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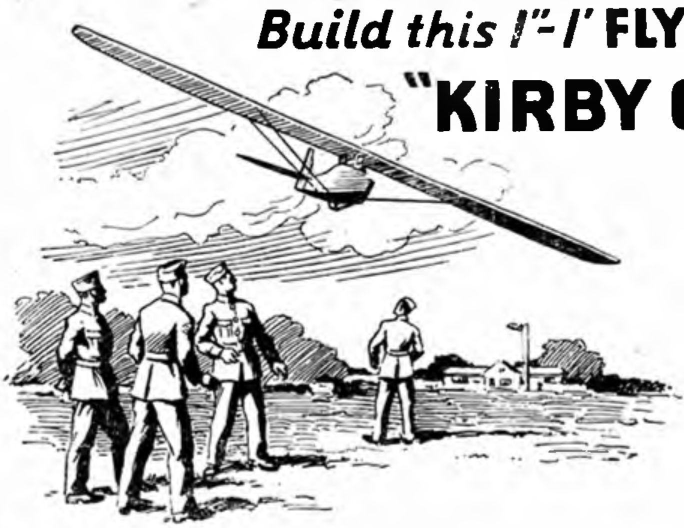

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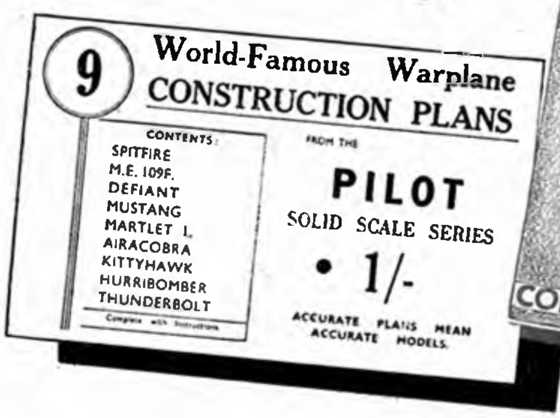

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The Model Aeronautical Journal of the British Empire

Established 1936

ALLEN HOUSE
NEWARKE STREET
LEICESTER
Tel: LEICESTER 65322

VOL. IX No. 104 JULY 25th, 1944

SUBSCRIPTIONS:
INC. CHRISTMAS DOUBLE NUMBER
15/- P.A. PREPAID.

The Future of Design

THE model aeroplane movement is, even now, expanding rapidly. After the war its development will be immense. If it is to take its rightful place alongside full-scale aeronautics new standards by which model performance may be judged must be arrived at now. So long as a machine is to be assessed merely upon how long it will remain in the air, there can be little or no advancement, either from the technical or practical aspects. By all means let us keep the "Duration" model, but do not let us treat this type as the first and last word in model aeronautics. The same remarks apply to aerofoil sections. Let us climb out of the R.A.F. 32 and Clark Y rut. There are, at the moment, thirty-six different aerofoil sections covered by the AEROMODELLER Aerofoil Section Sheets. At the most only half a dozen or so are in general use.

The design of full-size aircraft will go through great changes during the next twenty years. The modeller must keep pace if the worth of the movement is to be fully recognised. We should like to see designers submitting experimental flying wing and rotating wing models, multi-engined scale or semi-scale models, flying models designed for a specific purpose or duty, such as the carrying of a certain minimum payload or with fighter performance including aerobatics, glider-towing tugs, designs for jet-propelled models, all-wing gliders and sailplanes, duration machine with experimental wing sections—and so on and so on.

It is only by delving thoroughly and enthusiastically into the innumerable possibilities that the modeller will keep abreast of the times and gain his deserved place in the future of aerodynamics, whether model or full-scale.

Success has been achieved in Duration design, but there can be no excuse for resting on laurels gained. The knowledge acquired in the past must be applied to the future. Let, therefore, a start be made by experiment with some of the less known, but equally efficient, aerofoil sections. Let us see club and competition organisers catering for all types of models and offering prizes of equal value for all sections. Let the present leaders of the movement prove themselves worthy of the part they play in the development of the future of aeromodelling.

It is difficult to arrive at a good reason for the present state of affairs. Some years ago there was, admittedly, a lack of authoritative data on model aerodynamics. Consequently some justification existed for following proven theories and designs. More recently, however, there has been considerable research in low-speed aerodynamics, particularly as applicable to the aeromodeller. Wind tunnel test at Reynolds number as low as 30,000 and 40,000 have been made on numerous aerofoil sections, the results of which have been published. Even now, despite conditions imposed by war, more than one wind tunnel is under construction and we may confidently expect, when time and materials are again available, publication of data that will cause drastic modification of current thought and design procedure.

One of the causes of the present standardisation has been, and still is, the yardstick by which the worth of a model is judged, namely, Duration. We do not condemn the "Duration" or "Wakefield" model as such. Both have been brought to a high standard of efficiency, so much so in fact, that we would even say that stagnation has resulted. This is at once apparent from a study of the plans of many of the duration machines submitted to us. There is very little to choose between any of them.

Elsewhere in this issue readers will find particulars of the AEROMODELLER Aerofoil Section Sheets and a comprehensive résumé of the uses to which they may be put.

We trust that as the result of examination of the Sections available, aeromodellers will experiment with some of the so far lesser-used sections . . . And we shall await their results with interest. D. A. R.

Sailplanes and Gliders

Recent news from Germany and Italy indicates that, even under extremely adverse wartime conditions, the design and construction of model and full-scale sailplanes continues.

It seems that in Italy the model designs have not changed greatly since before the war; they are still highly efficient-looking machines of semi-scale appearance and high aspect ratio. This raises an interesting point: what is the ideal type of model to build?

The majority of people in this country who construct and fly model sailplanes do so without any really serious thoughts except to enter local and club contests, or perhaps just to have some enjoyable flying.

We, however, believe it is time English aeromodellers realised that soon, maybe very soon, there will once more be great scope for flying in international team events. A more advanced type of model is necessary for success in these contests.

It is widely agreed that large size, a certain amount of weight, and general robustness are needed for models built to international standards. The question of aerodynamic design is not yet agreed upon, and there exist two main schools of thought, the champions of high *versus* low aspect ratio.

The exponents of the former cause argue that in theory, a high A.R. gives a very efficient lift/drag ratio, and that the wing may be set at an angle of incidence which produces the minimum sinking speed. Certainly, full-sized sailplanes do use exceptionally high aspect ratios; as a parallel we have the model Zeus, by R. H. Warring, with an A.R. of over 20 : 1. The opposite school of thought do not agree that for models, huge spans and small chords are the ideal. In their opinion, the points which count are Reynolds Number and airfoil design.

We are inclined to agree that, unless gigantic models are built, a wide chord and moderately high speed (giving a relatively high Reynolds Number) and as efficient as possible an airfoil, should produce better results in models than too great an aspect ratio. A new model, the Temple "Sokol," which has a very low A.R. and an entirely original mathematically designed airfoil, is a very good example of this class.

Tailless sailplanes have never been popular, but we would offer the suggestion that here is the type for future development. At present no tailless machines can hold their own with the advanced types of normal conception, but this is the fault of the designs, not of the tailless type as such. At present it is customary to use one of the well-known airfoils in such designs, and to sweep back and wash out the wingtips: all this being in the interests of stability.

We would call this the wrong angle of approach to the subject. If the theoretical designers would devise high-lift airfoils with little or no loss of performance over the normal types, but having very small centre of pressure movement, the sweepback—which is notoriously inefficient—could be eliminated, and the true flying wing would result.

This, to our minds, seems to be the main avenue of research in model sailplane design, unless we wish to see the subject running in a rut.

Taylorcraft "Auster" Competition

WE have had a few queries in regard to the above Competition, such as whether the exact type of freewheel shown on the drawing must be incorporated—as to whether sizes of material other than those actually shown may be used, and whether very minor alterations in the use of materials such as balsa for the wing tips instead of bamboo are permitted.

The answer to these and similar questions which may occur to readers is that "reasonable latitude" is allowed. The essential point for competitors to bear in mind is that the external dimensions and shape of the model must be strictly to the drawing; also the internal construction, as shown on the drawing, must be strictly adhered to, *BUT*, in view of war-time difficulties in connection with the obtaining of the sections specified, no objection will be taken to variations in the sizes of the sections. For example, the spacing of the ribs *must* be the same as on the drawing, but the material need not necessarily be exactly the same thickness or as specified. Similarly with the fuselage: the various longerons and struts *must* be set in the positions indicated, but they need not necessarily be of the cross section specified.

In regard to the rubber motor, the lengths and sections given on the drawing need not be strictly adhered to.

Footnote

It is with deep regret that we record the death of Mr. A. L. Wykes, managing director of Taylorcraft Aeroplanes (England), Ltd., who was killed whilst flying an Auster in aid of Leicester's "Salute the Soldier Week" on Sunday, May 14th.

Mr. Wykes was keenly interested in the model aeroplane movement; in fact, it was he who sponsored the Taylorcraft Auster Competition mentioned above.

Miniature Accumulators in Italy

DESPITE the troublesome times through which Italy has recently passed, interest in aeromodelling continues unabated.

Just as in this country, so in Italy, there is growing interest in miniature accumulators. The latest type are the same size as the popular 4½ volt flat torch type battery used in this country. They are of "wet cell" construction, and fit in heavy type torches with the usual two brass leaf "terminals" on the top. These accumulators are made of transparent plastic material, and have lead plates to within ⅛ in. of the top. The electrolite is a jelly, but the cell has apparently to be kept topped up to plate level with distilled water, in the usual way. The stopper is a simple anti-drip type, similar to that used on large accumulators, and incorporates a return valve which allows gas but not the electrolite to escape. The rating is 2 volts, and the cell is re-charged at 2 volts, ·3 amps. It is reported that this type of Italian cell has quite a long life, but that inevitably it is on the heavy side.

In England we have recently come across a cell which is approximately 1½ in. by 1⅜ in. by 4 in. high, the height of the cell proper being 3⅜ in. This accumulator weighs 8 ozs., and is of the "wet" type, and is rated at 2 volts. The plates are of lead, and closely fill the container, which is made of celluloid. There is one positive plate and two negative plates, separated by substantial wood spacers, so it would seem that the cell should have a long life, and be free from shorting between the plates.

Tests are now being made, and a further report will be given in due course.

CONTENTS OF THIS ISSUE

Elementary Airscrew Theory and Design Method

On pages 180–1 of the March issue of the AEROMODELLER we published an article by G. Garwood under this heading.

At the top of page 181 a series of calculations follows the quotation of p/2 = ·0017. This, of course, is an error. p = ·00237 slugs, cubic feet at G.L., and therefore p/2 = ·00119, and not ·0017 as given by Mr. Garwood.

Since the calculations which follow are derived from the one at the top of the page in which p has been incorrectly quoted, it follows that they are all incorrect.

We regret the publication of these inaccurate calculations, of which the author says: "I am not going to bother myself to explain how the mistake in my article came about—you would not believe it anyway."

The Hillson Praga

In the early part of Mr. Riding's article on page 242 of the April issue, the following sentence appeared: "Since the engines were not made from A.I.D. approved materials, Certificates of Airworthiness were withheld and experiments were made with motors of different design." From this it might be concluded that the aeroplane, as such, did not receive Certificates of Airworthiness—which, of course, was not the case.

We are informed by Messrs. F. Hills & Sons, Ltd., of Manchester, manufacturers and concessionaires for Praga aircraft, that "the 39 h.p. twin-cylinder air-cooled engine was thoroughly satisfactory, but the Inspection Control at the manufacturers' premises in Prague had to be 'vetted' by the A.I.D. before the engine could be accepted as airworthy under British regulations. As a result of the visit of an official of the A.I.D. to Prague, all difficulties were removed, and by the time Pragas were coming off the production line C. of A.'s were automatic."

As was stated towards the end of the article, Praga machines were used by the Ipswich Aero Club, the North Staffordshire Aero Club at Meir, the Thanet Aero Club and the Northern Aviation School and Club at Barton-on-the-Moss, Manchester.

As readers will of course be fully aware, it was an essential requirement that Certificates of Airworthiness were available for any machine flown for hire or reward.

Association of British Aeromodellers

In Club Report we publish List No. 2 of donations to the Association of British Aeromodellers, and note that the total already collected is now past the £500 mark.

We are asked to point out a typographical error in the announcement that appeared in last month's issue. Under Subscriptions it stated "Associate Members under 25 years of age—5s. a year." This should read "Associate Members under 21 years of age—5s. a year."

We are informed that West End offices have been taken at 28, Hanover Street, and will be opened early in July, by which time it is hoped to have appointed a full-time Secretary. Arrangements for collection of post are already in operation, and the Temporary Secretary has requested us to inform all interested that *all future* communications should be addressed to 28, Hanover Street, W.1.

The other day we had a chat with the prime mover, Mr. C. A. Rippon, and understand that the preparation of Rules, Regulations, etc., for a whole series of competitions to be organised on a National scale is under active preparation, and that he hopes to let us have full particulars for publication in the August issue of THE AEROMODELLER, on sale towards the end of July. We understand that several novel types of competitions, in addition to the more usual ones, will be included.

As announced in our last issue, Sir Robert Bird, Bart., M.P., has accepted the Presidency of the Association, and in the near future we understand that he may address an "open" meeting of members.

The Petrol 'Plane "Ban"

We regret that, at the time of going to press, we are not in a position to give much further information in regard to our approach to the Air Council concerning the extraordinary arrangement come to by the S.M.A.E.

We have from time to time had contact with the Air Council, but owing, no doubt, to the opening of the Second Front, this matter has for the time being been side-tracked. However, we do know that the Air Council has received a considerable amount of correspondence from all over the country, unanimously protesting at the inequity of the whole business and that serious consideration has been given to these protests.

Maybe, by the time this issue is published, this matter will have been settled to the satisfaction of all parties.

American Pole-line Records

Our American friends continue to put up their speeds for the pole-line flying of petrol engine driven model aircraft.

News is just to hand from Seattle that in Class C, a Super Cyclone (10 c.c.) with special high pitch airscrew (the model hand launched and without landing gear), achieved 102 m.p.h. on 75 ft. wires.

In Class B a model powered with a Forster engine, presumably a "29" (4·75 c.c.) achieved 72 m.p.h.; and in Class A a speed of 55 m.p.h. was obtained with an Ohlsson "19" (3·1 c.c.) motor.

We understand that on the day on which these records were made, a successful and intentional outside loop was performed.

Mechanised Brock's Benefit?

We learn that U.S. aircraft engineers are investigating the possibility of a jet helicopter, with jets issuing from the rotor blade tips. Our own tame technician is also considering the improbability of applying jet propulsion to his monthly stipend—just to make it go farther.

News Item

A new modelling wood is being offered for sale in America, known as OHONOTE; it comes from Mexico. Suppliers claim it does not split or break, is ouly a little heavier than balsa though much stronger, and is almost as easy to use.

A Bevin Boy

To be an airman—that is why
He joined the A.T.C.
But he's a pitman now because
His number ends in 3.

His sense of humour is not dead,
He does not peak or pine:
He merely says "Were mine the choice,
The choice would not be mine."

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THE PRESTATYN WIND TUNNEL

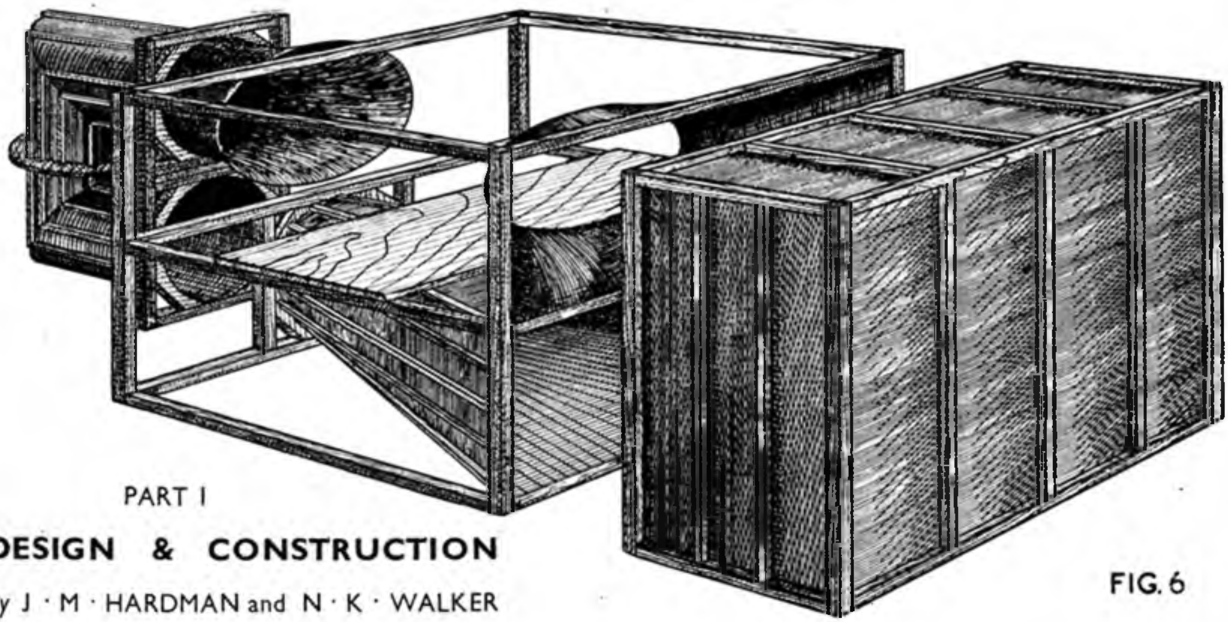


FIG. 6

PART I

DESIGN & CONSTRUCTION

By J · M · HARDMAN and N · K · WALKER

IN the early part of the winter of 1942, a series of lectures given to the members of the Rhyl & Prestatyn Model Flying Club were very well received. Several members expressed regret that no really accurate data on tests of our small-sized airfoils and other components was available. The suggestion was made that we should construct a wind tunnel and make a real attempt to obtain accurate results. This was mentioned by "Clubman" in a Club Report and we shortly afterwards received a letter from Mr. Walker who had seen the report and kindly offered his assistance.

We had to decide firstly the type of tunnel which would best suit our purpose. There are, roughly speaking, two types of tunnel to choose from: open return, and closed return, each of which has two subtypes (see Figs. 1, 3 and 4).

(1a) The simplest of all tunnels is a straight tube, roughly 6 diameters long, which is provided with a fan to blow or suck air through it. If a blower fan is used, straighteners must be provided to remove the twist of the airstream introduced by the fan blades. This type of tunnel is simple in construction and is very robust if properly made. It also has the advantage of "breaking-up" into smaller sections for storage, but it unfortunately requires a great amount of space owing to the large clear space around it and at each end for the air to circulate in. Much useful work has been done in a tunnel of this type by Mr. D. A. Russell, using a tunnel which was probably the first ever built exclusively for work on model aeronautics. This type requires a great deal of power

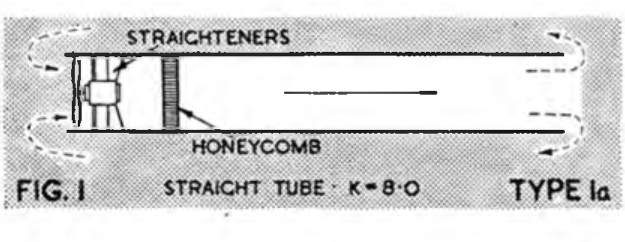


FIG. 1 STRAIGHT TUBE · K = 8·0 TYPE Ia

to run since its efficiency is low. Mr. Russell's tunnel had, I believe, a 1½ h.p. motor which gave a wind speed of 30 m.p.h. on a diameter of 20 inches. Now the horse-power required to run a tunnel is given by:—

$$H.P. = \frac{KAV^3}{1,000,000}$$

where "A" is the cross section of the working section in sq. ft.
"V" is speed in ft./sec.
"K" is a constant

and for this type "K" works out to be about 8·0.

All tunnels except the above have what is called a "contraction." The principle is as follows:—

By Bernouilli's Theoreum, the total energy of the stream is the sum of the pressure and velocity heads. Now if the velocity is increased by choking the stream, the velocity energy increases at the expense of the pressure, and so of the total head the proportion due to the velocity is increased. An everyday example of the use of such a "contraction" is found in the rubber "anti-splash" nozzle sometimes fitted to domestic water taps (Fig. 2). The effect of these nozzles is to increase the speed of the water to about three times its normal value and to multiply the velocity energy by 9, i.e., 3^2. The relative importance of the eddies in the flow is reduced by 89 per cent. and, as everyone knows, the results are superb. To aid the effect of the contraction a honeycomb or gauze is usually inserted in the widest part of the tube, and this breaks up the large eddies into smaller ones, which are more easily damped out by the contraction than are the large ones.

(1b) The other type of open return tunnel is of the N.P.L. form (Fig. 3). This is in some ways similar to the first, but the air inlet is two or three times the area of the working section, and hence functions as a contraction. A honeycomb is placed in the inlet, and the fan is invariably placed after the working section, relative to the air direction. Values of "K" for this type of tunnel range from 1·5 to 4, but as with the other open return tunnel it requires a great deal of space for the air to circulate in outside the tunnel itself.

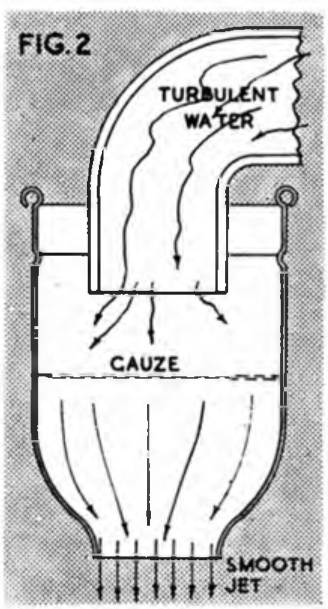
Closed return tunnels (Fig. 4) have a continuous duct which takes the air from the fan back through the "contraction" and across the working section again, and hence the energy of the air is not being used up constantly: in fact the fan merely has to supply sufficient energy to overcome the friction in the circuit. For this reason tunnels of the closed return type are more efficient than the open return ones. They may have an open or closed jet at the working section, depending largely upon the purpose for which it is to be used. Generally a closed working section is preferable for airfoil tests, but for model work and airscrew testing, an open jet type is the best. Values of "K" are from 0·8 to 1·5 for open jet tunnels, and from 0·4 to 1·5 for closed type.

In view of the great convenience of the open jet type of tunnel for model work, this was the one we eventually chose for the Prestatyn Model Research Tunnel (Fig. 5) and (Fig. 6), but provision was made for a closed working section to be substituted for the open one. The design is generally based on that of the R.A.E. 5 ft. tunnel (Fig 4) but has been considerably modified to suit the conditions that we require. The jet is elliptical, measuring 18 in. by 30 in. and the length of the open working section is 30 in. or 1·3 × mean jet diameter. The length of all other portions has been reduced also, and the fan has been placed at the beginning of the return circuit instead of in the collecting cone. The return circuit has been taken under the working section to make the apparatus more compact, and to elevate the jet to a convenient level for working. The final result of all these operations is that the tunnel now only measures 9 ft. 6 in. long by 4 ft. 6 in. wide by 5 ft. high.

The cross-sectional area of the jet works out to be 2·95 square feet, so assuming a value for "K" of 1·4, which is quite reasonable, and a motor of ½ horse-power with a fan and shafting efficiency of 60 per cent. of the full-size value, we should obtain a wind speed of 36 ft./sec. As the full-scale efficiency is about 90 per cent. this means that we have allowed ·6 by 90 per cent. or 54 per cent. for our model efficiency and we feel sure that we can exceed this.

The next difficulty we were confronted with was how to make the air flow evenly round the bends. When a stream of air passes round a right angle bend there is a natural tendency for the air to crowd on the outside of the bend. This of course produces an uneven distribution of flow which must be prevented, and to do this the air is split up into a large number of separate streams which are each turned through a right angle and then recombined. The easiest way to effect this is to subdivide the duct into parallel sections at the bends. This method is effective but unfortunately leads to rather a high frictional loss which we must eliminate as far as possible. The method most used nowadays, and that which we are using, is to make the bends sharp turns and insert diagonally across the corners a series of small, highly cambered airfoils or turning vanes.

FIG. 2



These are called "cascades." After completion of the tunnel each "cascade" airfoil is adjusted independently in order to get an absolutely uniform flow. Any signs of "stalling" or a breakaway of the airflow may be detected by "fishing" in the region of the "cascades" with a specially made pitot head, which will be described in a later article.

The next item to be described is the fan. It has six blades of approximately parallel chord, mounted on a large turned spinner and boss. These blades are adjustable for pitch and the basic pitch was designed to suit the conditions prevailing when the tunnel was in operation at maximum wind speed, for the revs. per minute and tunnel speed for this condition are known. When the tunnel is running for the first time, the pitch is adjusted to give the highest speed, and a pitot tube is traversed across the jet. Any irregularities in the flow, such as a higher velocity at the centre than at the tip or *vice-versa*, are noted, and if necessary a new fan is designed with the pitch slightly altered at the portions of the blades where the velocity is farthest away from the mean. As a last resort, the airflow in any bad "high spot" may be slowed down by means of wire gauze. The straightening vanes behind the fan are also adjustable to eliminate any twist in the airflow, a process difficult to effect and requiring unlimited patience.

