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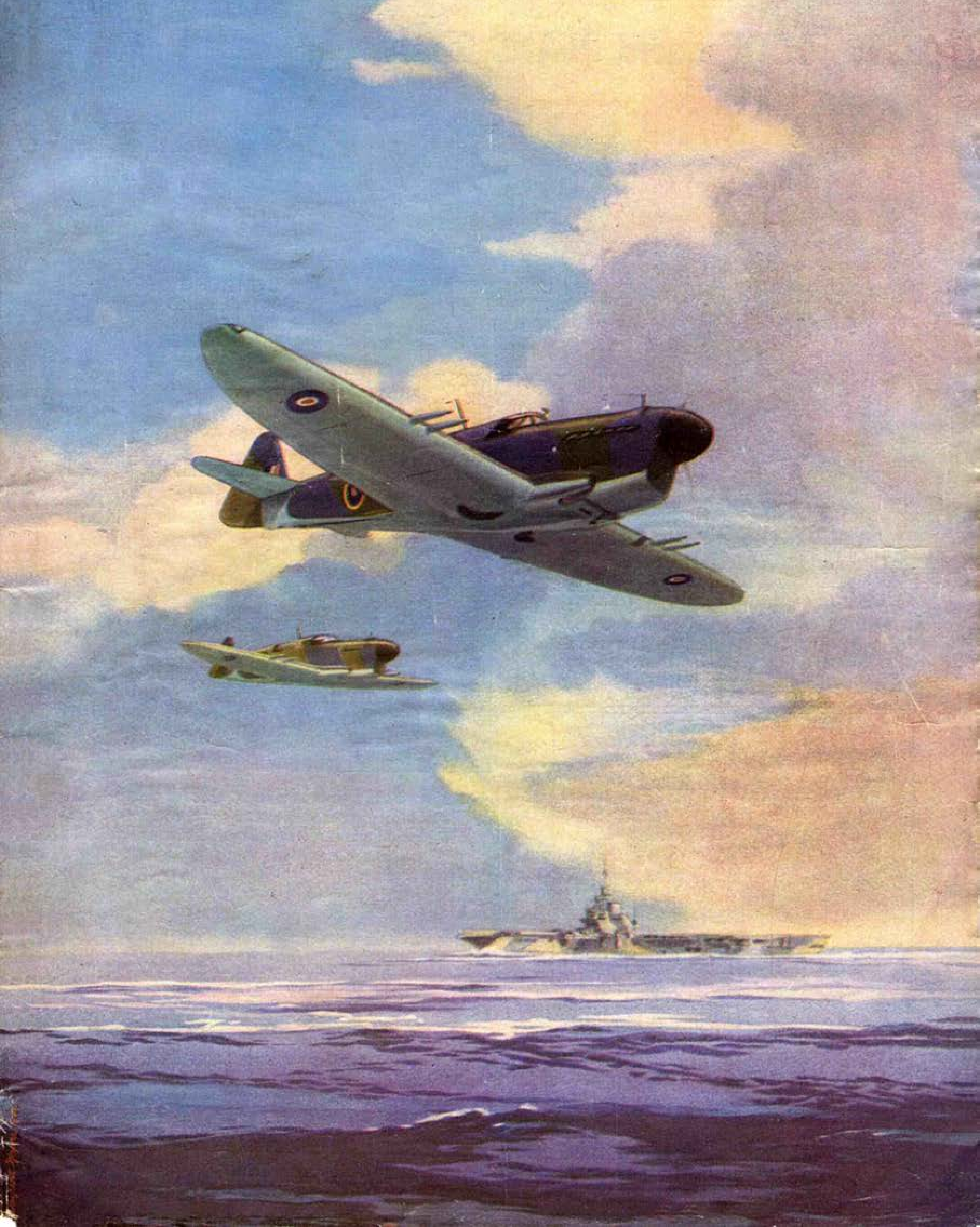

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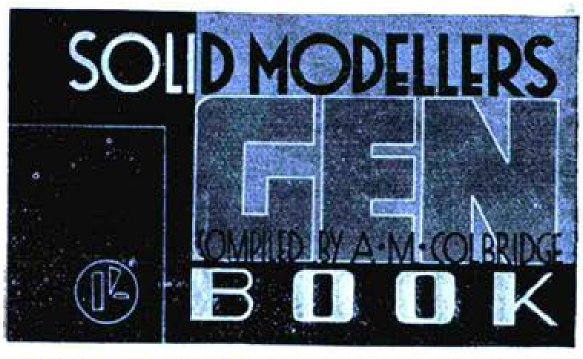

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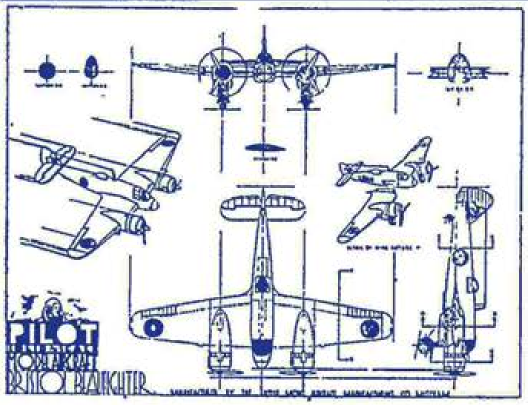

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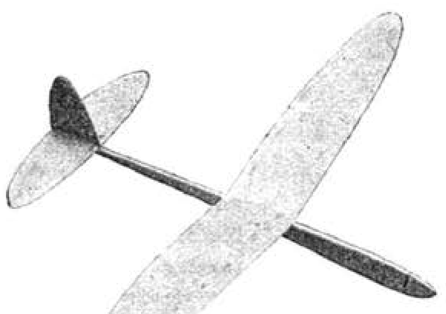

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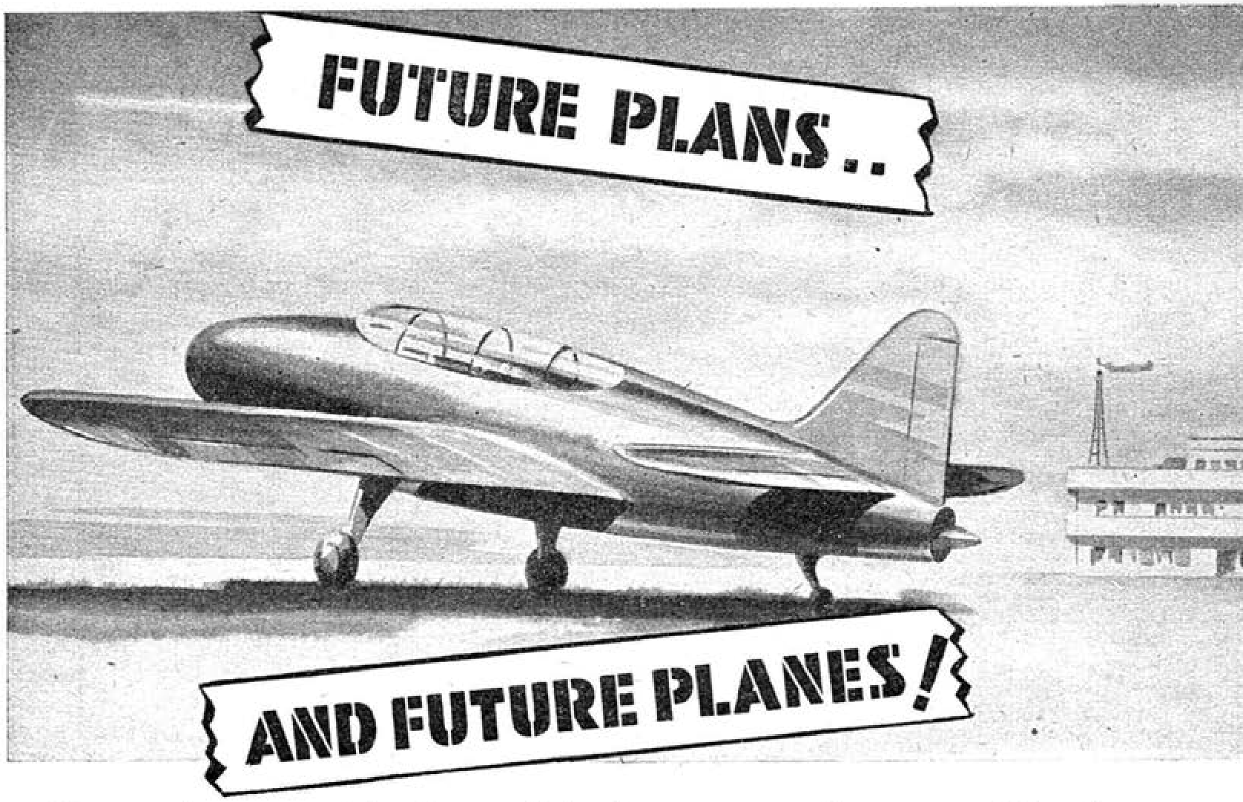

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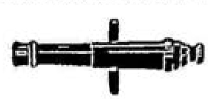

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THE "AEROMODELLER" EXHIBITION

To the conglomerated noise of many shuffling feet, the radio playing soft music, the hum of Mr. J. S. Evan's R.T.P. Magister flying pretty well continuously for the benefit of the R.A.F. Benevolent Fund—the chitter-chatter of many enthusiastic aeromodellers admiring the model aircraft, and with feet and back aching from many hours overtime . . . we retire to our office and attempt to write our Monthly Editorial . . . in the middle of Britain's First National Model Aircraft Exhibition, held in the year 1945, despite Hitler and the worst that his V-1 and V-2 weapons can do!

It is an amazing show, this First National Model Aircraft Exhibition ever to be held in Great Britain—amazing in more than one sense.

Amazing in the sense that it was so well supported by many distinguished persons—headed by Lord Brabazon of Tara, who formally opened the Exhibition, inspected all the models, saw the cinema film of model aircraft, and, by his presence, "blessed" aeromodelling.

Amazing in the sense that so many other distinguished persons, headed by Sir Henry Tizard, K.C.B., found time to come and support Lord Brabazon, and support Sir Henry's vote of thanks to him.

Amazing—perhaps most amazing of all—that so many hundreds of aeromodellers throughout the country, despite wartime conditions, have so readily helped the AEROMODELLER by sending in their models for display.

Amazing, finally, that we could crowd into the Dorland Hall so many visitors each day!

We write this Editorial a couple of days after the opening of the Exhibition, and before the judging of the entries has been completed; and are, therefore, unable to provide, in this issue of the AEROMODELLER, a comprehensive report of the Exhibition. Suffice it to say that the March issue—published towards the end of February—will contain a full report of the Exhibition from its opening by Lord Brabazon, to its closing and clearing away by the AEROMODELLER staff; and that we have had taken a film, not only of the Opening Ceremony and the main exhibits, but of many individual models; and that this film will be available in due course, on loan to Clubs throughout the country, and, in fact, the British Empire.

To we of the AEROMODELLER who, years ago, first looked forward to the day when—admittedly under more peaceful conditions—we might organise the First National Model Aircraft Exhibition, there has come a tremendous sense of achievement that we have been able to organise the Exhibition, despite wartime conditions.

In view of our need to get these notes to press, we can but touch lightly on the salient aspects of this Exhibition. The crowds—the magnificent models—the many enquiries—the interest shown by visitors in the demonstration stands of flying and solid model building; the interest shown in the 5½ in. wind tunnel so kindly loaned and staffed by members of the recently-formed Low-Speed Aerodynamic Research Association; the many enquiries at the stand of the Association of British Aeromodellers, which, incidentally, has recently had affiliated to it the whole of the A.T.C., headed by Sir Leslie Gossage, K.C.B., C.V.O., D.S.O., M.C., who has also become a Vice-President.

Looking back over the past nine months, during which so much time and energy has been devoted to developing the A.B.A. into its present position, we feel that no greater pleasure can have been enjoyed by anyone than that enjoyed by Sir Robert Bird, Bart., M.P., and Lady Bird, in view of the efforts which they have made on behalf of the Association, and it was with real pleasure that we received Sir Robert and Lady Bird at the Opening Ceremony.

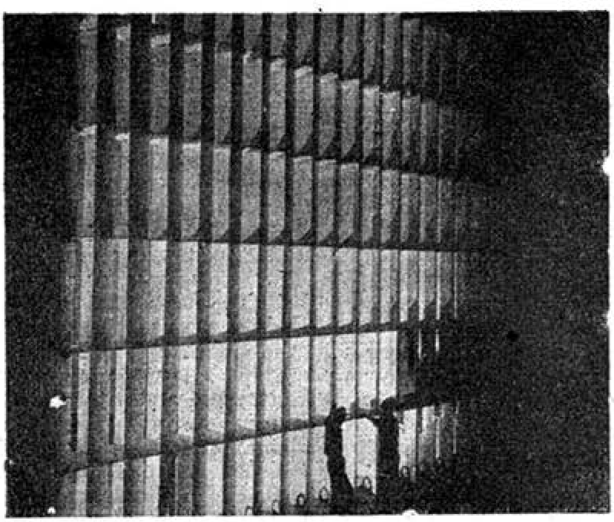
One omission from the Exhibition was any representative from the S.M.A.E. This Society was, of course, invited at the same time as the Association of British Aeromodellers, the Air Training Corps, the Model Aircraft Trade Association, the L.C.C. Men's Evening Institutes, and similar organizations interested in model aircraft, to arrange and exhibit, space and stand being provided free by the AEROMODELLER. However, the S.M.A.E. Council decided not to avail themselves of the AEROMODELLER offer. We mention this point because we feel that members of the S.M.A.E. throughout the country must have been disappointed to know that their Society was not represented at this First National Model Aircraft Exhibition ever to be organised in London, or, for that matter, in the British Empire.

"Aircraft Paintings"

The latest publication from Aeromodeller Plans Service is "Aircraft Paintings" by C. Rupert Moore, A.R.C.A., which consists of high-grade reproductions in full colour of sixteen AEROMODELLER cover paintings.

The book is bound in white cloth and gold embossed, and contains a 16-page write-up by Mr. O. G. Thetford, descriptive of Mr. Moore's work in recent years, together with notes on the individual paintings. The book runs to 48 pages, and is priced at one guinea. Copies may be obtained from the publishers, at Allen House, Newarke Street, Leicester, post free 21s. 6d., or from any model shop, bookshop, or W. H. Smith & Sons' bookstalls.

(Above.) Gargantua! Looking down the long return section of the Boeing Aircraft Corporation's wind tunnel. Below is a view of one set of "turning" veins. These veins, of airfoil shape, are hollow and filled with water to cool the airflow, which becomes hot at the high speeds at which the tunnel operates.



Wind Tunnels—Large and Small

We publish on the opposite page further details of the Prestatyn Wind Tunnel, and feel that no small measure of praise is due to Messrs. N. K. Walker, J. M. Hardman and Members of the Prestatyn Club for their excellent work in this respect. Further details of the wind tunnel will be published when they become available.

As this is more or less the " Close Season " for flying, other clubs would do well to take example from the above enthusiasts' efforts. Very little accurate data is available on low speed aerodynamics to date, and a vast amount of research has yet to be done before any really *accurate* information becomes available. It will be encouraging to hear of more efforts in the building of wind tunnels from other quarters of the Aeromodelling Movement.

Whilst on the subject of wind tunnels readers will probably be interested in details of the Boeing Wind Tunnel, photographs of which appear on this page and also page 132.

Some idea of the size of this huge apparatus can be gauged by details of the fan alone :—diameter 24 ft., weight of each blade 150 lb. and the sixteen blades with the hub weigh 7 tons. Driven by a 18,000 h.p. Westinghouse electric motor this fan is capable of producing wind speeds approaching the speed of sound. The tunnel walls are built of concrete, specially surfaced so as to reduce friction on the airflow. The test section of the tunnel measures 8 ft. by 12 ft. and will accommodate models up to 11 ft. span. Special models built in adjoining model building shops are used almost exclusively for the aerodynamical research work. Of special interest is the great accuracy of the instruments used in connection with the tunnel. An intricate system of balances records the many different forces acting on a model under test, such as lift ; drag ; yaw ; pitch and roll, etc. Some idea of the accuracy of these balances can be given by stating that lift from 1/10th of a lb. up to 8,000 lb. can be recorded.

An Invitation

Many American modellers are at present in this country, and we have had the opportunity of meeting quite a number in person. We are struck by their boundless enthusiasm, not to mention the phenomenal number of " gas motors " they seem to possess. They are all certainly keen to attend flying meetings over here, and Clubs could do a great deal to enhance our American contemporaries' stay in this country by helping in this respect.

We shall be glad to put any American enthusiast in touch with his nearest British club and trust that any contacts we help to make will prove valuable assets to post-war co-operation and understanding between the aeromodellers of Great Britain and the United States.

CONTENTS OF THIS ISSUE

THE PRESTATYN WIND TUNNEL

PART II——INSTRUMENTS

BY N · K · WALKER, B.Sc.

AND J · M · HARDMAN

THE preceding article dealt mainly with the construction of the tunnel itself, the special care of the club members. In this article I propose to describe the aerodynamic design of the fan and the design and construction of the instruments and balances to be used.

Fan. Mr. Hardman showed (in the previous article) that the tunnel will absorb 0·33 h.p. when running at 36 ft./sec., allowing a fan and shafting efficiency of 54 per cent. Allowing 10 per cent. losses in the shaft, 0·297 h.p. must be utilised in driving the fan itself. Now the fan diameter is 2 ft. and the motor speed is 1,425 r.p.m., which is geared up 3 : 2 to 2,138 r.p.m. or 35·62 revs./sec. at fan. The power coefficient can now be calculated for the fan :—

$$C_p = \frac{550\ P}{\rho n^3 D^5} = \frac{550 \times 0{\cdot}297}{0{\cdot}002378 \times 35{\cdot}62^3 \times 2^5} = 0{\cdot}0475.$$

J can also be calculated, remembering that the velocity is reduced at the fan (owing to the expansion in cross-section) to 33·8 ft./sec.

$$J = \frac{V}{nD} = \frac{33{\cdot}8}{35{\cdot}62 \times 2} = 0{\cdot}474,$$

and Cq the torque coefficient is $\frac{C_p}{2\pi} = 0{\cdot}00757$.

R. and M. 829 gives thrust, power and efficiency curves for a complete family of airscrews at a moderate Reynolds' number. From these the data plotted in Figs. 1 and 2 have been obtained, which may be useful to other model wind tunnel builders. Fig. 1 shows how maximum efficiency and torque coefficient at maximum efficiency vary with J. Fig. 2, gives the correct blade setting (blade angle at 0·7R) for various values of J. Now the torque coefficient in Fig. 1 only applies to propellers whose total blade width at a point 0·7R from the centre equals the radius, so, if our value of Cq is higher or lower than that of Fig. 1 we must increase or decrease the blade width in proportion, since Cq is proportional to blade width.

From Fig. 1 the value of Cq for a 6-bladed airscrew is 0·0113 (at J equals 0·474) and the required value is 0·00757, so the width of each blade must be $\frac{R}{6}$ times $\frac{0{\cdot}00757}{0{\cdot}0113} = 1{\cdot}5$ inches. From Fig. 2 the correct blade setting is 13 degrees. (Note that from Fig. 1 the efficiency is 60 per cent., as was assumed earlier. Had the two values been different the calculations would have to be corrected throughout, including the tunnel speed.) This calculation is good enough to design the first fan to check tunnel losses and speed distribution, but for best results at least one more set of blades will be needed. For instance, the shaft losses are proportional to the shaft speed and when the tunnel is running we will measure these losses and consider whether it will be advisable to run the fan at a lower speed and use wider blades.

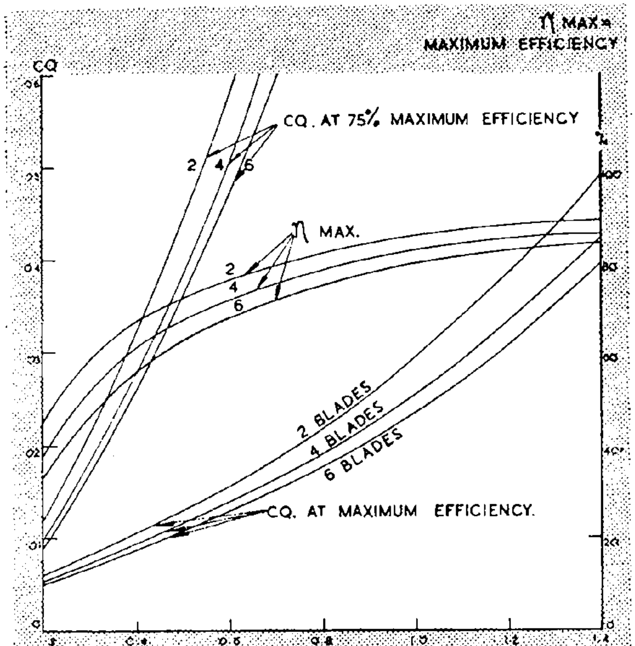


FIG. 1.

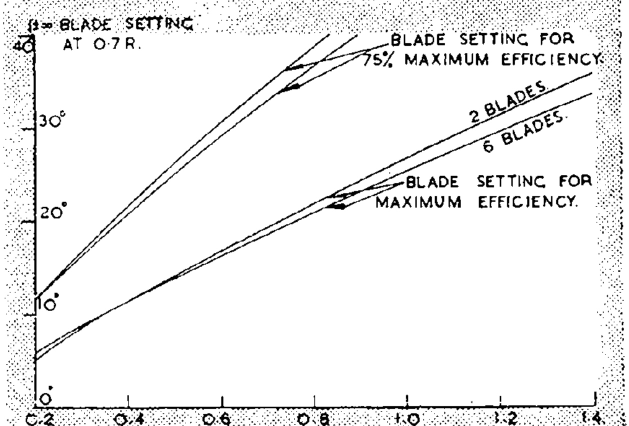
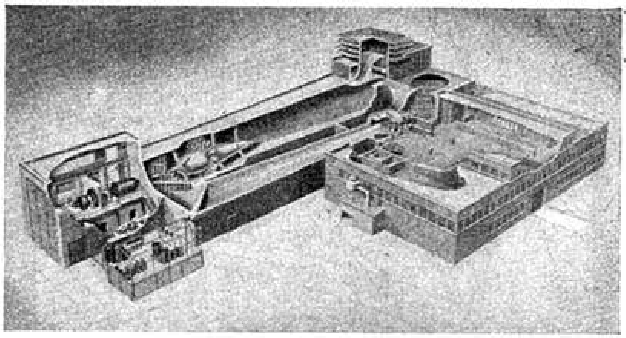


FIG. 2.

Pitot-static Tube. A copy of the N.P.L. standard pitot-static tube was constructed of stainless steel and brass tubing, but it was made only 45 per cent. of the full size and slightly altered in detail construction (see Fig. 3).

