (2) New chrome wrist-watch for 2 or 3.5 c.c. engine. Cash adjustment if necessary.—C. Murfitt, 22, Edmund Street, Hanley, Stoke-on-Trent. (3) 5s. worth of "Hobbies" fretwork plans for any A.P.S. plans.—J. Reay, 137, Ashley Road, Male, Cheshire. (4) Rola P.M. loudspeaker with output trans., earphones, valves; 1A7GT and 1C5GT, .0003 and .0005 variable condensers. Excellent condition, will exchange for any make 2 c.c. engine. Cash adjustment if necessary.—N. James, 4, Selsdon Road, London, N.W.2. (5) Vols. II and III "A.F.P." and "Radio Control for Model Aircraft," "Petrol Engines for Model Aircraft," "Design of Wakefield Models," gliding manual, for .22 air pistol or rifle.—D. Leech, 12, Beading Gardens, Newcastle-on-Tyne, 4. (6) 51 in. span gull-wing glider of good construction and a 22 in. span Hurricane. Will part exchange for a petrol engine of 3 c.c. to 10 c.c.—R. G. Sellwood, 84, Summerland Avenue, Minehead,

PAYMENTS OVERDUE.

We have cheques awaiting certain persons in payment for articles published in previous issues of the AEROMODELLER. Their names are listed below. At the moment, we are unable to forward the cheques as we are not in possession of the necessary addresses. If these contributors will write to us, informing us of their whereabouts, we will dispatch their cheques immediately on receipt of their communication. All letters should be addressed to The Editor, The AEROMODELLER, Allen House, Newarke Street, Leicester.

Name.	*Article.*	*Issue.*
G. F. Webb	The Firefly	October, 1942
W. J. Gay	Avro Manchester	February, 1943
J. S. Thompson	Cloudline	March, 1943
— Attridge	Photograph	October, 1943
A. H. Wolverson	Auto Pole for Gliders	November, 1943
J. A. Marett	Photograph	January, 1944
J. Keetch	Photograph	January, 1944
J. Sweeting	Photograph	January, 1944

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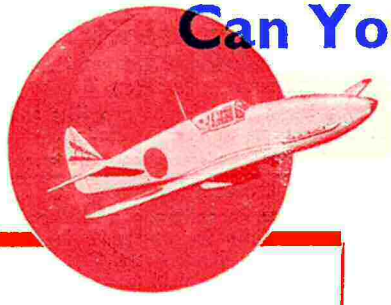

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?

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