Being true aeromodellers, the types of construction we decided upon for the tunnel was a former and stringer arrangement, internally covered (Fig. 6). First, a main frame was constructed of 2 in. by 1½ in. wood, which was to enclose the nozzle, collector, and the return section with the expansion. It also supports the balances which are on the very top of the tunnel. The return section of the tunnel, under the jet, changes between the ends of this frame from a 2 ft. diameter circular cross-section to a 2 ft. by 4 ft. 2 in. rectangular cross-section, using 24 1 in. by ¼ in. stringers.

The large rectangular end of the return circuit was very simply constructed by making two 50 in. by 59 in.

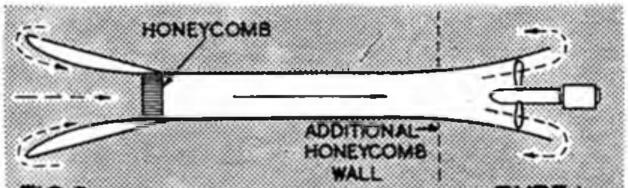


FIG. 3 N. P. L. TYPE K=4–1·5

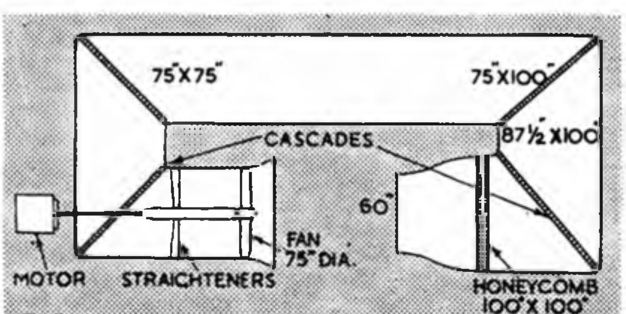
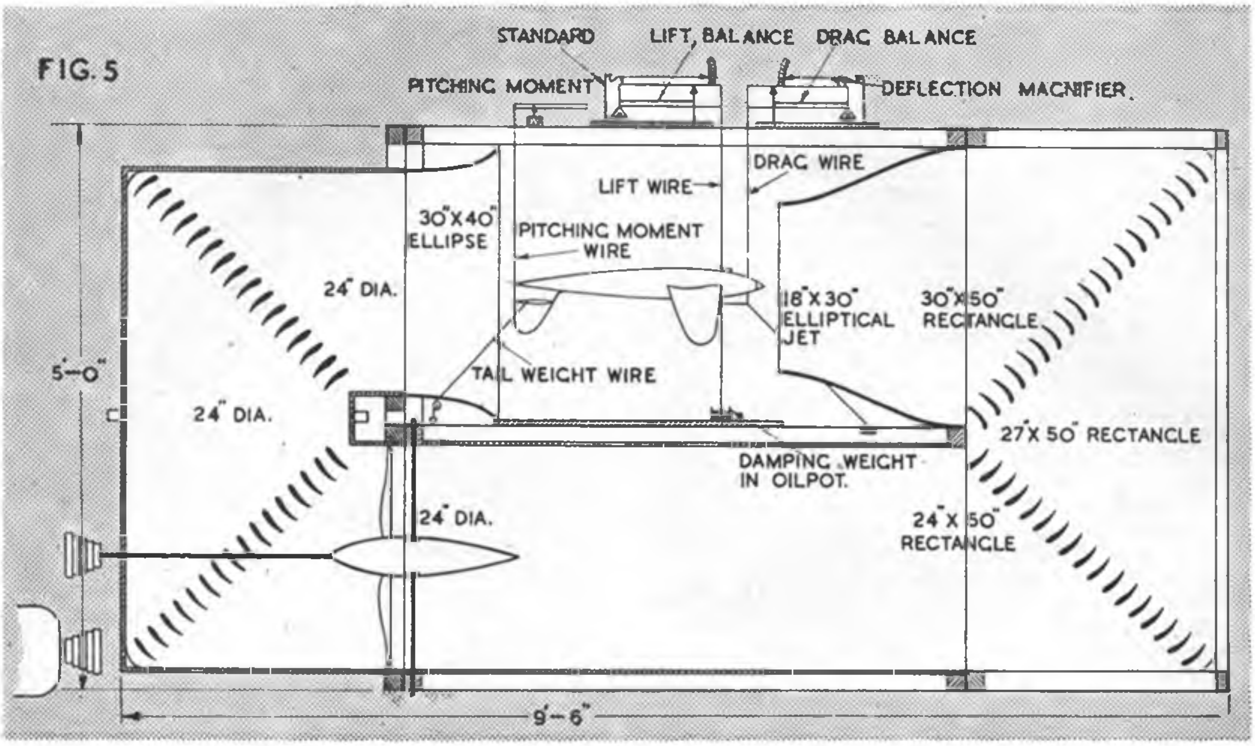


FIG. 4 R.A.E. 5' TUNNEL (R & M 1364) K=0·83

FIG. 5



rectangles joined together by pieces which made the internal depth of this section 27 in. The back rectangle, and the separating pieces were of L cross-section to facilitate attachment of the covering. Also the large spaces were then strengthened by adding ½ in. by 1 in. strips to attach the covering to; these about 6 in. apart.

The other end, near the fan and collector, was more difficult. It was finally made by fastening two circular formers together in a large frame, a third circular former was added perpendicular to this frame, and between the other two circles stringers were then fastened in place, using butt joints at the corners (see Fig. 6).

The entire structure was covered on the inside with thick " black-out " paper, using Scotch glue.

By this means a perfectly smooth inside is obtained, an essential feature if the tunnel is to be successful. As the air in the return circuit is travelling considerably slower than that in the jet, its pressure is much greater. The jet is obviously at atmospheric pressure, so there will be a bursting pressure amounting to 1·6 lb. per square foot in the return circuit. The type of construction employed is hence very suitable since the pressure will hold the paper securely against the formers. It also has the advantage of being light and easy to construct and economical of material.

Next came the problem of making the shaped nozzle and collector cones. The method which we finally used was to make them by applying layers of paste-soaked newspaper over a mould. The mould was assembled by making a rectangular base and an elliptical top, these being joined by curved wooden formers, the shape being calculated from Relf's equation (R. & M.). The middle of the mould was filled up with paper and rags, and faced with a ½ in. thick layer of plaster of paris, carefully shaped. The mould was then greased, and layers of newspaper, soaked in flour paste, were applied until about 1/16 in. thick all over. This was then allowed to dry thoroughly for about a week, because if it were removed from the mould while still damp it would warp badly. It was then removed from the mould, cleaned out, and varnished inside and out. The whole was then glued and tacked into place inside the main frame. The same type of construction was used for the collector, but the shape is not so critical as that of the nozzle.

The fan blades are mounted in a turned oak spinner, which is fitted with a streamline tail fairing which also serves as a rear bearing. The shaft extends out through the shaped end of the tunnel, and at the end is fitted with a cone pulley which is mounted in a large cradle. A similar cone pulley is fitted to the motor shaft, so that speed change is effected merely by moving the belt along the pulleys. A sliding resistance is also provided for delicate adjustment, although we hope to try to improve on this by introducing a coil in the motor circuit and controlling speed by lowering a piece of soft iron into this coil.

The " cascades " were constructed as an ordinary wing, but have no wooden trailing edge. The 300 odd ribs were made by one of the club members and these fit on to a main spar of ½ in. by ⅜ in. wood. They were then covered with the same type of paper as the remainder of the tunnel, which was glued to form a feather edge at the trailing edge. These were fitted into the tunnel so that they could be adjusted for incidence, but were rigidly fixed when properly adjusted. The set of " cascades " directly behind the nozzle are used to make certain that the flow across the jet is absolutely horizontal.

The tunnel corrections were calculated from Glauert's R. & M. 1566 by Mr. Walker, who also designed and constructed the majority of the instruments which we hope to describe in a later article. It is estimated that the approximate total cost of the tunnel when everything has been settled, will be about £40, but we all feel that this has been well spent in producing the finished article.

✱ STOP PRESS

Issued at the request of the Air Ministry (Department of Civil Aviation) in connection with the flying of all types of model aircraft in Great Britain.

At the request of the Air Ministry we publish the undernoted information :—

AIR MINISTRY,
Department of Civil Aviation,
Ariel House, Strand, W.C.2.
22nd June, 1944.

Sir,

I am directed to refer to your letters of the 8th, 19th and 31st May and 7th June regarding restrictions on the flying of model aircraft, and to inform you that, in view of the considerations you have put forward, it has been decided to modify the restrictions previously imposed on the flying of these craft.

2. The restrictions which will now apply to all model aircraft, including gliders, are set out in a letter under to-day's date addressed to the Secretary of the Royal Aero Club, a copy of which is attached for your information.

3. The Department is anxious on security grounds that these regulations should be strictly observed, and any assistance in drawing public attention to them you can give will be appreciated.

4. I am to express regret that it has been impracticable to reply earlier to your letters.

I am, Sir,
Your obedient Servant,
A. H. WILSON.
for Director-General of Civil Aviation.

D. A. Russell, Esq.,
Managing Editor,
Model Aeronautical Press, Ltd.,
Wilmary House, Merton Lane, Highgate, N.6.

AIR MINISTRY,
Department of Civil Aviation,
Ariel House, Strand, W.C.2.
22nd June, 1944.

Sir,

I am directed to refer to Air Ministry letter C.S.22713/S.6 of 10th May, 1944, concerning restrictions on the flying of model aircraft and to inform you that the Department has no objections on security grounds to these restrictions being modified slightly.

2. The revised restrictions on the flying of all model aircraft (including gliders) will now be as follows :—

(a) Such aircraft are not to be flown South of a line Southwold—Bury St. Edmunds—Bedford—Gloucester—Bristol Channel.
(b) There is to be no flying between the hours of sunset and sunrise.
(c) There is to be no flying in officially prohibited areas or within two miles of any Royal Air Force Station.
(d) Models are to be set to fly in a closed circuit only.
(e) Wing span in all cases is not to exceed 10 ft.
(f) Maximum engine running time is to be 45 seconds.
(g) Maximum time airborne is to be 2 minutes.

3. Copies of this letter have been sent to the Society of Model Aeronautical Engineers and to the Association of British Aeromodellers.

I am, Sir,
Your obedient Servant,
A. H. WILSON.
for Director-General of Civil Aviation.

The Secretary,
Royal Aero Club, 119, Piccadilly, W.1.

We have great pleasure in announcing that, following the representations made by the Managing Editor of this Journal to the Air Ministry, per his letters of the 8th, 19th, 31st May and 7th June, the Air Council has amended the rules affecting the flying of model aircraft as set out in the letter published on the right.

It should be noted that the conditions remain in effect as set out in the Air Council's earlier letter of May 13th, but now there is no limitation on the flying of petrol engine driven model aircraft to members of the S.M.A.E. only, neither is it necessary for timing devices to be approved by that Society.

The effect of this latest Air Ministry announcement is therefore that the flying of all types of model aircraft may now be carried out by any person, provided that the rules (*a*) to (*g*) inclusive, as set out in the Air Ministry's letter of 22nd June. 1944, are strictly adhered to.

In making our representations to the Air Council we had the support of the Model Aircraft Trade Association and the Association of British Aeromodellers, and the Air Ministry is to be congratulated on having dealt so fairly with this matter.

It will be noted that the Air Ministry is anxious that the regulations should be strictly observed, and now that "flying for all" has been made available, we earnestly request all Aeromodellers to carefully study the Air Ministry regulations and abide by them most strictly, both on security grounds and in the interest of the Aeromodelling Movement as a whole.

As and from the date of publication of this issue of the AEROMODELLER, the N.G.A. Third Party Insurance cover is reinstated, and all Aeromodellers who intend flying petrol driven model aricraft should notify the Secretary of the N.G.A. at Allen House, Newarke Street, Leicester, with full particulars of their aircraft, so that registration may be carried out as quickly as possible

Remember, now that the Air Ministry has granted our request, "Fly with Care" at all times.

NOSEBLOCKS, PROPELLER SHAFTS AND OTHER DEVICES

BY T · P · BURNABY

THE arrangement shown in Fig. 1 is frequently employed on endurance models at the present time. It provides a freewheel for the propeller, facilities for stretch-winding (front hook and detachable noseblock) and a run-true bobbin in place of the unsatisfactory motor hook. There is no mechanical rubber tensioner, but the rubber motor may be self-tensioned by twisting the front bobbin through the middle of the skein a number of times, thereby twisting the two halves of the skein in opposite directions. The turns thus imparted to the skein must be allowed for when winding the motor.

A slight reduction in friction may be obtained by mounting the freewheeling mechanism behind the propeller, but this usually involves soldering, which weakens the steel wire shaft, and so it is not much used.

By employing the special form of wire pawl shown in Fig. 2, the freewheel becomes automatically self-setting.

In most cases it is preferable to employ a mechanical rubber tensioner instead of "self-tensioning" the rubber motor, and the usual arrangement is shown in Figs. 3 and 4. The pull of the rubber motor when fully wound compressed the spring A, as shown in Fig. 3. When the motor becomes almost unwound, the spring A gains the upper hand and moves the propeller shaft forward into the position shown in Fig. 4. The arm B then engages with the stop C and prevents the motor from unwinding further (this is the "tensioner" action), and the clutch D disengages from its socket in the propeller, allowing it to freewheel.

The spring A may be either a "safety-pin" type or an ordinary helical type. The former will be found more suitable, since it can be made to exert a more constant force over its range of operation. This helps to make the mechanism positive in its action.

The arm B may either be soldered to the shaft, or to the locking sleeve of the bobbin hook, or it may be formed integral with the bobbin hook, as shown in the diagram. The bobbin hook is then secured by passing a small elastic band over the arm B, binding it round and round, and then looping the other end over the arm B.

The above mechanism provides for mechanical tensioning, freewheeling, a run-true bobbin, and stretch winding. It is not possible to *hand*-wind, unless a clip is placed over the spring A.

It should be noted that when the tensioner operates, the centre of gravity of the aircraft is shifted appreciably forwards. In certain cases this shift may be an advantage (see below), but normally it should be kept as small as possible.

A useful addition to the mechanism in the form of an automatic release gear is also shown in Figs. 3 and 4. The stop C is made from an L-shaped piece of wire which moves in a slot at the back of the noseblock, the long arm of the L sliding in a length of tubing embedded in the noseblock. A rear view of the noseblock is shown in Fig. 5. The L-piece normally hangs in the lower position, with the long arm projecting below the bottom of the noseblock. When the tensioner comes into operation the arm B lifts the short arm of the L-piece (marked C) to the top of its slot, thereby stopping the motor as usual, and lifting the projecting portion of the long arm of the L-piece (marked E) into the noseblock. The arm E can very simply be used to unlatch a de-tracting undercarriage or drop a parachute or bomb, or any other device. A length of thread with an elastic band inserted somewhere to keep it taut is tied to a small wire hook which is hooked over the arm E. A wire staple fixed below the fuselage will be necessary to keep it in position. When the tensioner operates at the end of the motor run the withdrawal of the arm E releases the thread operating the device. It is absolutely reliable, and can be used on any model aeroplane fitted with the above type of rubber tensioner. The extra weight involved is negligible. I have put it to uses ranging from dropping bombs to releasing the upper component of a composite model, and it has proved itself to be absolutely reliable and simple and convenient to use.

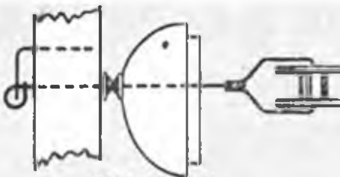
Another automatic release device which should be mentioned is one which was advocated by Mr. R. H. Warring, for retracting the undercarriage of a Wakefield model aircraft. It is shown in Fig. 6. Two discs are mounted on the propeller shaft, forming a sort of winding spool. A length of thread is attached to the shaft between the discs; Warring suggests passing it through a small hole drilled in the shaft, but a clip formed of a small spiral spring, which will grip the shaft sufficiently tightly without being soldered, removes the difficulty of drilling the steel wire. The other end of the thread is attached to a wire pin which projects through the bottom of the fuselage through a suitable bushed hole. The slack portion of the thread is disposed of in a suitable manner: I would suggest passing it through an adjacent hole in the fuselage bottom and stowing it away in a shallow cowling, which could be a dummy air intake.

When the propeller is released the thread is slowly wound in, until finally the pin is withdrawn from its socket, thereby unlatching the release. The pin will, of course, whirl round inside the fuselage at the end of a short length of thread, so precautions must be taken to avoid tangles. The time at which the release occurs may be varied at will by altering the length of thread.

Fig. 7 shows how the two release mechanisms described above may be combined in a single noseblock unit. This arrangement is especially suitable for retracting and subsequently de-tracting the undercarriage of a scale model, but it has many other uses. All sorts of possibilities of experiments with Fowler flaps, Mayo composite aircraft, glider towing, dive bombing, not to mention the humble parachute and bomb, at once suggest themselves.

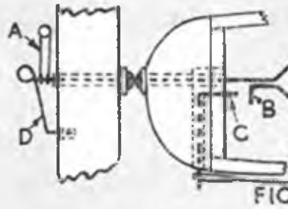
Dreaming apart, however, it is amazing how many complex release mechanisms, which have been described in the AEROMODELLER in times past, have been rendered obsolete by my simple invention of the sliding tensioner stop. Levers linked to cupwashers on the shaft, so as to reproduce the forward movement of the shaft due to the tensioner action; spring attachments to the *rear rubber anchorage* (a most unsatisfactory arrangement owing to the loading of the tail with heavy gadgets), are all made obsolete by a simple fitting which is a mere attachment to an existing tensioner unit; easy to make, of negligible weight, positive in action and absolutely foolproof.

The introduction of the folding propeller has brought with it new difficulties owing to the rearward shift of the C.G. when the propeller folds. The obvious remedy of arranging for the counterweight to swing forward when the blade swings back is very little used, possibly owing to constructional difficulties. In the case of two-bladed propellers there is no counterweight. The ordinary mechanical tensioner helps things by producing

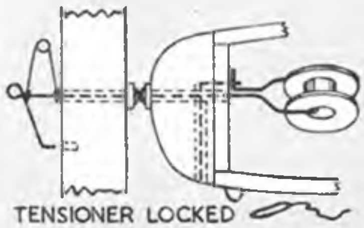


FREEWHEEL
FIG. 1

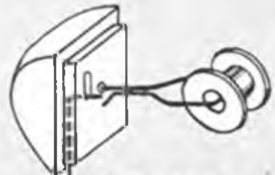
SELF SETTING F/W
FIG. 2



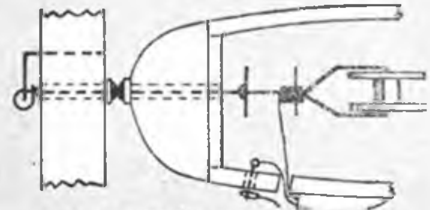
TENSIONER WITH SLIDING STOP RELEASE GEAR
FIG. 3



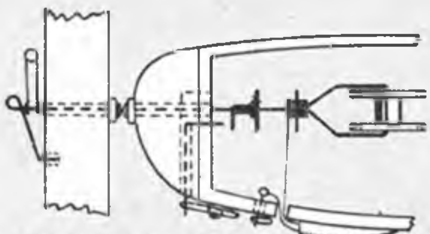
TENSIONER LOCKED & RELEASE UNLATCHED.
FIG. 4



3/4 VIEW OF FIG 3
FIG. 5



R.H. WARRING'S RELEASE GEAR THREAD & DISC ARE SHOWN SECURED TO BOBBIN HOOK LOCKING SLEEVE.
FIG. 6



COMBINATION OF SLIDING TENSIONER STOP & WARRING'S RELEASE GEAR.
FIG. 7

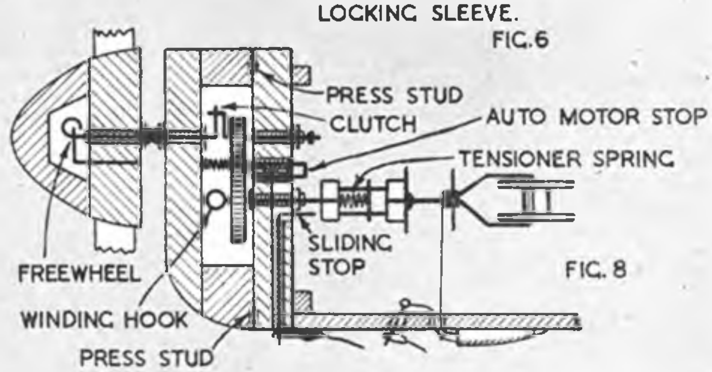


FIG. 8

a compensatory forward shift of the rubber motor. This shift should therefore be made as large as is convenient. In addition, the tensioner spring may be mounted behind the propeller, so that the propeller boss participates in the forward movement. On a streamlined model fitted with a spinner, this is not possible. In addition, the unwieldy safety-pin spring must be replaced by a spiral spring which can be enclosed in the spinner. It should be explained that there is no freewheel, the propeller hub being locked in position by the tensioner stop so that the blade folds along the top of the fuselage. The freewheel clutch is therefore modified by lengthening the clutch member so that it slides in its socket without disengaging from it.

Additional compensation may be arranged, if necessary, by arranging for a sliding weight inside the fuselage to be operated by the sliding tensioner stop release gear.

Mechanical C.G. shift compensation for folding propellers is not necessary on parasol monoplanes, or high-wing monoplanes, provided that in the latter case the propeller is lightly constructed. This is because the C.G. shift can be used as a substitute for "downthrust." C.G. shift compensation will be found very necessary for low-wing monoplanes, and to a lesser extent for mid-wing and shoulder-wing aircraft.

The last diagram depicts a step-up gearbox. The difficulties of providing for freewheeling, mechanical tensioning, stretch-winding, and automatic release gear in a step-up gearbox are great, but not insuperable. The gearbox shown has, in addition, a knock-off propeller and an automatic stop to prevent the motor from racing when the propeller is knocked off. The front part of the noseblock clips on to the rear part by means of press studs, and is removed when stretch-winding. The automatic stop will prevent the motor from unwinding until the propeller unit is placed in position.

The freewheel is the ordinary self-setting type described above, incorporated inside the spinner.

The mechanical tensioner is the most complicated part of the apparatus, and the most difficult part to make. It may, of course, be dispensed with and a self-tensioned rubber motor employed. It will be seen that it is similar in principle to the ordinary tensioner described above. The drilling of the two brass blocks is the chief difficulty.

Both types of automatic release gear are fitted.

The automatic motor stop requires explanation. It consists of a piece of wire bent into a U with two unequal arms. The removal of the propeller unit allows it to slide forward under the action of the spring mounted on the long arm, until the short arm engages with a hole drilled in the large gear wheel.

It will be seen that the gearbox is somewhat heavy, but on a scale model the extra weight in the nose is usually welcome. Except for the mechanical tensioner, it is not unduly difficult to make, and the knock-off propeller, in addition to preventing many a breakage, enables the motor to be stretch-wound. Finally, the two automatic release mechanisms incorporated make it especially suitable for the flying scale model enthusiast.

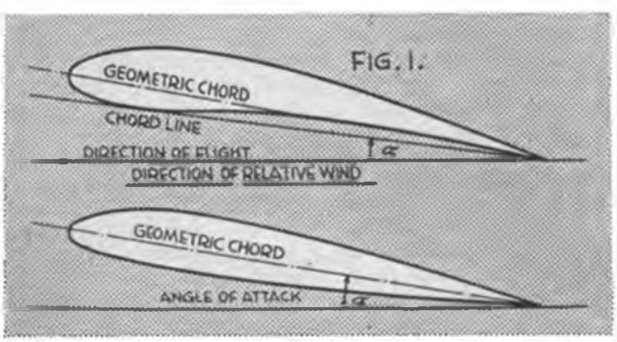
TAPERED AND ELLIPTICAL WINGS

MANY articles have appeared in past issues of THE AEROMODELLER dealing with the theory, design and construction of tapered and elliptical wings. But, while it is now generally agreed that the tapered or elliptical wing is more efficient than the rectangular type, it seems that the structural difficulties involved still cause quite a number of headaches. This is rather surprising in view of the availability of the excellent selection of AEROMODELLER "Aerofoil Section" sheets. For the benefit of those modellers who do not know about the sheets, or who have not taken full advantage of them in the past, we give below a brief summary of their numerous uses.

The sheets measure 30 ins. by 10 ins., and each contains 31 profile shapes, or sections, ranging in size from 9 ins. chord to 3 ins. chord by 2 ins. stages. In the bottom right-hand corner is a characteristic graph of the aerofoil concerned, measuring 5 ins. by 3½ ins., showing the Cl, Cd, L/D and C.P., plotted against the angle of attack. Thirty-six different aerofoils are covered by the series, including all the better-known sections used by aeromodellers, such as R.A.F. 32, Clark Y, Grant X8, NACA 97 and 6512, Eiffel 400 and 431, Gottingen 436 and 426, and so on. There are also a number of less used sections which should be most useful to modellers who go in for experimental work. All the sections in the series are specially selected as being the most suitable for model aeronautical work, and the data shown on the graph had been arrived at as a result of wind tunnel tests carried out at comparatively low Reynolds numbers. The modeller may, therefore, approach his design calculations with confidence and with the knowledge that actual flying performance will be very reasonably near calculated performance.

Before the introduction of these Aerofoil Section Sheets the designer wishing to employ tapered or elliptical wings had to lay out the wing plan form, decide the rib spacing, and then plot each rib separately. It was a lengthy business, and, not unnaturally, as a result, the majority of builders used the more easily constructed rectangular wing. Now it is merely necessary to decide on the wing plan form and the aerofoil section to be used. Then the appropriate Aerofoil Section Sheet is pasted to stout card, or, preferably, if obtainable, thin three or two-ply. The chord of the ribs required is measured and the sections cut from the sheet to be used as templates for cutting the actual ribs to be used for the model. The chord sizes may be marked on the back of the templates for future reference.