Auxiliary Pitot Heads. (Fig. 3.) The standard head is far too large for detailed exploration of the flow behind models or in the tunnel during adjustments, so a series of pitot and static tubes were made which plug into a standard tube holder. The holder is long enough to completely traverse the tunnel and is fitted with a support which can be screwed to the walls of the tunnel and will lock the tube in any position.



Sectional view of the Boeing Aircraft Corporation's wind tunnel.

Yaw Meter. (Fig. 3.) It is very convenient to possess an instrument which will indicate directly the direction of the flow. This can be used for removing twist in the tunnel when adjusting and for measuring propeller efficiency and wing downwash.

Such an instrument is the yaw meter. It consists of two pitot tubes set at angle 2θ to each other. The difference of pressure between the tubes is zero when both are at the same angle to the airflow, and also the pressure difference at any angle y is equal to $\frac{1}{2}\rho V^2 \sin 2\theta \sin 2y$ and is a maximum when the tubes are at right angles when: $\triangle p = \frac{1}{2}\rho V^2 \sin 2y$, or for small angles $\triangle p = (\cdot 035 y)(\frac{1}{2}\rho V^2)$.

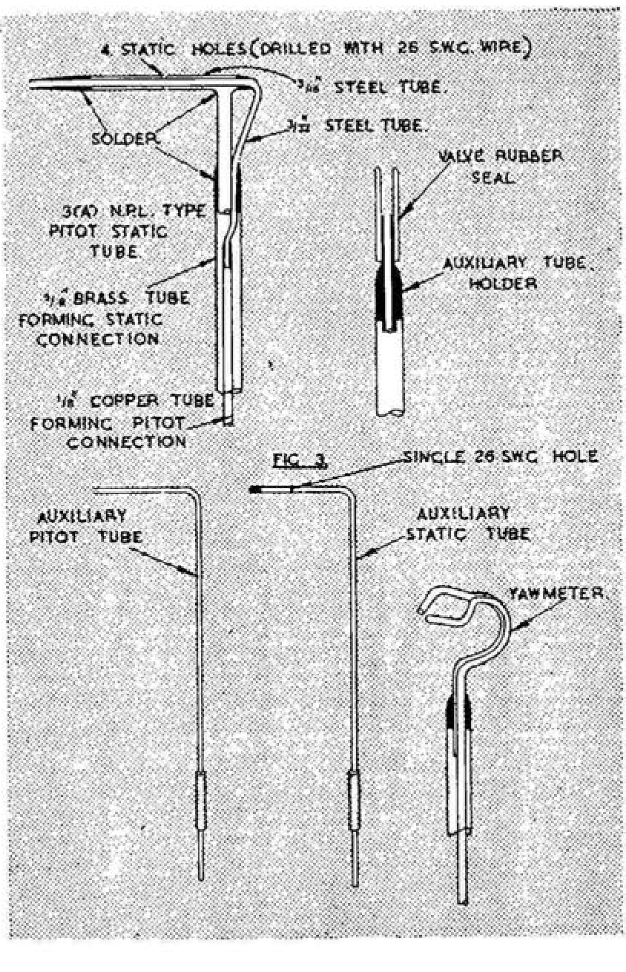


FIG. 3.

Step-up Gauge. The normal gauge used in amateur wind tunnelling is the inclined U-tube. Now the pressure to be measured is $\frac{1}{2}\rho V^2 = 0{\cdot}0229$ inches of water at a wind speed of 10 ft./sec., and it is desired to know the speed to nearer than 1 per cent., *i.e.*, we must detect a difference of reading of 0·00025 inches of water.

Assuming we can read a scale to 0·01 inch, the deflection must be magnified 40 times, so the angle of slope of the inclined tube must be 1·4 degrees roughly. Unfortunately, it is necessary to calibrate the gauge before use, since the accurate measurement of such a small angle is impossible, and the calibration is liable to change with time, for even a built-in spirit level only reads to about $\frac{1}{5}$th of a degree, so if the gauge is knocked it is liable to an error of 10% in spite of careful adjustment.

The accuracy required is about double that of a cheap commercial chattock gauge, and even the cheapest chattock costs £15 or so—quite an impossible sum.

Accordingly, I designed the "step-up" gauge. The principle is similar to that of the chattock gauge, *i.e.*, a divided U-tube, but instead of restoring the balance by raising one leg a known amount and measuring the distance moved through, the division is allowed to move. The construction is as follows (see Fig. 4):

Two large tubes are connected by a fine capillary tube, all being of uniform bore. Now let the area of the large tubes be A and the small tubes be "a". Suppose a pressure is applied to one of the large tubes which causes a difference of levels "h". Then the level in one tube falls a distance h/2 and the level in the other rises a corresponding amount, *i.e.*, a volume of liquid of $\frac{Ah}{2}$ has been transferred from one tube to another. Now suppose there is a bubble of immiscible liquid in the capillary tube, this will be pushed along by the flow of liquid and will displace a volume $\frac{Ah}{2}$. But if the distance moved through is l then the volume displaced is la.

These two must be equal to $la = \frac{Ah}{2}$ or $l/h = \frac{1}{2} A/a$, and this is the "step-up" ratio.

It is also equal to $\frac{1}{2} D^2/d^2$ where D and d are the diameters of the large and small tubes respectively.

The step-up ratio is quite unaffected by tilt; in fact tilting the instrument is used as a convenient way of setting the index to zero.

A number of different combinations of fluids were tried, but the best results were obtained with an air bubble and methylated spirit in the tubes. Water was quite useless, as it tended to stick and dirtied the glass capillary, while methylated spirit acts as a cleaning agent. A great convenience of the air bubble is the ease with which a new bubble can be introduced.

The actual instrument constructed for use on the tunnel is shown in section in Fig. 5.

The main tubes A, B, are of seamless solid drawn brass tube (1·4 cms. internal diameter) and are soldered solidly to 16 gauge brass plate (C, D) as bases. (All soldered joints are well made with a fillet of solder inside and outside.) A smaller side tube of about $\frac{5}{16}$ inch bore is soldered low down into one side of each of the main tubes (E, F) and the tops of the latter are closed with discs of 16 gauge brass plate soldered into place with a small bore copper tube G and H let in for the rubber connections. On the pressure tube A an additional connection I is provided at the back, and on the "static" tube B opposite tube F is another $\frac{1}{16}$ inch tube J, which is closed by a rubber bung. The main capillary tube K which is of glass and about 1·5 m.m. bore, is fixed into tube F with Chatterton's compound (a sort of flexible black wax) and is connected at its other end to a three-way glass cock M by a sleeve of $\frac{1}{16}$-inch tubing N sealed on with the wax. The other end of the cock is waxed into tube E, completing the connection. The whole assembly is mounted on blocks on a wooden baseboard which is provided with a levelling screw at one end and a small spirit-level let into the surface of the board.

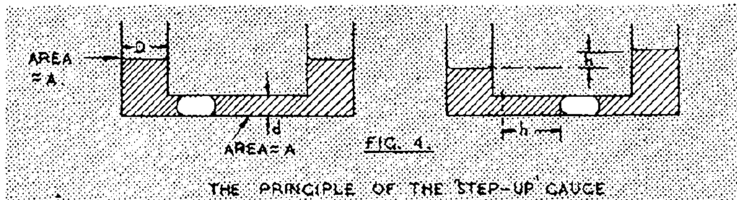


FIG. 4. THE PRINCIPLE OF THE "STEP-UP" GAUGE

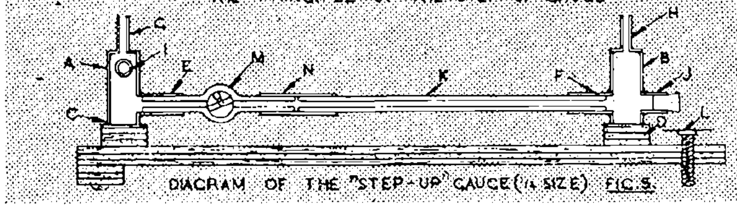


DIAGRAM OF THE "STEP-UP" GAUGE (¼ SIZE) FIG. 5.

The three-way tap has two holes in it. One is bored straight through, the other starts at right angles to the first, turns through a right angle and reaches the open air through the end of the tap. Thus the tap can be "open"—a clear passage from tube A to B—"closed" when the tap is turned through 45 degrees; the two tubes will now be shut off from each other and the bubble locked in position or "reset" when the tap is turned through 90 degrees from the "open" position and the capillary tube can communicate with the outside air. By dextrous use of the tap and levelling screw it is possible to introduce a small bubble of air and set it to the zero mark. Note that the levelling screw is only used as a zero adjustment—the factor of the instrument is not changed by the levelling screw. Should too great a pressure be applied and the bubble be blown into tube B another bubble is easily drawn in. (If this occurs with a Chattock gauge the whole instrument must be taken to pieces and cleaned.)

An additional refinement is the small gap which separates the two tubes inside sleeve N with an extra zero mark 00 placed on the end of the glass cock just outside N. Owing to the small gap the effective distance between 00 and 0 is increased and an additional range given to the instrument. In the gauge used at Prestatyn the length of the scale is 7 ins., but this is increased to 9 ins. if 00 is used as zero.

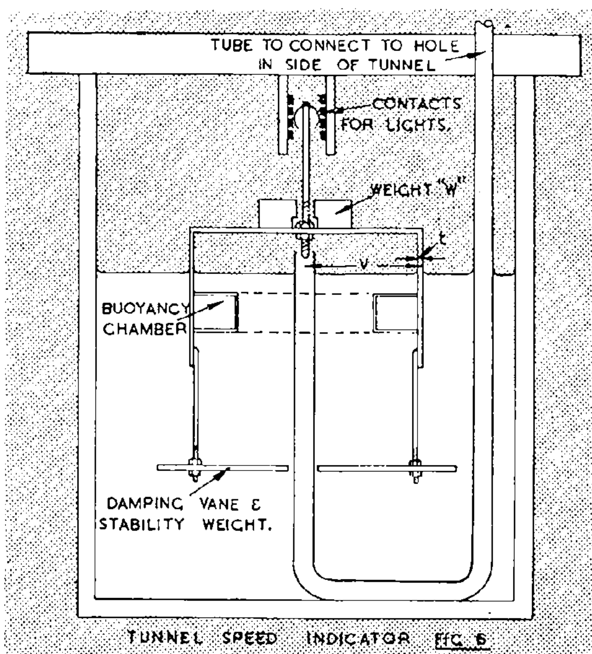
A question which may occur to readers is: Does the liquid leak past the bubble? I have set the bubble to zero, applied a pressure and locked the gauge, then tilted the gauge up to 45 degrees. After leaving it in this position for several hours I restored it to its original position and unlocked the bubble. The bubble returned to within 0·01 in. of its original position, proving that no liquid had leaked by. In practice the gauge described is a little slow in reading. Future experimental gauges will have capillary tubes of 2 and 3 m.m. bore and ratios of up to 200 to 1. These should read to 0·0001 in. wg., and be much speedier in reading owing to the larger bore of the capillary tube; but the liquid may tend to leak past the bubble.

Pressure Plotting Device. A pressure switch has been designed for pressure plotting airfoils, since it is obviously impracticable to construct a step-up gauge for each station at which the pressure is needed. It consists of two accurately turned brass discs pressed into contact by light springs. There are a large number of holes drilled in the face of the lower disc at a certain radius which communicate with radial tubes projecting from the sides of the disc. These radial tubes can each be connected to a pressure point on the airfoil.

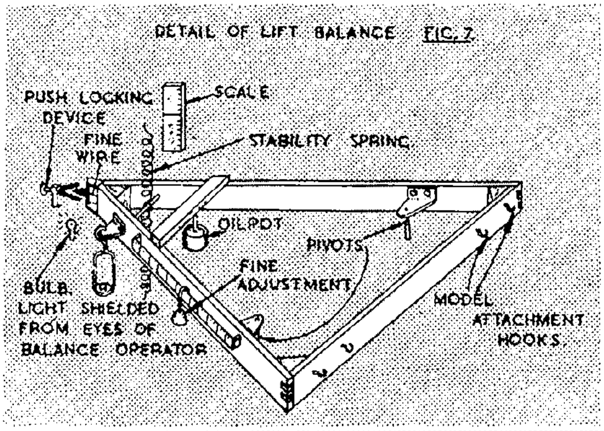
There are four additional tubes, two of which connect to the step-up gauge and two to a small pitot static tube. A series of grooves are arranged in the upper disc to enable the pressure side of the gauge to be connected to any point of the airfoil in turn while the static tube is open to the atmosphere. Alternatively, in one position the pressure gauge is connected to the pitot static tube.

Tunnel Speed Indicator. (Fig. 6.) In addition to the step-up gauge and pitot tube used in calibrating the tunnel, some very easily read index must be provided for the use of the rheostat and balance operators. It is also advisable to avoid introducing any form of pitot tube into the flow. At the maximum section just at the entrance to the contraction, the air is moving slowest, so by Bernouilli's theorem, the static pressure will be increased. The increase in static pressure is proportional to the square of the tunnel speed, so this can be used as a measure of the speed if measured on some form of gauge.

During the calibration of the tunnel a connection will be taken from the side of the maximum section to an ordinary manometer and the speed kept at any convenient point while the pitot traverses are made, across the



TUNNEL SPEED INDICATOR FIG. 6



jet. When the tunnel is in service a far better system will be needed. The type of manometer used must (*a*) Not change its zero or calibration with time; (*b*) Be insensitive to disturbance; (*c*) Need the minimum of adjustment in use; (*d*) Indicate small changes of pressure very accurately and without absorbing the whole attention of the operator.

These requirements are met by the form of " pressure balance " shown in Fig. 6. Here a thin walled cylinder of brass or celluloid—radius = " r," wall thickness " t " —floats in a jar of oil (relative density p). The lower end of the cylinder is open and it is about a quarter full of air. A piece of glass tubing projects upward into the air space and communicates with the static hole in the side of the tunnel. If a small pressure be applied to the tube, the float tends to rise higher out of the liquid. This tendency is resisted by the addition of a small weight " W " grams which is placed on top of the cylinder. This weight is exactly chosen to counter-balance the pressure caused by the mean tunnel speed. It is given by $W = 0{\cdot}00041\, r^2 k^2 V^2$ ozs.

"r" is measured in inches, "V" in ft./sec.,

$$\text{"k"} = 1 - \left\{ \frac{\text{area of jet}}{\text{area of max. section}} \right\}$$

At top speed in our case " W " is about 1·7 ozs.

Now at the mean speed the float is in exact equilibrium, but if the speed rises slightly the pressure rises and so does the float. The movement of the float, either up or down, can be made to operate a series of signal lights. It can be shown that the change in pressure required to raise the float a distance " l " is given by

$$p = \frac{2t \cdot l}{r} p \text{ ins. of water.}$$

Now in our case we wish to detect a change in " p " of 2 per cent. at a speed of 5 ft./sec., *i.e.*, 0·00016 in. wg. and a convenient value of " l " is 1/20 in.

" t " is 0·003 in. " r " is 1·5 in. " l " is 0·05 in. p is 0·8.

$$p = \frac{2 \times 0{\cdot}003 \times 0{\cdot}8 \times 0{\cdot}05}{1{\cdot}5} = 0{\cdot}00016 \text{ in. wg.}$$

Balance Arrangement. (See Fig. 5 in Part I, July, 1944.) The balance arrangement is of the " Gottingen " type and is very simple to construct. Lift, drag and pitch balances are provided and are connected by an arrangement of fine wires (40 s.w.g.) which separate out the various components. Small hooks are fixed half way along each wing panel at the leading edge and a wire taken from each straight up to the lift balance. A 4 oz. weight is hung from each hook and is submerged in thick oil, and a 3 in. length of wire is carried forward horizontally from the hook to a point just below the drag balance. Here the wires connect vertically with the drag balance, and two other wires pass forward and downward at an angle of 45 degrees till they reach the contraction cone to which they are attached. The pitching moment balance is attached to the fin by vertical wire and the pitching moment weight wire runs backwards at 45 degrees over a set of pulleys and has a 4 oz. weight fixed to its end.

It is important to keep the pitching moment wire vertical so the entire pitching moment balance is raised or lowered on a series of blocks, which give a set of fixed incidences measured before a run. A better arrangement has been designed but this is so far untried.

The set of balances is mounted above the jet on the main frame of the tunnel and the oil pots stand on the top of the return circuit, just below the jet. A set of signal lights is fixed to the wall of the tunnel building behind the balances so that the operator can tell whenever the speed is not quite correct and wait for the rheostat operator to put it right.

Details of Balances. (Fig. 7.) The balances are similar in principle to the steelyard type often described in the AEROMODELLER, but are much stronger and will weigh up to a pound or two.

The main frame is a strong right-angled triangle of wood (2 ins. deep by ⅝ in. thick) dovetailed together at the corners and reinforced with plywood gussets. The bearings consist of angle plates of 16 s.w.g. sheet steel screwed to the inside of the sides of the triangle about 3 ins. from the remaining side. A large dent is made in each plate and finished off with a centre punch. The resulting conical dimple is then case-hardened and provides the female bearing. The male portions are two hardened steel points set in a beam across the tunnel. A scale pan is fixed to the apex of the triangle, and weights from 200 grams down to 10 grams are used here. Fine adjustment is provided by two smaller weights sliding on scales in front of the beam.

The indicator is a 36 s.w.g. wire fixed to the apex of the wooden frame. A spot focus bulb placed about 1 in. from the wire casts the shadow of the wire on to a paper screen fixed about 6 ins. away on the other side, thus magnifying the deflection. This indicator is a particularly good type when studying unsteady lifts as it has no tendency to vibrate, as have the mechanical types of deflection magnifier.

Damping is provided by an oil pot with an adjustable vane and stability by a stretched spring attached by its mid-point to the apex of the wooden triangle.

Yawing Moment, Rolling Moment and Sideforce Balance. The design of this balance is not yet complete, so I will give only preliminary details here.

The model is supported in flying position from a strut attached to a point vertically above the C.G. of the model, and the strut is arranged on pivots to twist on its own axis, or to roll about either of two horizontal axes parallel to the centre line of the model. The moment about all these axes in turn can be measured against the torsion of a spiral spring and read off on a dial. The whole balance assembly can rotate around the vertical axis to give varying degress of sideslip to the model. With this balance we can check up on the relative efficiency of various types of fins and dihedral arrangements.

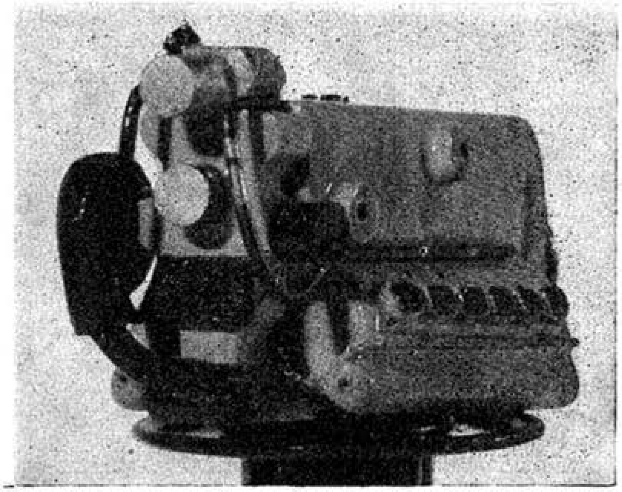
1/48th SCALE

SOLID MODEL MOTORS

ARTICLE VII

DAIMLER BENZ 601

BY S · B · S

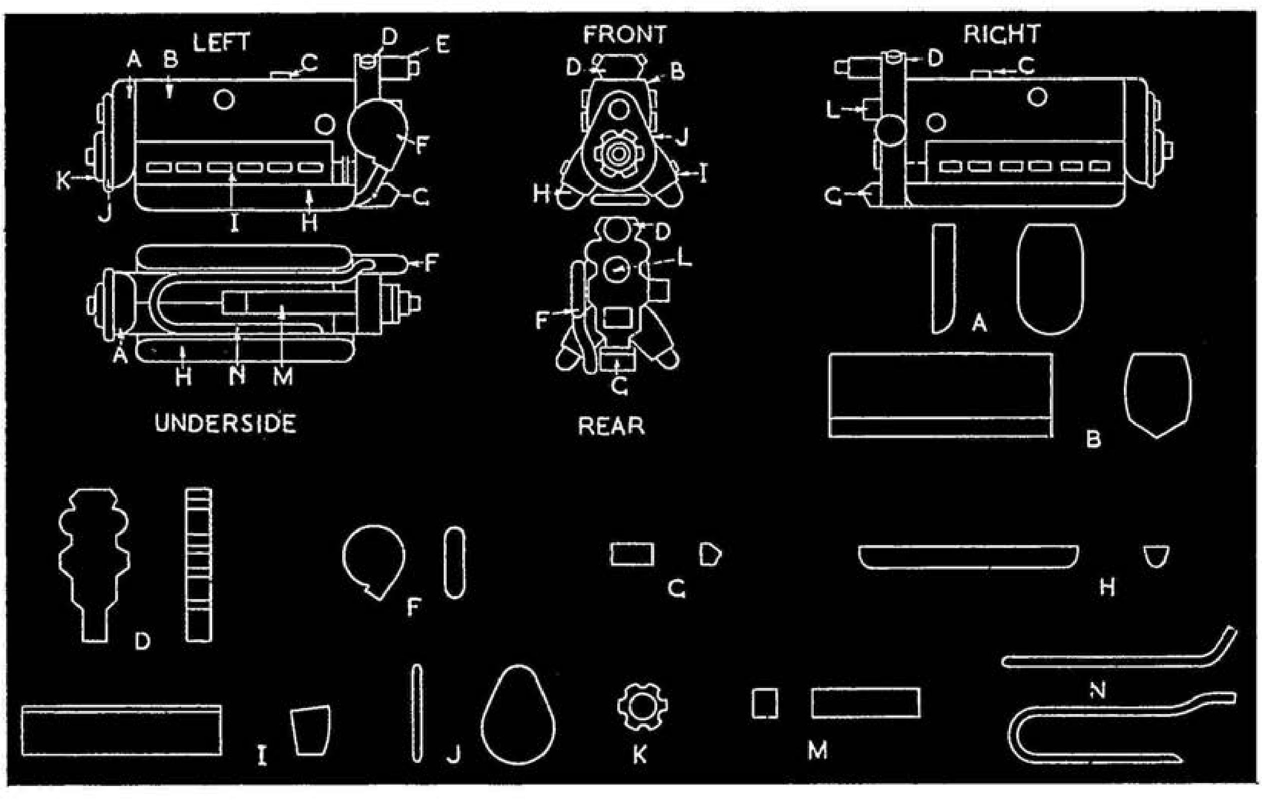


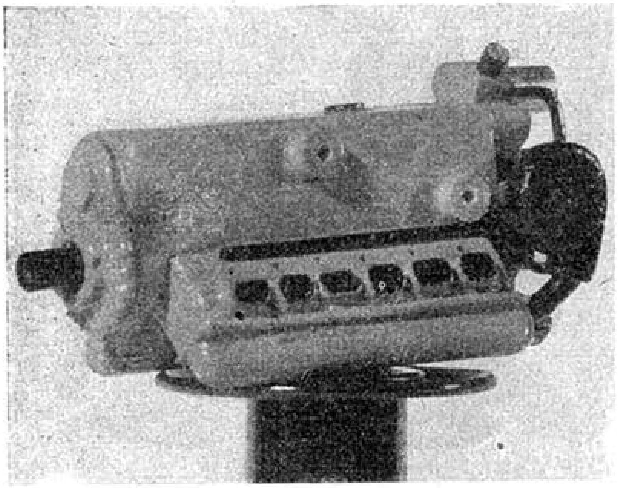
GERMANY'S opposite number to the Merlin, the Daimler Benz 601, is an inverted Vee type, liquid cooled, of 12 cylinders. As a model it is fairly easy to make, having smooth clean lines which can be readily copied in almost any class of wood.