Little difficulty should be experienced in fitting the ribs to a large variety of wing plan forms, it only being necessary to arrange the rib spacing to give chord size changes of ·2 ins., or multiples of this number.



The very moderate price of 6d. per sheet, or 15s. for the complete set of 36, should enable wide use of these up-to-date aids to wing construction.

We receive a large number of queries from readers concerning design problems, and from a study of these it is apparent that many modellers are not at all sure of themselves when they are confronted with such requirements as measurement of angles of attack and incidence, calculation of area for elliptical or tapered wings, etc. To conclude this article we give below list of references for the model aeroplane designer.

1. The angle of attack, denoted by the symbol α, is the angle between the chord line of the aerofoil and the relative airflow. The angle of attack must not be confused with the angle of incidence, which is the angle between the aerofoil chord line and a fixed reference line, usually the datum line of the fuselage. Once set the wing remains at this angle no matter what attitude the model may assume. If the wing is set at plus two degrees angle of incidence relative to the fuselage datum line and the airflow is parallel to this datum line, then the angle of attack is also plus two degrees. If, however, the airflow changes relative to the datum line, the angle of attack will alter accordingly, but the angle of incidence will remain at plus two degrees.

2. The chord line on under-cambered sections is defined as a line drawn tangential to the lower surface, touching at two points, usually the trailing edge and the lowest point on the underside. The geometric chord is a line joining the centre of the leading edge to the trailing edge.

In the case of the bi-convex section the chord line is defined as a line joining the leading and trailing edges (as above). This line also represents the geometric chord for this type of aerofoil section. Fig. 1 shows the above diagrammatically.

3. Area of tapered wing = span X average chord =

$$\text{span} \times \frac{\text{tip chord plus root chord}}{2}$$

4. Area of elliptical wing $= \pi$ a.b.

$$\text{where } a = \frac{\text{root chord}}{2} \quad b = \frac{\text{span}}{2}$$

5. Aspect ratio $= \frac{(\text{span})^2}{\text{area}}$ 6. Lift $= L = Cl \frac{p}{2} S V^2$

$$\text{Drag} = D = Cd \frac{p}{2} S V^2$$

where Cl = Lift Coefficient.
Cd = Drag Coefficient.
p = mass density of air = ·00238 slugs/cu. ft.
S = wing area in square feet.
V = velocity in ft./second.

Lift and Drag are given in pounds.

7. Velocity =

$$\sqrt{\frac{2W}{p\ Cl\ S}}$$

where W = weight in pounds.

8. V min (stalling speed) =

9. Reynolds number of a wing =

6300 X V X l

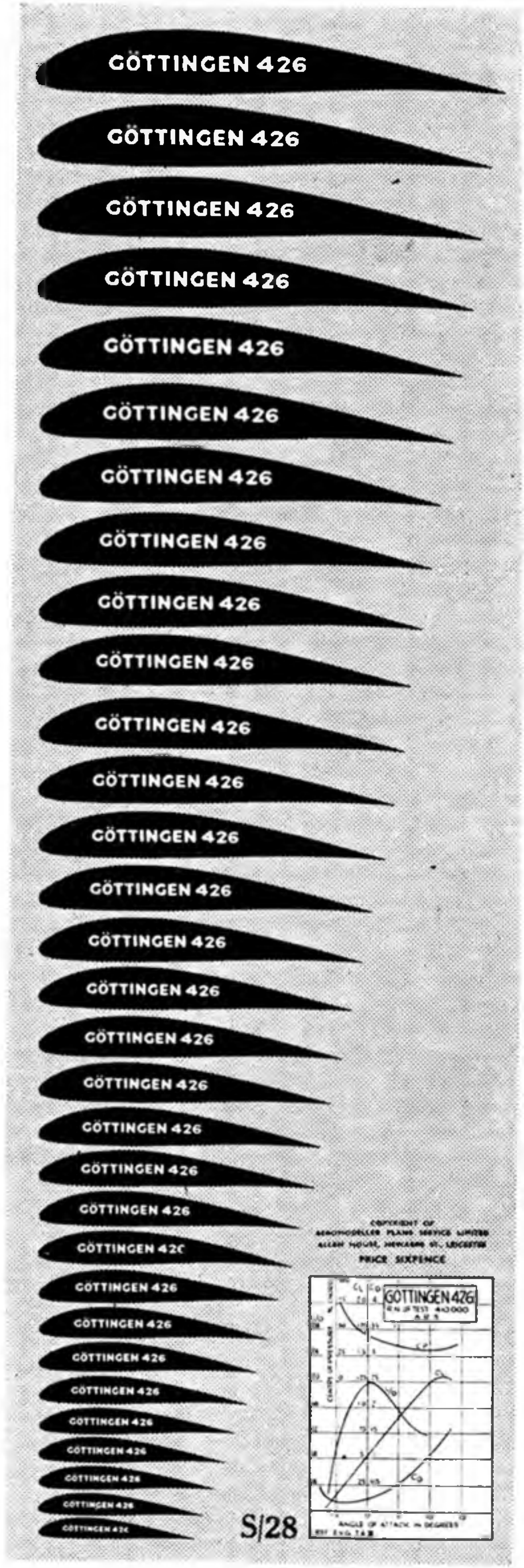
Finally, here is a summary of the points to be taken into consideration when choosing an aerofoil section :—

(*a*) Structural considerations. The section must be deep enough to accommodate a spar or spars to give the required strength to the wing.
(*b*) The Lift/Drag ratio should be as high as possible.
(*c*) A high power factor is required.
(*d*) The section should have low profile drag.
(*e*) The Centre of Pressure movement should be small.
(*f*) Cl Max. should be high to ensure low stalling speed.

It will almost invariably be found impossible to combine *all* the above factors for successful model aeroplane design, and it will be necessary to make the best compromise. Here the aeromodeller falls in line with the designer of full-size aircraft. It is, for instance, almost impossible to find an aerofoil section giving a high lift value combined with really low drag, and for this reason, a compromise very often has to be made between the high lift section and one of moderate lift showing considerably less drag. For high speed work a thin, slightly cambered section is required, but it may be found that the ideal aerofoil is not deep enough to accommodate sufficiently strong spars and so a thicker section has to be chosen. Compromise again.

The Aeromodeller Aerofoil Section Sheets cannot do the spade work for the modeller. They cannot decide for him just which section is the best for his purpose. They cannot design his wing. But when he has finished with the slide rule and the ice-pack and hates the sight of his pencil, then the Sheets take over and enable him to carry straight on with the work of construction without further reference to books on geometry for plotting the ribs. However, there is one book that all modellers should possess.* "Airfoil Sections for the Aeromodeller," by R. H. Warring. It is intended to be used in connection with the Aerofoil Section Sheets and gives, in addition to comprehensive data on each individual aerofoil section, an elementary working knowledge of aerofoil theory and performance calculations. Six chapters are devoted to this subject and the book will prove invaluable for reference.

D. B. M. W.



AUTOMATIC GLIDER CONTROL

BY A · ARNOLD

IN spite of all the wicked-looking theory, formulæ and slide rule calculation the problem of control of a glider in free flight does not seem to have been solved.

Now a bar magnet, freely swung and not interfered with, will always of course gravitate to a north and south position, and after grasping this great fact I immediately set out to employ it in figure of eight gliding and so on. I have not been able to try it in the air owing to the present awkward times, but I can assure you that the principle is workable for I have rigged it up on a board and tested it out on terra firma.

This is the working principle :—Imagine a solenoid rigged up as an inverted pendulum and working through in arc of, say, ninety degrees. Coupled up to the rudder it would hold it either to port or starboard according to which side the solenoid had swung, and by its own depending weight would hold the rudder firmly in the position to which it had been deflected.

Now, though this device will work with the wind in any direction, we must imagine for the sake of simplicity that the wind is coming from the north. We launch our glider from a suitable soaring site, in a north-westerly direction. It rapidly gains height, turning east through north because the solenoid, by its own weight is holding the rudder to starboard. All this time the magnet, continuing to point north is, of course, swinging across the glider, so that when our sailplane is flying in an easterly direction the magnet is making an angle of ninety degrees with the line of flight. In this position the magnet closes an electrical contact, energising the solenoid and throwing it over to the other end of its travel. The rudder is now to port and the sailplane commences to turn west through north. Having attained a westerly course, the magnet has now traversed an arc of a hundred and eighty degrees and closed a second circuit which swings the solenoid over again, and the rudder once more to starboard. And so the figure of eight gliding goes on until either the number eight battery gives out or the soaring current fails.

Now for the sticky part ; how the electrical contacts work.

The size of the magnet I used was three inches by three sixteenths by three sixteenths, weighing about half an ounce. Though it is of a special alloy it is only barely strong enough to work the contacts and I would suggest a magnet of at least a quarter of an inch section. A quarter of an inch under the three inch magnet is mounted a three inch diameter flat brass ring. It is cut from twenty gauge material and its face is about a quarter of an inch wide ; it is wired up to the positive pole of the dry battery.

Just under this ring are two lightly tinned iron triggers, each pivoted on a brass spindle. Underneath the iron triggers is a second brass ring, electrically "dead," holding the triggers up to within a sixteenth of an inch of the underside of the upper brass ring. The triggers, through their brass spindles, are connected electrically to the solenoid. The magnet, swinging over either trigger, attracts it upwards so that it makes contact with the upper brass ring, thus closing the circuit and operating the solenoid. (From this solenoid there is, of course, a return wire to the negative pole of the battery.)

Now these two triggers are so mounted that they can be swung around between the brass rings so as to allow for the wind direction in relation to the north pole. If the wind is blowing from the north as in our first example, the triggers will have to be athwartships in order to accomplish figure of eight soaring. If the wind is, say from the east, the triggers will have to be aligned fore and aft because the turning points of the sailplane must now occur on the northerly and southerly flights.

Here arises a little snag. If the magnet is swinging in a horizontal plane on a vertical axis the north and south poles of the magnet will operate both triggers simultaneously, which, of course, must be avoided. So, keeping the axis vertical, we must arrange for the north pole of the magnet to be inclined downwards at least a quarter of an inch, remembering to keep the air space between it and the brass ring still at about a quarter of an inch. The south pole of the magnet will then be found to be too far away to affect the trigger over which it swings.

By the way, the weight of metal in the triggers must be carefully worked out by trial and error for, if too heavy, their power of attraction will overcome that of the earth's magnetic north pole, and if too light, they will not have enough power to make a sufficiently positive contact electrically. Those I used were made up from twenty-two gauge wire and were half an inch long.

The magnet *must* be mounted in frictionless bearings and this can be done by using two plated steel gramophone needles for the axle, fixed at right angles to the magnet and pointing outwards. Owing to their position in the lines of force they do not interfere with the action of the magnet. These needles work in two brass cups, one of which must be adjustable so that play can be taken up without exerting pressure on the points. For my experiment I used a block of mahogany half an inch square, drilled to take the magnet and the needles with a driving fit. As the magnet will be inclined from the horizontal it is imperative that it must be accurately balanced, and this can easily be done by first allowing it to swing on a horizontal axis *across* the earth's lines of force (*i.e.*, the magnet should be pointing east and west). It will then be only a matter of minutes to find the centre of balance.

In figure of eight flight the two triggers are opposed to each other, and if zigzag flight is required it is only necessary to move them a little towards each other. Obviously, the closer together the triggers are, the straighter will be the line of flight, and so they can be arranged for narrow zigzag flight in any desired direction, irrespective of the quarter from which the wind is blowing. In practice there is a limit to the proximity of the two triggers for if they were too close together the magnet would be able to operate both simultaneously.

Now for the solenoid. As I mentioned before, it works as an inverted pendulum whose axis is an inch and a half below the iron " plunger " over which the solenoid swings. This solenoid need be only seven sixteenths of an inch long and wound with thirty-six gauge enamelled copper wire. The thinner the wire, the greater the power of the solenoid, and there is no fear of it burning out because the current only passes through momentarily. The plunger can be made from iron rod an eighth of an inch in diameter.

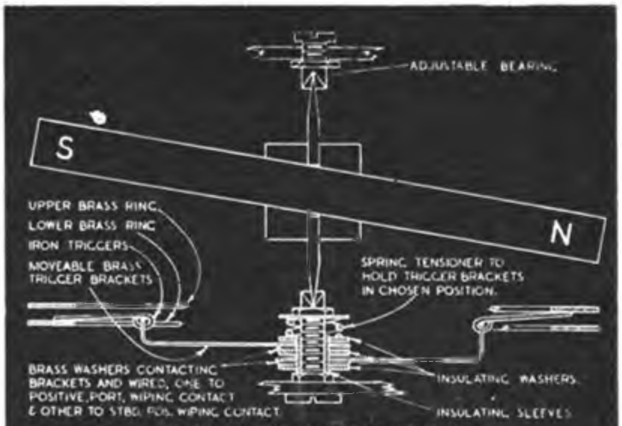
The action of an energised solenoid, when free to move, is to fly backwards and forwards over the encircled plunger, finally coming to rest at the centre point of the plunger, therefore the current must be switched off as soon as the solenoid reaches the midway point of its travel. Then, when it comes to rest at the end of its travel, its own weight will hold it in that position. As the arc of travel in this case is on a radius of an inch and a half, the distance of travel should be about two and three-quarter inches, measured circumferentially. The moving solenoid should not affect the trim of the glider for it is always less than two inches from the centre line and its weight is not more than half an ounce.

Arranged on either side of the solenoid are two wiping contacts, made from spring brass wire. The positive and negative terminals of the solenoid are in brushing contact with these two wiping contacts which extend in distance, over half of the arc. The other half of the arc is covered by another separate pair of these wiping contacts. The starboard positive wiping contact is wired to one trigger, and the port positive wiping contact to the other trigger. Both negative wiping contacts are wired to the negative pole of the battery. In operation, as soon as the solenoid is energised by a trigger closing the circuit, it is immediately thrown over to the other side where the wiping contacts are, for the time being, dead—until the magnet swings over to the other trigger by the action of the circling glider.

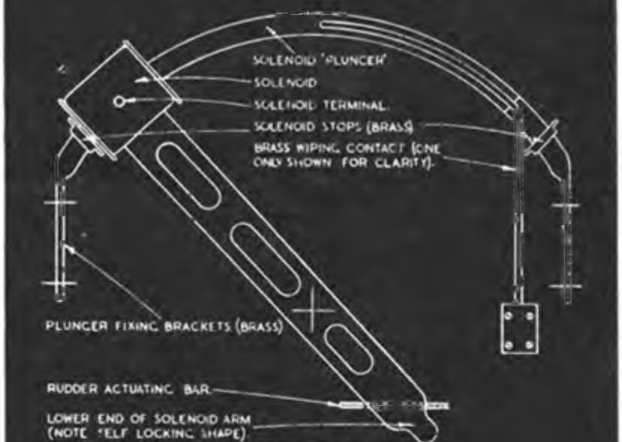
We have now got the operating mechanism working successfully and it only remains to couple up the solenoid with the rudder, but before doing this it would be as well to indicate the general arrangement of the component parts. The complete magnet assembly could, I think, be nicely housed in the wing centre section of a mid wing model, where it will be approximately on the centre of gravity. The solenoid will have to be about twelve inches further aft so that its magnetic field will not interfere with the operating magnet. The complete solenoid assembly should not weigh more than an ounce, or an ounce and a half at the very most, so that though it is a fair distance from the centre of gravity it should not affect the flying qualities of the sailplane. It swings athwartships. The dry cells, which could be a small torch battery, will be housed in the nose just forward of the magnet assembly. It is important to note that on to-day's torch batteries the terminals are often of ferrous metal which will have to be replaced by brass ones.

Now to come back to the rudder coupling. First of all we have an actuating bar working in a horizontal plane and lying fore and aft. It is rocked from side to side at its forward end by the lower projection of the solenoid pendulum. At three-quarters of its length from the forward end is the fulcrum which is movable fore and aft in a slot in the bar, to adjust the amount of deflection of the rudder. From the after end of the actuating bar two cords run over pulleys at either side, inboard of the fuselage, and then diagonally to the rudder horns. The reason for crossing the cords (or wires) like this is that they will make a cleaner exit from the fuselage to the horns and so only smaller holes in the fuselage will be necessary.

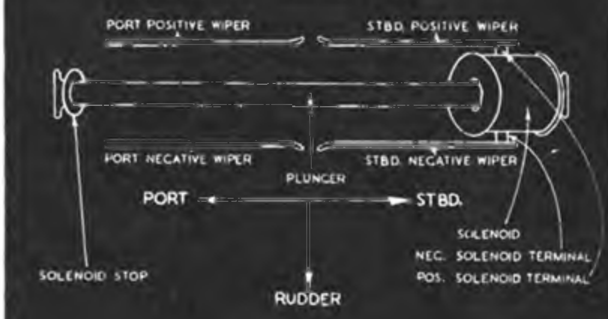
The foregoing may sound a little complicated but the system is actually quite simple and I believe, will be thoroughly workable in actual practice. All the parts will have to be carefully made and fitted, for any undue friction will have a disturbing effect. The whole apparatus, including the small torch battery (which will supply energy for many hours of flight), should not weigh more than four or five ounces, a weight that a medium-sized glider could easily cope with.



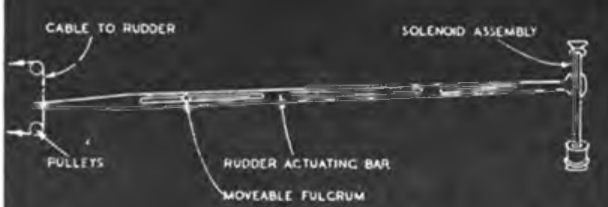
ELEVATION OF MAGNET ASSEMBLY.



ELEVATION OF SOLENOID ASSEMBLY.



PLAN OF SOLENOID ASSEMBLY



PLAN OF RUDDER ACTUATING BAR.

GADGET REVIEW

By "Bonsus"

While there is nothing new in the idea submitted by G. E. Banks for an automatic pilot, I feel that many of the younger readers of the AEROMODELLER will be interested, especially if they have not previously considered the problem of fitting " George " to their models. Diagram 1 shows the device clearly. A is a small lead weight fixed to the wire frame B, which is pivoted on the former by two small brass tubes, C. If the model dives the weight swings forward, pulling thread D. This runs over the pulley E and raises the elevators. If the model climbs too steeply, exactly the reverse action takes place. The elevators must be kept as light as possible or the weight will have to be heavy.

If the weight is arranged to swing sideways instead of fore and aft, and the threads attached to elevators or rudder, lateral stability may be taken care of. Care will be needed in finding the correct weight and in adjusting the elevator movement.

Here is yet another bomb release gear, this time for gliders. The originator is D. L. Bruce. The gear is driven by a small clockwork motor. See diagram 3. A suitable motor may be taken from any small toy motor car, loco or similar article. Any of the small spindles may be used to drive the timing disc, which should be rotated as slowly as possible. The motor is mounted on the balsa supports as shown.

The timing disc may be made of hard balsa and should be of the maximum diameter possible. A small groove is cut in the periphery to take the driving band, which consists of a thin rubber band. A small bamboo peg is fitted as shown and protrudes about $\frac{1}{8}$ in.

Now for the actual release gear. The bomb is held in place by the steadying rods and a locating pin, which fits into a hole in the bomb. Another pin, bent to form a loop as shown, is fixed into position. Finally, the wire release itself is shaped and fixed on a pivot at A.

The action is as follows : When the motor is started the timing disc, turning very slowly, brings the bamboo peg around until it touches the wire release. This is then pushed forward and the bomb released.

This method enables the glider to reach quite a good height before the bomb is released. It may easily be adapted to operate a parachute.

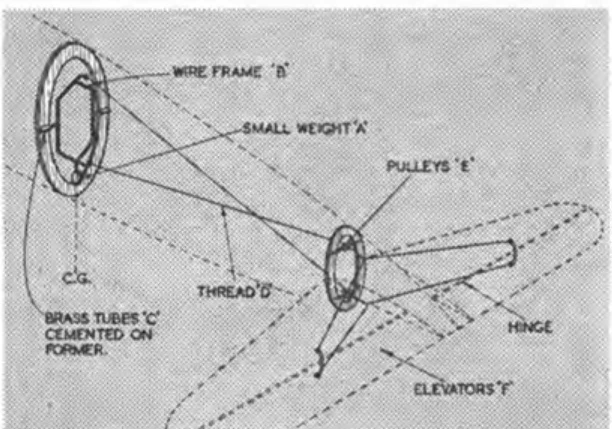
A simple and effective detracting undercarriage comes from M. E. Alford, and is shown in diagram 6. The elastic E is attached to the rear block or a cross member at the end of the fuselage. The distance P will depend upon the type of model to which the device is being fitted. Elastic D is fixed to the top of the leg and some convenient place in the wing. The stop Z forms part of the wing rib H when the undercarriage is in the down position. It should be fitted so that when this is the case the leg swings past the verticle. This will prevent the legs tending to retract when landing. The stop is shown in the up position at Y and in the down position at Y_1.

Operation is as follows. When the motor is wound the dowel forming the rear motor attachment is pulled forward and the operating cables are slackened off. This allows the undercarriage legs to be retracted by hand. The releasing plate is then moved from position X_1 to X, where it prevents the wheel from detracting. The machine is then launched by hand. As the motor unwinds the dowel is moved back under the tension of the elastic E and the release plate is moved in its slide by the pull of the cables. The wheels are then pulled into the down position by the action of the elastic D.

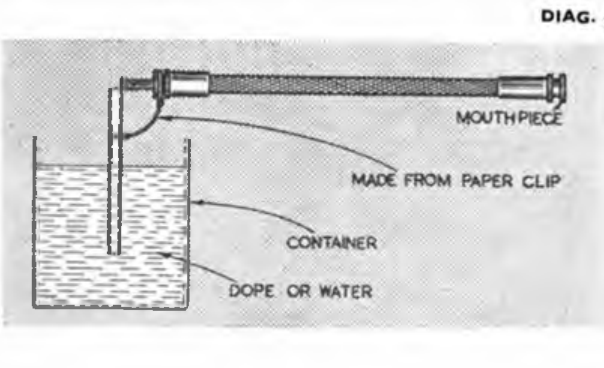
D. Clegg has devised a simplified valve for air wheels constructed from cycle inner tubes, see diagram 4. The grooved centre portion of a cycle valve is cut off and each end filed smooth. It is then inserted into $1\frac{1}{2}$ in. of valve tubing and tied. The tubing is then coated with rubber solution and pushed into the hole in the tyre. A hole $\frac{1}{8}$ in. diameter is made in the centre of a cycle patch and the patch stuck to the tyre with the tubing projecting through the hole. About forty-eight hours should be allowed for the solution to set. The tyre is inflated by inserting a cycle valve into the tubing and pumping up with an ordinary bicycle pump. When the tyre is the required size the tube is folded back on itself and held tightly while the valve is withdrawn. Then a 3/32 in. ball bearing is pushed into the tubing and the latter unfolded to cover the ball. The pressure of air in the tyre is not sufficient to force the ball out of the tube.

Small paint brushes have a habit of becoming stiff and hard after some use especially if one has not been too careful about cleaning them up after a job. K. Knott has found that they may be easily renovated. This is how he does it.

DIAG. 1.



DIAG. 2.

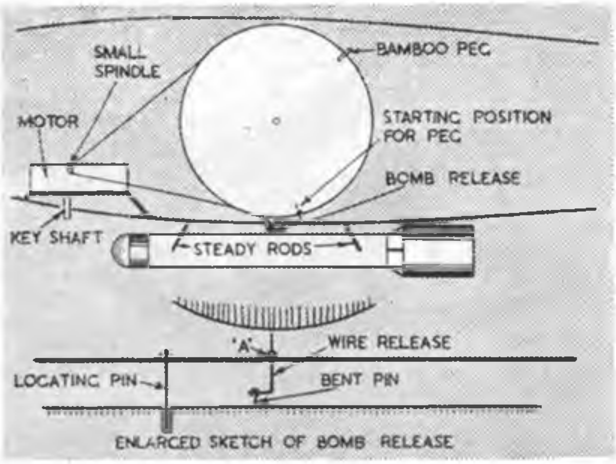


A few cuttings of *human hair* are bound together. The metal stock of the brush is opened up with pliers and a little rubber solution (as used for cycle patch repairs), is squeezed in. The hairs are inserted immediately and the stock closed up. When the solution has set the hairs are trimmed with a razor blade. The result is an almost new brush. Mr. Knott states that it only took him about fifteen minutes to renew two brushes of approximately a quarter of an inch across the bristles.

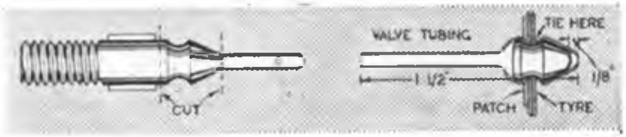
While on the subject of paint here is a simple spray gun, sent in by D. Stolbery. It is easily and quickly constructed from a bicycle pump connection, a piece of glass tube and a paper clip. Diagram 2 shows the construction. The glass tube is cut by making a scratch on one side with a file. It will then snap off cleanly. After using dope the sprayer may be cleaned by pulling a piece of string having a knot in one end, through the tube. Bicycle pump connections are not so easy to get these days, but as no fluid touches the connector it is always ready for its original purpose.

Many solid modellers find difficulty in attaching rigging wires to biplane models so that they will look neat and stay put. John Humberstone has an idea for overcoming this problem. He makes his struts of brass or copper tubing through which the cotton rigging wires are passed. The tubes are sunk into recesses in the wings and the cotton cemented into position and trimmed off.

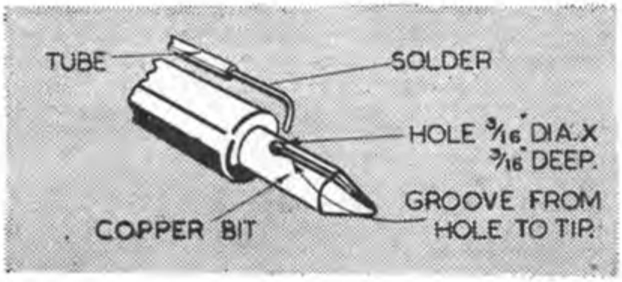
A further application of the idea published recently for attaching a device to a soldering iron, is sent in by D. Osborne. The idea is to feed solder automatically to the work. In this case a hole is drilled in the bit as shown in diagram 5. A groove is then cut along the bit to the point. The solder is brought into contact with the bit as required and for successful operation the groove should be neatly tinned and the bit kept free from corrosion.



DIAG. 3.

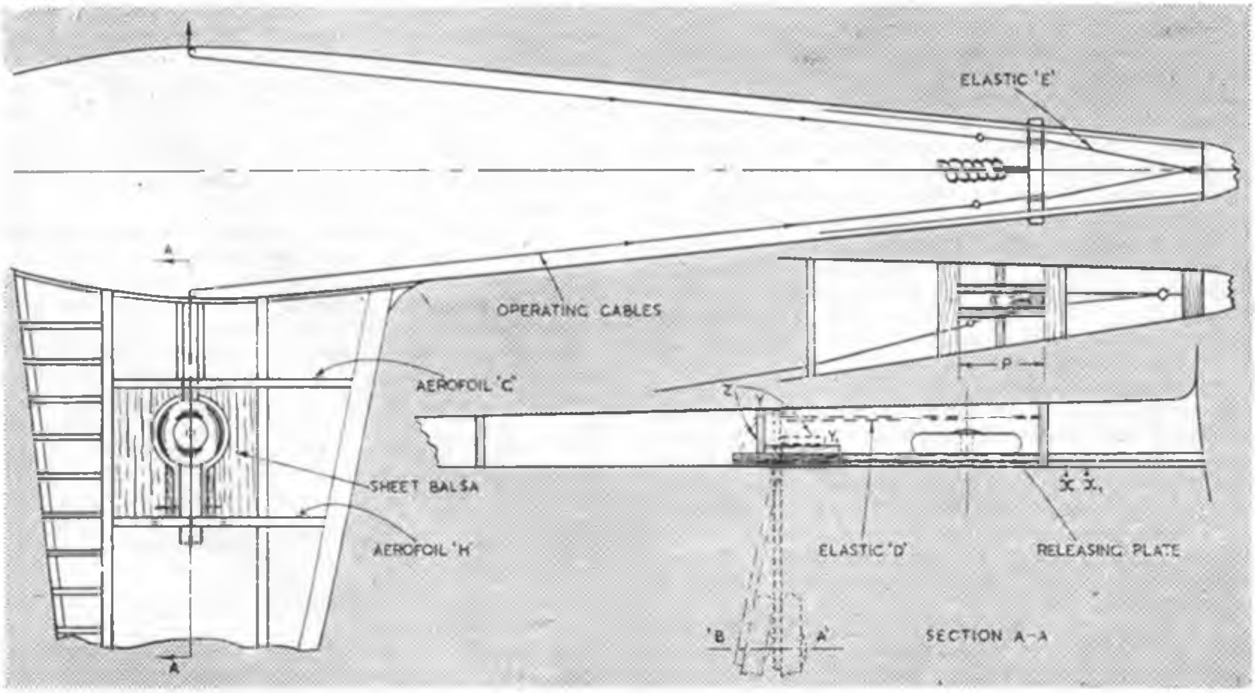


DIAG. 4.



DIAG. 5.

DIAG. 6.



THE De HAVILLAND 18

BY E. J. RIDING

Photo by courtesy of De Havilland Aircraft Co., Ltd.

Little was done in the way of serious airline work until August, 1919, when the Aircraft Transport and Travel Company started a regular daily service to the Continent. The machines in use at that time were without exception converted bombers; ill-equipped and not particularly economical to operate. The D.H. 18 was one of the first machines to be designed solely for airline work and was the result of valuable experience gained in the operation of such aircraft as the D.H. 4A—a D.H. 4 with a coupé top over the rear cockpit—and the D.H. 16—a more or less modified D.H. 9A with a widened fuselage capable of seating four passengers and fitted with either a 450 h.p. Napier "Lion," or a 375 h.p. Rolls-Royce motor.

The D.H. 18 was designed and built by the Aircraft Manufacturing Company in the winter of 1919–20. The prototype was registered G-EARI and it was placed on the London to Paris service of the Aircraft Transport and Travel Co., in April, 1920. Its life was, however, comparatively short, for it was crashed and written off the assets in November of the same year.

The second and third machines to be built were known as D.H. 18As. They were registered G-EARO and G-EAUF; both machines being supplied to A. T. & T. where they remained until the firm's decease in December, 1920, caused by a slump in trade due to the winter months and lack of Government support in the face of competition from subsidised French airlines. The remaining firms managed to struggle along until the end of February, 1921, when a general cessation of British air services to the Continent forced the Government to make an investigation, resulting in a subsidised reduction in fares to £6. 6s. 0d. and £12 for the return journey. Services recommenced on March 18th, 'RO and 'UF being taken over by the Air Council.

A fourth machine, G-EAWO was acquired by the Air Council in the middle of May. By September, 1921, G-EARO had flown more miles on the Continental air services than any other aeroplane, and she followed 'RI into retirement during November of the same year. A month later a new machine, G-EAWW, described as a D.H. 18B, was supplied to the Air Council, making its first trip to Paris on December 18th. This was followed by a sixth and last machine, G-EAWX, in January, 1922.

G-EAWO was destroyed in a collision with a French Farman "Goliath" near Grandvilliers during bad visibility on April 4th, 1922. She had been acquired by the recently formed Daimler Hire, Ltd. By this time, 'UF, 'WX and 'WW were being operated by the Instone Air Line, Ltd., on their Croydon-Brussels, Paris and Cologne routes where they remained until superseded by the D.H. 34s with which they had been competing since the beginning of the year. G-EAWW was the subject of an interesting experiment carried out by the Technical Department of the Air Ministry on May 2nd, 1924. After being partially reconditioned by the makers, 'WW was ditched in Harwich harbour, the object being to determine the time taken for an aeroplane to sink after a forced landing at sea. 'WW started to settle down after about 25 minutes, after which she was towed ashore in order to salvage the engine.

So ended the D.H. 18s. They were good aeroplanes in their time, and they form an important milestone in the history of commercial airlines in this country.

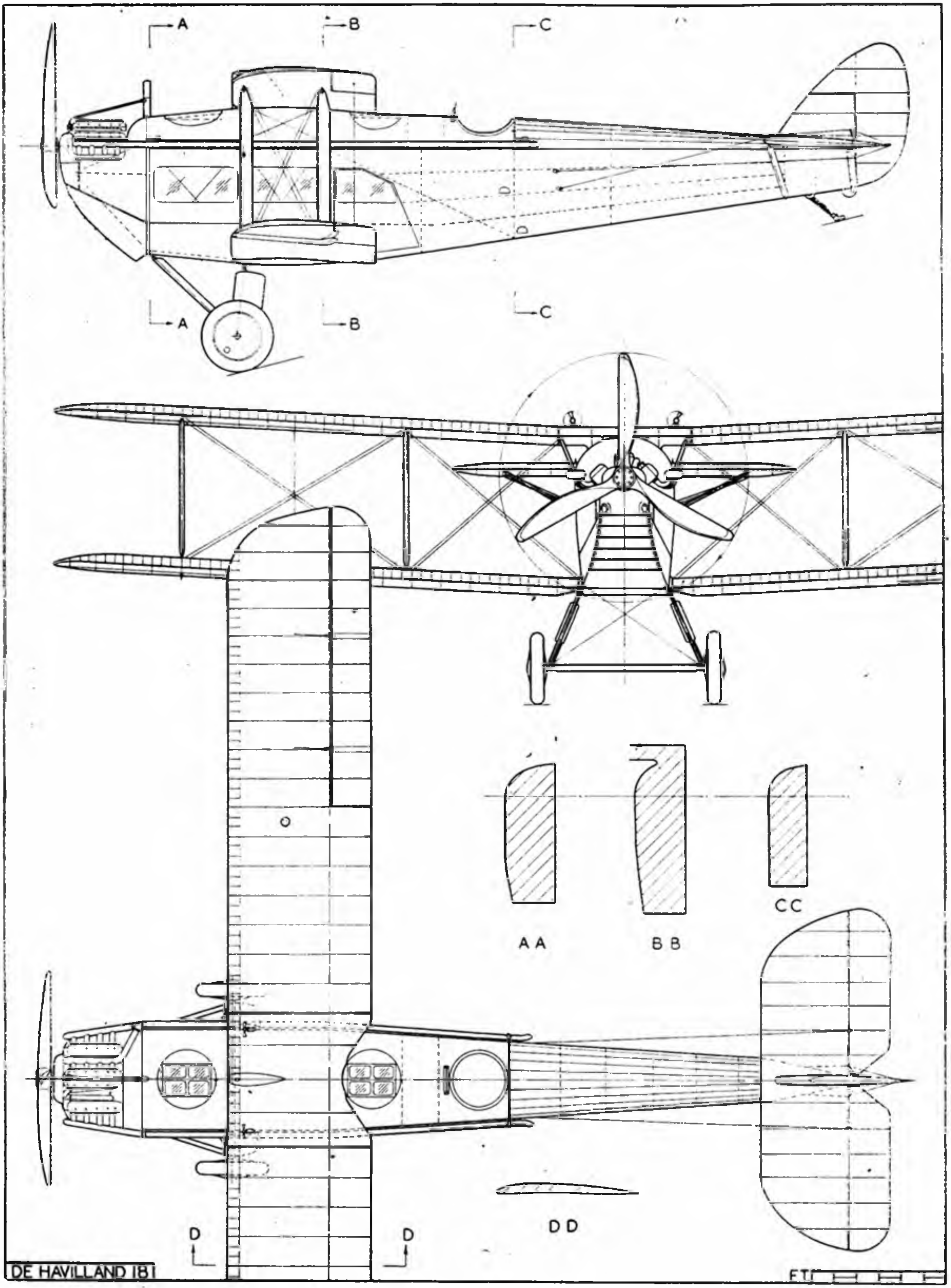
In the 18s and 18As, the fuselage was of wooden construction, wire braced and fabric-covered aft of the passengers' cabin, the forward portion being covered with three-ply. The machine was an eight-seater, the pilot being seated behind the cabin and in the open air. Wings and tail unit were of orthodox wooden construction with fabric covering. The engine was a 450 h.p. Napier "Lion" 12-cylinder, water-cooled type with the cylinders arranged in three banks of four in the shape of a broad arrow.

The 18B had an entirely plywood covered fuselage, improved emergency exits and an engineer's platform on the side of the nose giving easy access to the motor. When not in use, the platform could be stowed alongside the fuselage. G-EAWX was fitted with a three-bladed Leitner-Watts metal airscrew during 1922–23 for experimental purposes.

Specification: Eight-seat passenger-carrying aeroplane; span, 51 ft. 3 in.; length, 39 ft. 0 in.; height, 13 ft. 0 in.; wing area, 621 sq. ft.; weight: empty, 4,040 lb.; loaded, 7,116 lb.; max. speed, 125 m.p.h.; landing speed, 45 m.p.h.; fuel: 95 gals. in main tank above cabin, 10 gals. in gravity tank on top centre-section; ceiling, 15,000 ft.; range, 400 miles; running cost, 2s. 8d. per mile.

Colour schemes: Daimler Air Hire, Ltd. Red all over, white letters.

Instone Air Line, Ltd. Blue fuselage, aluminium wings and tail, white letters on fuselage, black on wings.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PHOTOGRAPHIC SECTION

J · A · HODGSON

SOONER or later in any book dealing with the photography of models one finds reference to the small size of the image on the negative. Remarks usually follow to the effect that negatives may always be enlarged.

Although continual reminders are made in the pages of this journal that it is undesirable to approach too closely to small models with the camera, most of the negatives submitted for reproduction show this defect. The result is that definition on wing tips or tail is poor and becomes very marked when enlargements are made.

It appears sound to assume that persons prepared to spend much time and great trouble to produce model aircraft of the very high standard prevailing in this country to-day, would be equally prepared to spend a few minutes' thought and time in improving their efforts at model photography.

It also appears that a good percentage of the readers who send pictures to us are very keen amateur photographers, whilst quite a few of the rest worry very little about photography and are quite satisfied with the prints returned to them from their chemists.

We are going to talk a little about developing negatives and enlarging them, hoping to pass on a few useful hints to the keen camera men, and to initiate "the rest" into the highly interesting hobby of processing one's own films.

Enlarging: to the uninitiated one would explain that a negative is placed in an optical lantern and the image projected on to a screen—the principle being exactly the same as the projecting of lantern shades. This reference will convey something to most readers. Most good negatives of small models—say 1/72nd scale models—have images averaging about 1 in. in length. If the images are much bigger than 1 in. they are usually indefinite unless taken with some special camera; we refer to those negatives made on No. 2 Brownie film, size 3½ in. by 2½ in. Normally, enlargements, size 8½ in. by 6½ in., are made for reproduction purposes. Allowing for some "background" the image, 1 in. in length, may be projected and "enlarged" up to 7 in. in length, or as our textbooks say, enlarged 7 diameters. It will be easily understood that a wing tip—out of focus, yet barely perceptibly so, on a small print is readily noticeable on the enlarged print. We hope that readers will therefore easily understand that it really does not matter if the image on the negative is only 1 in. or even ¾ in. in length providing it is dead sharp.

To make enlargements one must have the necessary equipment. It is not always expensive and can often be home-made. At some later date we may, if our readers request it, advise on the making or buying of the necessary items, but at the moment it is not our job. Negatives can always be placed in envelopes suitably marked with the portion of the picture to be enlarged, and the chemist will do the work.

We photographic people maintain, and rightly so, that the negative is the important thing. Enlargements or contact prints can only reproduce what the negative contains. Once the film is exposed and developed, the negative is there finally—and irrevocably complete. If it is out of focus, under exposed, or badly developed—that is just too bad, and very little can be done about it. From a negative can be made hundreds of prints, good, bad or indifferent—but the negative is the master key.

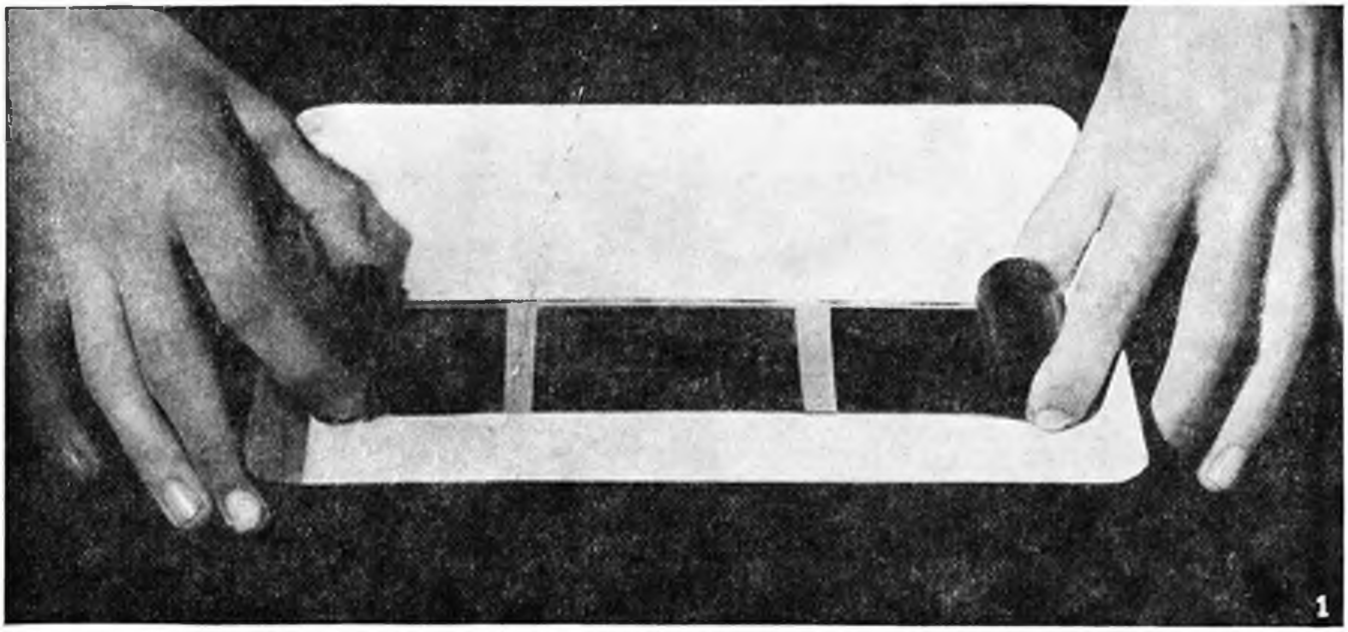
In this the fifth year of war, films are not easily obtained. When we do get them we use them carefully, try to make good sharp pictures on them and we certainly do not go about the job of taking photographs so carelessly as in pre-war days.

Then we send our film to the chemist, wait, often for quite a time, before it is returned. It is usually developed in a tank along with quite a lot of other films and contact (same size) prints are made from the negatives just as they are made from the negatives on all the other films. Some chemists give special development if asked, but not many nowadays. The point is, having gone to such trouble getting a film, having exposed it very carefully—spent a long time in setting up the camera—and knowing that the film is "rather special," with negative images only 1 in. in length, why not develop the film oneself? We can give it special treatment to help that very small image, can take extra special care over the development and then have the one or two selected negatives enlarged at any convenient time.

The readers who understand a little about photography may already do this. We are of the opinion that a fine grain developer is essential—one which does not call for over exposure, does not require special treatment and prolonged development and gives crisp and contrasty negatives. Every amateur photographer has his own pet developer, but let us assume that we are explaining the development of a roll film to those who have never undertaken the job before.

From your chemist purchase a small bottle of fine grain developer such as Johnson's (any well-known make will do) and a tin of acid fixing.

Do not bother about elaborate equipment, safelamps and so on. Carry out the whole operation in complete darkness. The kitchen will do nicely—late in the evening with the blinds drawn, but make sure the room really is dark. Mix the chemicals exactly as directed, use diluted and at the temperature specified on the bottle. Two dishes, size about 6 in. by 4 in., are needed. Pie dishes will do unless you prefer to purchase the correct ones. Place the dishes one either side of a bowl of clean water. Development time for fine grain developer is on an average about 15 minutes (instructions will be included with the chemicals), so arrange some system of warning when development is completed. In the absence of a luminous watch or clock, someone could knock on the door for you! Unroll the film, in darkness of course. It will soon be found that the film is attached to a length of backing paper which may be torn away. When the paper is detached, hold the film in the right hand. Wind off 3 or 4 in., immerse it in the developer, quickly slide the film through the developer and making into a roll in the left hand. Make sure the film is completely wetted and continue to roll it from left to right hand, as illustrated. When the development time is completed, rinse quickly in the bowl of water and carry out the same operation in the dish of acid fixing. After 5 minutes or so the light may be switched on. Continue fixing until the film loses all trace of its "milky" appearance. Leave it washing in the bowl under a running tap for a further 20 minutes, then pin up to dry.



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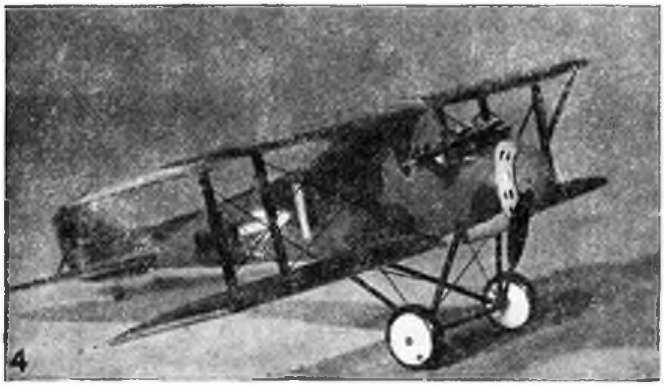
2

1. *Wind film from left to right hand and vice versa.*
2. *Contact print from negative "A". Camera too close to model.*
3. *With Camera at greater distance. Negative "B" has small image perfectly sharp.*
4. *Enlargement from negative "A" reveals tail and wing tips muzzy.*
5. *Negative "B" enlarges quite well.*

3



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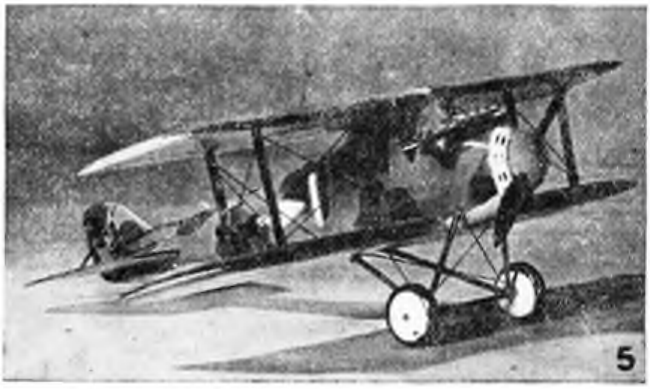

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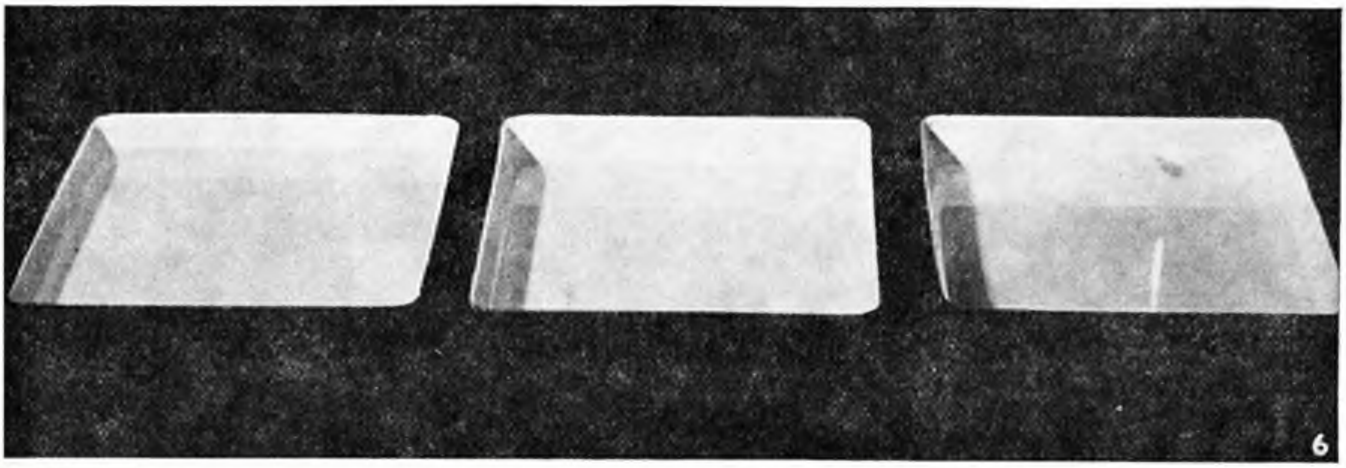

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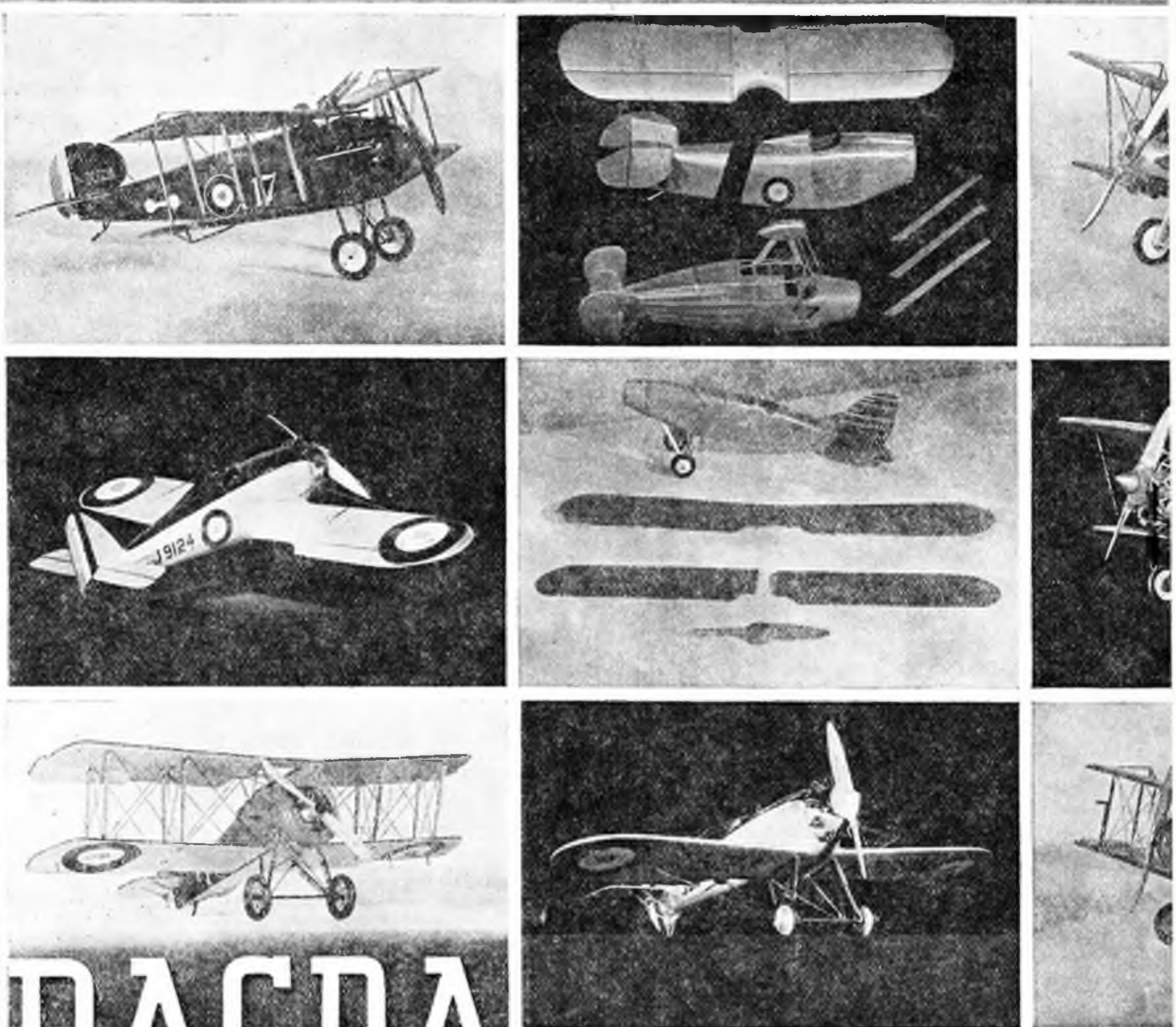

DAGRA ENGINEERING COMPA

Answers a Challenge! . . . .