The crankcase is made up of two pieces: the main portion B and the nose-piece A. The former should have the angle clean and sharp, and the latter should be carefully rounded off to give a bulbous effect. The cylinder blocks I come next. There are two of them and one wall of each has a slight curve. On each block will be seen six tiny rectangles, the short sides of which are slightly curved. These are the exhaust outlets and are made up from ply or card about 1/32-in. thick. On each side of the crankcase B will be seen two small circles. These are the engine mounting lugs, and like the tiny disc C, they are made from 10-gauge knitting needles. The four lugs should have a hole drilled through.

The nose cover J should have tiny grooves filed in the front edges, spaced about 1/16-in. all the way round. These are to simulate the flutes for the bolts. K, the ring round the prop shaft was made from a suitable brass washer, filing in the six grooves with a fine round file. The prop shaft, which is hollow, was made from 11-gauge needle, drilling down the centre with a 3/32-in. drill. A thin disc of 10-gauge needle cemented to the upper centre of the nose-piece completes that part.

At the other end of the engine we have a fancy shaped piece, D. This is the auxiliary gear case and is fixed firmly to the end of B. Two tiny round pieces cemented to the sloping sides at the top are part of the gun interrupter gear and can be made from match sticks sanded down to shape.





Immediately behind them is fitted a short piece of 9-gauge needle, part E. This is the magneto. Below it are two pieces L; one in the centre back, and one on the right side. These are also of 9-gauge needle. Below them again is a small rectangle which can be of stiff card or thin ply. This is the hatch covering the hole through which the cannon fired on certain marks of the M.E. fighters. This piece should be in line with the hollow prop shaft.

A triangular-shaped piece G is fitted at the bottom to complete the rear auxiliaries. On the left side of D is fitted the blower casing F. This should be slightly rounded off at the edges, and from it is lead a U-shaped piece of wire. This should lie between the cylinder blocks on the underside and is made from 14-gauge wire. The curve leading up to the blower F will want careful shaping so that it will sit right. Nestling inside the U-shaped wire, and cemented at the rear to the inside of D, is a long rectangular piece M. This is the fuel injector.

One point I have overlooked just about completes the assembly. This is the cylinder heads H. These should be nicely rounded off, and sandwiched between them and the cylinder blocks I, there should be a piece of good thin card. This is to simulate the flanges, and it should overlap all round by about 1/64-in.

I have no precise information as to authentic colouring except that from photographs: everything seems to be pretty dark, so I coloured mine light grey, with the exhaust outlets, prop shaft, C, F, gun hatch cover, and G, in black. E, L, and M I did in aluminium paint.

Two lengths of 20-gauge wire, one on each side, lie along the cylinder blocks just above the exhausts. They curve up at the rear of the engine and finish in the two top grooves in D. Cemented in position they complete the model.

A DETHERMALISER FOR LARGE GLIDERS AND PETROL MODELS

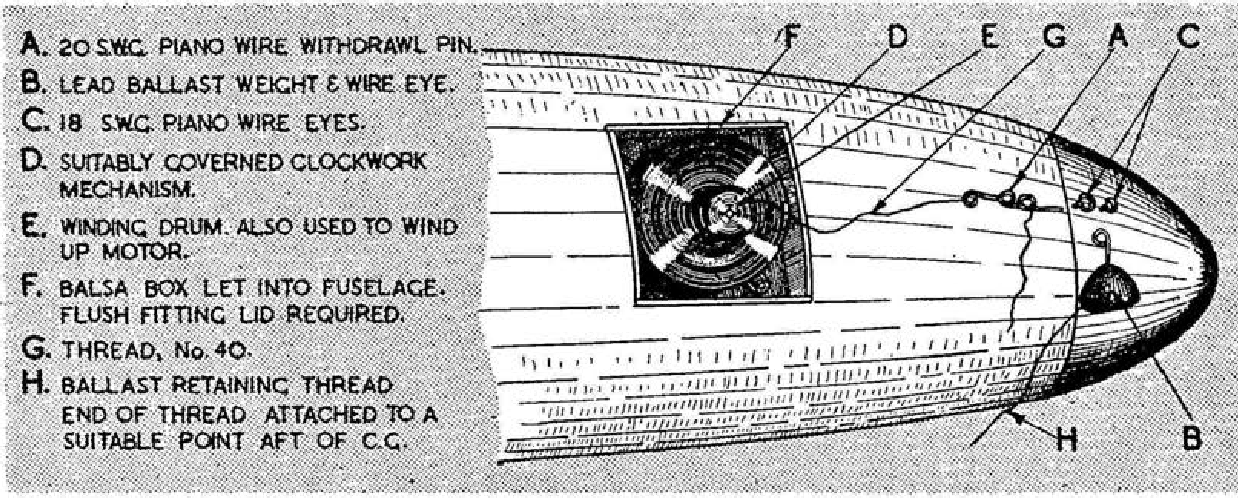
BY G · W · W · HARRIS

THE following is a brief description of a dethermaliser fitted to my latest glider "Igo IV."

The purpose of this gadget is to prevent the model being carried away by thermals or wind, to do this a portion of the nose ballast (in the case of gliders) (B) is released by a clockwork mechanism (D).

The ballast released is attached to a length of thread (H) which is connected to any suitable part of the model such as at the CG point or in extreme cases a wing tip or even the tail. The idea is to force the model down in a series of stalls. Only mild stalling is necessary to bring a model out of a thermal so don't be afraid to use this dethermaliser, a broken model is better than a lost one anyhow!

The length of the thread (G) will determine the time the unit takes to release (B), this length is adjustable by releasing the thread through the loops of (A). I have set my dethermaliser unit to run for a maximum of 4 minutes.



THE MERLIN

BY RAYMOND MALMSTRÖM

THE Merlin is an attempt on the part of the writer to create a model that follows, without being a copy, the general layout of a type of aircraft that has won battle honours in every theatre of war.

The fighter bomber provided the inspiration for the Merlin, and the result has been the creating of a model which, for appearance and flying performance, has stood up to the criticism of men who have been servicing the sleek fighter bombers of the Allied Air Forces, which, at every hour of the day and night, have been carrying destruction and death to the enemy.

Construction has been simplified as much as possible, and extra care, patience and accuracy will be more than repaid when the Merlin stands on the bench ready for first tests.

Fuselage. Of normal construction, the fuselage is built on the keel principle. Sheet is inserted in the sides to form a solid anchorage for the ribs of the inner wing bays. Carefully insert, line up, and cement the wing bridge in position. Cover and apply two coats of clear dope.

Engine Nacelles. Cut out and steam, bend the two halves of each nacelle. Cement in the formers and blocks (for receiving undercart tubes and locking pegs). The two halves are then glued together and covered with two layers of cross-grained tissue, well doped on.

This type of construction has proved to be far easier to build and also stronger than a built-up framework, and if a nacelle is badly damaged in flying, it is more easily replaced than a built-up one.

Wings. The plan furnishes all details of the inner and outer wing bays. Note the sheet covering on the leading edge of the inner bay. The blocks X1 and Y1, for taking the upper parts of the locking pegs, should be firmly cemented on to rib R.1. Sheet wood is employed to form a seating for the engine nacelle mounting, also for bomb slips.

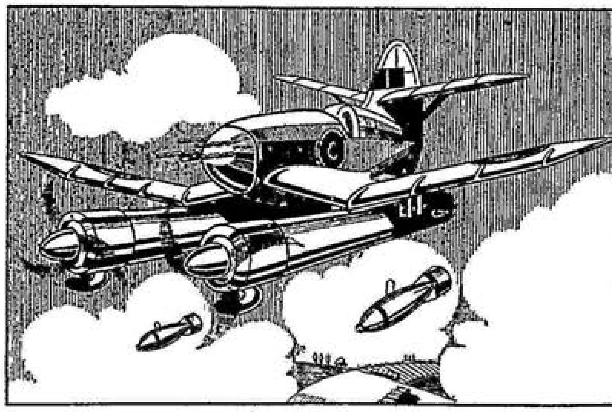
Cut lightening holes only when using hardwood. Sand L.Es. and T.Es. to streamline shape. Cover bays with one layer of tissue. Give one coat of clear dope.

Engine nacelle mountings and locking pegs are glued in position, and then the completed nacelles are slid on to the locking pegs and cemented.

Tailplane and Fin. These should be built up directly on the plan. A small hardwood or, preferably, celluloid sheet should be incorporated into the lower portion of the fin. Tailplane and fin one coat of clear dope. Nought degrees incidence to datum, on tailplane.

Undercarriage. Use the undercarriage when flying over short grass. The rubber band to each leg should be very small, so that maximum tension is put on the legs.

Bomb Slips. Although the author claims no originality for these they have not been consciously copied from any other layout, and they do give very great certainty of operation. The moment of release is fixed by the adjusting of the rear rubber band which passes over the dowel retaining the motor. The release rods should be sliding fits, and ensure that the bombs are free to fall,



Sketch by Author.

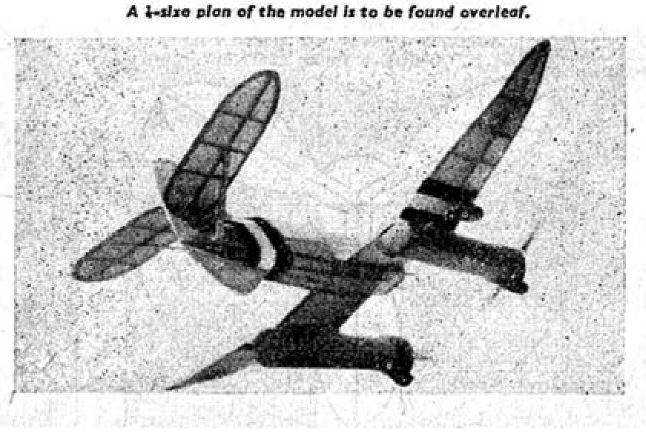
and not too tightly held on the slips. A tiny lead shot in the nose of the bomb causes it to fall nose first.

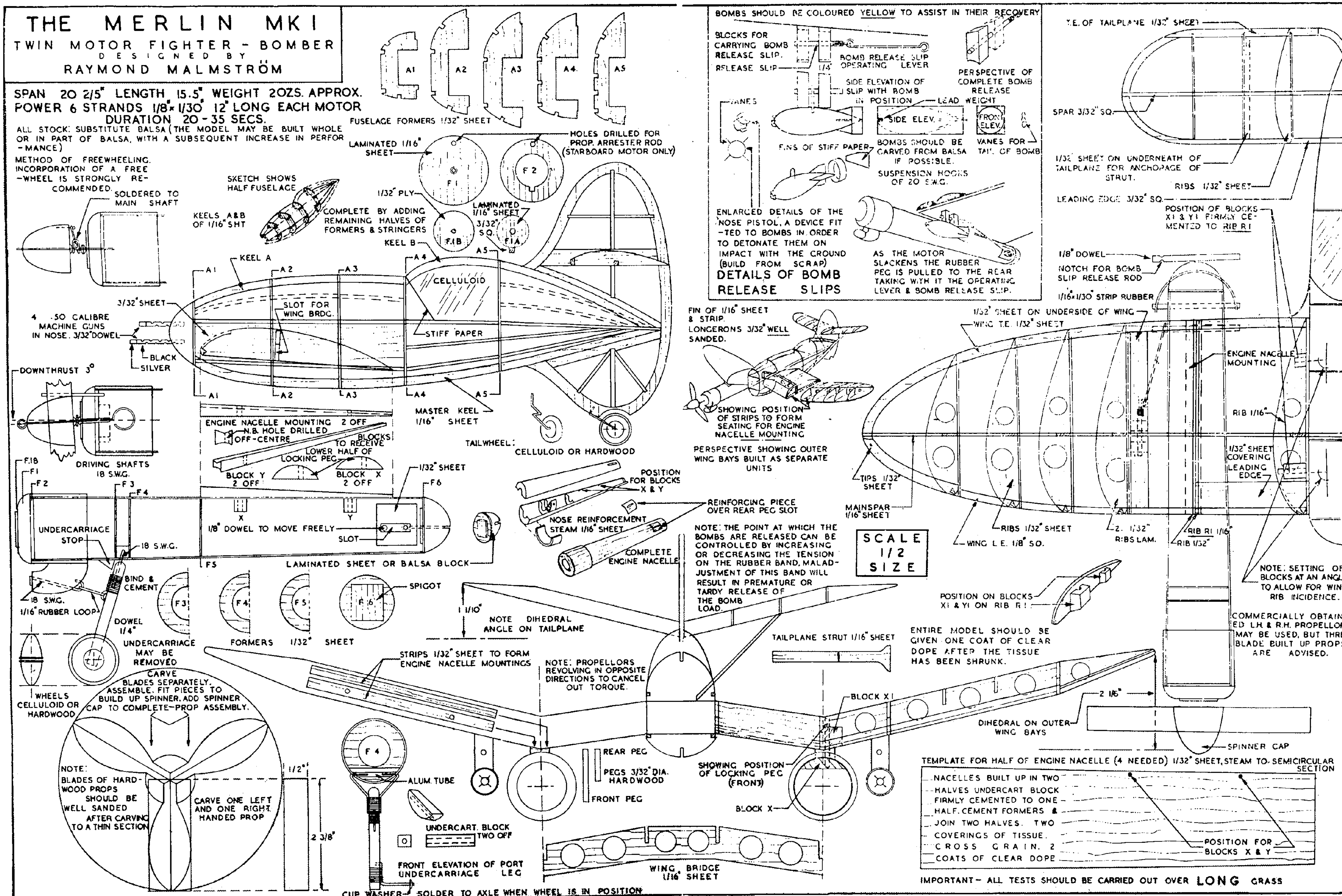
Propellors and Motors. Props. These should be three-bladed, left and right handed. They should be balanced before fitting, and identical in weight and blade area and pitch. Spinners may be built from scrap and the nose blocks drilled at the correct downthrust and bushed. A freewheel should be incorporated behind the spinners. Torque is cancelled out by the opposed rotation of the airscrews. The motors should be well lubricated and stretch-wound.

Flying. Testing for glide must always be the first operation and not until this glide is flat and free from diving and stalling may power be used. Tail heaviness, the curse of semi-scale and scale types, is not troublesome in twin motor types with the engines set well forward. Any tendency to nose heaviness should be corrected by either warping the T.E. of the tailplane upwards or by a very small piece of plasticine located in the rear of the fuselage. If built according to the plan, little difficulty should be experienced before long steady flights are obtained.

In conclusion, the designer of the Merlin believes that the future development of and research into the hobby of aeromodelling must, and eventually will, be directed to the production of models that are in real truth MODEL AIRCRAFT. These models, because they will bear a direct relationship to the full-size machines, will ensure that there is a lively and very real link between the men who design and fly model aircraft and the men who design and fly the full-size machines.

A ¼-size plan of the model is to be found overleaf.




THE MERLIN MK I
TWIN MOTOR FIGHTER - BOMBER
DESIGNED BY
RAYMOND MALMSTRÖM
SPAN 20 2/5" LENGTH 15.5" WEIGHT 2OZS. APPROX.
POWER 6 STRANDS 1/8"x 1/30" 12" LONG EACH MOTOR
DURATION 20 - 35 SECS.
ALL STOCK: SUBSTITUTE BALSA (THE MODEL MAY BE BUILT WHOLE OR IN PART OF BALSA, WITH A SUBSEQUENT INCREASE IN PERFORMANCE)
METHOD OF FREEWHEELING. INCORPORATION OF A FREE-WHEEL IS STRONGLY RECOMMENDED.
SOLDERED TO MAIN SHAFT
FUSELAGE FORMERS 1/32" SHEET
A1 A2 A3 A4 A5
LAMINATED 1/16" SHEET
HOLES DRILLED FOR PROP. ARRESTER ROD (STARBOARD MOTOR ONLY)
F1 F2
SKETCH SHOWS HALF FUSELAGE
1/32" PLY
KEELS A&B OF 1/16" SHT
COMPLETE BY ADDING REMAINING HALVES OF FORMERS & STRINGERS
LAMINATED 1/16" SHEET
3/32" SQ.
F1B F1A
KEEL B
KEEL A
3/32" SHEET
CELLULOID
SLOT FOR WING BRDG.
STIFF PAPER
4 .50 CALIBRE MACHINE GUNS IN NOSE. 3/32" DOWEL
BLACK
SILVER
DOWNTHRUST 3°
MASTER KEEL 1/16" SHEET
TAILWHEEL: CELLULOID OR HARDWOOD
ENGINE NACELLE MOUNTING 2 OFF
N.B. HOLE DRILLED OFF-CENTRE
BLOCKS TO RECEIVE LOWER HALF OF LOCKING PEG
BLOCK Y 2 OFF
BLOCK X 2 OFF
DRIVING SHAFTS 18 S.W.G.
1/32" SHEET
F1B F1 F2 F3 F4 F5 F6
UNDERCARRIAGE STOP
18 S.W.G.
1/8" DOWEL TO MOVE FREELY
SLOT
LAMINATED SHEET OR BALSA BLOCK
BIND & CEMENT
18 S.W.G.
1/16" RUBBER LOOP
DOWEL 1/4"
UNDERCARRIAGE MAY BE REMOVED
FORMERS 1/32" SHEET
SPIGOT
WHEELS CELLULOID OR HARDWOOD
CARVE BLADES SEPARATELY. ASSEMBLE. FIT PIECES TO BUILD UP SPINNER. ADD SPINNER CAP TO COMPLETE PROP ASSEMBLY.
NOTE: BLADES OF HARDWOOD PROPS SHOULD BE WELL SANDED AFTER CARVING TO A THIN SECTION
CARVE ONE LEFT AND ONE RIGHT HANDED PROP
POSITION FOR BLOCKS X & Y
NOSE REINFORCEMENT STEAM 1/16" SHEET
REINFORCING PIECE OVER REAR PEG SLOT
COMPLETE ENGINE NACELLE
1 1/10"
NOTE DIHEDRAL ANGLE ON TAILPLANE
STRIPS 1/32" SHEET TO FORM ENGINE NACELLE MOUNTINGS
NOTE: PROPELLORS REVOLVING IN OPPOSITE DIRECTIONS TO CANCEL OUT TORQUE.
F4
ALUM. TUBE
UNDERCART. BLOCK TWO OFF
FRONT ELEVATION OF PORT UNDERCARRIAGE LEG
CUP WASHER
SOLDER TO AXLE WHEN WHEEL IS IN POSITION
1/2"
2 3/8"
REAR PEG
PEGS 3/32" DIA. HARDWOOD
FRONT PEG
WING BRIDGE 1/16" SHEET
BOMBS SHOULD BE COLOURED YELLOW TO ASSIST IN THEIR RECOVERY
BLOCKS FOR CARRYING BOMB RELEASE SLIP.
RELEASE SLIP
BOMB RELEASE SLIP OPERATING LEVER
PERSPECTIVE OF COMPLETE BOMB RELEASE
SIDE ELEVATION OF SLIP WITH BOMB IN POSITION
LEAD WEIGHT
VANES
SIDE ELEV.
FRONT ELEV.
FINS OF STIFF PAPER
BOMBS SHOULD BE CARVED FROM BALSA IF POSSIBLE.
VANES FOR TAIL OF BOMB
SUSPENSION HOOKS OF 20 S.W.G.
ENLARGED DETAILS OF THE NOSE PISTOL, A DEVICE FITTED TO BOMBS IN ORDER TO DETONATE THEM ON IMPACT WITH THE GROUND (BUILD FROM SCRAP)
AS THE MOTOR SLACKENS THE RUBBER PEG IS PULLED TO THE REAR TAKING WITH IT THE OPERATING LEVER & BOMB RELEASE SLIP.
DETAILS OF BOMB RELEASE SLIPS
FIN OF 1/16" SHEET & STRIP. LONGERONS 3/32" WELL SANDED.
SHOWING POSITION OF STRIPS TO FORM SEATING FOR ENGINE NACELLE MOUNTING
PERSPECTIVE SHOWING OUTER WING BAYS BUILT AS SEPARATE UNITS
NOTE: THE POINT AT WHICH THE BOMBS ARE RELEASED CAN BE CONTROLLED BY INCREASING OR DECREASING THE TENSION ON THE RUBBER BAND. MALADJUSTMENT OF THIS BAND WILL RESULT IN PREMATURE OR TARDY RELEASE OF THE BOMB LOAD.
SCALE 1/2 SIZE
TAILPLANE STRUT 1/16" SHEET
SHOWING POSITION OF LOCKING PEG (FRONT)
BLOCK X
BLOCK X1
T.E. OF TAILPLANE 1/32" SHEET
SPAR 3/32" SQ.
1/32" SHEET ON UNDERNEATH OF TAILPLANE FOR ANCHORAGE OF STRUT.
RIBS 1/32" SHEET
LEADING EDGE 3/32" SQ.
POSITION OF BLOCKS X1 & Y1 FIRMLY CEMENTED TO RIB R1
1/8" DOWEL
NOTCH FOR BOMB SLIP RELEASE ROD
1/16"x1/30" STRIP RUBBER
1/32" SHEET ON UNDERSIDE OF WING
WING T.E. 1/32" SHEET
ENGINE NACELLE MOUNTING
RIB 1/16"
1/32" SHEET COVERING LEADING EDGE
TIPS 1/32" SHEET
MAINSPAR 1/16" SHEET
RIBS 1/32" SHEET
WING L.E. 1/8" SQ.
2. 1/32" RIBS LAM.
RIB R1 1/16"
RIB 1/32"
NOTE: SETTING OF BLOCKS AT AN ANGLE TO ALLOW FOR WING RIB INCIDENCE.
POSITION ON BLOCKS X1 & Y1 ON RIB R1
COMMERCIALLY OBTAINED L.H. & R.H. PROPELLORS MAY BE USED, BUT THREE BLADE BUILT UP PROPS ARE ADVISED.
ENTIRE MODEL SHOULD BE GIVEN ONE COAT OF CLEAR DOPE AFTER THE TISSUE HAS BEEN SHRUNK.
2 1/6"
DIHEDRAL ON OUTER WING BAYS
SPINNER CAP
TEMPLATE FOR HALF OF ENGINE NACELLE (4 NEEDED) 1/32" SHEET, STEAM TO SEMICIRCULAR SECTION
NACELLES BUILT UP IN TWO HALVES UNDERCART BLOCK FIRMLY CEMENTED TO ONE HALF. CEMENT FORMERS & JOIN TWO HALVES. TWO COVERINGS OF TISSUE. CROSS GRAIN. 2 COATS OF CLEAR DOPE
POSITION FOR BLOCKS X & Y
IMPORTANT - ALL TESTS SHOULD BE CARRIED OUT OVER LONG GRASS

AIRCRAFT RECOGNITION

BY L · E · P · LLOYD (S.M. Worcester Air Scouts, Hon. Sec., St. Paul's S.C. 253)

MUCH has been written on Aircraft Recognition and many theories of teaching it put forward. As a subject it can be very boring, especially if it is taught by using silhouettes only.