In the article "Aeromodelling as an Industry," which appeared in the April *Aeromodeller*, it was said that models of the standard of those illustrated had yet to be seen in this country.

Such a sweeping statement cannot be allowed to pass unchallenged!

The Dagra Engineering technicians are confident that in workmanship, accuracy and finish their products fully equal the models made by the Doering Twins. To support their claim the Company publishes this advertisement which illustrates various models taken at random from its workshops.

Some of these models are part of an order for Westland Aircraft Ltd. Clients such as these demand a high standard of workmanship—a standard well within the capabilities of the Dagra Engineering Co., Ltd.

Here are a few of the details incorporated in the above models:—Aluminium cowlings accurately beaten to shape; wheels where specified are spoked and revolve; engines, built in detail from the manufacturers' blue prints; cockpits completely equipped, including lighting to il… all models are robustly constructed of metal an…

Established in 1935, this Firm of Precision Engi… of scientific scale models and is organised on … Manufacturing Concerns whose products it rep…

Where else would you find a Firm of model-… library, drawing office, photographic studio, … spraying plant, assembly and inspection depart…

Orders for models to any scale may now be p… on request. Prices range from £20-£40 accordi… work required.

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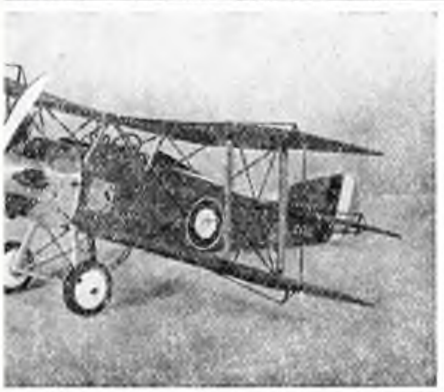

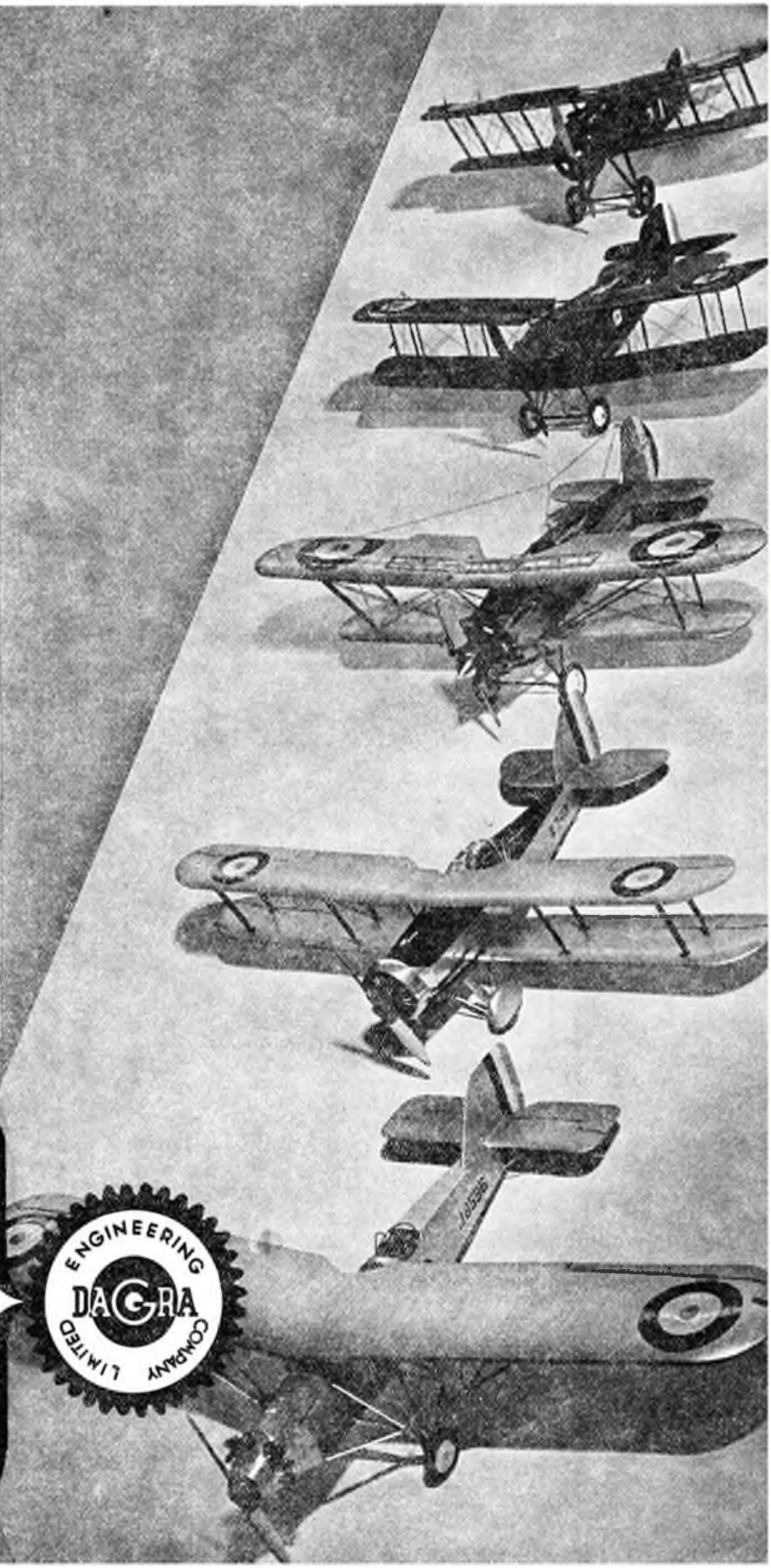

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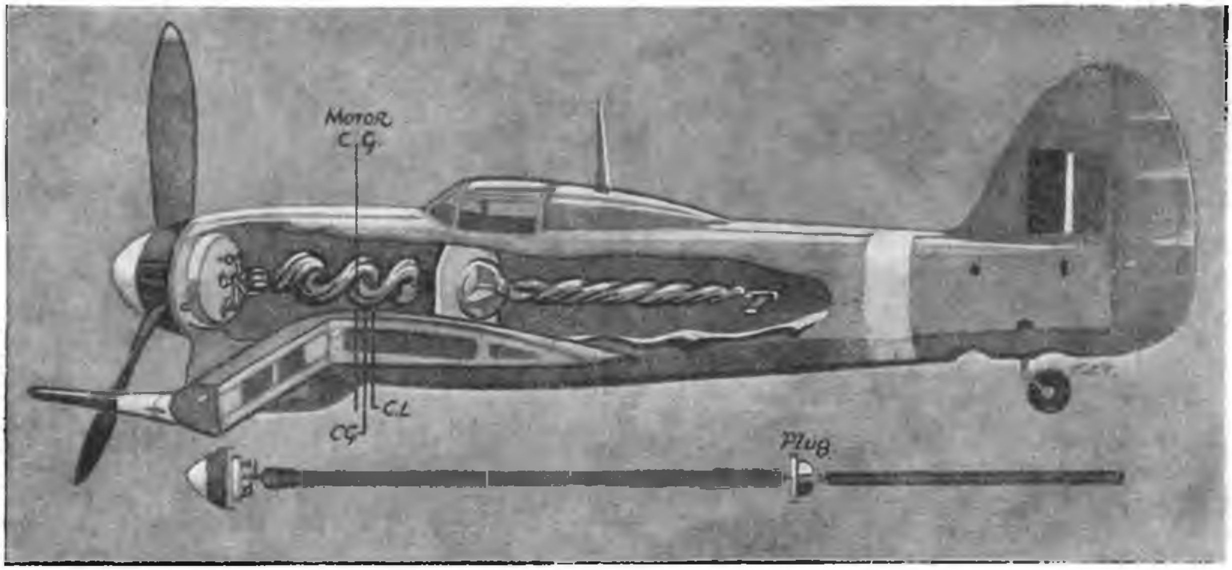
C.G. CONTROL BY THE MOTOR

BY C · RUPERT MOORE, A.R.C.A



THE greatest difficulty experienced in the average flying scale model is to install a motor of sufficient length and weight to give a reasonable duration, without putting the centre of gravity so far back that ballast has to be resorted to. The solution so far has been multi-skein motors of very short length, often little more than half the fuselage length, geared together, the gears acting as ballast earning its keep.

A short motor is essential in a flying scale model, as weight distributed over the total length makes it impossible for the small scale tail to control the model even when ballasted to the correct C.G.

The solution is to pack a long motor in a short space and keep the C.G. of the motor as far forward as possible in front of the usual mid-point, which is its natural position. This has been done by a simple device which I have christened the "Moore Diaphragm." The drawing shows it as installed in my Typhoon. A bulkhead is placed halfway (or thereabouts) between the front and rear rubber anchorages. Concentric with the rubber axis is a hole about $1\frac{1}{4}$ ins. diam., into which fits a "plug" which is tight push-fit. A lip round the front of the "plug" prevents it pulling through the hole.

Through the plug is a bush in which runs a shaft with any form of anchorage at either end. Three or more curved guides are cemented to the back of the plug to guide the plug into the hole. A mechanical rubber tensioner is fixed to the airscrew shaft.

A rubber motor whose length is from $2\frac{1}{2}$ to 4 times the length between the nose and tail anchorages is divided into two *unequal* skeins, the long portion being fixed in front of the plug and the short portion behind. The front portion at least should be "roped" to take up some of the slack. The "roping" method I use is to make up the skein of half the required number of strands and twice the required length, this is given from 50 to 200 turns according to length and the run true bobbin is put on to the exact centre of the skein. The bobbin is held so that it cannot turn and the skein is doubled and the ends locked together on the same hook. The bobbin is released when the skein twists itself into a rope. A strip of soft leather $\frac{3}{8}$ in. wide is passed through the skein end and stitched firmly to the eye on the plug shaft, or several loops of VERY SOFT string can be used in place of leather; when space allows run true bobbins can be used.

Where rubber clearance permits, especially with very long motors, the "pre-winding" should be done so that the skein is untwisted at the beginning of winding.

It is important that the openings in the ordinary bulkheads are big enough to allow the plug to pass, both for fitting and for stretch-winding the motor. When in place the motor handles exactly like an ordinary single skein. When the rubber is stretched the plug pulls out, stretching the rear skein, and when wound the tension reseats the plug. As the greater portion of the motor is kept in front of the diaphragm, which is about the mid-point between the front and rear anchorages, the C.G. is in front of the mid-point.

In practice it works very well, the central bearing damps down vibration and the "rope" plus mechanical tensioner takes care of the slack front skein.

The following is an example of the advantage: My Tiger Moth originally had a four-skein motor of 12 strands, 24 ins. long, between 18 ins. anchorage; 2 oz. of ballast (including gears) was necessary. Maximum turns 600.

The diaphragm and plug were fitted working between the same anchorages.

A single skein (in two parts) of 24 strands, 36 ins. long, takes 712 turns and no ballast is required. Add to this that the single skein has only two-thirds the rubber in it, hence two-thirds the weight, it will be seen that a saving of over 3 ozs. has gained 112 more turns. When fitted to the Wakefield models, far longer motors can be carried with less vibration, and at the same time the C.G. can be pushed forward, making smaller tail area possible.

Although I have applied for a Patent on this device I wish to make it clear that I have no desire to prevent any amateur making and fitting this, or the Moore Drive, to any model for his own use, and should any aeromodeller wish to publish a plan incorporating this device or the Moore Drive, permission will be granted readily (subject to the customary safeguards) on receipt of written application.

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,

I was extremely interested to read J. H. Maxwell's article "Aspect Ratio *versus* Reynold's No." in the April, 1944, issue of the AEROMODELLER, particularly as by using the same data (R. & M. 1Π7), he reaches similar conclusions to those published in the April, 1938, AEROMODELLER, in an article by myself entitled "Aspect Ratio."

There I developed a formula which indicated the optimum aspect ratio for model aircraft of varying speeds and sizes. I notice that the optimum value given by my formula is considerably higher than that given by Mr. Maxwell's graph, for the case he treats, viz., 200 sq. in. area at 20 f.p.s. This is probably due to the fact that my comparison was on a basis of constant C.L. of 0·4, as compared with Mr. Maxwell's implied value of about 0·76.

I shall be interested to read of any further developments on this subject, particularly with regard to the combined effect of aspect ratio and scale, on the most critical factor in duration models, namely, the value of C.L. 3/2/total C.D.

R. A. HARVEY, B.Sc.(Eng.).

Hants.

DEAR SIR,

I would like to respond to your invitation to comment on a letter from D. Brown of Kent and to tie up with it a few remarks on other matters.

Firstly, as I anticipate a flood of unkind remarks from some of the modellers, I must state that I am not a model builder. I have built a few scale solids and one or two proprietary brands of flying models, but that would not justify me in calling myself an "aeromodeller." My interest lies in the real aeroplane and in aeronautics generally, in an amateur capacity. That will explain quite a lot.

Unfortunately Mr. Brown seems to be basing his opinions on an assumption that model aeroplane design and construction in Germany is similar to that indulged in by a large majority in this country, "freak aircraft." In my opinion, there is no other word for some of the fantastic contraptions designed and built by the amateurs over here, and I agree with Mr. Brown that neither the aircraft industry nor the nation could possibly derive any benefit therefrom. How freakish these flimsy contraptions (I refuse to call them "model aircraft") are can be realised by a careful reading of N. K. Walker's letter. He says "if certain *qualities* such as *realism*, impressive appearance, *durability* and high wing loading were sacrificed a very high duration could be attained." (The italics are mine.) Now, what could our designers, such as Arthur Gouge, Sidney Camm, Ray Chadwick or J. Lloyd, learn from a thing like that! Let our modellers concentrate on experimenting with new ideas for improving the range, load carrying capacity and reliability of their models and the aircraft industry may one day sit up and take notice. In other words, let us have more model *aircraft*.

The point that is apparently realised in Germany but has been overlooked by Mr. Brown is that technical staffs in the aero industry have to concentrate to a very large extent on improvements of standard basic designs. Building a 'plane these days is a colossal undertaking and prototypes of new aircraft—even though they follow orthodox design—cost many more times to make than the saleable value of the final product. Therefore, it would not be an economical proposition for a firm to search hundreds of mares' nests in the hope of finding one golden egg. That is where the amateur scores. In his own workshop or kitchen he is not tied down to specific jigs, machinery and other production factors; he can while away his leisure on any idea he fancies. If he fails he has nevertheless had his pleasure in experimenting and no one is the loser: if he succeeds, providing his design is workable in a full-sized aircraft, then he, the aircraft industry and the country at large will benefit. That, I should imagine, is the main idea behind the competitions in Germany.

The aeromodellers in this country have suffered from some very harsh wartime restrictions, but is not that partially of their own making? Had they been able to show that they had been, and still were, contributing to the war effort by advancing and improving the design of *load carrying* aircraft through their experiments they would probably have been granted quite a lot of concessions. After all, one cannot blame the authorities for not wishing to waste essential materials such as balsa, rubber and petrol on the monstrosities which are apparently the aeromodelling fan's idea of perfection!

G. F. L. COTGROVE.

Gravesend.

[*Certainly a controversial letter! We invite the opinions of other readers, defining the "end" to which aeromodellers should strive. There will be people who will enquire "Why* **strive** *to any end? Is not the* **flying** *of the model—***any** *model—a sufficient 'end' in itself?" Maybe—but the better the* **design** *surely the better the* **flying**?—*Ed.*]

DEAR SIR,

Despite the number of published solutions to the universally difficult subject of downthrust and its application to rubber models, including the most recent one by Mr. Maxwell, there is still a considerable amount of argument as to which solution is the correct one.

The only real and complete solution to the problem of downthrust elimination as applied to rubber motor models is the "isolated case of the C.G. theory," mentioned (in passing) by Mr. Maxwell, who said: "The C.G. theory holds good only for the isolated case in which *the thrust line not only passes through the C.G., but also lies parallel to the direction of flight.*"

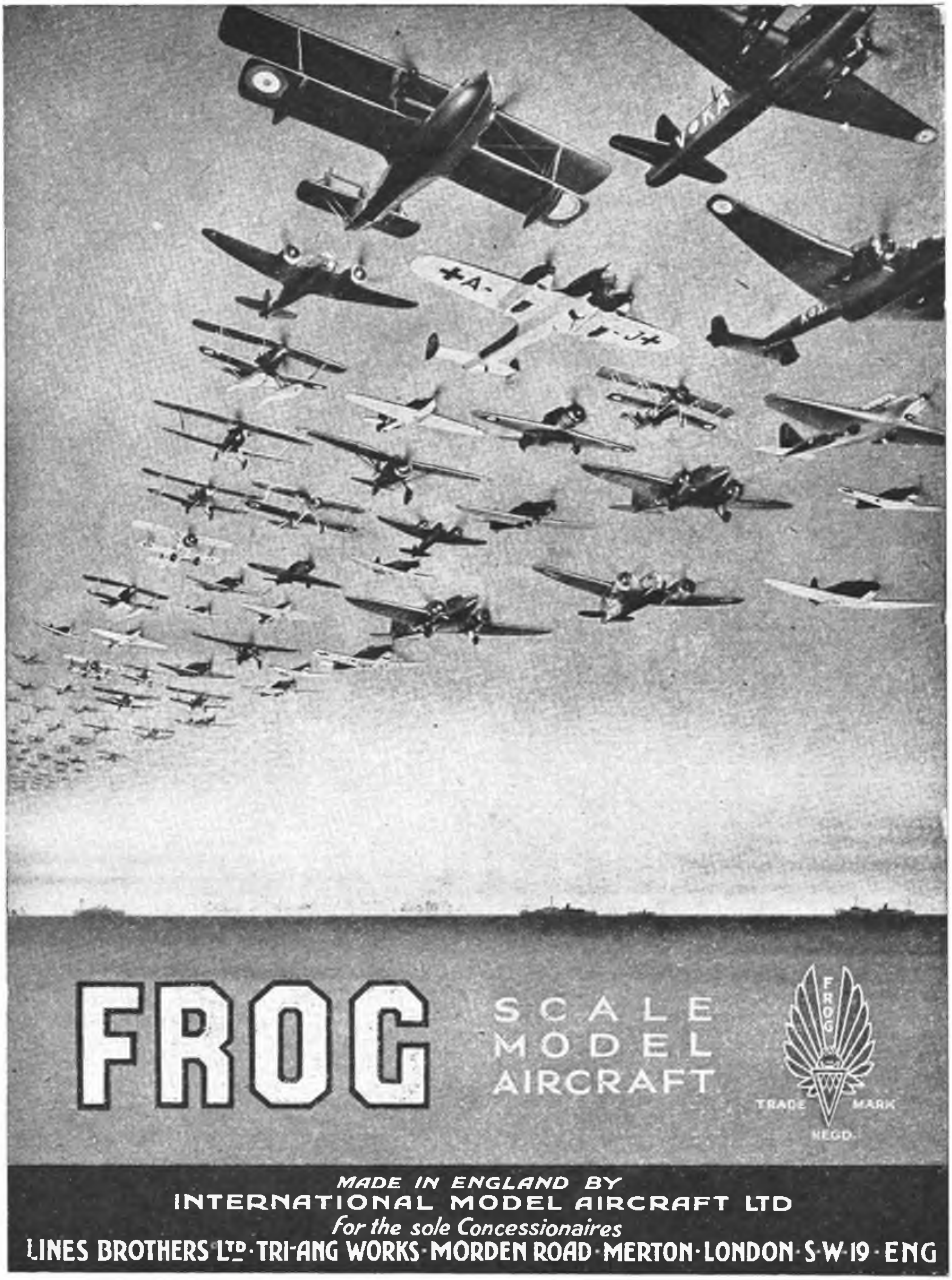
This is the only possible pure solution as far as a variable thrust machine is concerned, if the model is to climb (in equilibrium) at a wing incidence initially fixed by the designer or maker, which generally corresponds with the maximum rate of climb for a given thrust value. In other words, the model has to be designed in such a way that (1) there is no pitching couple applied to the machine whatever value the thrust may take; and (2) the model will climb at a maximum rate for a given thrust value.

The problem of design thus becomes: (1) to place the C.G. in such a position that the thrust line passes through it and is parallel to the fuselage datum; (2) to put the wing at the angle of incidence (relative to the datum) corresponding to the best L/D for the whole machine; also (not design) (3) to adjust the model by fore and aft shifting of the C.G. during gliding tests so that the flattest possible glide is attained.

I have no doubt that the supporters of the "Maxwell theory" will now try to wreck my argument by asking where the change of trim necessary to bring the model from overall L/D maximum to the altitude corresponding to minimum sinking speed is going to come from. The answer to this is again the only one possible, and it requires (4) the use of a folding propeller to regard problem (1) and its solution; it is necessary to estimate the weight and C.G. position of (*a*) fin, and (*d*) undercarriage during flight (whether fixed or retracted).

Assuming that the positions of (*c*) and (*d*) are fixed relative

continued on page 411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Reader's Letters—*continued from page* 409

to the datum of the fuselage it becomes necessary by a method of trial and error to find the position of the wings (allowing for dihedral) which puts the C.G. on the thrust line, which itself must be parallel to the designed datum.

Problem (2) is a theoretical problem which is adequately covered by standard textbooks on the market, and it should not be necessary for a repetition of it in this article.

Problem (3) needs no comment as it is one of the first lessons a modeller has to learn, and if he cannot do it then his chances of doing anything worth while are small.

Problem (4) has already been covered on both theoretical and practical sides by an article in a past AEROMODELLER by E. Watson about a year ago, and this also should need no repetition.

I hope that this letter will serve as a basic guide to downthrust elimination in model design, and also that the theorists will dissect it to try to find flaws, as, after all, a first-class argument often leads to better results, which surely is an aim worthy of achievement.

R. ANNENBERG.

Tottenham.

DEAR SIR,

In reply to the criticism in the April AEROMODELLER of jet propulsion suggestions which appeared in the February issue, may I say firstly, that I am surprised that only one contributor voiced his opinion, and, secondly, that I was not unaware of the criticisms he makes. It is my belief that he did not fully appreciate the aim of the proposals appearing in the February issue.

To answer Mr. Payne's points one by one, may I emphasise at the beginning, that my interest in jet propulsion is entirely confined to that sphere which involves me professionally, namely, the metallurgical considerations of the materials of construction. The whole trend of my article was a desire to introduce " something new," and then to hear the opinions of interested modellers, especially with regard to the materials.

The first unit, which according to Mr. Payne shows a " glaring fault," by having the engine before the compressor, was drawn thus for specific reasons, and with full knowledge of the resultant loss in efficiency. I do consider the difficulties of mounting the engine and its controls in the interior of the unit would be greater than the gain in efficiency, and do not agree that further heating by fuel injections would then be unnecessary. As for the design of the blower, I am fully aware of the snags involved, but have already solved them to my satisfaction, again, that happens to be my line of business, and surely one is justified in accepting a difficulty when a solution can be found. To conclude, I have now arranged the carburettor intake *behind* the compressor, still keeping the engine at the front, and drew a 2-cylinder engine with two jets, merely because I have access to one. Unlike my critic, I have no wish to dogmatise on the number of cylinders or jets to be used in a unit of this type, I merely suggest one possibility available to me.

With regard to the second unit, I have no knowledge of Whittle's propulsion plants, and understand from my engineer colleagues that the principle of this unit, my only guide, was established long before Whittle developed it. Agreed, the unit is complex, but the reasons for its complexity were stated in the script. I have recently acquired support for my original contention that cooling of the combustion chamber and turbine is very necessary. Some years ago, in using a simple thermal jet of rockets, cooled by an air stream, I built an annular air scoop into a monocoque fuselage, and found no structural weakness, but very efficient cooling of the structure in the vicinity of the jet. This was my main reason for drawing an air scoop of this character in the unit under discussion. With the assistance of a friend, I have already managed to evolve a method for construction of the complex air passages in Unit 2, with slight modifications of the original plan.

In dealing with the " two last grouses," the fuel injections were not drawn in detail, as the whole design was merely an indication of principles, the same applying to the amount of convergent-divergent restriction in the discharge nozzle. It should gratify my critic that in experimenting with fuel injectors, I too found the type he proposes to be the most efficient. In some recent experiments carried out for entirely different reasons, I had occasion to rig up a discharge nozzle one inch diameter at the outlet, using petroleum either as fuel, and a venturi injector. Air at two atmospheres pressure sent through the nozzle gave rise to a flame three feet in length. Subsequent tests with various injectors, combustion chambers, and nozzles, led to the conclusion that air cooling in Unit 2 is absolutely essential.

In conclusion, I accept the figures for relative efficiency of airscrew and jet, but do not find that any excuse for avoiding a new method of propulsion, if only experimentally. Mr. Payne, for one, prefers airscrews, whilst myself, for another, prefer to try anything once.

However, I thank Mr. Payne for his comments, and hope we have stimulated ideas among aeromodellers rather than distracted them.

C. R. TOTTLE.

DEAR SIR,

I'm very sorry to relate
The AM. hasn't come, to date,
And since the date is now mid-May
I've wondered much at the delay.
Perhaps they've cut your paper ration
Or treated you in such a fashion
That space has grown so very tight,
And " Rushy " cannot sleep at night
For headaches that his efforts brought
To make a pint pot hold a quart.

Or is it that, the ban now lifted,
The Staff has had the office shifted
To some remote and open space
Where many flights of ease and grace
May be indulged in, once again,
With every laid-up petrol 'plane,
While Mr. Russell, standing by,
Is gazing down with anguish'd eye
At crude wire-fashioned undercarts
And other undeveloped parts.
See Doctor Forster wander round,
To beat his head upon the ground,
Whene'er he sees they have inserted
An engine which is NOT inverted ?

Or has some tragedy occurred
Of which I haven't heard a word ?
Has Mr. Temple chanced to see
" Celestial Horseman " up a tree ?
Or Copland's Typhoon, " U " controlled,
Around him all the fishline rolled,
Until he's trussed up like a mummy,
Complete with corrugated tummy ?

Or, horrid thought, can it be true
That my subscription's overdue ?

ROBERT BURNS.

Kilmarnock.

[*Shades of Scotland's greatest bard! Some poer hae been gien to see oorsels as ithers see us!! Hoot awa wi ye, mon!!!—Ed.*]

Erratum

In Readers' Letters for the June issue we published a photograph of two petrol planes sent by G. W. W. Harris. The caption stated that one of these machines won the Sir John Shelley Cup meeting for 1934. This is an error, and we wish to point out that this machine came second in the meeting for that year.

RADIO CONTROL APPARATUS

BY J · A · I · REID

BEING extremely interested in model petrol 'planes and radio-controlled models, I have designed a control apparatus. In it there is only one motor, clockwork or elastic, for the whole control system, which effects a considerable saving in weight. It is controlled by an escapement mechanism " borrowed " from Mr. A. J. Cope, and described in the AEROMODELLER, December, 1942. There is a five to one reduction gear from the escapement to the main camshaft. On this shaft are three cams as shown, each one having an arm with a roller attached held tight on the cam by a spring. This spring must be strong enough to pull the roller into the dip in the cam against the air pressure on the rudder, etc. Also the motor must be strong enough to push the roller out with the external cam against the spring and the air pressure. The working would be as follows :—

The transmitter would be worked by a single push button, causing the set to transmit when it was pressed. The receiver would be of the super regenerative type causing the miniature relay to close on receiving a signal. On pressing the button the escapement shaft would rotate through half a revolution and make *one* of the cams operate one of the control arms. As soon as the signal ceased, by releasing pressure on the button, the escapement would make another half revolution back to its original position leaving all the arms in the neutral position.

Supposing the cams were in the position shown. On pressing the button cam B would come into operation and turn the rudder to the right. On releasing the button the cams would make another 1/10 revolution and leave all the arms in neutral.

The sequence of operations is thus :—

A. Rudder left.
B. Rudder right.
C. Elevator down (dive).
D. Elevator up (climb engine on, stall engine off).
E. Engine off.

The arm of the third cam would have to be connected to a dash pot in order to have a reasonable time lag before the ignition is cut.

The ideal adjustments would be :—

Normal level flight with engine on, gentle glide with engine off.

A and B left or right turns of any desired size.

C if dive at about an angle of 20.

D if steady climb with the engine off.

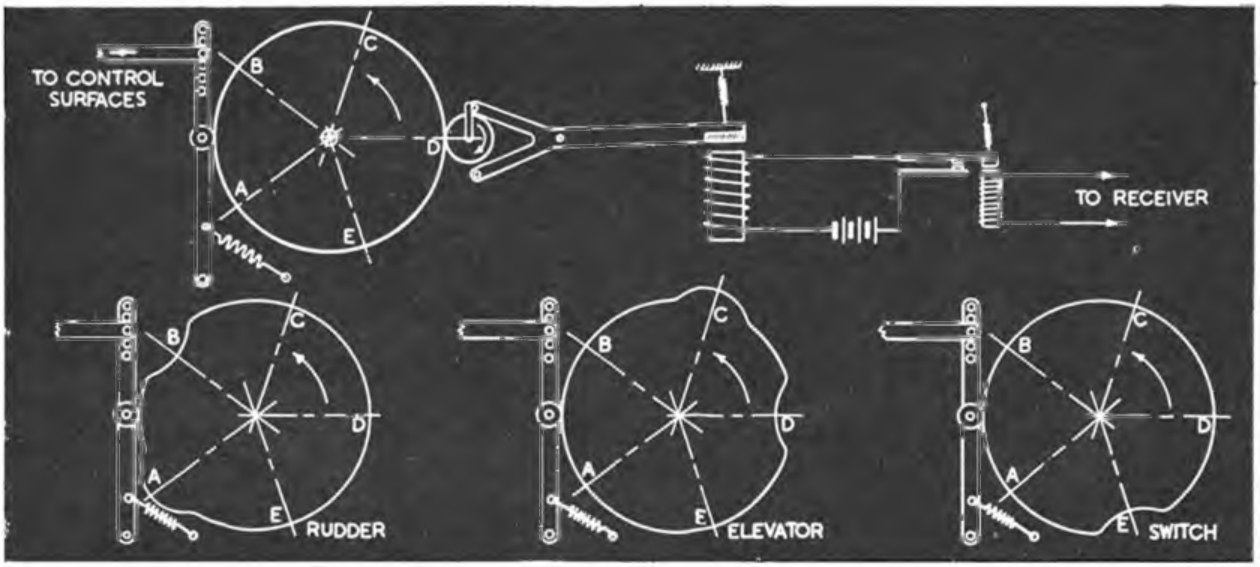
E engine off after about two seconds.

For taking off, the elevator would be down to start with, then level when the tail came off the ground, and when the 'plane had flying speed, up to make it climb.

For landing, the engine is switched off by E, a turn left (A) and a turn right (B) to bring it into a suitable position for landing. A dive (C) to bring it down quickly if necessary and when it is a few inches off the ground a stall (C) to put it down on three points (perhaps I I).

The disadvantages as far as I can see are that the set has to be kept transmitting the whole time the machine is not in level flight, e.g., climbing, turning, etc., and this may burn out the valves ; and the fact that if one wants, say elevators up from the position shown in the diagram the rudder has to move first. However, a touch on the button will move the cam B past the roller very quickly and the direction of flight will not be affected much.

The advantages are : first, extremely light weight, there being only one motor for the whole set of controls and no batteries other than the one for the relay ; secondly, simplicity of operation. One has only to press a button five times to complete a whole cycle and in that cycle every control is operated ; and thirdly, a minimum of delicate electrical contacts to be kept clean and adjusted. According to most engineering conventions it is the electrical system of a machine that is the least reliable and in this system it is confined to the wireless itself.



FLY WITH CARE

"The Aeromodeller," far-seeing in the development of the movement, and to protect and uphold the rights and good name of bona-fide aeromodellers, arranged the formation of the N.G.A. This Journal thus provided for its readers and the aeromodelling movement as a whole a service unparallelled throughout the world.

MANY modellers will be familiar with the words "*Vola cum cura*"—Fly with Care—the motto of the National Guild of Aeromodellists, membership of which entitles the modeller to insurance cover against third party and loss of model risks. The policy, underwritten by Lloyd's, ensures indemnity up to £5,000 on any one claim in the third party section, and up to £2 against the loss of any one model. Full details of the N.G.A. membership and premiums payable for the insurance are given elsewhere in this article. In the meantime a few notes on the history and purpose of insurance may prove instructive to readers.

As far back as the 13th century man realised the necessity for some form of insurance against unforeseen and unwanted occurrences. The first English insurance scheme was brought into existence early in the 17th century and covered shipping risks. The institute of Lloyd's originated in a coffee-house, kept by Edward Lloyd in the City of London in 1669. This coffee-house became the resort of business men who were willing to subscribe policies dealing with sea risks. The present-day corporation of Lloyd's does not subscribe policies, the risks being taken by individual members, each signing for a specified sum for which he is responsible.

A clear detail of the purpose of insurance is given by the "Encyclopædia Britannica": "Insurance is the practical device by which civilised man protects himself against the contingencies of life. He has for centuries realised the regularity with which the law of averages operates when great numbers are involved and has employed his knowledge to provide by insurance against the hazards to which the products of his enterprise and industry are at all times subject." The principle of insurance was admirably stated by a Select Committee of the House of Commons who, in reporting (in 1825) on the laws relating to friendly societies, said: "Whenever there is a contingency, the cheapest way of providing against it is by uniting with others, so that each man may subject himself to a small deprivation, in order that no man may be subjected to a great loss. He upon whom the contingency does not fall does not get his money back again, nor does he get for it any visible or tangible benefit; but he obtains security against ruin and consequent peace of mind. He upon whom the contingency does fall gets all that those whom fortune has exempted from it have lost in hard money, and is thus enabled to sustain an event which would otherwise overwhelm him."

Well, that just about describes insurance as it is to-day. The N.G.A. is a group scheme, that is, in plain language, one to which a large number of people contribute small premiums for the benefit of substantial cover. The aeromodeller, paying sixpence per annum premium, is covered against third party claims up to a maximum sum of £5,000. Thus if any "contingency" should occur, such as a model flying through a greenhouse or breaking a window, any claim arising from the mishap will be paid. The same applies in the case of injury caused to a person by a model aeroplane flown by a member of the N.G.A.

During the past year a further insurance has been made available to the modeller whereby he may insure his model against loss by flying out of sight. In this instance the modeller pays two shillings per model per annum. Cover is available up to £2 per claim. This should prove particularly attractive to modellers who, having spent considerable time and money in producing that "super duration machine," lose it on test flight in a thermal. They are at least in a position to write off the financial aspect of the loss.

The N.G.A. motto, *Vola cum cura*—Fly with Care—should be the personal consideration of all modellers. Careless and inconsiderate flying may cause damage, not only to persons and property, but to the very movement itself. With the coming of peace the hobby will develop beyond imagination. Already tremendous interest is being shown in the possibilities of radio-controlled power-driven models and jet propulsion as a form of motive power.

Accidents are bound to happen even in the best of circumstances. Persons may be injured and property damaged. A few "incidents" involving court cases, given unproportional and probably inaccurate publicity by the daily press, will inevitably result in some form of control being exercised over the whole movement. Thus will the majority suffer for the misdeeds of the few, as is always the case. The AEROMODELLER is of the firm opinion that every active modeller should join the N.G.A. Thus will the first step be taken for protection of the public and its property, by *aeromodellers themselves.* If, in the future, it can be made plain that the vast majority of modellers are insured against third party risks, unnecessary restrictive legislation may be avoided.

In this connection it is interesting to note that the newly formed Association of British Aeromodellers has affected a group insurance with the N.G.A. whereby all its members flying any type of model aircraft are automatically insured immediately on payment of their subscriptions.

Details of the N.G.A. membership and insurance are given herewith. Membership is renewable on the 1st of February each year. Renewal forms are available on application to the National Guild of Aeromodellists, Allen House, Newarke Street, Leicester, and are printed in the appropriate issue of the AEROMODELLER.

The membership fees are:—

Rubber-driven Model Aircraft, Gliders and Sailplanes ..	6d. per annum.
Petrol-driven Model Aircraft and Model Race Cars	2/6 per annum.

(The cover for Petrol-driven Models is temporarily discontinued pending classification of the position with the Air Ministry.)

N.G.A. transfers for attaching to models are available at two a 1d. (small) and 1d. each (large). These are of the "waterslide" type and should be soaked in lukewarm water for two or three minutes. The transfers then become loose and may be slid off (face upwards) on to the model and lightly pressed with a handkerchief or soft pad.

Labels for detailing the name and address of the owner are available for attaching to models insured under the loss by flying out of sight section.

MINIATURE ACCUMULATORS

$1\frac{1}{2}$ ounces in weight

BY P · E · NORMAN

IN the accumulator I am about to describe I have reduced the size and weight down to a limit for use on my own 30-in. span petrol model aircraft. The same method could be used, however, for making larger accumulators. I have, in fact, experimented myself with several sizes up to 4 ozs. in weight.

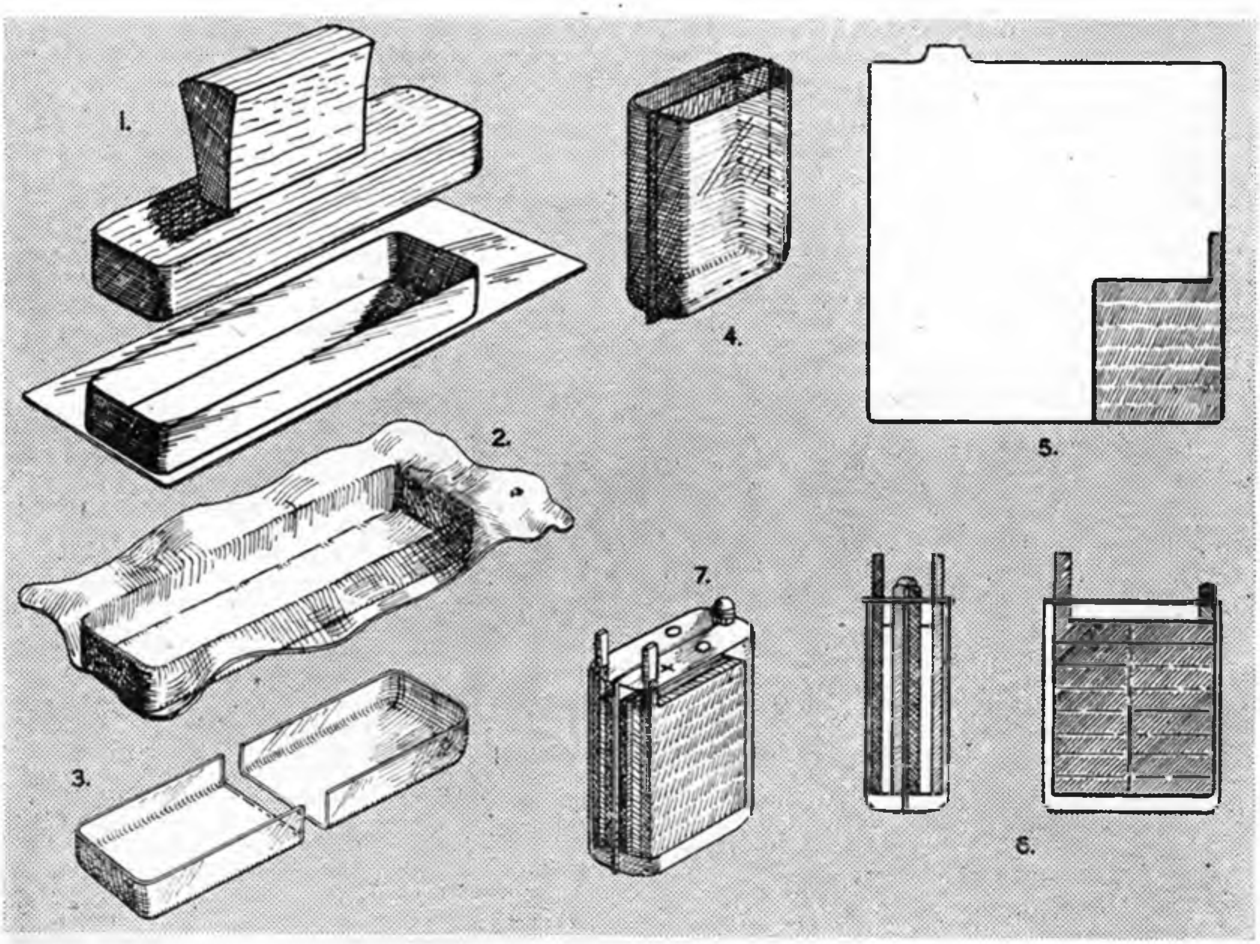
The Container. This is made of moulded sheet celluloid in the following manner :—

Obtain a Dunlop puncture outfit tin and remove the lid. Cut a piece of close-grained wood which will fit into the tin leaving about a $\frac{1}{32}$-in. space all round ; fasten a handle on to this piece of wood and shellac thoroughly, thus making a suitable wooden stamp.

These two pieces, the tin and the wooden stamp, form the outside and inside mould (see Fig. 1).

Next take some sheet celluloid (the type used for side-screens is ideal, being about $\frac{1}{32}$-in. thick) and cut several pieces which will overlap the sides of the tin by about $\frac{3}{4}$ in. all round. Put the tin into boiling water and gently drop the celluloid sheet over it—this will immediately soften in the boiling water. Then press the celluloid well into the tin by means of the wooden stamp. Remove the whole thing from the water and allow to cool. Afterwards remove outside and inside moulds and you will have a perfect pressing of celluloid (see Fig. 2). (It is as well to mass produce these accumulators by pressing half a dozen or so at a time.) Trim away the surplus celluloid at the edges until it is about $\frac{1}{4}$ in. to $\frac{3}{8}$ in. deep, then smooth off the surface on a sandpaper block, lastly cutting the pressing into equal halves (see Fig. 3).

Cut another piece of celluloid a little larger than the



two halves and with balsa wood cement or amyl acetate stick the two halves of celluloid on to this centre-piece exactly opposite one another, and allow to set. (See Fig. 4.) Trim off the surplus celluloid and you now have a container with two cells and a centre partition.

Test for leaks by filling with water.

The Plates. These are made from full-size accumulator plates cut down to a size suitable for fitting into the container. (Those used in aircraft containers about $\frac{1}{16}$-in. in thickness are admirable for this job.)

When cutting the plates down use a sharp razor blade and arrange one edge to form the outside edge of the plate, leaving about $\frac{3}{8}$ in. to $\frac{1}{2}$ in. projecting at one end to form the terminal. (See Fig. 5.)

Two positive and two negative plates will be needed, and care must be taken when cutting these plates that the paste does not drop out.

The spacers can be made from match-box wood or from the actual spacers of the full-sized accumulator.

Insert the plates, one negative and one positive in each cell, connecting the two by means of thin copper wire strengthened by a blob of solder.

Now cut another piece of celluloid to fit over the top with small openings for the projecting terminals. Cement this piece in position, spreading the cement well round the projecting lugs to prevent leakage. (See Fig. 6.)

When dry make two small holes in the top just large enough to insert a fountain pen filler.

There are two methods of overcoming acid spilling from these accumulators. Either mix some "jelly" with the acid to form an unspillable jellified substance (this "jelly" may be obtained at most wireless shops) or pack some glass wool into the top of the accumulator before the top is cemented on. This glass wool will then absorb any acid likely to spill.

In my own accumulators I next solder a short length of cotton-covered copper wire on to the projecting lugs, thus dispensing with any terminals or clips on the accumulator itself, where corrosion is likely to take place. It is essential that there should be no difficulty in fixing leads on to these tiny accumulators. (See Fig. 7.)

Top up the accumulator with acid sucked from the full-sized battery by means of a fountain pen filler, and charge with 6 volts from this battery, making sure that the two are connected positive to positive and negative to negative. A flash lamp bulb may be included in the circuit as a resistance, but I generally charge mine right across without much apparent harm to the small accumulator; also, if they have been mass-produced, the plates can easily be removed and new ones inserted after the container has been washed out.

When charged, I find these small accumulators will light a ·3 amp. flash lamp bulb for about half an hour, and they give excellent results with any standard coil.

As Dr. Forster suggests, it is advisable to put the small accumulator on charge just before each flight.

Larger sizes can be made according to individual requirements by selecting a larger tin for the mould.

THE RIGEL

BY H · LINER

PLAN OVERLEAF

THIS model is built to F.A.I. specifications, and gives an average flight of about two minutes from a 200-foot tow line.

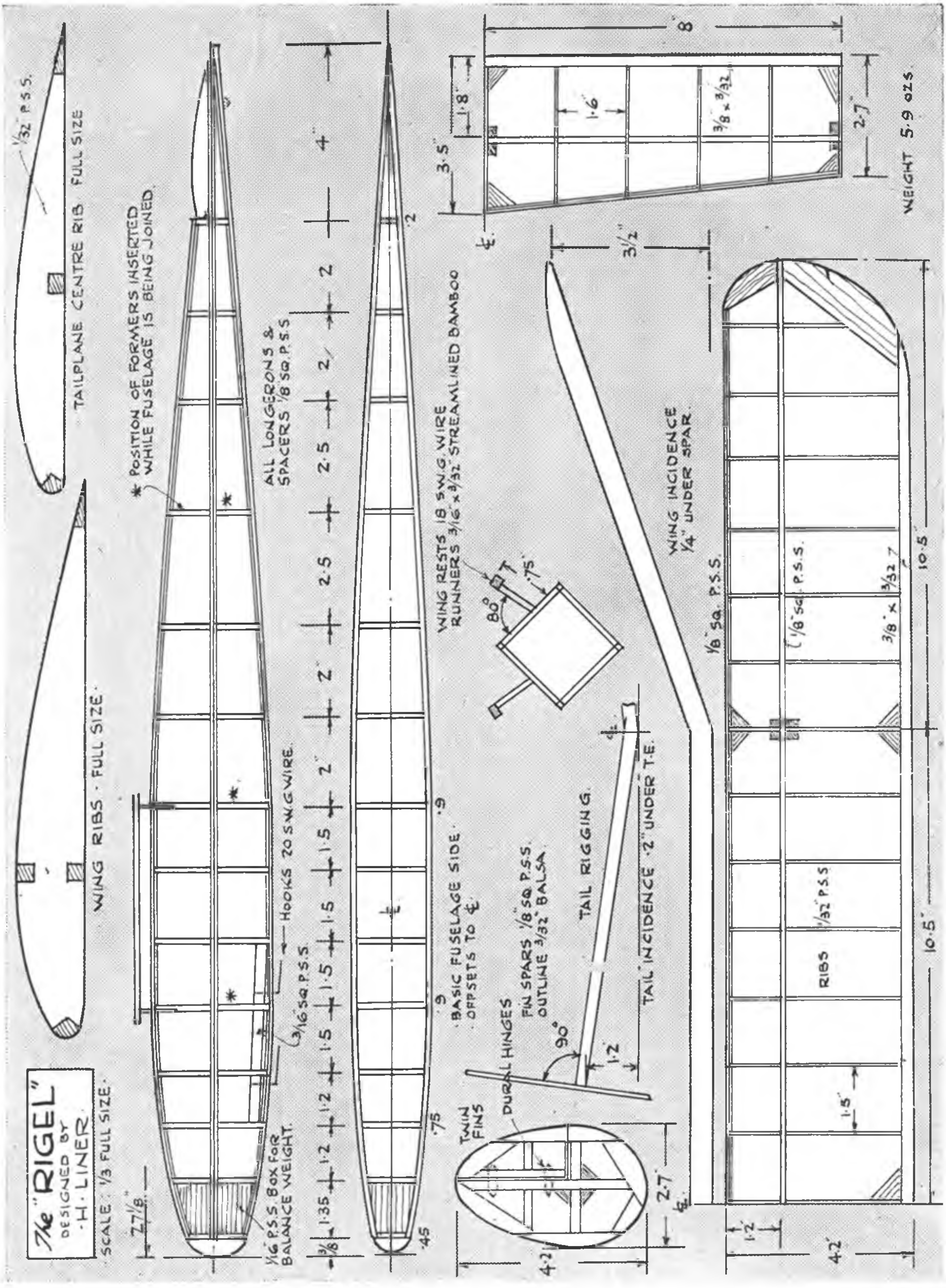
Fuselage. Like the rest of the model this is of easy construction, the trickiest part being the fitting of the launching hooks. These are bound to a piece of 3/16 in. ×3/16 in. P.S.S. which is cemented firmly to the fuselage, nicks being made in the bottom longeron to ensure that the hooks are central. The hooks and wing rests are made from 20 and 18 s.w.g. wire respectively. The fuselage is built from 1/8 in. × 1/8 in. P.S.S. and the sheet in the nose is 1/16 in. × 1/16 in. P.S.S. To ensure that the fuselage retains its original shape throughout its life, formers are cemented at the position shown on the plan. Wing runners are of 3/8 in. × 3/16 in. bamboo and the nose block is curved from a piece of hard balsa.