It is the aeroplane that is of paramount importance in teaching recognition. This has been overlooked in the past, but it has proved a costly error. It is impossible to meet every aeroplane on the ground, but the "personality" of the aeroplane must be introduced to the learner. This has been called the "glamour" of recognition. The aeroplane must be introduced, and its story, character and personality stressed. Tell the story of its life, its great deeds, its outstanding flights, and tales of great pilots or squadrons who have flown it in peace or war. The stories of the "Wellington", the "Spitfire", the "Hurricane", the "Swordfish" and the "Blenheim", are as exciting as any detective yarn. Stories can be told about all aeroplanes. To do so the teacher must keep records and cuttings about the world's aeroplanes. The gap in the stories of the Russian aeroplanes is now being filled in. During these talks, which may be used as introductions and as "interest" chats, a great deal of information can be imparted, such as size, general appearance and purpose. If possible, show a model of the aeroplane during the talk. It is essential that the beginner should know the meaning of terms that are used frequently. By using models and drawings, the following terms should be illustrated and taught to the beginner: Low-wing, mid-wing, high-wing, shoulder-wing, parasol-wing, dihedral gull-wing, inverted gull-wing, leading edge, trailing edge, tapers, elliptical, swept-back, wing fillets, cut-out, biplane, staggered wings, unstaggered wings, span, chord, in-line engine, radial engine, fuselage, tail plane, fin and rudder, hull, steps, sponsons, undercarriage, floats, and bracings. A knowledge of these terms saves a lot of time when teaching becomes more advanced.

In conjunction with these talks, use models and photographs. Plaster the meeting room with photographs. One can use large cardboard sheets on which are pasted photographs of aeroplanes, with three or more views of each type. All this is helping to introduce the aeroplane. The learner sees his new acquaintance and gets a first idea of the aeroplane's general appearance. He can see its general characteristics, its "sit" in the air, its approximate size, its armament, the position of the wings, the tail plane, the motor or motors and the undercarriage. It is wrong to assume that to a beginner the name Dornier 17 Z means a bomber, or that Macchi 200 is a fighter.

Assume that the beginner knows nothing, so do all you can to connect the name with the aeroplane. In this way a great deal of confusion is saved, and with the correct connection of name and aeroplane the learner is saved the ignominy of making "howlers" in simple tests. If a room is available, suspend model aeroplanes in various flying altitudes, so that they can be looked at and studied. It is well to have the names of each aeroplane plainly printed at the top of its wire. The names can be deliberately misplaced and this used as a test. If the models are hung four feet above the eyes of the lookers, and the models placed in varying altitudes, a good test can be given. Of course, the heights and positions of the models must be changed so that all angles can be studied at different times.

With the knowledge the beginner should have at this stage he can proceed to the silhouettes, small and large. What is their value? It is very considerable, because it gives true proportion and the outline of the aeroplane. The learning of the silhouettes may be a grind, but it is indispensable. But spare the beginner a cold pack of silhouettes, which has to be learnt by sheer constant study. Take them in stages. Do the single engined types first in plan and side view. Follow this with the "two," the "three" and the "four" engined, then take the "head on" views. Show all these on an epidiascope, if possible, and illustrate the contrasts between types. It is better to show contrasts than similarities. It impresses the mind better. There has been too much testing of similarities, and this has caused a great deal of confusion in recognition. How can a Spitfire IX be like an Me 109F when all the contrasts are shown? Or how can the Fw. 190, Master III, Typhoon and Mohawk be confused when the contrasts between each type are known? In the same way, show the contrasts between the Lancaster and the Halifax, Me 210, Hs 129 and Mosquito, Skymaster, Kurier and Albatross, Proctor, Hendy Heck, Mentor and Simoun, and other types. Again, if the student has knowledge of the history of the Lockheed air lines and studies the views and silhouettes of these with it in his mind, he will not confuse the Lockheed 10, Lockheed 12 and Lodestar, and will be helped in recognising the Hudson and Ventura.

In tests, try to catch the unfortunate "sitters," but do not always try to catch the slower ones. Always cater for them and do not kill their interest. Arrange tests for the very advanced ones and for the weaker ones. It is just as well sometimes to catch the experts. It can be done if one finds a photograph from a sufficiently awkward angle. At this stage the enthusiast has a good grasp of recognition, and now the range of aeroplanes can be increased to whatever he desires. So far, what has been done? The aeroplane has been introduced, its personality known, its purpose, size and history learnt

Photo by courtesy of the "Aeroplane."

"Angle of Attack." Recognition models being used by an R.A.F. Instructor for tuition in Interception.

GOERING'S GALLERY. R.A.F. Fighter pilots study recognition points on solid scale models of German aircraft.

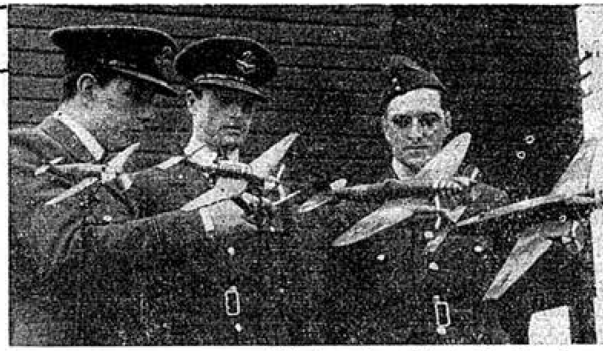


Photo by courtesy of the London News Agency.

and the silhouettes known. In learning the silhouettes it is well to have a method.

Look at the silhouettes and study them in order of, motors, fuselage, tail unit and undercarriage. This is why it is best to commence with the plan view silhouette. In order to keep up a good standard, the student of recognition must keep on learning and re-learning so that fundamentals are remembered.

It is now that the interest has to be maintained and knowledge increased. Every teacher on recognition needs as much information as he can get, and should file all his data. The information given in " Aircraft of the Fighting Powers " (Vols. I–III) is invaluable. Here is given the story of the aeroplane, pictures and 1/72nd plans. The 1/72nd scale is the best to use. From these much detail can be taught, e.g., varying noses, tails, undercarriages, armament entrances, bomb racks and tail wheels. Accuracy is the main concern here, and it is well to know that all published plans are not accurate and should be avoided. This wealth of detail is most fascinating, and not only holds the interests of youngsters and spotters, but is of great value to them. From plans, such as in " Aircraft of the Fighting Powers ", and from kits, models can be made. But for time and shortage of materials it would be grand to have a model of every aeroplane in existence. A spotter's dream! Some models can be made and used to good purpose. There is no easy road here. The model must be accurate. If not, they may look well, but as aids to recognition they are a hindrance. The modeller who takes care and studies his plans learns more about the aeroplane he is making than lots of teaching can give him. He will know that aeroplane whenever he sees it, and from all angles. It is a pity that so many models are spoilt by over anxiety to see them finished, and details are overlooked. One great and common failing is that the aerofoils are incorrect. When this error is found it gives a good opportunity to explain why aeroplanes fly. It is noticeable that those who make flying models are seldom guilty of this error. Again, very often the wings are badly set and a mid-wing aeroplane becomes a shoulder-wing type, or a dihedral is wrong, and sometimes so wrong that a dihedral becomes an anhedral! To the spotter the model must be accurate, and the ordinary modeller can do this if only he will pay sufficient attention to his plans and take enough time to be accurate. It is also essential that camouflage should be accurately done, the roundels correct in size and position, and any recognition aids that are on an aeroplane, e.g. Typhoons and Thunderbolts, correctly placed.

Model making is not only a great hobby ; it has many real educational values, if only the teaching of accuracy and detail. Models, even the ordinary ones, as they may be called, are the valued possessions of the makers, and are real aids to recognition and air-mindedness. There are also the exceptional models, the work of the very skilled modeller. This standard cannot be reached by all. The modeller who hollows out his fuselage, places in it the small figures of the crew, makes the turret to revolve or the undercarriage to work, is the enthusiast. He is not always the best spotter, but his model is a real thrill to others who see it and helps greatly to make the aeroplane a friend. Encourage modelling, but do not expect too much at first. In a club or Air Scout troop, try to get a varied selection of models made by the members. If the model is not a success the study of the plan is well worth while. Models widen the knowledge and interest of all. It is easy to tell the enthusiast when he is looking at models. His eyes shine when he sees good ones.

As practical aids to the teaching of recognition, models can be used in many ways. The suspension of the models in the meeting-room, and the making of models have been mentioned. Occasionally scenes can be made with the models. Suspend them in flying altitudes and arrange mock combats. It is possible to represent aeroplanes being shot down " in flames ", by using cotton wool dyed. A bombing raid on an aerodrome or factory can be displayed. Tugs and gliders can be made realistic by using thread as the towing ropes. These displays attract the attention, and maintain interest. Variety must be brought into all teaching. We have found thin copper wire suitable for suspensions. Models can be used to teach " snap " recognition. A model, suspended from a pulley, can be passed through a beam of light, taking only a fraction of a second to pass through it. The angle at which it appears to the viewer can be arranged. The shadowgraph and the " Hunt " trainer have been very much in the news and both are very good aids to learning recognition, and both use the model aeroplane. In these many ways the model is better than any other teaching aids. The model helps more than any other method to make the aeroplane " live ", and is more attractive than the cold black silhouette.

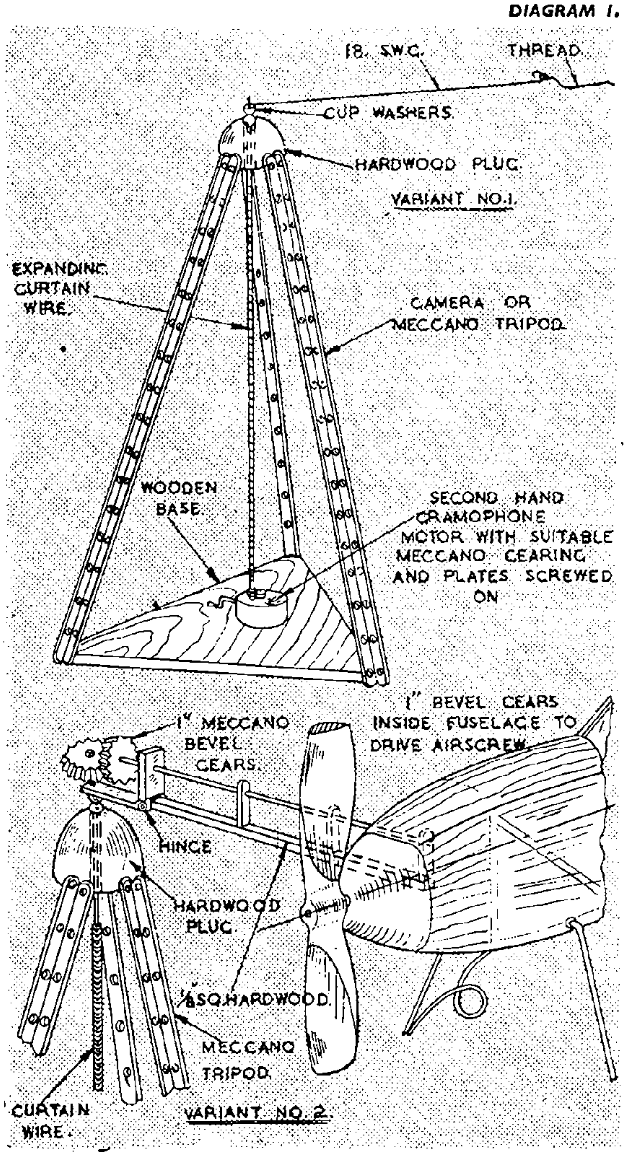
Methods, such as these given in this article, have been used by Mr. P. D. Hanson and myself with Worcester Air Scouts and St. Paul's Spotters' Club (N.A.S.C.253) since 1940. Interest must be held at all times if the recognition standard is to remain high. Keep the aeroplane in the front always. Connect the aeroplane with its model, its silhouette and with all the interesting photographs and facts you can find. Always be ready to answer questions about the aeroplane. This can be done quite easily if records are kept, and an index to all available sources. Never neglect the silhouette. It is to recognition what tables are to arithmetic ; and heaven knows, they are a trial to many. Always give the aeroplane its character, and build round it as bright a background as you can, by using stories, photographs and models, so that it becomes real. Only by using methods such as these can recognition be adequately taught, and the learner be able to " spot " all the aeroplanes he sees. Encourage members to keep a log of all aeroplanes they see, and to note height and course. It is then possible to settle any recognition disputes, and to learn if any new types are about. Recently this method proved its use when the first Corsair was seen. The recognition expert always knows his aeroplane, he more than recognises it.

GADGET REVIEW By "Bonsus"

V. HARVEY FULLER, of Cheltenham, decided to build an auto pole for gliders, as suggested by an AEROMODELLER correspondent recently. Having no rubber, however, he used a gramophone motor for motive power. Diagram 1 shows two methods of using Mr. Harvey Fuller's auto pole. In both cases the frame consists of an old camera tripod or a built-up structure of wood. The minimum height should be about 2 ft. The legs, which should be about 15 in. apart, are attached to a triangular wooden base, upon which is mounted a gramophone motor. The drive, taken from the final gear on the motor, is conveyed to the auto head by means of a length of flexible curtain wire. The swivel consists of a plug drilled to accommodate a short length of brass tubing. The flexible drive is soldered to a length of piano wire of suitable gauge, which passes through the plug as shown in the diagram. Cup washers or a ball race may be used as a bearing. A hole is drilled in the top of the tripod, or in a piece of hardwood if a timber frame is used, to take the plug.

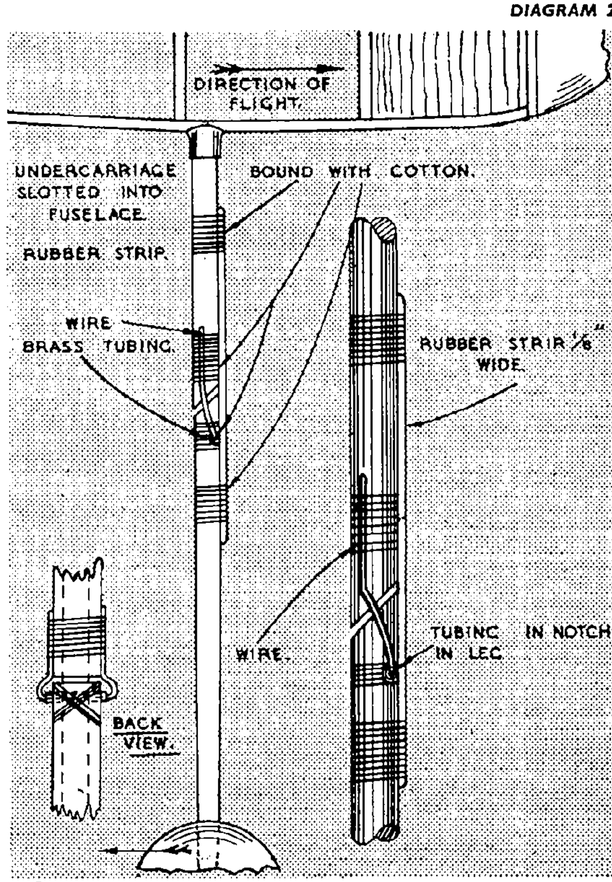
In the second method the drive is taken to the airscrew of the model, which, in revolving, will propel the model round the pylon. In this case the flexible drive to the pylon head is the same, but instead of the wire arm two Meccano bevel gears are employed. Similar bevel gears are incorporated in the model. The two gear sets are connected by means of another flexible drive. Meccano spring belt does the job very well. This drive must be supported by an arm or girder of some sort and this may conveniently be constructed of 1/8 in. by 1/8 in. hardwood strip. The arm is hinged to the pylon head, which allows the model to take off and land.

DIAGRAM 1.



G. M. ALLEN, of Leicester, sends in a shock-absorbing undercarriage leg, which relies for operation on the well-tried system of levered suspension. The leg is shown in diagram 2. The leg is made from hardwood or bamboo and is of suitable size for the model in question. It is cut into two, the lower portion being twice the length of the upper portion. The cut should be made at an angle of about 45 degrees in order to prevent forward movement of the lower component.

DIAGRAM 2.



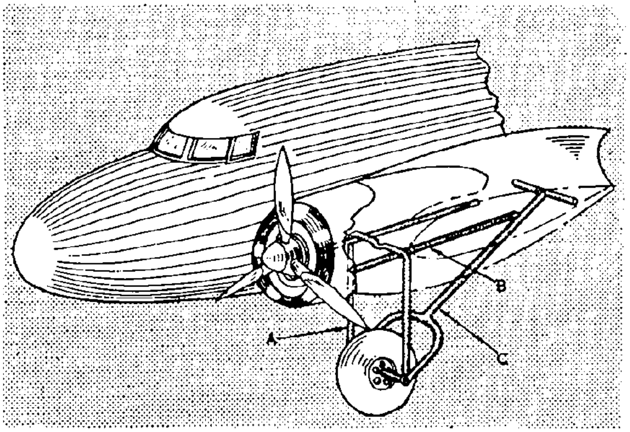
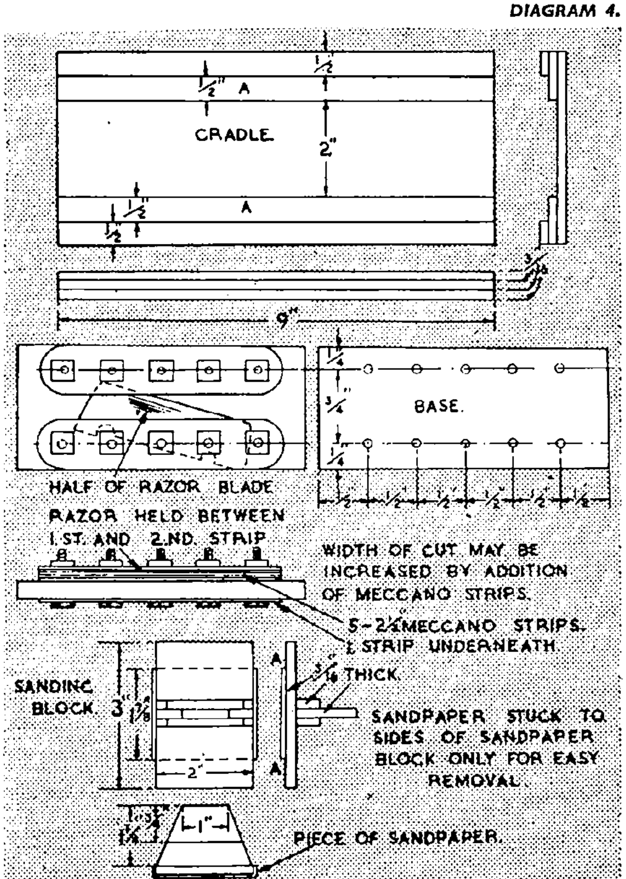


DIAGRAM 3.

Then a small notch is cut in the latter not less than ¼ in. below the apex of the sloping cut. Into this notch is bound and cemented a small piece of brass tubing. When the cement is dry a length of wire is passed through the tubing and the ends are bent upwards and backwards to be cemented and bound to the upper portion of the leg. A check should be made to see that there is free backward movement of the lower component. Finally a length of rubber strip is bound to the upper and lower components as shown in the diagram. The strength of the rubber will be best found by experiment.

Two useful ideas come from J. OSBORNE, of Worthing. These consist of a simple balsa stripper and a specially adapted sanding block for making sheet out of rough balsa. The two gadgets are shown in diagram 4 and no explanatory notes should be necessary. When making sheet, sanding is continued until the section AA on the block comes into contact with section AA on the cradle. Any dimensions may be used when making these devices.

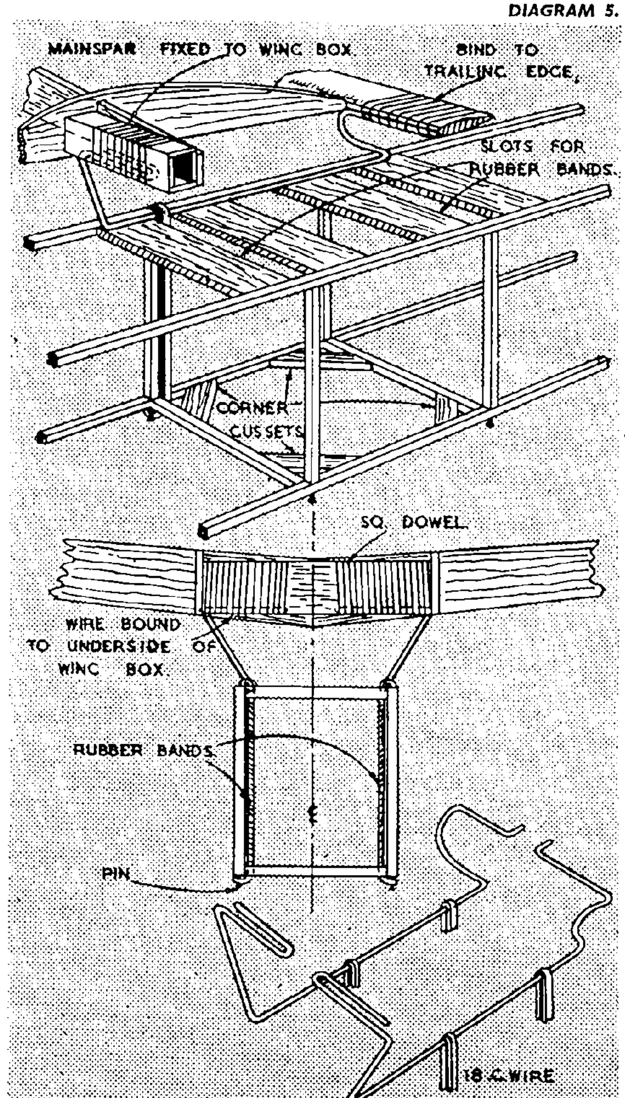
DIAGRAM 4.



Master J. D. McHARD, of Sheffield, has produced a very simple and efficient retracting undercarriage for solids. Here again the diagram, No. 3, shows the construction clearly. Operation is straightforward. To retract move leg A backward along runners B. To detract reverse the procedure.