Wing. The wing employs Clark Y section which gives good results on a glider of this size. The ribs are cut from 1/32nd sheet P.S.S., the spars and L.E. are of 3/8 in. × 1/8 in. P.S.S. and the T.E. is of 3/32 in. × 3/8 in. P.S.S. or balsa. The top spar is not continued right to the tip but stops at the last rib. The tips are shaped from 3/32 in. balsa. The centre-section is built as a unit and the tips then cemented into position giving $3\frac{1}{2}$ in. polyhedral at the tip. Do not omit the gussets and other strengthening pieces at the wing join, or if the model experiences a heavy wing tip landing something will come loose. It is advisable to use P.S.S. for the wing spars, etc., even if balsa is available, because judging from experience balsa spars will not stand up to the rough treatment which a gliders' wings are subjected to in windy weather.

Tail Assembly. This is of rather uncommon design, but improves the stability of the model; no other arrangement gave as stable a flight as the tail shown here. The dihedral (1·2 in.) is put in by cracking the main spar, L.E. and T.E. after the tail has been built, and covering the cracks with cement and gussetting the leading and trailing edges. The end ribs on the tail are offset so that the fins form a sort of funnel thus giving a slight drogue effect, and making the model almost impossible to spin on the line. The fins are cemented to the tailplane after covering and are right angles to the tailplane, not vertical as is the usual procedure.

Covering. The original model was covered with Japanese tissue and given two coats of dope and one coat of banana oil on the wings and fuselage, and one coat of dope and one of banana oil on the tail assembly. The colour scheme of the original model was red fuselage, fins and wing tips and yellow main wing and tailplane. The underside of the fuselage as far back as the rear wing rest is double covered (cross-grained). This will save any amount of minor repairs which would have to be done if these panels were not double covered.

Flying. When flying the model, use only the front hook for catapulting for if catapulted from the rear hook, especially in any wind, the model will almost certainly loop or stall and crash. The winch can be used on either hook. I have found that during calm weather it is best to let the model fly off the line without any help from the wincher; if the wind is fairly strong the best method of release is the "back-pedal and tweak" as described by L. G. Temple in his article on glider launching. Adjust the model to fly in circles of about 150 feet in diameter, by moving both trim tabs on the right. This is about the smallest circle that can be obtained without spinning the model during the launch. Another method which I use to get a straight tow but a circling flight, is to trim the model to fly in the size of circle required, and then to winch the model slightly cross wind. This sounds dangerous, but after a little experience you soon get the knack of it, and the model will appear to crab on the line, and as soon as it is released will commence circling.



The "RIGEL"
DESIGNED BY
H. LINER
SCALE: 1/3 FULL SIZE.
WING RIBS · FULL SIZE.
TAILPLANE CENTRE RIB FULL SIZE
1/32" P.S.S.
* POSITION OF FORMERS INSERTED WHILE FUSELAGE IS BEING JOINED.
ALL LONGERONS & SPACERS 1/8" SQ. P.S.S.
HOOKS 20 S.W.G. WIRE.
3/16 SQ. P.S.S.
1/16 P.S.S. BOX FOR BALANCE WEIGHT.
BASIC FUSELAGE SIDE OFFSETS TO ℄
WING RESTS 18 S.W.G. WIRE RUNNERS 3/16" x 3/32" STREAMLINED BAMBOO
TWIN FINS
DURAL HINGES
FIN SPARS 1/8 SQ. P.S.S. OUTLINE 3/32" BALSA
TAIL RIGGING.
TAIL INCIDENCE ·2" UNDER T.E.
WING INCIDENCE 1/4" UNDER SPAR.
1/8" SQ. P.S.S.
1/8" SQ. P.S.S.
3/8" x 3/32"
RIBS 1/32" P.S.S.
3/8 x 3/32
WEIGHT 5.9 OZS

FUSELAGE CURVES from AEROFOIL OUTLINES

BY R · H · ANNENBERG

OWING to the considerable difficulty which many people experience in drawing out the outlines, especially at the rear end of fuselages of the longer types of gliders and powered models by the use of strips of birch, etc., bent to a reasonably smooth curve and then running a pencil around the outline, a method of plotting the outline in the same manner as aerofoil sections would seem to ease this difficulty.

The basis of the method is to modify the co-ordinates of the upper or lower surfaces of aerofoils as obtained from tables in standard publications of aerofoil data.

An important point to notice is that changes of curvature are rather more smooth if the outline is plotted instead of putting it in by eye.

The example illustrating the method is slightly more complex than would be met with for average models, but the modifications necessary are quite obvious after a little thought and the calculations involved are quite easy especially if a slide rule is available. The method is illustrated by a calculated set of co-ordinates for an 18 in. long circular section pod for a 6 ft. sailplane having a maximum of 4 in. at 6 in. from the nose, also a diagram of 2 in. at the rear end, which is the diameter of the boom at this point.

Four sets of tabulated calculations would be necessary if the fuselage is not symmetrical about the centre line. In the following example, however, only two tables are necessary as the pod is symmetrical.

A book of aerofoil sections (see Harborough publications) is then inspected and a section which suits requirements as regards shape is selected, i.e., in the example, the upper surface of Clark Y was chosen as it had a slightly reflexed trailing edge which is an aid to fairing the rear of the pod into the boom.

If a deep " belly " is required on the fuselage, the underside of a section such as R.A.F. 32 could be utilised up to the point of the position of maximum ordinate of undercamber.

The basic measurements are then laid out on the plan in the usual way.

With the lettering as indicated in Fig. 1, let Bd=a, BE=b, DE=c. One table is then drawn up for the curve from A to D corresponding with the curve on the aerofoil from the nose to the point of maximum camber and another table drawn up from the curve from D to F corresponding with the aerofoil curve from the point of maximum camber to the trailing edge. The datum lines for the modified curves are thus AB and EF while the fuselage datum is the line AC. Suppose the LE, maximum and TE ordinates given in the table are respectively x y and z, calculations are as follows:—

(1) Set down as shown the aerofoil stations given in the tables to as far back as the point of maximum camber. (2) Having decided upon the length of AB, the distance from the nose of each ordinate station is calculated by proportion, i.e., distance from nose $= \frac{\text{\% of chord at station}}{\text{\% at max. ordinate}} \times AB$. (3) The tabulated ordinate is then set down as given in the aerofoil section tables. (4) The relative ordinate is then obtained by subtracting the LE ordinate from the station ordinate when calculating for the curve AD (and the TE ordinate from the station ordinate when calculating for the curve DF). (5) The datum ordinate is then calculated by proportion from the known values of BD and DE respectively, i.e., datum ordinate at station $= \frac{\text{Relative Ordinate}}{\text{Max. Relative Ord.}} \times$ BD (or DE).

(6) The fuselage ordinate is the same as the datum ordinate for the curve from A to D, but for the curve from D to F the values of BE must be added to get the fuselage ordinate.

In the case of (say) a streamlined Wakefield, the value of BE will be zero and then the datum ordinate is the same as the fuselage ordinate for the whole length of the machine instead of for the front part only.

E.g. :—AB=6 in., BC=12 in., BD=2 in., DE=1 in.

% Aerofoil Chord ..	0·00	2·5	5·00	7·5	10·00	15·00	20·00	30·00
Distance from A (ins.) ..	0·00	0·5	1·00	1·5	2·00	3·00	4·00	6·00
Tabulated Ordinate ..	4·1	6·8	8·1	9·00	9·8	10·8	11·3	11·9
Relative Ordinate ..	0·00	2·7	4·00	4·9	5·7	6·7	7·2	7·8
Datum Ordinate ..	0·00	0·69	1·025	1·26	1·46	1·74	1·85	2·00
Fuselage Ordinate (ins.)	0·00	0·69	1·025	1·26	1·46	1·74	1·85	2·00

% Aerofoil Chord ..	30·00	40·00	50·00	60·00	70·00	80·00	90·00	95·00	100·00
Distance from A (ins.)	6·00	7·71	9·43	11·15	12·86	14·57	16·30	17·12	18·00
Tabulated Ordinate ..	11·9	11·45	10·5	9·1	7·55	5·6	3·7	2·85	2·1
Relative Ordinate ..	9·8	9·35	8·4	7·0	5·45	3·5	1·6	0·75	0·00
Datum Ordinate ..	1·00	0·95	0·83	0·69	0·54	0·34	0·16	0·075	0·00
Fuselage Ordinate ..	2·00	1·95	1·83	1·69	1·54	1·34	1·16	1·075	1·00

The pod shape can now be plotted in an exactly similar manner to the plotting of an aerofoil section and the points joined up by a birch strip in the usual manner.

The amount of tabulation can be reduced by omitting the 1st, 3rd and 6th rows and doing the respective subtractions and additions mentally if so desired, the check on one's calculating being whether the plotted prints lie on a smooth, continuous curve.

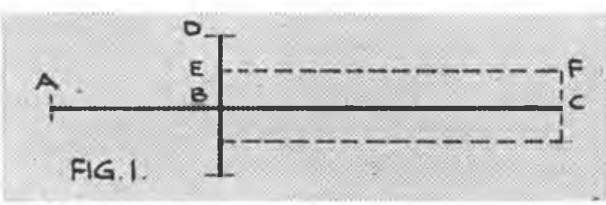


FIG. 1.

MONTHLY MEMORANDA BY O. G. THETFORD

Royal Canadian Air Force Official Photograph.

Spit. Four.

Until recently a " missing link " in the Spitfire family, the Mark IV has now been revealed as a photographic reconnaissance version, similar in most respects to the Mark V, but carrying no guns in the wings, probably so that extra petrol tanks can be fitted, as on the latest Beaufighter torpedo-fighter. Many Spitfire IV photographic machines are being used in the Mediterranean theatre, where they are fitted with tropical intakes. They are painted cerulean blue all over, this now being standard for high-level photo types and high-level fighters. A Spitfire IV bearing the single identification letter " X " aft of the fuselage roundel carried the serial number BR 416. It was previously stated in these columns that PRU types carried red and blue roundels on the fuselage, but of late the red, white and blue type (no outer yellow ring) has been substituted. Many photographic Mosquitoes have been observed with these markings. The roundel with the wide white ring (as used on all types prior to the summer of 1942) is used.

" Annie " as an " AT."

Several Avro Ansons, Mk. V, are understood to have been supplied to the U.S.A.A.F. for service as advanced crew trainers in the " AT " category under the American designation " AT-20." The Mk. V Anson is built in Canada for the Commonwealth training plan and is normally finished training yellow all over (the Mk. V is similar to the Mk. VI, illustrated above, but is not fitted with the dorsal turret). The AT-20 carries regulation white star insignia on the wings and fuselage and is finished silver in common with other U.S. advanced trainers such as the Bobcat and Wichita. The Anson is the second Canadian-built aeroplane to be given an American designation, the first being the Norseman.

British Mustang III.

The Mustang III with the Merlin motor and the four-blade airscrew is serving with the R.A.F. in addition to the U.S.A.A.F. (as the P-51B). The latest version has a bulged cockpit hood which slides backwards (as on the Spitfire and Hurricane) instead of opening sideways as on the Me 109. A British squadron with Mustang IIIs carries the code letters " QV." Some readers will recollect these markings on Spitfire IIs early in the war.

A still later version of the Mustang in service with the U.S.A.A.F. has a " bubble " type cockpit hood (as on latest Typhoon). One of these versions, painted dark olive green, carries the usual insignia and the serial number " 312102 " in yellow across the fin and rudder. The last three numbers " 102 " are repeated at either side of the motor cowling just aft of the airscrew.

A Gloster " twin."

One of the mysterious prototypes exhibited to politicians at Northolt aerodrome in May, 1939, is now known to be the Gloster F 9/37 twin-motor monoplane fighter, only two of which were built. Originally built as a two-seat fighter, it was later changed into a single-seater, which placed it in the same category as the Whirlwind. The first prototype L 7999 had two 1,050 h.p. Bristol Taurus TE/I radial motors and later two 900 h.p. Taurus IIIs. The second prototype was fitted with two Rolls-Royce Peregrines and was serially numbered L 8002.

L 7999 first flew on April 3, 1939, just after the Whirlwind and a month or two before the first Beaufighter. It carried the regulation fighter markings of the early 1939 period, which consisted of dark green and dark earth above and a curious combination of silver fuselage belly and undersurface of tail; white undersurface of starboard wing and motor and black undersurface of port wing and motor. The serial number L 7999 was painted in white beneath the port wing with the tops of the numbers towards the trailing edge and in black beneath the white wing with tops of numbers towards the leading edge. The serial number also appeared in black on the rear fuselage but not on the twin rudders. No roundels appeared beneath the wings and red and blue roundels were painted above the wings and on the fuselage. The Gloster F 9/37 is an interesting addition to the collection of prototypes suggested last month.

Footnote.

In answer to many enquiries from readers, aeroplanes of the U.S.A.A.F. in this country are operating both with and without camouflage at the time of writing. All-silver machines carry identification stripes and letters in black or dark blue. Camouflaged bombers carry code letters in bluish-grey; camouflaged fighters in white. National insignia is painted beneath both wings of fighters and beneath the starboard wing of bombers. Both categories have the national insignia above the port wing only and on the fuselage. P-47 fighters have been seen with red cowlings, green cowlings and white cowlings. Some P-47s have the rudder painted the same colour as the cowling, or another colour (i.e. yellow).

"PHOTONEWS"

The Consolidated B-24J Liberator, with four 1,200 h.p. turbo-supercharged Pratt and Whitney Twin-Wasp motors.
(Photo: Consolidated Vultee Aircraft Corpn.)

The Beech AT-10 Wichita transitional trainer. The motors are 275 h.p. Lycomings. *(Beechcraft photo.)*

A Wright Duplex-Cyclone is installed in a Lockheed C 69 Constellation. A complete change of power-egg can be effected in 27½ minutes. *(Lockheed photo.)*

Above is the Spitfire VIII, which appears to be a tropical version of the Mk. IX. *(Photo: Chas. E. Brown.)*

The latest version of the Bell P 39 Airacobra is armed with a 37 mm. cannon firing through the spinner, two ·5 machine-guns in the motor cowling and a 20 mm. cannon below each wing. *(Photo: Bell Aircraft Corpn.)*

The Douglas P 70 Havoc night-fighter has four 20 mm. cannon in the nose. *(Photo: Douglas Aircraft Co.)*

The P-51B Mustang with Packard-Merlin motor known in the R.A.F. as the Mustang III. *(Photo: North American Aviation.)*

AEROPLANES DESCRIBED—XIII
THE FAIREY BARRACUDA

BY H · J COOPER

NEXT MONTH : The Bristol Beaufighter X

ALTHOUGH the existence of the Barracuda three-seat torpedo-bomber and mine-carrying aircraft was made public many months ago, an atmosphere of confused secrecy surrounded it until April last, when a formation of Barracudas, protected by Seafires, Corsairs and Wildcats, made an attack on the German battleship *Tirpitz* in Alten Fjord. C. Rupert Moore depicts this scene on the front cover, showing two Barracuda's commencing their attack with medium bombs. After much debating in Parliament concerning its merits or otherwise, the Barracuda is now vindicated so far as the British public is concerned.

Considering that it is a descendant of such nice-looking aircraft as the Fleetwing, Fox, P.4/34, and others, the appearance of the Barracuda comes rather as a shock. Not by any standards can it be called good-looking, but in an analysis of all naval torpedo-bombers can one be found which has pleasing lines ? Take, for example, the Grumman Avenger or the Heinkel He 115 ! Structural requirements dictate a whole host of awkward features for the designer to incorporate, and after the Navy has loaded it up with its special equipment there are bound to be excrescences undesirable aerodynamically but necessary for war-power.

The most unusual feature of the Barracuda is the Youngman flap fitted under the trailing-edge, which enables it to be used for dive-bombing. The high-set tailplane, *à la* Whirlwind, is also unorthodox.

The Barracuda is of all-metal construction, with fabric covering over the movable control surfaces. A Merlin XXXII twelve-cylinder liquid-cooled motor is fitted, and it drives a four-bladed Rotol airscrew.

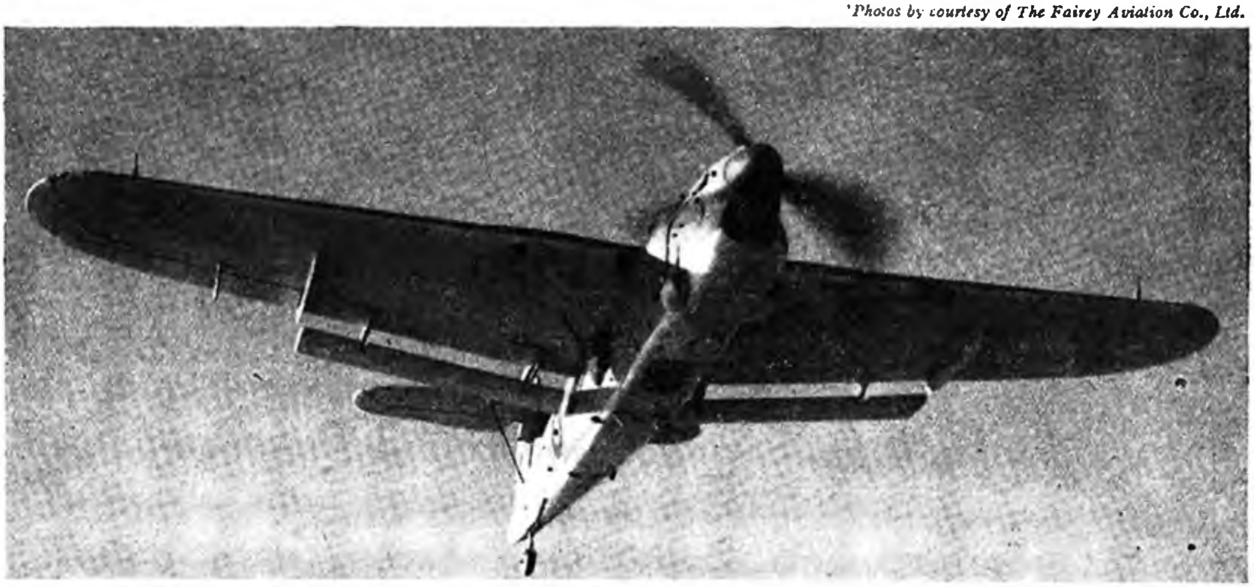
The undercarriage of the Barracuda retracts into the wing and fuselage, and the fact that it completely disappears is a high tribute to the designers, who were faced with the problem of putting away two heavy legs attached to a high wing. The tail-wheel does not retract.

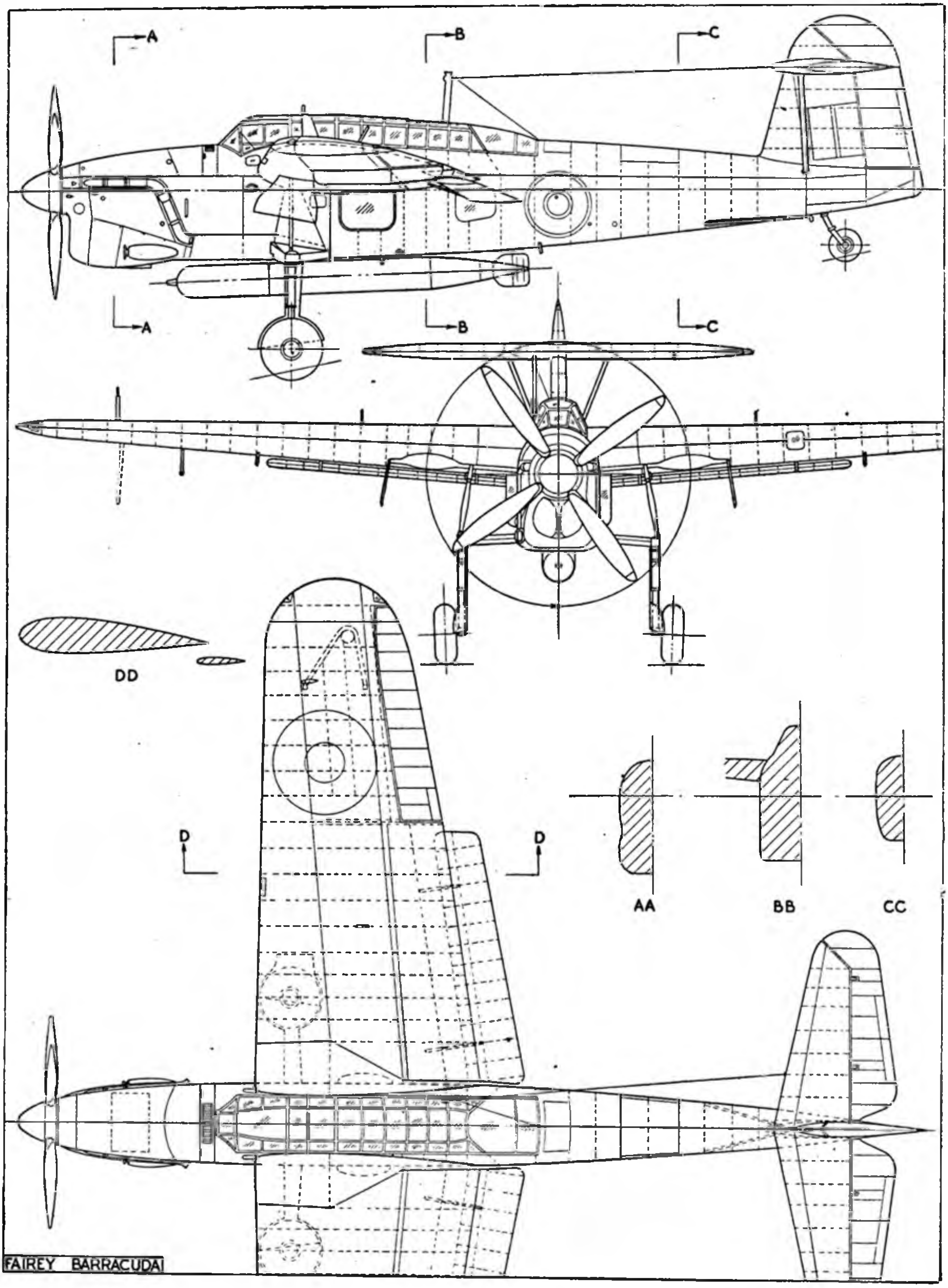
For handling on the ground or carrier deck a retractable V-shaped member is fitted below each wing-tip, and the usual deck-landing hook is fitted below the fuselage.

The Barracuda can carry an 18-in. torpedo, a mine, or bomb load externally.

No performance figures or dimensions of the Barracuda are available for publication.

Photos by courtesy of The Fairey Aviation Co., Ltd.

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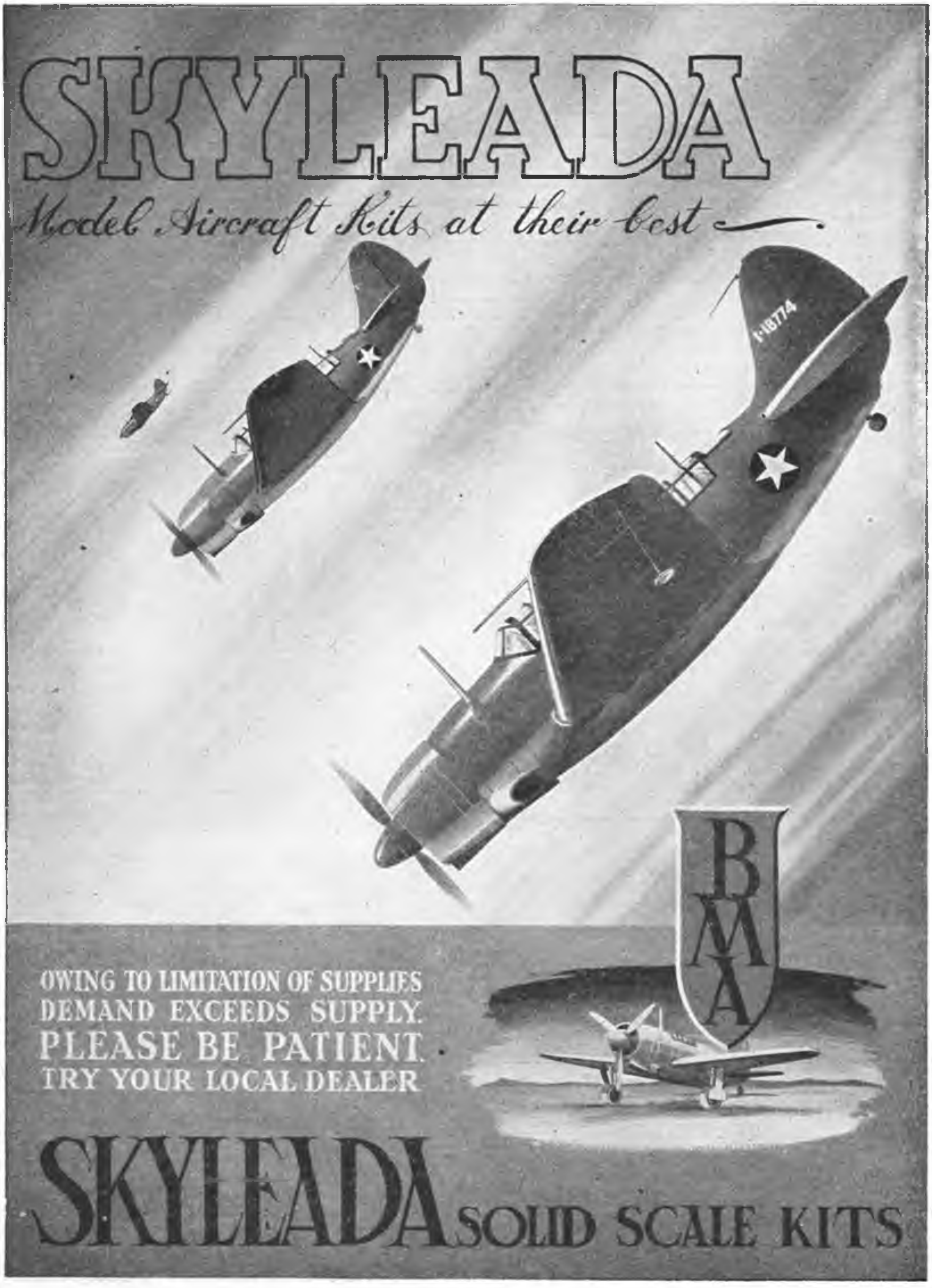
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Club News

BY CLUBMAN

L. G. Temple's S.M.A.E. No. 2 Contest Winner. With a magnificent finish and a wealth of detail this model fully deserves the honours bestowed upon it. It was photographed by Dr. E. C. W. Smith at a display of models organised by the Brentwood School M.A.C.