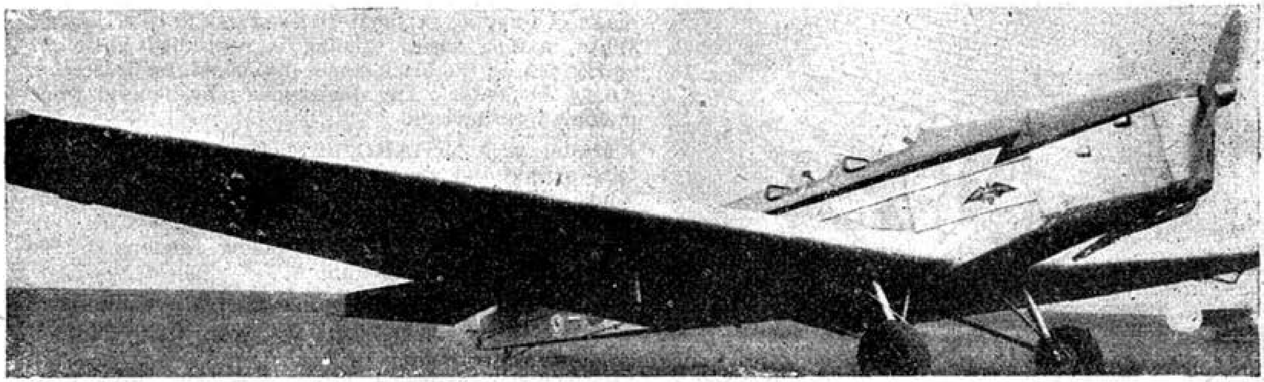
A parasol wing mounting which eliminates those rather ugly rail fixings, comes from F. WILDE, of Chester. Diagram 5 should make construction quite clear. The wire saddle is attached to the wing centre-section by binding and cement. The attachment to the fuselage is by means of rubber bands looped around the saddle and secured to pins in the framework. The wing may be moved fore and aft for trimming purposes.

DIAGRAM 5.



THE B.A.M. "SWALLOW II"

BY E. J. RIDING



THE ancestry of the Swallow II can be traced back to the German Klemm L.25, several of which were imported into this country during 1930–31. In 1933 the type was manufactured over here by the British Klemm Aeroplane Co., Ltd., of Feltham, the forerunners of the British Aircraft Manufacturing Co., Ltd.

Structurally the Swallow was not unlike its German prototype, a wider track undercarriage being fitted and certain parts of the airframe strengthened in accordance with British requirements. The final version was produced in 1935, the main differences being a more angular appearance, the wing tips, rudder and tailplane having straight lines in their layout for ease in production. The machine was of wooden construction throughout, covered with plywood with the exception of the rudder, which was fabric covered. The wings were made to fold and the undercarriage, which was of the split type, was capable of taking a tremendous amount of punishment, the legs being attached to the front spar and the radius rods positioned so that the legs moved forward as the undercarriage took the landing loads.

Dual control was fitted and the adjustable tailplane could be trimmed about its front spar by means of a hand lever in the cockpit.

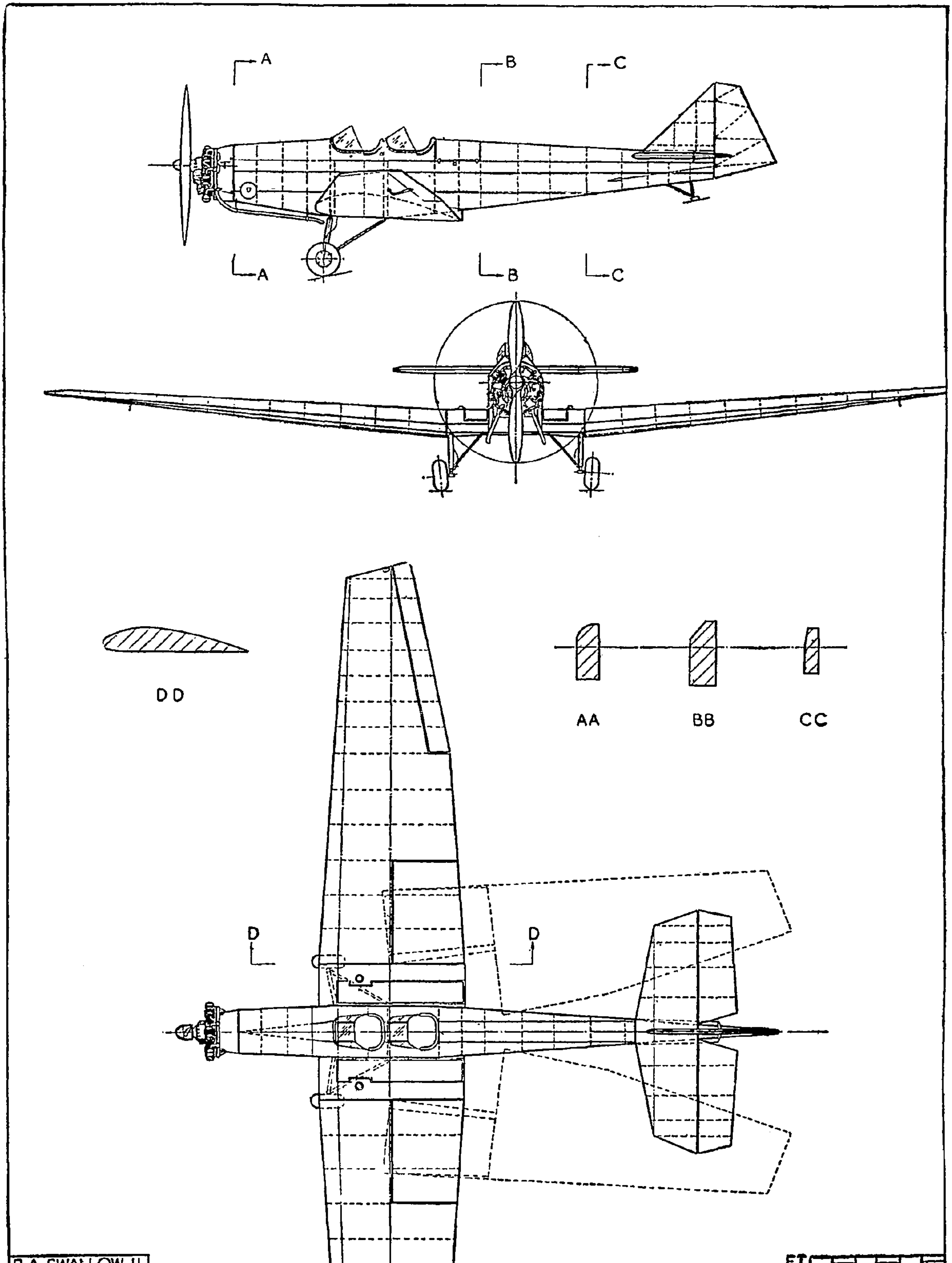
A neat finish was given to the cockpits by incorporating a second skin on the inside, thus effectively hiding cross struts and preventing the accumulation of dust and dirt, besides giving additional strength to the forward portion of the fuselage.

Fuel sufficient for a flight of 420 miles was carried in a tank aft of the engine and a tank—or tanks—in the centre section of the wing. Either the 80/90 h.p. Pobjoy Cataract III 7-cylinder radial or the 80/90 h.p. Cirrus Minor 4-cylinder in-line air-cooled engines were fitted and the performance was slightly better with the Pobjoy owing, no doubt, to the saving in weight.

The manufacturers claimed that the Swallow II was the safest aircraft in the world and the machine actually did uphold this claim to a remarkable degree. In practice the Swallow could be flown with perfect safety at speeds below 30 m.p.h. without the slightest sign of a wing dropping and only by means of special loadings and elevator settings was it possible to force it into a spin. On two occasions the Swallow has taken off and flown by itself.

The Swallow proved extremely popular in civil aviation and, up till the outbreak of war, over 150 machines of this type had been registered in this country alone. A large proportion of these were privately owned, but the majority belonged to various schools and clubs, notably the Hanworth, Doncaster, Bristol, Liverpool and Romford Aero Clubs, where they did a considerable amount of good work in connection with the Civil Air Guard scheme just before the war. The photographs depict the Pobjoy and Cirrus versions. The former, G–AEMS, belonging to the Liverpool Aero Club and was silver all over with a green, gold and brown band down the fuselage. The other machine, G–AEYW, belonged to the Cinque Ports Flying Club at Lympne and was silver all over with a light blue decking. A Pobjoy-Swallow, G–AEZM, was still flying in 1943, the owner being G. B. S. Errington, Airspeed's test pilot, who has recently disposed of it to a private owner at Taunton. This machine was painted in the standard war-time civil camouflage, dark green and earth with the letters underlined with red, white and blue horizontal lines.

SPECIFICATION: Length, 27 ft.; span, 42 ft. 8 ins.; tare weight, 960 lb.; loaded weight, 1,500 lb.; max, speed, 112 m.p.h.; landing speed, 30 m.p.h.; ceiling, 17,000 ft.


A
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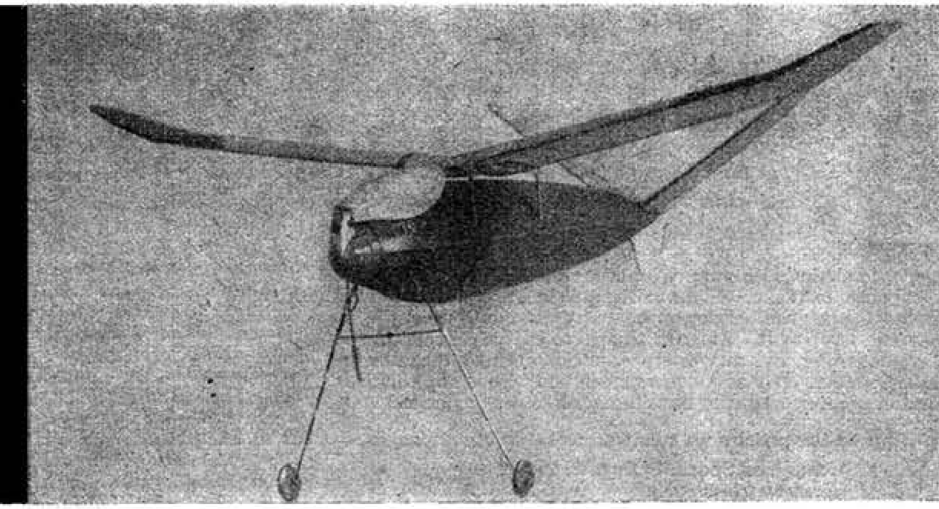
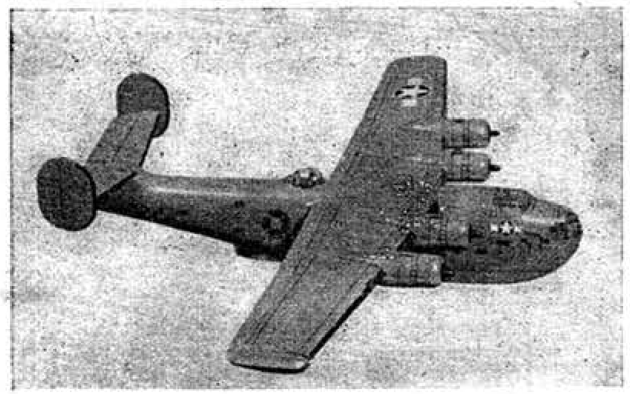
B.A. SWALLOW II
F.T.

MODEL NEWS

M. F. Boulestein, who is a strong believer in designing by practice rather than theory, sends us this photograph of his somewhat unusual "Wakefield" model on the right. He describes it as a "Flying Test Bench", embodying most of the features of a typical modern "Wakefield". With a glide of 1 : 11 and an aspect ratio of 7½ the model will fly in almost any weather. The absence of fin area above the fuselage leading to the incorporation of a dihedralled tailplane is most interesting.

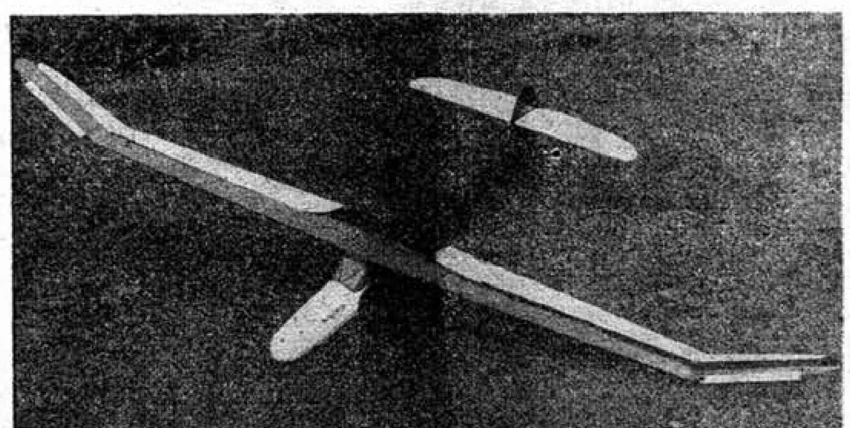


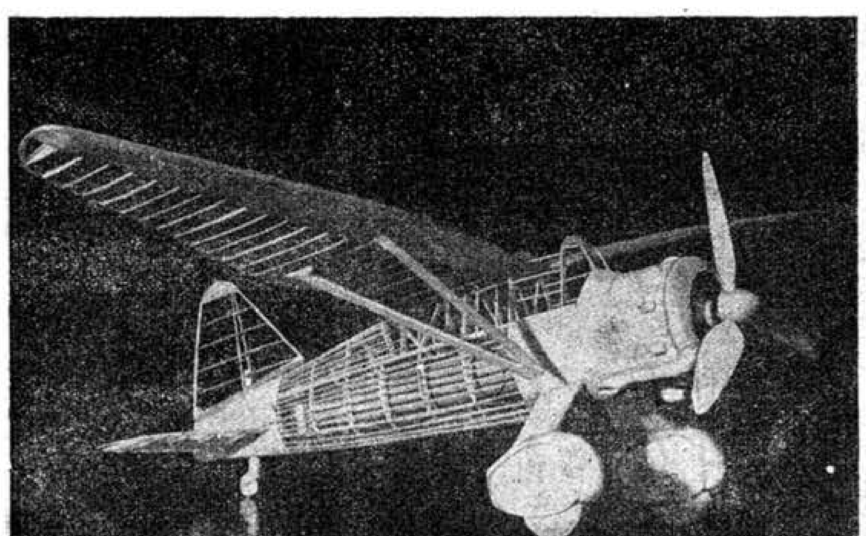


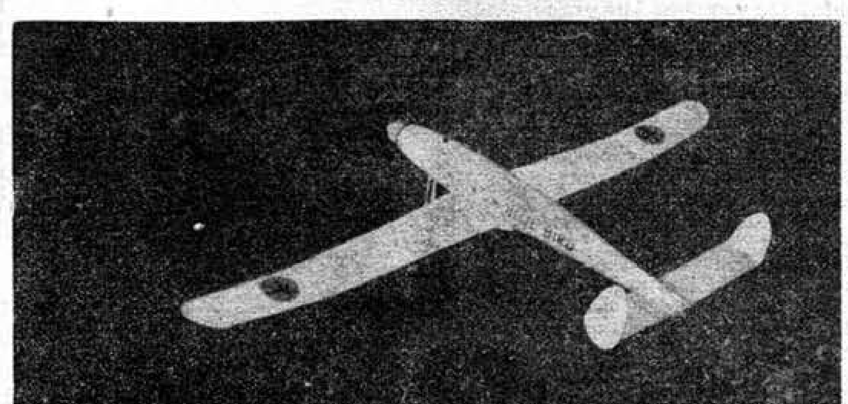
Above is an excellent 1/72nd scale model "Coronado", built from "Aircraft of the Fighting Powers" plans by H. J. Pridmore and photographed by J. Evans. The hull is hollowed out and incorporates four sliding doors, fully detailed cockpits and gun turrets, etc. Control surfaces are moveable and include retractable wing tip floats. Six hundred hours were spent on the construction, which appears to be well worth the time spent on it.

A flying scale Westland Lysander built from Aeromodeller Plans Service plans by C. Babbage and photographed by a friend with the aid of a Leica camera. This is Mr. Babbage's first attempt at model building and he has certainly stepped off on the right foot. Construction appears to be first class and we feel sure that the model's flying capabilities will more than pay him for the amount of work he has put into it.

Above shows a flying bomb being intercepted by a Spitfire, sent by F. W. B. Seaton. Both models are to 1/48th scale and were photographed against a hand-painted sky background. It seems a pity in view of the high standard of the photograph that the undercarriage of the Spitfire should be in the detracted position.







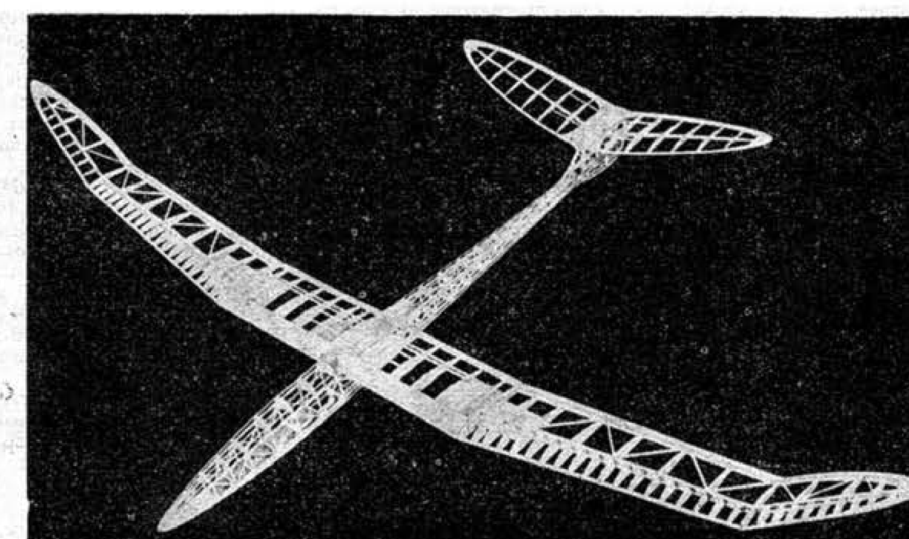
Top left shows an outstanding shot of a Beaufighter X sent by C. A. Goodwin. Both the modelling and the photography are of the highest order.

Centre shows a 5 ft. span sailplane designed and built by M. A. Slack. This model incorporates flaps, has an aspect ratio of 15 : 1 and an all up weight of 10 ozs.

Bottom centre shows a 54 in. span "Wakefield" model built by C. Chaplin. Despite its high aspect ratio the model has shown no tendency to spin. The undercarriage shown in the photograph was intended to be retractable, but proved a failure and has since been replaced by the normal fixed type.

From the Far East comes this photograph of a solid scale Typhoon built by L.A.C. Bernard O'Connar, present address Punjab, India. The model was built with the aid of a penknife and razor blade in temperatures of sometimes a 100 degrees in the shade. The model has created considerable interest in the camp and drawn several other would-be solid modellers into the fold Altogether a fine effort

"Enceladus" an 83¾-in. span sailplane constructed by Spr. N. McLeod and photographed by H. R. Burton. Built entirely of substitute, the model has an uncovered weight of 12·1 ozs. and a wing area of 2·95 sq. ft. Here again a dihedralled tailplane is employed with the resultant small fin area. The sprung skid on this original model has been scrapped in favour of a nose-wheel on the latest version.



Readers' . . . . . . Letters

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

DEAR SIR,

In common with many other aeromodellers we have a complaint to make. The quality and interest of the articles appearing in the AEROMODELLER of late is deplorable to say the least of it. Most of them are entirely irrelevant to aeromodelling and absolutely unfathomable to the average aeromodeller. (By average we mean one who is not a mathematical genius, and who has not acquired his or her B.Sc.)

Here are the articles we condemn as being unreasonable :—

1. " Streamlined Speed." August, 1944. (*Exemple classique.*)
2. " Scientific Welding." Feburary, 1944. (We have not yet reached a point where welding plays a noticeable part in aeromodelling.)
3. " Aerodynamics of Humming Birds." August, 1944.
4. " Unnatural Hazards." May, 1944.
5. " Feather Flyabout." January, 1944.

Regarding No. 5, we think it the crudest effort imaginable. According to Mr. Jamieson, the first model aircraft was constructed of feathers. (See Chapter I, McGillicuddy's Year Book.) This "model" seems to indicate that we aeromodellers are going back to the Dark Ages.

With the exception of No. 5, would you please be kind enough to explain what aeromodelling interest they contain ?

We also agree with Mr. Gould wholeheartedly concerning the theory. Agreed, a certain amount of it is needed, but why " do it " on the poor practical aeromodeller by devoting a large section of the AEROMODELLER to theory ?

At this point we should like to compare AEROMODELLER of August, 1944, to the AEROMODELLER of August, 1941.

1. In the 1941 AEROMODELLER there are no articles with no bearing on aeromodelling.

2. There is less theory and more PRACTICAL articles by PRACTICAL writers.

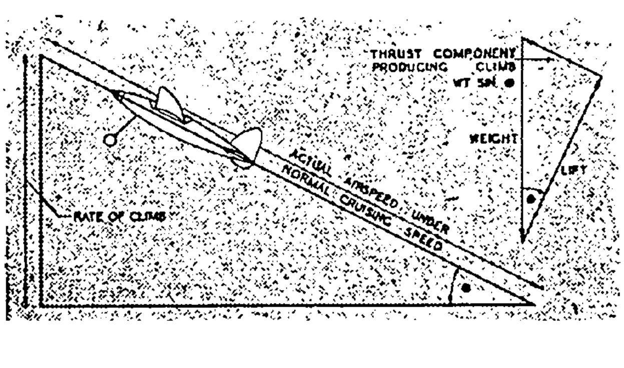
We are of the opinion that your 1/72 scale plans are the best obtainable. Your articles on the back history of aircraft and facts about them are as accurate as possible, thanks to H. J. Cooper and E. J. Riding. Your Monthly Memoranda, Photonews are of great interest, and the few flying plans which appear in the AEROMODELLER are definitely the best.

We also should like to hear other readers' views on this subject.

1360 A.T.C., M.A.C., Stapleford, Notts.

J. E. MOTE.
D. M. BOOTH,
P. M. SHEPHERD.

" We welcome such letters as this, in which preferences, likes and dislikes and criticisms are put forward in a friendly manner. It is our aim to provide as wide a service as possible and to cater for all aeromodelling interests. The old catch-phrase ' that one man's meat is another man's poison ' is inevitably true, but as much as these readers wish to keep the AEROMODELLER *literally* 100 *per cent. devoted to practical aeromodelling subjects, so many other readers write in expressing their appreciation and approval of articles which are not necessarily of* 100 *per cent. interest, but do in themselves, add to the general fund of knowledge available on subjects allied to aeromodelling. It is our experience that not many aeromodellers study the subject from every angle, and it follows therefore that most of them will have likes and dislikes, for or against a particular feature, and just as much as these three readers have their view-points, so many other readers will have their (opposite) view-points. A study of the percentage of ' theoretical ' articles which have appeared in the recent months will reveal that their percentage is not nearly as high as some of our readers would claim. Some readers are quite frightened at the appearance of a sign or a formula, turn over the pages and say, ' There's another theoretical article : what is the* AEROMODELLER *coming to ! ' We doubt whether more than two to three pages out of 52 on an average per issue are devoted to theoretical subjects. The number of enquiries we receive from readers for books on the theoretical aspect of aeromodelling indicate that there is quite a wide and strong interest for articles and literature and information of this type. One thing which has met with the approval of all readers is our re-introduction of the correspondence pages, and we again would invite readers to send in their views. After all, it is our living and our object to provide the material which aeromodellers require, and we best know their wants by their writing in to us. Readers may rest assured that all letters are carefully studied and our best efforts made to satisfy their needs."*—ED.



DEAR SIR,

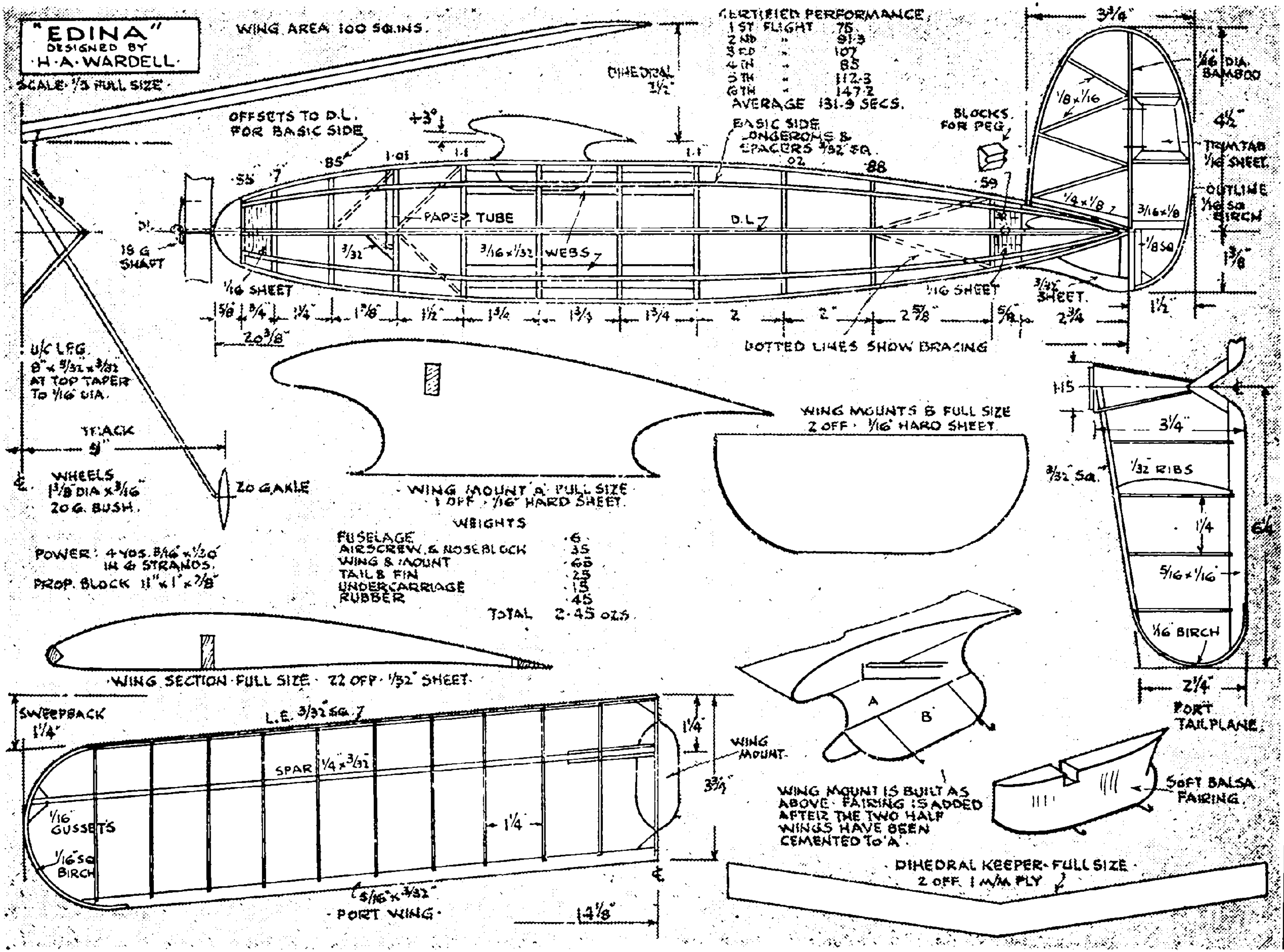
I would like to comment on two letters in the September issue. Firstly, may I agree with Mr. Gould, as far as mathematical articles are concerned. Most of the club members here have little knowledge of trigonometry or the calculus, and since the language of the mathematician is as unknown to them as Greek, the articles might as well be written in that tongue. They can follow the argument well enough if the same thing is expressed in words instead of symbols, which indicates that the less concise style of verbal argument would reach a greater number of people. Again, articles which reproduce information which can be had on application to textbooks on aeronautics are surely redundant, as enquirers could go direct to the source for the information and free space for matters of model import. Some articles almost lead one to wonder whether the object in writing them was to help us towards better models, or to show off recently acquired knowledge gathered in the course of studying for some examination or other !

Now in reply to Mr. Faulkner :—

The difficulty about accepting the R/C formula would vanish if he could accept the fact that the climb *starts* because of excess thrust and speed, but continues with excess thrust and reduced speed. The start is due to the extra lift which accelerates the model upwards. This produces a new airflow, compounded of the backwards one, with a new downwards one, and the reaction on the tailplane puts the nose of the model up. This at once calls for part of the thrust to carry a component of the weight, so the excess forward speed gradually falls until a stable rate of climb is reached. At this point the forces are as in the diagram, and the thrust is the sum of two parts, the drag being one, and the other, from the force triangle shown, is weight $\times \sin\theta$ where θ is the angle of climb.

The horse-power required for level flight is *not* the same as the horse-power required to provide the first part of the thrust, since neither the speed nor the drag is the same in the climb as in level flight. The speed is less as explained by

Continued on page 151.



"EDINA"
DESIGNED BY
H·A·WARDELL
SCALE 1/3 FULL SIZE
WING AREA 100 SQ.INS.
DIHEDRAL 1½"
OFFSETS TO D.L. FOR BASIC SIDE
+3°
CERTIFIED PERFORMANCE.
1 ST FLIGHT 75
2 ND " 91.3
3 RD " 107
4 TH " 85
5 TH " 112.3
6 TH " 147.2
AVERAGE 131.9 SECS.
BASIC SIDE LONGERONS & SPACERS 3/32 SQ.
BLOCKS FOR PEG
PAPER TUBE
3/16 x 1/32 WEBS
D.L.
3/32
1/16 SHEET
1/16 SHEET
3/32 SHEET
15 G SHAFT
DOTTED LINES SHOW BRACING
1/8 x 1/16
1/4 x 1/8
3/16 x 1/8
1/8 SQ.
1/16 DIA. BAMBOO
TRIM TAB 1/16 SHEET
OUTLINE 1/16 SQ. BIRCH
U/C LEG 8" x 3/32 x 3/32 AT TOP TAPER TO 1/16 DIA.
TRACK 9"
WHEELS 1 3/8 DIA x 3/16 20 G. BUSH.
20 G. AXLE
POWER: 4 YDS. 3/16 x 1/30 IN 4 STRANDS.
PROP. BLOCK 11" x 1" x 7/8"
WING MOUNT 'A' FULL SIZE 1 OFF · 1/16" HARD SHEET.
WING MOUNTS B FULL SIZE 2 OFF · 1/16" HARD SHEET
WEIGHTS
FUSELAGE ·6
AIRSCREW & NOSEBLOCK ·35
WING & MOUNT ·65
TAIL & FIN ·25
UNDERCARRIAGE ·15
RUBBER ·45
TOTAL 2·45 OZS.
WING SECTION · FULL SIZE · 22 OFF · 1/32" SHEET.
SWEEPBACK 1¼"
L.E. 3/32 SQ.
SPAR 1/4 x 3/32
1/16 GUSSETS
1/16 SQ. BIRCH
5/16 x 3/32
PORT WING
WING MOUNT
3/32 SQ.
1/32 RIBS
5/16 x 1/16
1/16 BIRCH
PORT TAILPLANE
WING MOUNT IS BUILT AS ABOVE. FAIRING IS ADDED AFTER THE TWO HALF WINGS HAVE BEEN CEMENTED TO 'A'.
SOFT BALSA FAIRING.
DIHEDRAL KEEPER · FULL SIZE · 2 OFF. 1 M/M PLY

A.B.A. NATIONAL COMPETITIONS, 1945

Over £350 in Cash Prizes with the addition of Silver Trophies

COMPETITION No. 1

RUBBER-DRIVEN DURATION MODELS.

Class A—Duration—for models built to the " Wakefield " formula :—

1st Prize, £6 ; 2nd Prize, £3 ; 3rd Prize, £1

Trophy valued at 25 guineas presented by PREMIER AEROMODEL SUPPLIES, LONDON.

Class B—Duration—for models built with a wing area not exceeding 160 sq. ins., and powered with a rubber motor not exceeding 2 oz. weight. (No limit to the all-up weight of the model.) For members *under* 16 years of age.

1st Prize, £6 ; 2nd Prize, £3 ; 3rd Prize, £1.

Trophy valued at 25 guineas presented by MODEL AERO SUPPLIES, HALIFAX.

Class C—Duration—for models built with a wing area not exceeding 160 sq. ins., and powered with a rubber motor not exceeding 2 oz. weight. (No limit to the all-up weight of the model.) For members *over* 16 years of age.

1st Prize, £6 ; 2nd Prize, £3 ; 3rd Prize, £1.

Trophy valued at 25 guineas presented by MODEL AIRCRAFT STORES, BOURNEMOUTH.

Class D—Duration—indoor models. Maximum all-up weight 2 oz. To be flown R.T.P.

1st Prize, £6 ; 2nd Prize, £3 ; 3rd Prize, £1.

Class E—Speed—indoor models all-up weight not to exceed 8 ozs. R.T.P.

1st Prize, £6 ; 2nd Prize, £3 ; 3rd Prize, £1.

COMPETITION No. 2

RUBBER-DRIVEN FLYING SCALE MODELS,

Class A—Duration—for models up to and including ½ in. scale.

1st Prize, £6 ; 2nd Prize, £3 ; 3rd Prize, £1.

Trophy valued at 25 guineas presented by ASTRAL AERO MODEL CO., LEEDS, YORKS.

Class B—Duration—for models above ½ in. and up to and including 1 in. scale. In each case models must rise off the ground.

1st Prize, £6 ; 2nd Prize, £3 ; 3rd Prize, £1.

Trophy presented by the PRESIDENT, Sir Robert Bird, Bart., M.P., J.P., valued at 25 guineas. Trophy valued at 10 guineas presented by SUPER SCALE KITS, UPPINGHAM, RUTLAND.

COMPETITION No. 3

NON-FLYING SCALE MODELS.

Class A—1/72nd scale for members *under* 16 years of age.

1st Prize, £6 ; 2nd Prize, £3 ; 3rd Prize, £1.

Trophy valued at 50 guineas presented by " BOYS' OWN PAPER." Trophy valued at 15 guineas presented by Mrs. E. V. BARNES, NORTH CHEAM, SUTTON, SURREY.

Class B—1/72nd scale for members *over* 16 years of age.

1st Prize, £6 ; 2nd Prize, £3 ; 3rd Prize, £1.

Trophy valued at 15 guineas presented by YORKSHIRE MODEL SUPPLY CO., LTD., HALIFAX.

Class C—1/48th scale.

1st Prize, £6 ; 2nd Prize, £3 ; 3rd Prize, £1.

Trophy valued at 25 guineas presented by CHINGFORD MODEL AERODROME, LONDON, E.4.

Class D—Above 1/48th scale.

1st Prize, £6 ; 2nd Prize, £3 ; 3rd Prize, £1.

Trophy valued at 25 guineas presented by MODEL AERONAUTICAL PRESS, LTD.

COMPETITION No. 4

POWER-DRIVEN MODELS.

Class A—A design for a petrol engine driven model aircraft ; span *NOT* to exceed 10 ft., and model to be suitable for an engine between 10 and 20 c.c. The model to be suitable for radio control.

1st Prize, £20 ; 2nd Prize, £10 ; 3rd Prize, £5.

Trophy valued at 50 guineas presented by NATIONAL MODELLERS SUPPLY, APSLEY, HUDDERSFIELD.

Class B—A design for a flying scale model of any type built to any scale, and suitable for an engine *NOT* exceeding 10 c.c. capacity.

1st Prize, £20 ; 2nd Prize, £10 ; 3rd Prize, £5.

Trophy valued at 25 guineas presented by MODEL AIRCRAFT STORES, BOURNEMOUTH.

Class C—Free-Lance design power-driven model. Engine capacity *NOT* to exceed 15 c.c.

1st Prize, £20 ; 2nd Prize, £10 ; 3rd Prize, £5.

COMPETITION No. 5

MOTIVE POWER PLANTS OF ANY TYPE OTHER THAN RUBBER.

Class A—A design competition for an internal combustion 2 or 4 stroke engine of any capacity up to 20 c.c.

1st Prize, £20 ; 2nd Prize, £10 ; 3rd Prize, £5.

Trophy valued at 25 guineas presented by E. KEIL & CO., LTD., LONDON, E.3.

Class B—A design for any type motive power plant other than as for Class A (such as rocket, jet, steam, electrical, compressed air, etc.). In each case the design to be for a " general purpose " unit, suitable for a model of between 5 ft. and 7 ft. span.

1st Prize, £20 ; 2nd Prize, £10 ; 3rd Prize, £5.

COMPETITION No. 6

SAILPLANES.

Class A—Duration—for a model built to F.A.I. rules, and *NOT* exceeding 10 ft. span.

1st Prize, £6 ; 2nd Prize, £3 ; 3rd Prize, £1.

Trophy valued at 25 guineas presented by ELITE MODEL AIRPLANE SUPPLIES.

Class B—Duration—for a model of original design and span *NOT* exceeding 10 ft.

1st Prize, £6 ; 2nd Prize, £3 ; 3rd Prize, £1.

Class C—For a design of a launching gear for a glider.

One Prize : £5.

COMPETITION No. 7

RUBBER - DRIVEN SEAPLANES AND FLYING BOATS.

Class A—Duration—for seaplanes of any size and type. 1st Prize, £6; 2nd Prize, £3; 3rd Prize, £1.

Class B—Duration—for flying boats of any size and type. 1st Prize, £6; 2nd Prize, £3; 3rd Prize, £1.

IN EACH CASE MODELS MUST RISE OFF WATER AND LAND ON WATER.

COMPETITION No. 8

EXPERIMENTAL MODELS.

Open to any type of model or power unit of such a type that it does *NOT* qualify for inclusion in any of the above Competition categories, *i.e.*, jet propelled aircraft, autogyro, helicopter, etc.

1st Prize, £20; 2nd Prize, £10; 3rd Prize, £5.

Trophy valued at 20 guineas presented by AIR-TRAINING CORPS GAZETTE.

ALL TROPHIES ARE TO BE HELD BY THE WINNERS FOR ONE YEAR.

ENTRANCE FEES TO NON-MEMBERS OF THE ASSOCIATION OF BRITISH AEROMODELLERS.

For those *under* 16 years of age at March 31st, 1945, 1s. per entry for all events.

For those *over* 16 years of age at March 31st, 1945, Competitions Nos. 1, 2, 3b, 3c, 3d, 6, 7, 2s. 6d. per entry. Competitions Nos. 4, 5, 6, 5s. per entry.

ENTRY TO SECTION MEMBERS OF THE A.B.A. IS FREE OF CHARGE.

Applications for Entry Forms should be accompanied by a stamped and self-addressed envelope.

All Duration Competitions will be flown decentralised, at any time and place to suit the entrant, and in accordance with the Association's standard rules for decentralised competitions.

All entries for Competition No. 3—Non-flying Scale Models—to be sent to the Association's offices for judging.

All entries to be made on the standard entry form obtainable from the Association's offices.

CLOSING DATE FOR ALL COMPETITIONS IS MARCH 31st, 1945.

THE ASSOCIATION OF BRITISH AEROMODELLERS

23, HANOVER STREET, LONDON. W.1

READERS' LETTERS. *Continued from page* 148.

"C" in the February issue, hence one would expect that the drag would be less. There will be extra drag due to the slipstream and airscrew turbulence, but I doubt whether these quite make up the difference at large angles. However, as it is not possible to do much about the error involved, which is not very great in most cases, we can accept the h.p. required to overcome the drag as almost equal to the h.p. for level flight. It will be more for small angles of climb, and possibly less for large ones.

The lifting of the model requires h.p. sufficient to move the other part of the thrust, equal to Wt sin θ, at a rate equal to the actual flying speed, and is $\frac{Wt \cdot \sin\theta \cdot V}{550}$ where V is in ft./sec. As sin θ is seen from the diagram to be $\frac{Vc}{V}$ this simplifies to $\frac{Wt. Vc.}{550}$ Vc being the climb in ft./sec. Thus the formula gives (in. ft/min.) $R/C = \frac{\text{Excess H.P.} \times 33{,}000}{\text{Weight}}$ but the formula does not say that the excess horse-power acts vertically, and it only gives approximate results. Unfortunately it is just when there is very little climb that the formula will indicate more than will be attained.

Thus Mr. Faulkner may well have had cause to doubt the formula in one special case, but it will be found useful in spite of that, if its limitations are understood.

Ayrshire. ROBERT BURNS.

A NEW SYSTEM OF TIMING.

DEAR SIR,

Competitions have been won, under the present system of timing, by competitors who would not have stood an earthly if "so-and-so's" model had not flown behind a house or tree, and been clocked-off as o.o.s. The odd two minutes or so it flew after reappearing, not being counted. Why is this so?

I am not trying to criticise or pull to pieces the present system of timing, but, I am trying to suggest a new and fairer system, whereby the chap with the better model has just as good a chance of having the whole of his flight timed as the chap with the model which remains in sight all the time.

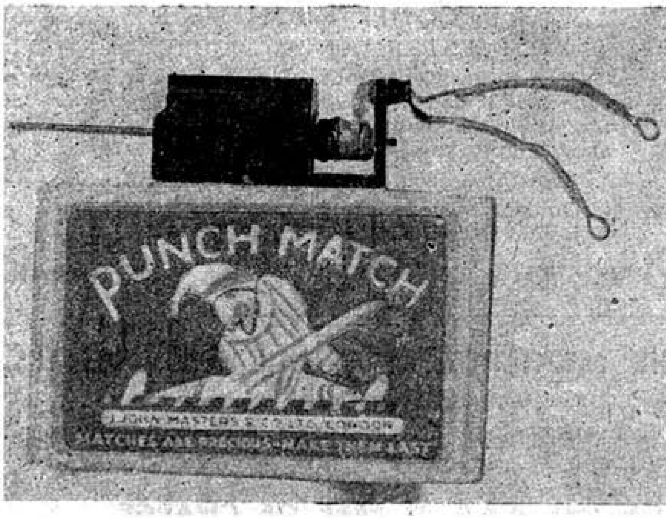
In the first place, timekeepers should have a good vantage point from which to watch the models. I have seen keen flyers watching their models from a far better point than the timekeepers, for some time after the model has been clocked-off as o.o.s. by the timekeepers. Timekeepers should also be mobile. They always seem to stay in one position until a model is o.o.s., whereas if they had moved 15 or 20 yards, they would have seen the model for another 25 or 30 seconds, which, as everybody knows, counts a lot in a competition.

Now for the timing of o.o.s. flights themselves. As soon as a model goes out of sight, a minimum of ten or more seconds should be counted from the time it disappears. If the model reappears before the end of that time, the flight goes on as if nothing had happened. If the model fails to reappear at the end of the minimum time allowed, that time is deducted from the time shown by the watch, and the remaining time is placed to the credit of the model.

It will be seen that this system gives a chance to the flyer whose model disappears behind a house or tree, etc., and then reappears, or the flyer whose model is circling and goes into the blue, and then reappears as it circles back towards the flying ground. (On good flying days, and other days as well, when this is very liable to happen, timekeepers should, if possible, come prepared with a pair of binoculars or a telescope.)

I hope this will help in obtaining a better system of timing flying model aircraft, especially o.o.s. flights.

Yorks. K. ECKERSLEY.



A SMALL ELECTRIC MOTOR

BY W · A · WOOLACOTT

Left shows the motor approximately its actual size. This particular version utilises a permanent magnet and readers will find that either type of motor can be built into a 1/72nd scale in line engine scale model. The drawing below is twice full-size, and as no lathe is required in the construction, building the motor should be well within the capabilities of most "Solid" enthusiasts.