THE big news this month is the partial lifting of the ban on petrol model flying, and I certainly welcome this " thin edge of the wedge " for the final lifting of restrictions on our hobby. After somewhat protracted representations from the S.M.A.E., the Air Ministry have given certain concessions, and it is now permissible to fly petrol models and sailplanes with a wing span not exceeding 10 ft. in certain parts of the country. Unfortunately, it is not yet possible to lift the ban in certain Southern restricted areas, which I suppose is understandable under present conditions, but hope for a speedy removal of this remaining restriction. Details of the latest concessions are given in the official S.M.A.E. report.

I only hope that all interested in the flying of such models will keep in mind the very real necessity for observing the utmost caution in seeing that no rules are disregarded, otherwise it will mean a re-imposition of regulations at short notice, and everyone will suffer. So—as the N.G.A. has it—*Vola Cum Cura*—in other words, Fly with Care.

The MERSEYSIDE M.A.S. had rather poor weather for the Gamage Cup event, but somewhat better conditions in the Weston Cup. I. S. Cameron made best time for the club, flying his " Wirral Wanderer " for a total of 3:24·3, R. F. L. Gosling following with 3:20·4. With such a veteran as Gosling, it is no wonder that the glider event (Weston Cup) saw a better showing, and said " old timer " put up an aggregate time of 11:13·2. His model " Judy " was lost after an eyestrain of 10:51 o.o.s. R. Young flew an " Elite No. 1 " for over 7 minutes on his first flight and aggregated 8:47·5, while Cameron totalled 6:02·9 with his " Tarpon," his best flight being 3:32. Nice times in any language !

The NEWTON ABBOT M.A.C. is still progressing, and entries are being made in National competitions this year. L. Webber totalled 3:09 with his " Macclesfield Marvel " in the Gamage event. J. Wilde is the indoor flying champ., holding records of 59·6 secs. r.t.p., r.o.g., and 61·4 secs. r.t.p. h.l. R. Wilkey holds glider records of 51·4 secs. h.l. and 3:15 o.o.s. with a winch-launched " Aegeous."

A " Salute the Soldier " exhibition was staged by the RIPON M.F.C., when over 90 models were on show. This followed a contest on the club flying field, when fine but windy weather produced quite a few thermals. Results were :—

Duration.	W. S. Elliott	1:06
Small Gliders.	D. Dale	5:15 o.o.s.
	G. Vandervelde	0:40
Large Gliders.	J. Vandervelde	1:46
	M. D. A. Heilde	1:01

B. Kell of the MIDDLESBROUGH M.A.S. broke the club record with his " Ajax " glider with a time of 5:25 o.o.s., the model being returned from over two miles away. High winds have spoilt the club entries in National competitions, but a steady entry is piling up points for the Plugge Cup.

Club records have been broken in the AGRICOLA M.A.C. in recent weeks, J. Cantwill raising the official H.L. figure to 6:43·4, and Mr. Mills flying his glider for 1:19·9 o.o.s. Very high winds have played havoc

" Friend and Foe," Typhoon and Fw. 190 models by L'Bdr. R. Coleman. Both models would be greatly improved by transparent cockpit covers.

An interesting semi-scale model of a German intermediate sailplane. This machine, weight 8 ozs., span 50 ins., has obliged its builder R. Anthony with 5 mins. o.o.s.

with competitions, especially on Gamage and Weston Cup days.

The " Clyde Model Dockyard Trophy," organised by the GLASGOW M.A.C., will be a centralised event this year, and will be held at Kirkhill on September 10th. As usual, the event will be for Wakefield type models, and prospective entrants may obtain entry forms from Mr. G. Leask, 2, Whitefield Terrace, Kirkhill, Cambuslang.

After a very successful winter session, the GLASGOW M.A.C. pole flying championships resulted in a number of records being broken, G. Leask now holding the figure of 2:10, as against the previous figure of 1:53. This chap also holds the r.t.p. scale record, his " Puss Moth " flying for 36·3 secs.

Efforts by the LEICESTER M.A.C. in the Gamage Cup affair were spoilt by rubber trouble, while Weston day brought a nice half-gale! On May 7th F. W. Davies obtained a flight of approximately two hours with a sailplane of his own design, but unfortunately no official timekeeper was available. (What, again! The number of times this sort of thing happens.) J. Marsh broke the club record on the same day with a flight of 13 minutes, the model being a lightweight jointly-designed by himself and G. Dunmore.

The BLACKHEATH M.F.C. have been quite active lately, the newly-formed Sidcup section staging a well-attended exhibition in aid of the R.A.F. Benevolent Fund. Over 80 models of all types were on display, and a number of new members swelled the numbers of this section to over the 40 mark. Gamage Cup day saw the commencement of the club flying season, though one or two hardy wallahs have been seen occasionally at Epsom during the winter months. Messrs. Warring, Galbreath and Marney caught strong thermals, and lost their models, the two former being returned the same day. Mr. Marney also lost his glider with a flight of 5:40, but this was returned later.

A new junior member, B. Thomas, has raised the club junior record from 1:33 to 5:35 with the first model he has built. Nice going, son, and encouragement for the future. A new flying field at Kidbrooke is in use, and S. Barnes, flying a " King Falcon " sailplane, has set up a new winch launch record of 9:27, using a 200 foot line. Another member to go in for long distance flying is R. Atley, who lost a " Beauglider " which finally decided to come down at Sydenham. If this sort of thing goes on, we shall soon see the Blackheath boys flying their models to Epsom instead of carrying them there!

In spite of the high wind, some good times were put up by the nine club entries in the Weston Cup, R. Galbreath losing his glider with a time of 3:06·1. This chap has been doing great things with a canard (tail-first to you ignoramuses!) type model, and an attempt is to be made on the British record for this classification at the earliest possible date.

The newly-formed RUGBY M.A.S. has been fortunate in obtaining the use of a 53-acre field for flying activities. Gliding is the main interest under present conditions, and Mr. Judson has evidently decided that wing panels require very definite fixing; his method being to use dowels of $\frac{1}{8}$-in. diameter *mild steel*. These rods are bent to give the required dihedral to the wings, and no amount of criticism or sarcasm seems to shake his faith in the extra strong but weighty arrangement.

D. Cookson, of the WHITEFIELD Y.M.M.A.C. broke the club towline glider record when flying in the Weston Cup with a time of 5:30 o.o.s. Other club records are :—

Duration.	J. Lloyd	5:05
Glider H.L.	C. Hargreaves	39 secs.
R.T.P.	D. Cookson	53 secs.

The PETERBOROUGH M.A.C. is being re-organised, and those interested should get in touch with the secretary, B. Lawson, 195, Alexandra Road, New England, Peterborough.

The AYLESTONE M.F.C. club record was broken no less than five times in the Gamage Cup effort, A. Law holding the final figure at 4:35·2. Previous to the Weston Cup flyaways were recorded by P. Matthews with 10:30, P. Jones 12:48·5, and A. Griffin 11:36·2. The latter stand as new records. Flights in the Weston Cup were postponed until the evening on account of the strong winds, but excellent times were put up. The first three members (all flying " Mick Farthing Lightweights") were F. Ivory 7:17, P. Jones 6:13·9, and D. Bourne 4:51·8.

The fourth Annual Rally of the WEST YORKSHIRE M.A.S. will be held on Sunday, August 21st, at Howley Hall, Batley, commencing at 2 p.m. The usual duration and glider events will be held.

The TORQUAY & D.M.A.C. held a glider match with the Newton club, the Torquay lads winning by nearly 200 points. J. Higgins put up the best total of 3:39, the best Newton time being by J. Wilde with 2:05·7. B. Crute holds the club glider record with a time of 4:46 o.o.s.

SURBITON & D.M.A.C. report perfect weather for the Gamage Cup, but no spectacular times. Testing before the Weston, however, produced its crop of unwanted thermals, and two planes were lost. K. Mee's model went o.o.s. after 6:10, and D. Butler's followed suit with 2:40. On Weston day the club turned up in force at Epsom Downs with hopes of beating the wind. Serious flying had to be postponed until after lunch, when reasonable times were put up considering the weather. At about 5 p.m. Butler's "Vagabond" decided to vanish again, and did so with a time of 36:19·2, the machine being lost. (A new system of club records is now being introduced in order not to discourage other members!)

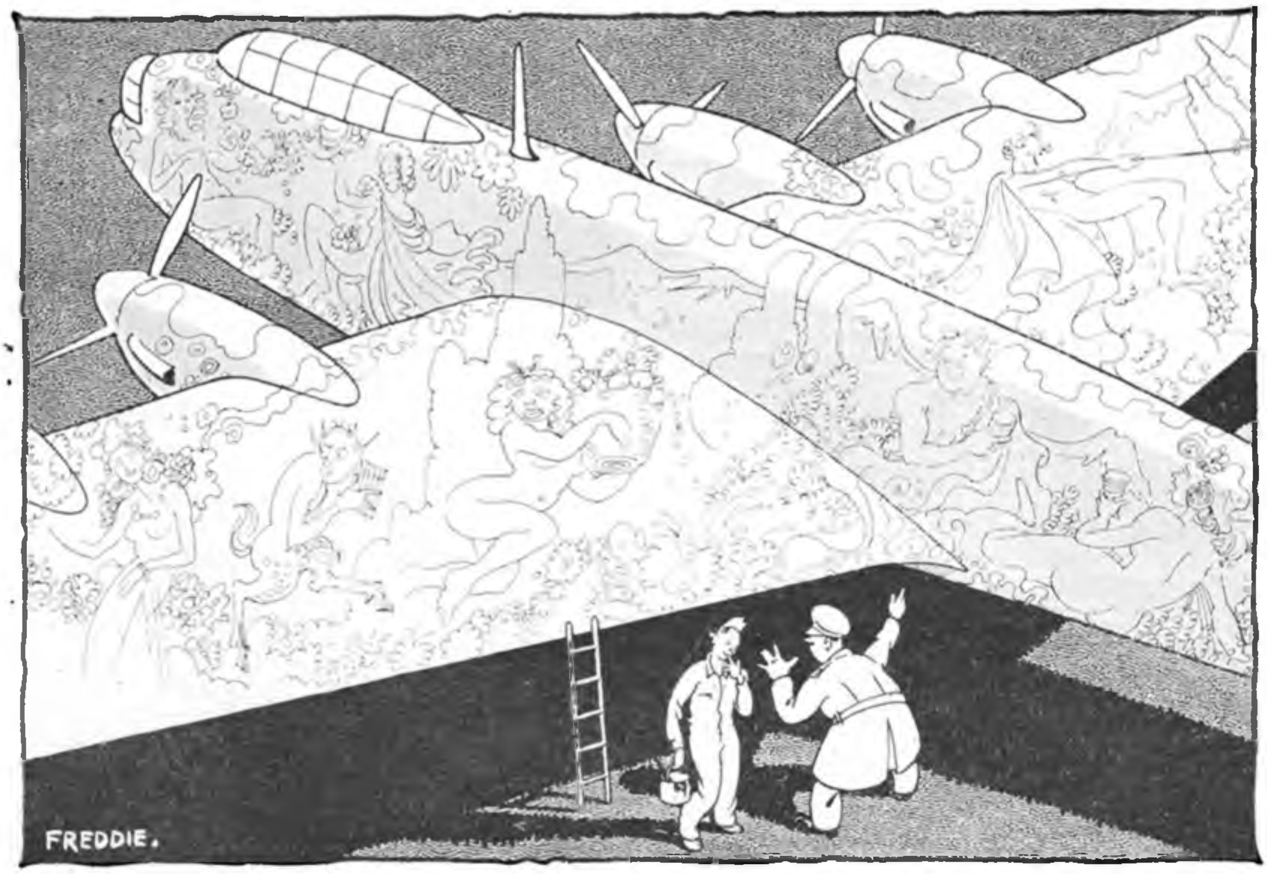
Not quite so spectacular was S. Ellis's flight of 6:59, which broke the record for the LANCASTER & MORECAMBE M.A.C., but it was sufficient to win a glider contest with a single flight, runner-up being J. P. Swindlehurst, who totalled 2:12·5.

LEEDS M.F.C. report fine but windy weather for the Weston, with a healthy crop of thermals that took five models o.o.s. during the day. Best flight of the day was by C. Furse's "Thermic 50," which went o.o.s. on its second flight in the comp. after 5:47·5, setting up a new club record for the class. (This model had only been test flown the day before the event!) H. Tubb's model cleared off on a test flight before the comp. and was returned from ten miles away. Vauvelle lost a brand-new "Ivory Gull" on his third flight after 1:30—it had taken him fifteen months of very limited spare time to build, and was only completed the night before the comp. Others to lose models were B. Crocker on his second comp. flight, and P. Holt, who went one better and did the trick first time. Must be gremlins.

The PENN M.A.C. have been putting up good times with gliders, a meeting on May 7th producing flights of 7:45 o.o.s. for P. Fisher, 4:05 for G. Caddick, and a new tailless glider record of 1:37 tow launch. This latter model, built by S. A. Ward, also put up a time of 2:13·5 from a winch launch.

R. Gallagher, of the BRADFORD M.A.C., has started the season well by putting up best times in his club entries for the two National comps. to date. His times were (Gamage) 2:05, and (Weston) 2:37·1, also obtaining best time of the day in the latter event with a H.L. flight of 1:33 in almost a gale.

The junior members of the BIRMINGHAM M.A.C. seem to be putting it across the seniors lately, F. Chatwin having raised the club lightweight record to 9:43 r.o.g., while the biplane record "went for a Burton" twice in a fortnight, first by Chatwin (2:37) and finally by D. W. Harrison (5:08). Looks healthy for the K. & M.A.A. Cup. Weston Cup dawned cold and windy, but the Brummagem lads put their fighting boots on, and didn't do so bad. J. Craven put up best time with a total of 11:40·4 for two flights, his second flight being a new club record of 10:45. The club have been approached by the "Brighter Birmingham Committee" to stage an "Open Day" to which the general public will be admitted. This will take place on Flight Cup Day, and all



"I'M SORRY, SIR, I GOT CARRIED AWAY."

are invited for a full programme of events commencing at noon.

The NORTHERN HEIGHTS M.F.C. held their first meeting on their new field on Gamage day, and while most of the members were giving their models the first outing of the season, times were quite respectable. Best flights of the day were: 6:51·5 by F./Lt. Watson, 5:58·5 by Mr. Mead, 5:34·2 by J. Davall, and 5:15 by F. E. Wilson. Top aggregates were put up by A. S. Cox (9:48·4), F./Lt. Watson (8:47), and F. E. Wilson (8:13·8). As more than three-quarters of the N.H. members who competed totalled over six minutes, and the total flying time recorded was over 1 hour 8 mins., they feel quite happy about their first outing

The old Derby M.A.C. has been re-named the DERBY MODEL AERO ENGINEERS. Any modeller wishing to join is asked to get in touch with the Hon. Secretary, J. C. Merriman, 220, Normanton Road, Derby.

The WORCESTER M.A.C. have just completed their winter indoor programme, and made a start on outdoor activities with a glider meeting, A. H. Viles placing first with a total of 5:07, followed by J. McGill with 3:39. The latter chap put up best time in the rubber driven contest, most efforts being spoilt owing to poor rubber.

D. Turkington, of 15, Belville Street, Greenock, Scotland, wishes to re-form the model aero club in that district, and wishes all interested to get in touch with him.

Well, good flying till next month, and keep 'em flying better than ever. I expect we shall start to get news of plenty of petrol model flying from now onwards, but don't forget to be extra careful in order that restrictions are not reimposed. It will only need a little carelessness on the part of a few to "gum up the works" for all, so be careful at all times. I hope it won't be long before the Southern section will be able to join in the game; but, till then, thank goodness for small mercies.

THE CLUBMAN.

SCOTTISH AEROMODELLERS' FEDERATION

We note with interest the formation of a new society in the North the Scottish Aeromodellers' Federation (S.A.F.).

This resulted from a meeting held in Glasgow on Saturday, May 6th, 1944. Representatives from the majority of Scottish Clubs were present, and they generally agreed that the formation of such a federation was necessary in order to protect and promote interest in the aeromodelling movement in Scotland.

The Federation intends to organise Scottish Championships both for individuals and clubs and to keep records of the best flights made in Scotland in the various classes.

We do not hesitate in giving the S.A.F. our full support and demonstrate this in a concrete form by donating a trophy to be competed for annually.

All interested in this new venture are invited to write for particulars to the Hon. Secretary, G. L. Shiels, Scottish Aeromodellers' Federation, 35, Stenhouse Avenue, Edinburgh 11.

EDINBURGH MODEL FLYING CLUB, GALA DAY

The E.M.F.C. Gala Day will be held on Sunday, 20th August, at the Club's Flying Field, DREGHORN, COLINTON, EDINBURGH. For further particulars of competitions and directions for reaching the field, apply to the Hon. Sec., G. Shiels, 35, Stenhouse Avenue, Edinburgh 2.

NEW CLUBS

PETERBOROUGH MODEL AERONAUTICAL CLUB.
B. Lawson, 195, Alexandra Road, New England, Peterborough.

CHELTENHAM COLLEGE M.A.C.
A. F. Becker, Cheltondale, Cheltenham College.

BURNLEY M.A.C.
R. Jackson, Higher Ridge Cottage, Brunshaw, Burnley, Lancs.

QUEEN ELIZABETH'S GRAMMAR SCHOOL M.A.C.
J. Wilkie, 52, Argyle Street, Glascote, Tamworth.

SECRETARIAL CHANGES.

ESTON AREA M.A.C.
L. N. Brunton, 3, Back South Street, Eston, nr. Middlesbrough, Yorks.

NORTHERN HEIGHTS M.F.C.
R. Jeffreys, 90, Durham Road, E. Finchley, N.2.

WESTON CUP RESULTS

MAY 14TH, 1944. GLIDER.

	Club.	*Individual.*	*Time.*	*Plugge.*
1.	Surbiton	D. Butler	2229·3	259
2.	Croydon	G. W. W. Harris	1129·4	258
3.	Birmingham	J. Craven	700·4	257
4.	Merseyside	R. F. L. Gosling	673·2	256
5.	Merseyside	R. Young	527·5	255
6.	Rhyl	P. Hawkins	470·7	254

ORDER OF CLUBS.

1.	Merseyside	757	22.	West Yorks	501
2.	Aylestone	739	23.	N'th'n Heights	496
3.	Birmingham	714	23.	N. Birmingham	496
4.	Blackheath	705	25.	King's Heath	485
4.	Cheam	705	26.	Blackpool	452
6.	Rhyl	699	27.	Chingford	455
7.	Bushy Park	698	28.	Middlesbrough	430
8.	Stretton	678	29.	Torquay	428
9.	Croydon	677	30.	Wallasey	415
10.	Streatham	663	31.	Grantham	401
11.	Hayes	658	32.	Bradford	381
12.	Whitefield	649	33.	Worcester	344
13.	Walthamstow	645	34.	Agricola	324
14.	Surbiton	622	35.	Tetbury	284
15.	Pharos	598	36.	S. Birmingham	255
16.	Leeds	587	37.	Edinburgh	211
17.	Thames Valley	584	38.	Newton Abbot	177
18.	Penn	577	39.	E. Birmingham	175
19.	Sale	567	40.	Harrow	149
20.	Bristol	559	41.	Chelmsford	2
21.	York	558			

No. of Entries 269
No. of Clubs 41

Average Weather—Windy to Very Windy.

Best Flight—D. Butler, of Surbiton .. .. 2179·2 secs.
2nd Best Flight—G. W. Harris, of Croydon .. 1129·4 secs.

This last model landed at Ford Aerodrome from Epsom 2½ hours afterwards.

A solid scale Handley-Page 0/400, built by D. Shearan, of Sheffield. Another "solid" modeller who has forgotten that the props. revolve when the plane is in the air!

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Model Aero Supply Stores, Sittingbourne	1	1	0
H. E. Goodchild, Windsor	1	0	0

OTHER DONATIONS—

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Messrs. A. & S. Atkins	1	0	0
C. H. Biggs	1	1	0
Vice-President Woking and District M.A.S.		10	6
	89	17	6
Add: *Founder Members	113	17	6
Trade—as per List No. 1	327	3	0
	£530	18	0

* In the Founder Members, List No. 1, the name D. G. Brown was given in error. The £5 listed was given by Mr. W. J. Wade, of Edinburgh.

DELEGATE MEETING, MAY 21st, 1944

Mr. C. S. Rushbrooke, of the Leicester M.A.C., welcomed the S.M.A.E. Council and delegates to Leicester on the occasion of this meeting, the first of its kind to be held. Mr. A. F. Houlberg, in the chair responded, thanking the Leicester Club for their co-operation and hoping the meeting would be the forerunner of many yet to come.

All present were delighted to hear that the ban had been removed on the flying of petrol-driven model aircraft with conditions as previously announced. The ban is also removed from sailplanes up to a span of 10 ft.

A great deal of interesting discussion followed this announcement and the Council intends having cards printed setting out the new regulations in detail.

The Council noted with regret the resignation of Mr. J. D. J. Laidlaw-Dixon, Press Secretary of the Society, wishing him every success in his new venture with H.M. Forces.

A noteworthy offer of a cheque for 3 guineas was made by the Pharos M.A.C., a donation towards buying a rotary duplicator for the Society. This offer was accepted with thanks.

Mr. Jones, of the Birmingham M.A.C., made the novel suggestion of awarding consolation prizes in addition to the usual three given. He felt that by doing this the Society would gain further support for their competitions. This scheme was welcomed and a decision promised at the next Council meeting.

Regional Competitions are again being organised, a sign of awakening local interest. The Manchester Region were congratulated on getting together, and they were given priority for the next Delegate Meeting by the sporting withdrawal of the Birmingham M.A.C.

At this Delegate Meeting at Manchester a full discussion is intended on the setting up of Regional Committees throughout the country.

Mr. F. E. Wilson suggested that the Council should provide a trophy to be competed for by members of H.M. Forces; this resolution was carried.

The meeting adjourned, following a vote of thanks to the chair.

M.E. No. 2 CONTEST

SUNDAY, JUNE 4th

Individual.	*Club.*	*Secs. Agg.*	*Plugge Points.*
J. P. Buckeridge	Pharos	717·8	157
Mrs. Buckeridge	,,	443·4	156
D. J. Thompson	,,	403·8	155
J. Parkinson	,,	350	154
A. Armes	,,	346·3	153
A. W. F. Alexander	,,	342·9	152
D. R. Taylor	Streatham	326·1	151
A. Mead	Pharos	273·3	150
F. G. Wyer	Cheam	232·8	149
C. Doughty	Birmingham	231·8	148

Clubs were in the following order:—

	Points.		*Points.*
Pharos	468	Blackheath	315
Surbiton	438	Bromley	313
Streatham	432	Blackpool	311
Croydon	419	Leeds	304
Birmingham	419	Merseyside	301
Cheam	395	Kings Heath	187
Aylestone	357	Hayes	113
Northern Heights	342	Walthamstow	102
Bristol	316		

INDOOR, 1944

March Results—Aggregate of three flights. Class A:—
Pharos, 534·4; Streatham, 490·1; E. Birmingham, 281·8; Blackpool, 250·6; Croydon, 206·7; Luton, 140·5.
Class B:—Pharos, 398·9; Blackpool, 210·6.
Best Individual:—
Class A.—J. P. Buckeridge (Pharos 187).
,, B.— ,, (,, 139).
April:—Pharos, 589; Streatham, 476·5.
Aggregate for two months:—Pharos, 1,123·4; Streatham, 966·6.

The Harborough Publishing Co., Ltd., informs us that the following people ordered Volume IV of "Aircraft of the Fighting Powers" several months ago, and the copies were returned by the Post Office marked "Gone Away." Names and addresses are:—C. R. Medley, 7, Michelgrove Road, Boscombe, Bournemouth. W. G. Wheatcroft, Wearington Park, Launceston, Cornwall. 1394765 Sgt. R. F. Wells, 14 (P) A.F.D., R.A.F., Dallachy, Nr. Elgin. If the above will send their present addresses copies will be forwarded without delay.

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APPENDIX - Links to the plans

THE RIGEL by H. Liner
Description and 1/3rd Scale drawings for 40 Glider
https://www.hippocketaeronautics.com/hpa_plans/det ...