Materials required :—

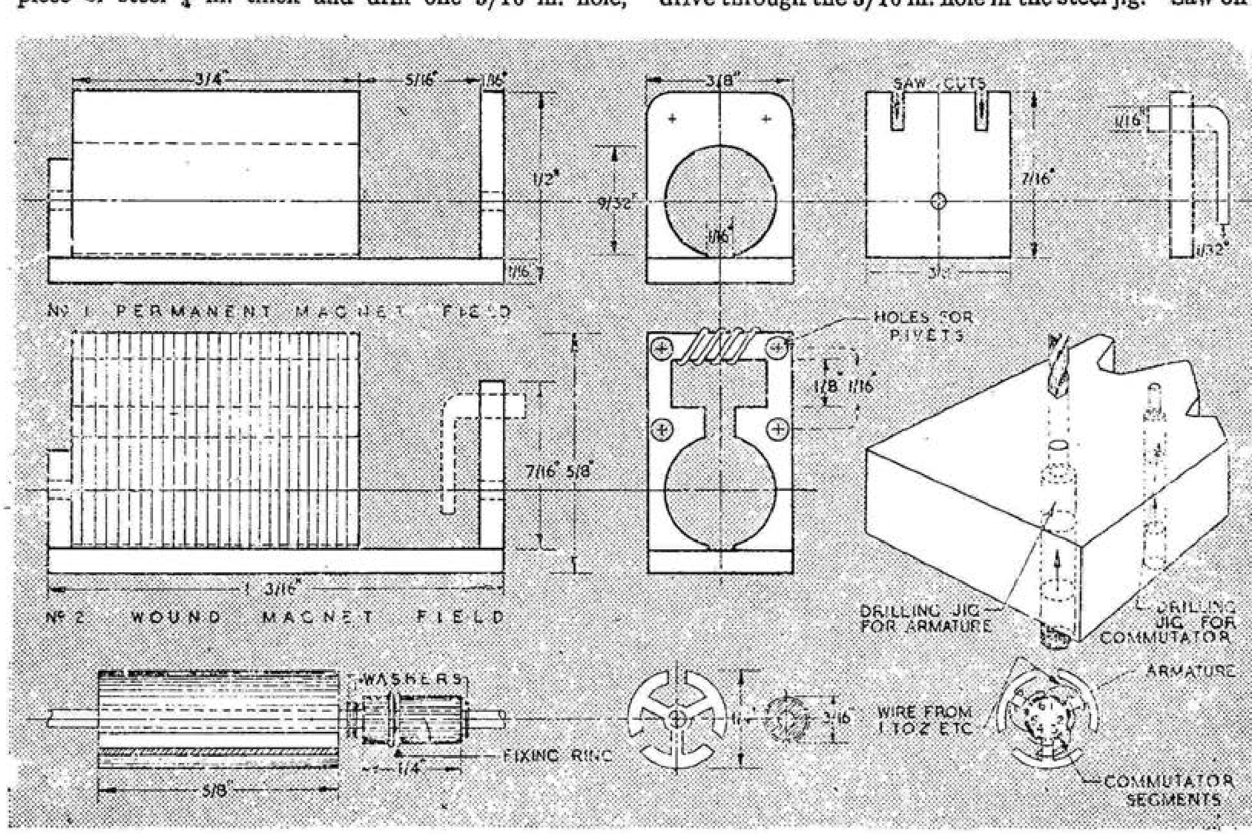
A piece of cast steel for the permanent magnet (or if a wound magnet is made, then a small sheet of 0·20 in. soft iron) ; a piece of brass or copper foil ; a length of ¼ in. round soft iron or ¼ in. round black iron bolt ; a piece of phosphor-bronze or brass ; a piece of fibre or hard wood and a needle of 3/64 in. diameter.

First to be made is the jig for armature and commutator. Take a piece of brass about ½ in. thick and mark off two points 1 in. apart. Drill through with a 3/64 in. drill, then follow two-thirds of the way with 3/16 in. in one and ¼ in. drill in the other. Next take a piece of steel ¼ in. thick and drill one 3/16 in. hole, this is a jig for the shaping of the commutator.

To make the armature, cut off a piece of the ¼ in. soft iron ⅝ in. in length ; place in the jig and drill through with a 3/64 in. drill ; insert needle and then solder.

The writer found that the easiest way to cut the slots in the armature was with a jeweller's hacksaw. Saw down first to the full depth of slot, then, by holding the saw at an angle, enlarge on either side. Now remove all sharp edges, dip in shellac varnish and allow to dry.

The commutator is made from a piece of fibre or hard wood. The one shown was made from a piece of beech. Whittle down to approximately 3/16 in. diameter, then drive through the 3/16 in. hole in the steel jig. Saw off a



½ in. length, place in jig and drill with 3/64 in. drill. Now take a piece of copper foil (brass will do), cut off 3 pieces and stick on the hub, leaving a gap of 1/64 in. (less if possible), between each. The fixing ring is made by soldering two turns of 5 amp. fuse wire around the commutator; this, of course, must be insulated from the three segments, with a strip of paper.

The armature winding is a simple lap winding; that is, the end of one coil forms the beginning of the next. This motor is wound with 40 turns per coil of 42 gauge (·0040 in.) enamelled wire. After winding, test for shorts and earth; if faulty, scrap and re-wind. Now test commutator for shorts and then push on shaft (see sketch). Solder connections and dip the whole in varnish; bake in front of fire.

The permanent magnet was made from an old ⅝ in. square file. This requires softening, so place in fire and leave all night, so that it cools down slowly with the fire. Now cut off a length ¾ in. long, drill a 9/32 in. hole and file up as shown in sketch.

The saw cut for the air gap should be 1/16 in. wide. Return to fire, heat to a colour mid-way between dull and bright red, then quench in oil or water. Magnetize from another magnet, or if this is not available, try the local garage or similar place.

The wound magnet takes longer to construct. Take a piece of soft iron sheet ·020 in. thick. Cut off sufficient pieces 7/16 in. by 11/16 in. to make it ¾ in. in length. Clamp together and drill as shown in sketch. Rivet and file to size. The top air gap should be slightly larger than the bottom. Dip the top portion in shellac, allow to dry and wind with 100 turns of 42 gauge enamelled wire. The two ends of the wire are eventually soldered to their respective brushes.

Now take a piece of phosphor-bronze or brass ⅜ in. wide and not less than 1/16 in. thick, cut off 13/16 in. for the base of the motor, ½ in. for the back-end plate and 7/16 in. for the front-end plate. Mark off for drilling on the two end plates 5/32 in. from the bottom (see sketch) and drill with a 3/64 in. drill. In the 7/16 in. piece cut two saw cuts for the brushes. These are made, as shown in sketch, from a piece of springy brass and fixed by insulating with paper and securing with shellac.

Three distance washers should now be cut from a postcard and placed two on the back of the armature and one on the front.

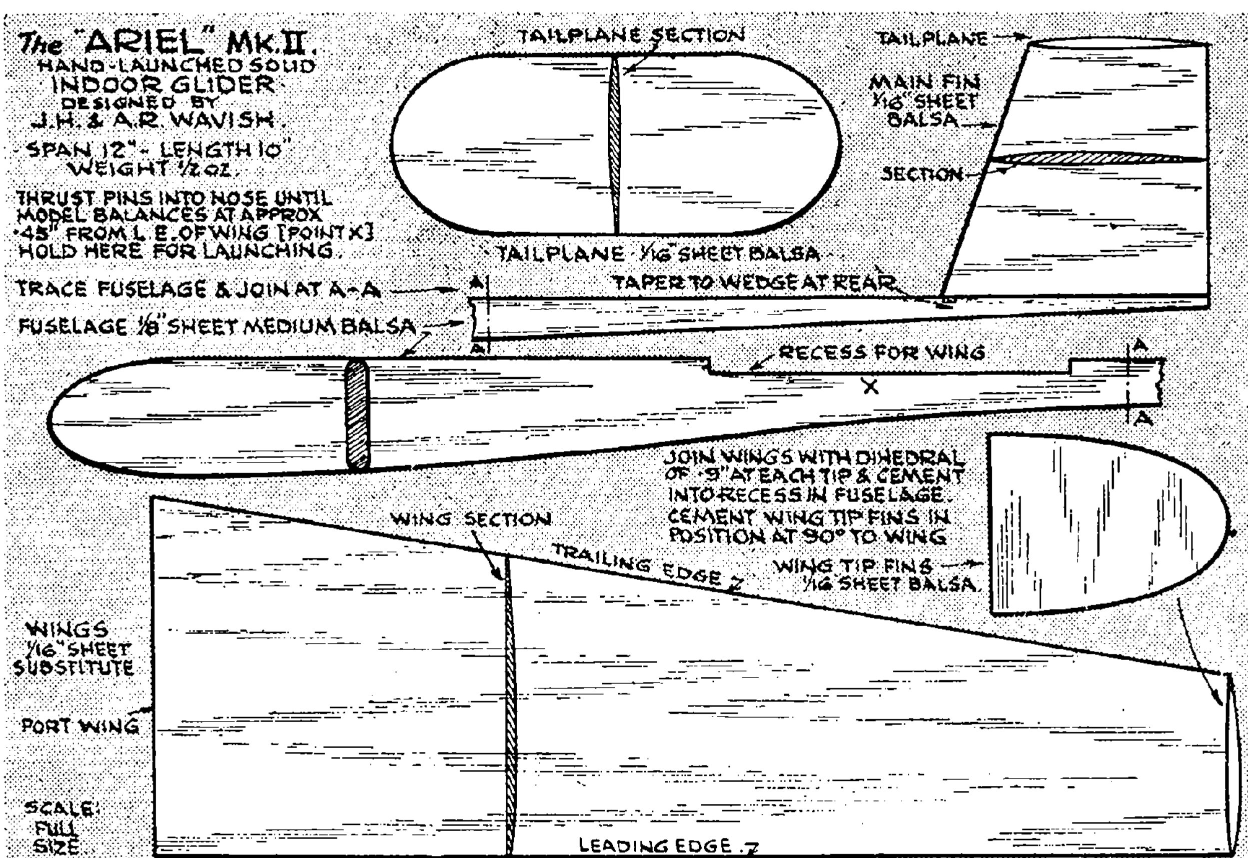
The motor is now ready for assembly. Solder the back-end plate and magnet to the base, place armature in magnet and hold front-end plate in position. If your marking off and drilling has been done correctly, the armature should rotate freely. If it does not, file gently. When free, solder front end plate; lubricate bearings.

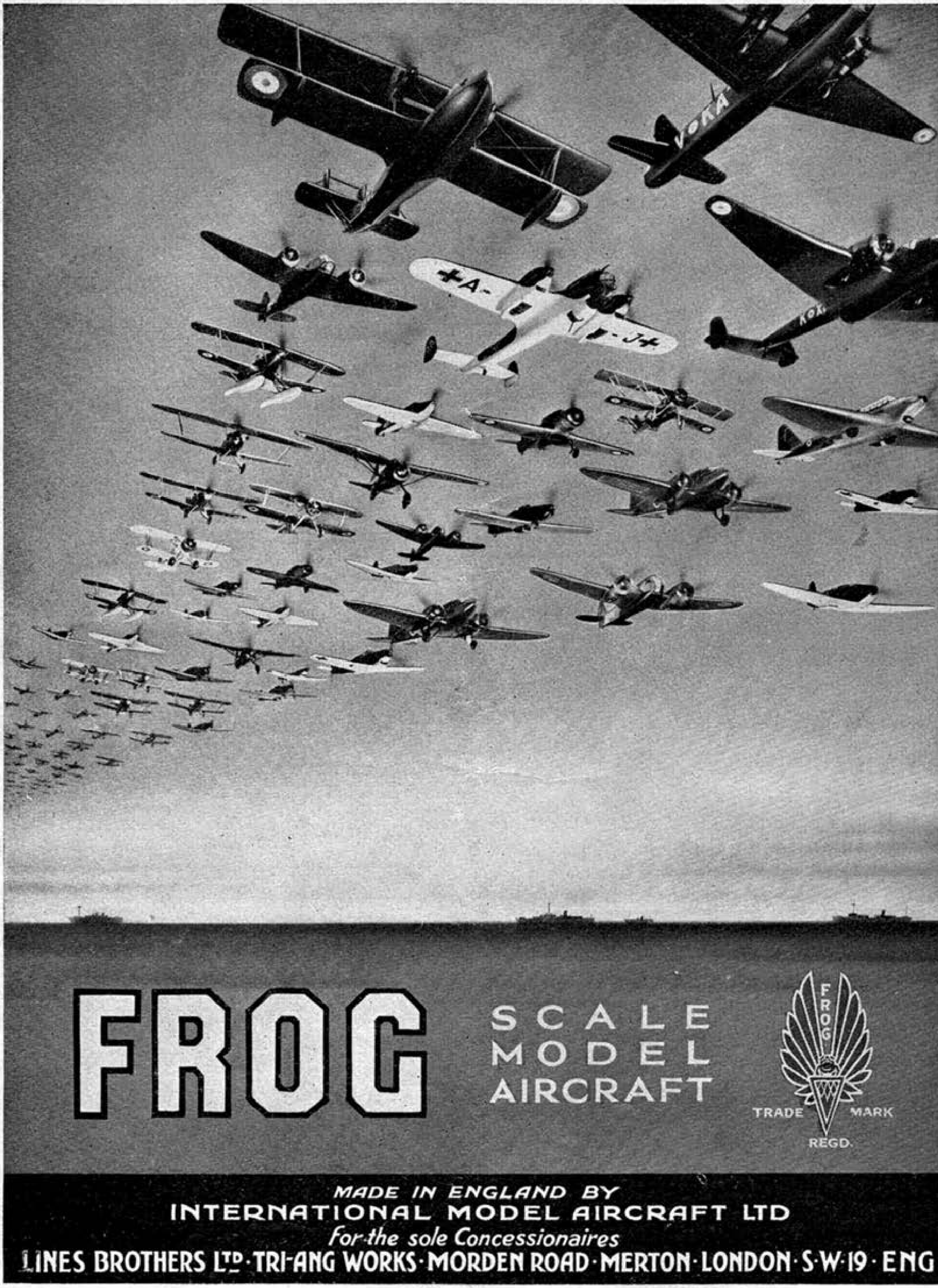
NOTES:

Permanent magnet should be drilled at a low speed and preferably with a carbon steel drill. The brushes should rest very lightly on the commutator.

The motor runs on 2·5 volts with the permanent magnet and 4·5 volts with the wound magnet, and by reversing supply leads will rotate in either direction.

This motor was designed to be made without a lathe and if the instructions are carefully followed, it should not present any difficulties to anyone. Total weight of finished motor, 0·714 ounces.




FROG
SCALE
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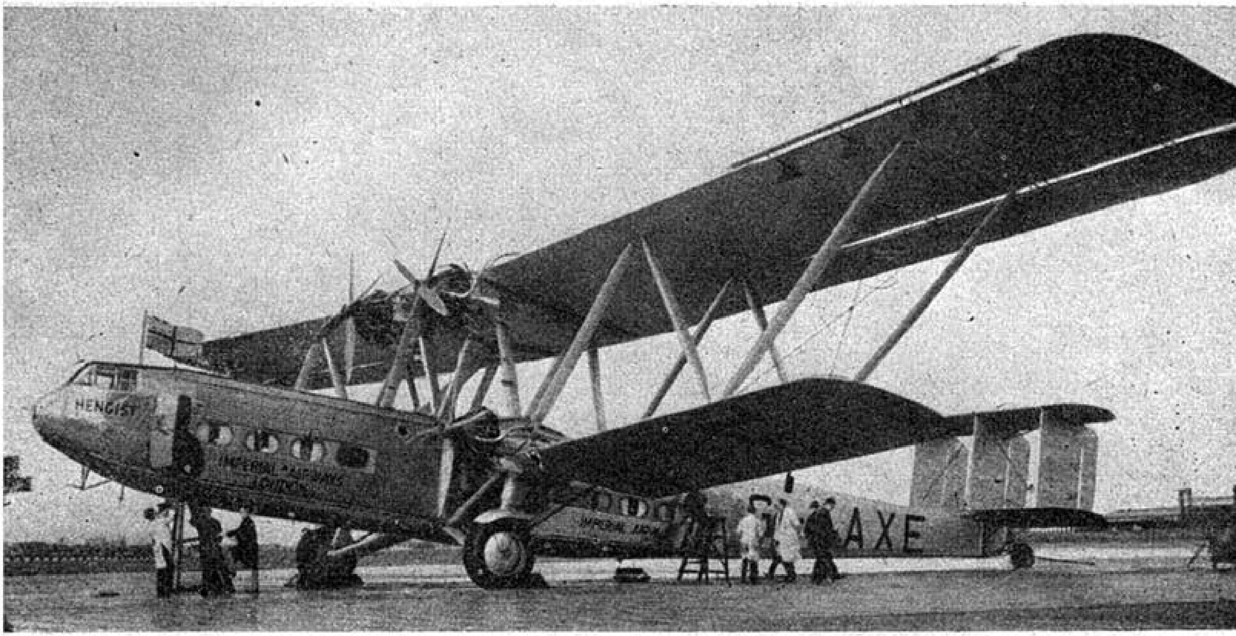


Photo: Fox.

• STALLING THE STALL •

BY F/LT. JAY

MY appeal is to experimenters who have mainly to do with scale type models, and I make the apology at once that a great deal of my assumption is based upon my experience of full-size flight.

The difference between full and scale size flying is in my opinion very small, and much can be done to assist the development of larger aircraft by experiments with models. The advent of the German flying bomb is a very good—even a devastating—example of what I mean.

To some, the ideas which I mention here may seem old, but perfection can only be reached by stages, and the earlier stages cannot be jumped. And practising with adaptations of existing ideas brings entirely new schemes, for if you can be disappointed for long enough, determination will produce results in the end.

The big weakness in flying, full or fractional size, is that the glide is unstable unless fast; resulting in high landing speed, the smashing of models and unnecessary strain on the structure of the parent aircraft.

There is only one direct solution to this trouble, which is to delay the stall occurring until the very last moment, and try to bring stalling speed, as a bird does, down to a point where it can land without strain.

Ornithopters do not enter into my ideas at all. A bird, when gliding and landing, is perfectly similar to an aeroplane, using a large elevator surface, providing its own flaps and (the only thing we can't do yet!) changing its wing section to high lift high drag section, set at an incredible angle of attack.

Now for the experiments I would like to hear about.

Dispense with saving weight at once. Weight will in future be saved in parent aircraft by new alloys, but whatever is saved will be made up for in payload. Have the wing loading high.

I am fortunate in having been able to experiment with scale models the parent types of which I have flown and know. Most of these models were built from Mr. Towner's designs and adapted by myself with a nice eye but no slide rule. My results are therefore not detailed.

The models I have used are the Hampden, the Hudson, the Spitfire; all of approximately 30 in. wing span and weighing about 8 ozs.: a Hurricane (pre-war construction of balsa), 20 in. span, 3 ozs.

To stabilise the glide and delay the stall, I have tried accepted methods, as follows:

First, fixed slots of the Handley Page type on the outer leading edge with an aerofoil upper surface, so fixed as to form a venturi action.

Incidentally, before trying any additional fitments, I deliberately stalled the aeroplanes "raw," and in each case the models approximated very closely to the behaviour of their parents. It cost me much time and labour to repair them, but without this preliminary what happened later would have been useless.

With the slots fixed the glide was prolonged and stable, with very slight tendency to wingdrop even in gusts, and landing speed was reasonable. Lift/drag ratio was high and in power flight no appreciable difference in duration was noticed. When deliberately stalled, each machine kept level, made a spongy sort of drop and picked up again after losing a good deal of height. (The Hudson alone recovered too late, failed to pick up a wingdrop and swooped round over long grass and smashed into barbed wire, but it was at the time definitely recovered from the stall.)

There may be some doubt in readers' minds as to whether such slots maintain lateral stability. In actual fact, they do. On the Tiger Moth and Tutor, where the slots are unlocked, it is difficult to make a wingdrop at the stall, and sometimes requires opposite aileron as well as full rudder. With slots locked, both machines will flip into a spin without opposite aileron.

The next experiment was with letter-box slots of the

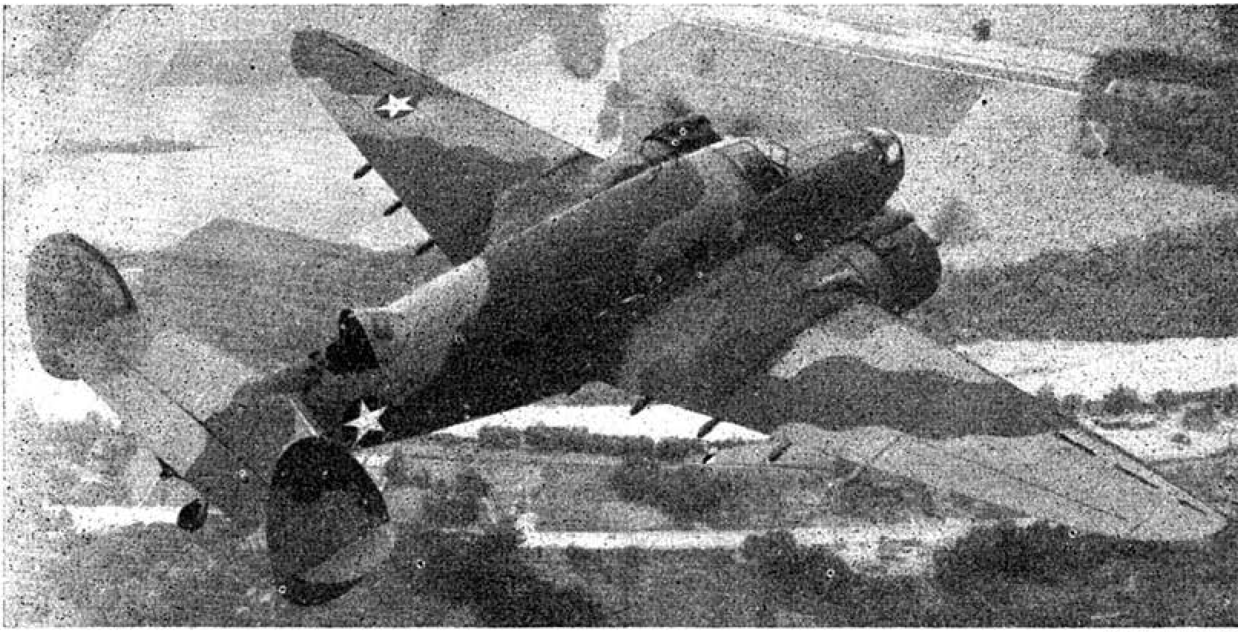


Photo: Lockheed.

On the opposite page is shewn one of the old Handley-Page 42 air-liners formerly operated with great success by Imperial Airways, now the British Overseas Airways Corporation. The slot on the port wing is in the open or forward position. On this page is a Lockheed A-29 Hudson of the U.S. Army. The wing-tip slots are of a different type from those on the H. P. 42 and are known as "letter-box" slots. They were not installed on the original Lockheed Model 14, from which the Hudson was developed, but were introduced as a result of operational experience.

type punched into the early Hudsons coming into this country for service. Dr. Forster I see has incorporated these in his scale Spitfire.

Results were disappointing by comparison. Gliding was faster than with HP slots, and lateral stability was not maintained. Both Spitfire and Hudson spun off the stall, and did not take the air again for three weeks.

Letter-box slots had the advantage of neatness and low drag, but the results were disappointing by comparison, and therefore I did not proceed with them.

HP slots were then retained for all the following experiments. It appeared to be no advantage to extend them along the whole leading edge of the wing; the outer third is enough. It was once suggested in AEROMODELLER that a length of twine fixed above the leading edge would have the same effect as shaped slots; but I find this does not work with high wing loading, and lateral stability is not maintained at all.

Next, flaps.

In the parent aircraft flaps stabilise the glide and give better control. Up to 25 degrees of flap gives added lift for glide in most cases. But the stall is more violent when it occurs and wing dropping excessive.

All the models were first tried with 20 degrees of flap, necessarily fixed. This, combined with HP slots, gave a better glide still; longer, slower and at a flat angle for landing. The stall was gentle on three machines, but the dear old Hudson still dropped a wing and spun in flatly, this time without much damage.

Drag was noticeably increased for power flight, but seemed to disappear on the glide.

Finally 45 degrees of flap were tried. Power flight was hopeless, of course, but the glides were almost perfect, and the Hampden thrice came down in three pointers. Stability was amazing even in gusts, BUT when the stall was reached the effect was quite violent on every one except the Hurricane.

Experiments with flaps must be treated with care, unless you wish to be continually rebuilding, as I have been. Remember that with flap down, the nose must be trimmed up by a negative incidence on the elevators. For high wings, the nose must be trimmed down; or, in the case of Mr. Russell's Lysander, with automatic slots working in conjunction with flaps, it is possible that no trimming would be necessary as the machine might take a nice nose up attitude for the final glide.

I would like to see some ingenious experimenter, such as Mr. Moore, contrive a simple arrangement whereby the machine takes off clean, and when the power runs out, puts down 25 degrees of flap and trims the nose up the required amount (as much as 1/16 in. was needed on the Spitfire), so as to give a slow, stable glide.

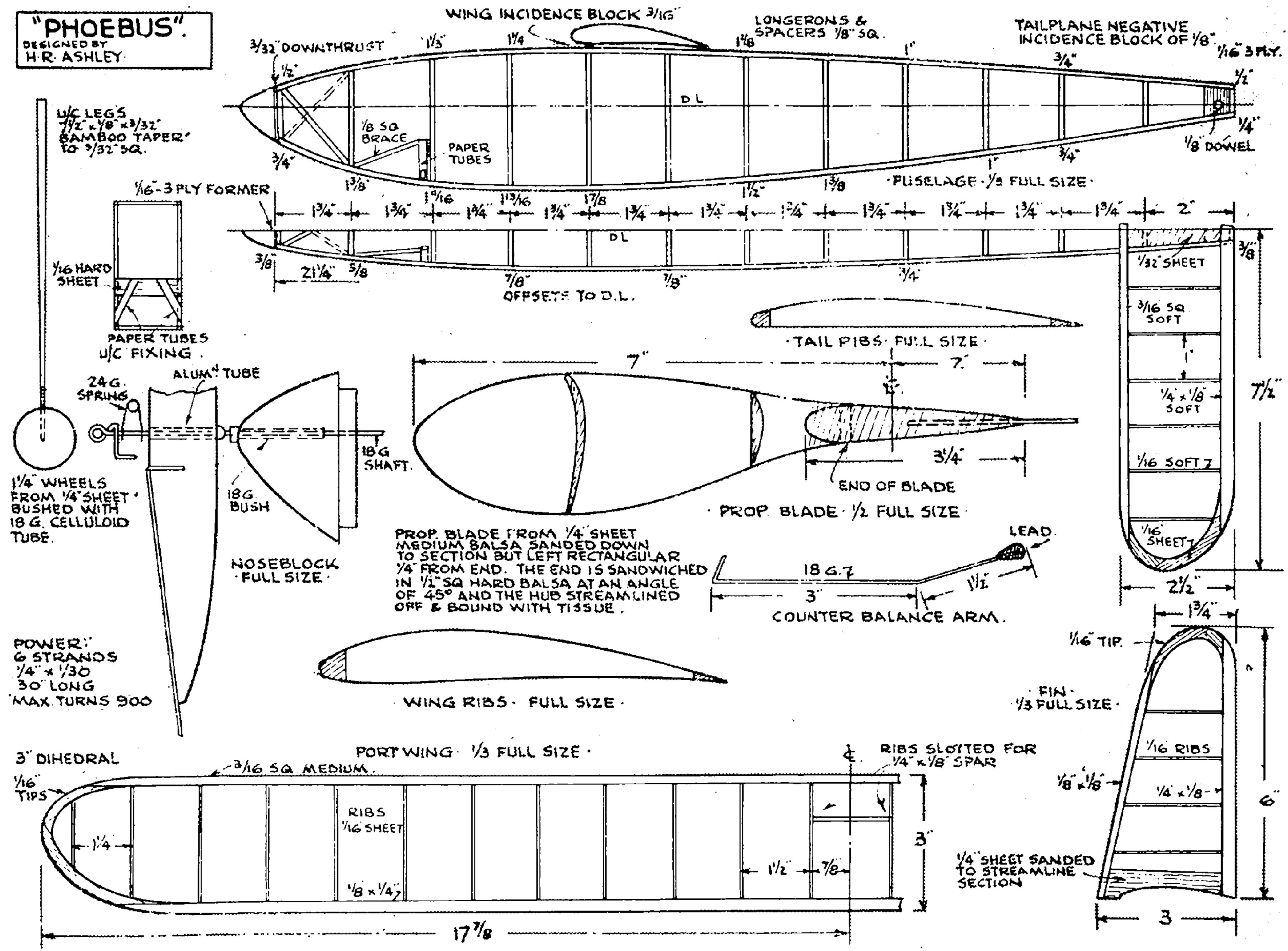
To begin experimenting in such things usually means to continue and I believe that if I can rouse any enthusiasm in the minds of your readers we will find many good ideas resting there which might make a great difference to the slow performance of aircraft in the future.

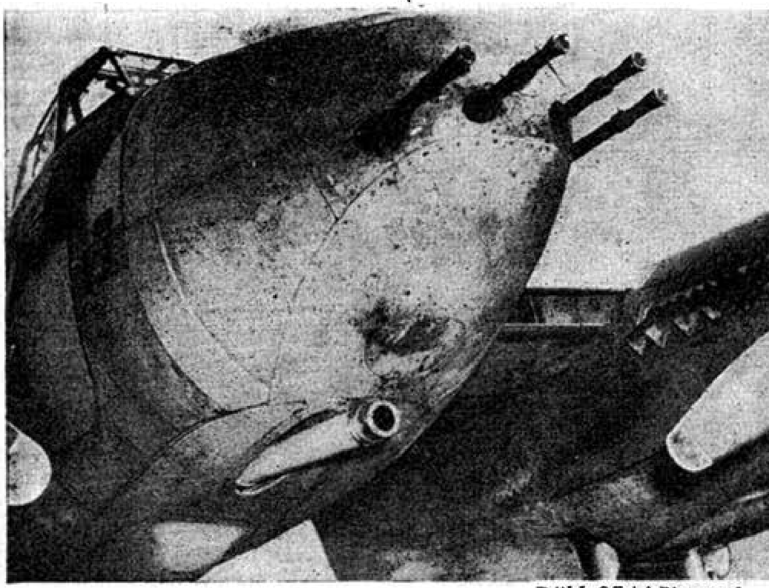
Anent stalling: do not forget that the stall begins *before* the last dizzy drop out of the sky, sideways or otherwise. Before all control is lost, the aeroplane will, while still flying, lose considerable height, and it is this part of the stall which is most dangerous, for it is often not noticed, and any bank or semblance of a turn which may be applied then will flick the machine into a spin. Most machines spin better *before* the dead stall than after it.

The stall does not always begin at the wing tips, either. Very often it will begin at the centre section.

I imagine that this is a very suitable time to attract the attention of the modelling fraternity to glides and stalls rather than duration, since rubber is so hard to get that my stock of pre-war stuff has now got so short that I have to swap over the motors from one machine to the other before I can test it for power.

And when that gives out I shall myself be stalled.


"PHOEBUS".
DESIGNED BY H.R. ASHLEY
WING INCIDENCE BLOCK 3/16"
LONGERONS & SPACERS 1/8" SQ.
TAILPLANE NEGATIVE INCIDENCE BLOCK OF 1/8"
1/16" 3 PLY.
3/32" DOWNTHRUST
1/8" DOWEL
1/8 SQ BRACE
PAPER TUBES
FUSELAGE 1/3 FULL SIZE
U/C LEGS 7 1/2" x 1/8" x 3/32" BAMBOO TAPER TO 3/32" SQ.
1/16"-3 PLY FORMER
1/16 HARD SHEET
PAPER TUBES
U/C FIXING
OFFSETS TO D.L.
D L
1/32" SHEET
3/16 SQ SOFT
1/4" x 1/8" SOFT
1/16 SOFT
1/16" SHEET
TAIL RIBS FULL SIZE
24G. SPRING
ALUM.M TUBE
18G SHAFT
18G. BUSH
1 1/4" WHEELS FROM 1/4" SHEET BUSHED WITH 18 G. CELLULOID TUBE.
NOSEBLOCK FULL SIZE
END OF BLADE
PROP. BLADE 1/2 FULL SIZE
PROP. BLADE FROM 1/4" SHEET MEDIUM BALSA SANDED DOWN TO SECTION BUT LEFT RECTANGULAR 1/4" FROM END. THE END IS SANDWICHED IN 1/2" SQ HARD BALSA AT AN ANGLE OF 45° AND THE HUB STREAMLINED OFF & BOUND WITH TISSUE.
LEAD
18 G.
COUNTER BALANCE ARM.
POWER: 6 STRANDS 1/4" x 1/30 30" LONG MAX TURNS 900
WING RIBS FULL SIZE
1/16" TIP
FIN 1/3 FULL SIZE
1/16 RIBS
1/4" x 1/8"
1/8" x 1/8"
1/4" SHEET SANDED TO STREAMLINE SECTION
3" DIHEDRAL
PORT WING 1/3 FULL SIZE
3/16 SQ. MEDIUM
RIBS SLOTTED FOR 1/4" x 1/8" SPAR
1/16" TIPS
RIBS 1/16 SHEET
1/8 x 1/4
17 7/8



British Official Photograph.

MONTHLY MEMORANDA

BY O · G · THETFORD

The Mosquito VI, XVI and XVIII.

The wide variety of Mosquito versions now flying has given rise to some confusion amongst model-builders and the fact that many of the Mark numbers are still restricted rather deteriorates the position. Three of the commoner versions which may now be mentioned include the Mk. VI fighter-bomber, the P.R.U. model (Mk. XVI) and the Mk. XVIII, news of which has just been released. The Mk. VI is a fighter-bomber version of the original Mk. II fighter.

The Mosquito VI is camouflaged in Dark Green and Medium Sea Grey on the upper surfaces and Medium Sea Grey on the lower surfaces. Various batches are serially numbered HX 958, HX 959, HX 960, etc., MM 417, MM 418, MM 419, etc., NS 839, NS 840, NS 841, etc., and HR 147, HR 148, HR 149, etc. Squadrons flying the Mk. VI include "SY," "EG," "YH," and "TH." It may be recalled as a matter of interest that "SY" squadron formerly flew Bristol Blenheims.; "YH" squadron flew the Lockheed Ventura at one period. "TH" squadron was at one period equipped with a night intruder version of the Douglas Boston III.

The P.R.U. Mosquito XVI is painted P.R.U. Blue on all surfaces. One batch is serially numbered ML 914, ML 915. ML 916, etc.

The Mosquito XVIII is a fighter version used by Coastal Command and is fitted with a "solid nose." Its special feature is a six-pounder cannon mounted in the nose (see heading illustration). Notes on the markings of the Mosquito XVIII will appear in an early issue.

British Camouflage Standards.

This feature has now been appearing in the AEROMODELLER for nearly three years and has attempted to provide builders of scale model aircraft with (*a*) all relevant information on the marking and colouring of military aircraft, and (*b*) notes on new Marks and structural changes in aircraft types in so far as these concern the model builder. In describing camouflage schemes, however, the writer has been handicapped by his medium. Mention of such colours as "Light Earth" and "Dark Green" conveyed little to a modeller who had never seen the actual colours on a full-size aircraft. The information on colour, to be intelligible, had to be supported by samples of the colour discussed.

Now, for the first time, we are able to supply the reader with this information. By the kind permission of the Ministry of Aircraft Production we have been able to prepare a chart of the twenty-four different camouflage colours employed on aeroplanes of the Royal Air Force and Fleet Air Arm. This Chart is reproduced in "Aircraft of the Fighting Powers," Volume V (1944) and has also been made available in pamphlet form, together with a Compendium of current camouflage schemes used on British and American aircraft.

From now onwards reference to certain camouflage colours in this column can be correlated with this colour Chart. For purposes of reference a complete list of the colours on the Chart appears below. The correct Air Ministry and Ministry of Aircraft Production nomenclature is used, despite the fact that, without an actual sample, the names are very often poor descriptions of the actual colour.

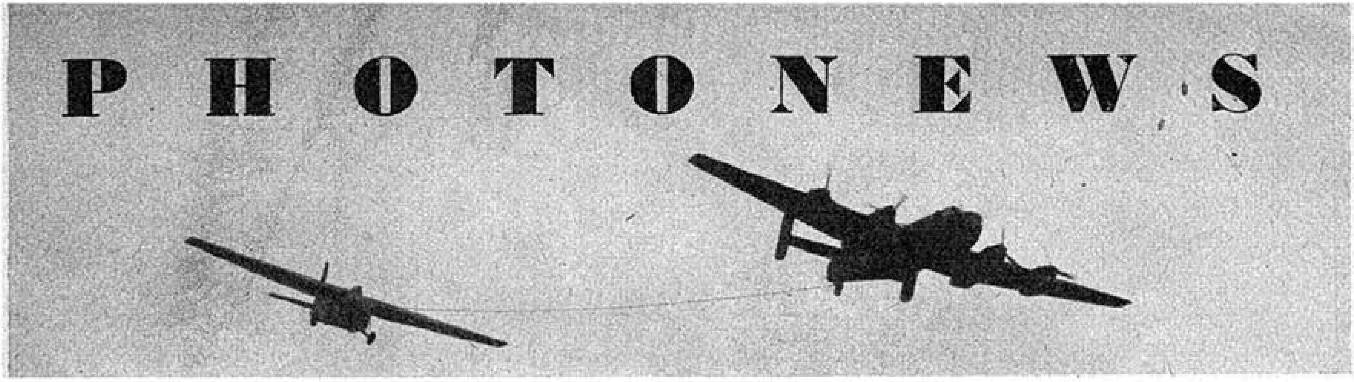
1. *Sky Grey*. 2. *Ocean Grey*. 3. *Light Earth*. 4. *Red (Roundels and Letters on Night-Flying Types)*. 5. *Dark Sea Grey*. 6. *Dark Green*. 7. *Dark Earth*. 8. *Middle Stone*. 9. *Dark Slate Grey*. 10. *Medium Sea Grey*. 11. *Light Green*., 12. *Yellow (Trainers and Roundels)*. 13. *Extra Dark Sea Grey*. 14. *Grey Green*. 15. *Light Slate Grey*. 16. *Sky*. 17. *Deep Sky Blue*. 18. *P.R.U. Blue*. 19. *Extra Dark Sea Green*. 20. *Sky Blue*. 21. *Blue (Roundels)*. 22. *Mediterranean Dark Blue*. 23. *Mediterranean Light Blue*. 24. *Azure Blue*.

R.A.F. Flashbacks—3.

This month's reminiscence is the Westland Wapiti biplane day bomber, the standard Army Co-operation aeroplane in the Middle East and India throughout the nineteen-thirties and also the standard equipment of the day bombing squadrons of the Auxiliary Air Force in this country from the early 'thirties until about 1936. The Wapiti bridged the gap between the De Havilland 9A of Great War days and the Hawker Harts and Hinds. The prototype Wapiti, produced in 1927, was numbered J 8495. It was of composite construction, as were the first twenty-five production aircraft. Subsequent machines were of all-metal construction and the Wapiti in the picture opposite, J 9237, is the first all-metal Wapiti ever built.

Wapitis with the squadrons were doped silver all over and carried the standard roundels on the wings and fuselage. The roundels on the wings overlapped the ailerons. Red, white and blue stripes appeared on the rudder. The fuselage decking was painted battleship grey or blue. Wapitis carried their squadron number (*i.e.*, 600, 601, 605, etc.) in the Flight Colour on the sides of the fuselage just ahead of the pilot's cockpit. The wheels were also painted in the flight colour.

P H O T O N E W S



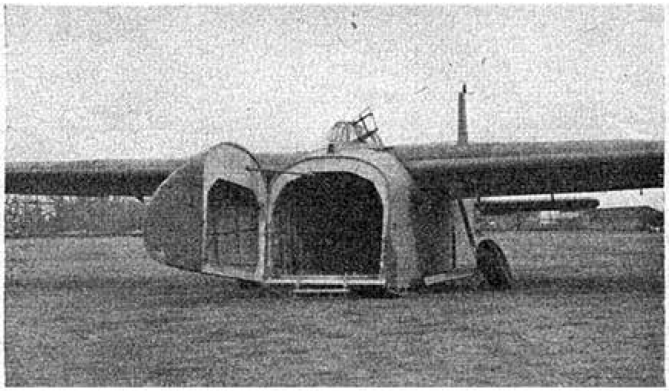
In the photograph above a Halifax V (Merlin motors) is towing a G.A.L. Hamilcar transport glider. On the right is shown a close-up of the nose of the Hamilcar with the door opened after landing. (A.T.P. Photo.)

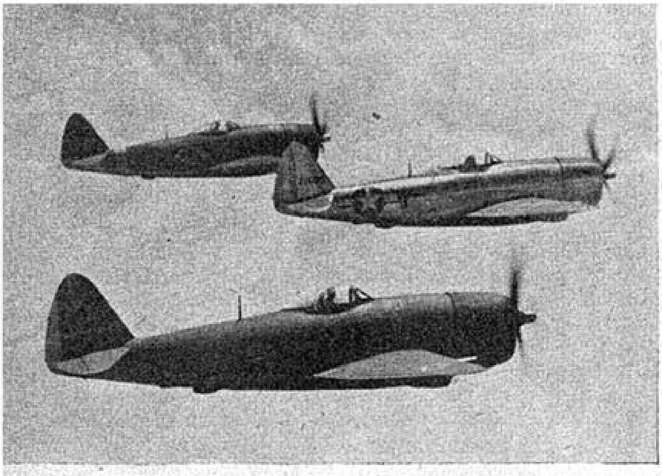
Below is a flight of P-47D Thunderbolts with "bubble" cockpits. They are shown in the colours of the R.A.F., U.S. Army and Brazilian Air Force. (Republic Photo.)

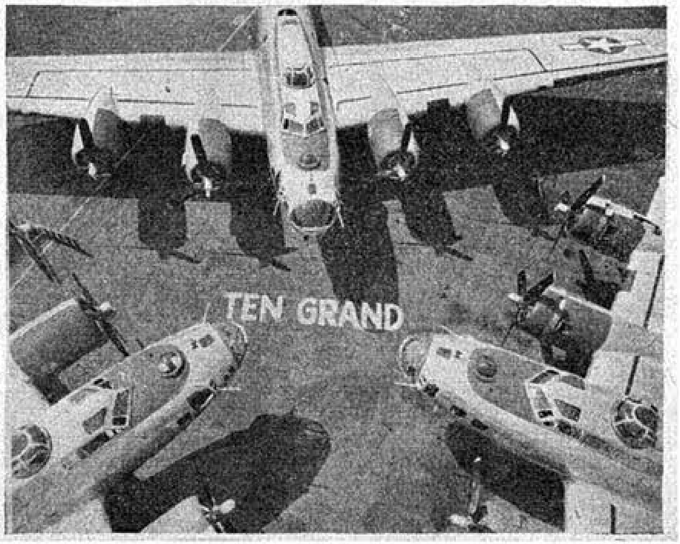
The Westland Wapiti (Jupiter), below, right, was a standard day-bomber from 1929 to 1933. It was used extensively by the R.A.F. on the North-West Frontier, and in this country by the Auxiliary Air Force. ("Flight" Photo.)

The aircraft in the lower left-hand photograph is a new helicopter built by the Bell Aircraft Corporation. (Bell Photo.)

"TEN GRAND."—In the lower right-hand photograph are shown the 9,999th, 10,000th and 10,001st B-17 Fortresses to be produced. The Boeing, Douglas and Lockheed factories have all been producing the B-17. Those in the picture are of the latest B-17G type. Photo: Aircraft War Production Council.)







AEROPLANES DESCRIBED XXIV

The FAIREY FIREFLY I

NEXT MONTH:—
The Bristol Bulldog IIA

BY H · J · COOPER

A.T.P. Photo.

THE name of Fairey is always associated with the Fleet Air Arm. As far back as the last war, Fairey seaplanes were operating with the R.N.A.S., and ever since then the firm has been largely responsible for the high standard of efficiency which the Fleet Air Arm, both when controlled by the Air Ministry and later, as now, by the Admiralty, has attained.

Commencing with the Hamble Baby of 1916, a wide variety of naval designs has been built, including the Campania and N–10, from which was developed the famous III series. There was also the little Jaguar-powered Flycatcher fleet fighter built as a landplane or a seaplane or as a float-amphibian, and in any form the most successful fleet fighter of its time. The III series was the forerunner of the Seal, Swordfish, Albacore and Seafox biplanes and the Fulmar and Barracuda monoplanes of to-day. Now we have the Firefly, the latest two-seat fleet fighter reconnaissance aircraft.

Naval aircraft are much more complex in design than land-based aircraft. So much additional gear has to be carried and so many devices essentially naval have to be incorporated that there are few navy types which have a high performance. The Firefly is an exception, and already promises to be one of the most successful designs of this war.

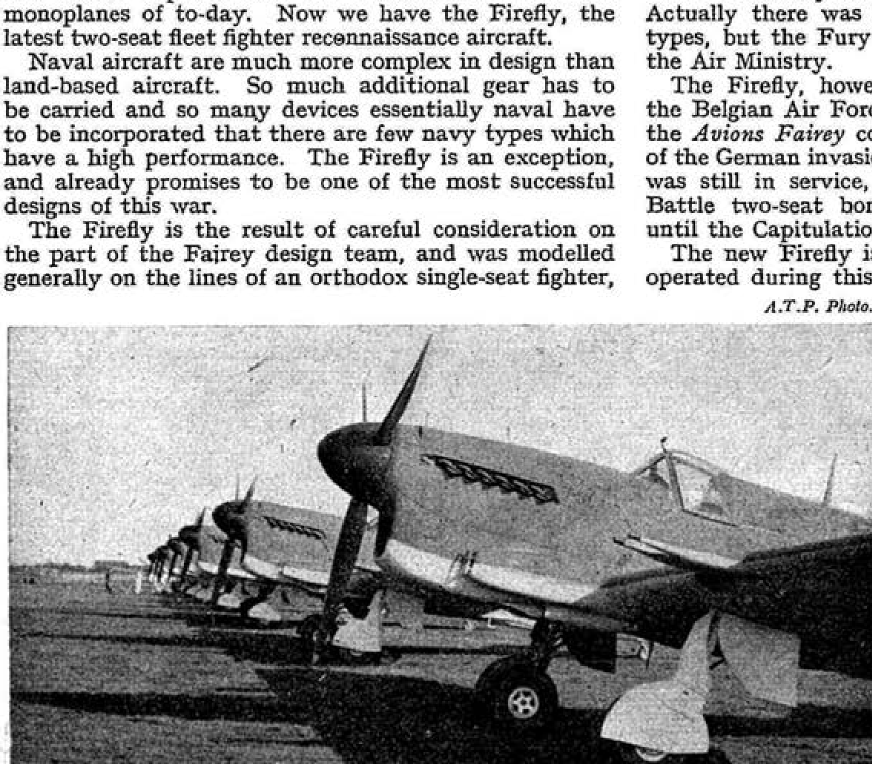
The Firefly is the result of careful consideration on the part of the Fairey design team, and was modelled generally on the lines of an orthodox single-seat fighter, but incorporates all necessary naval features such as wing-folding and deck-landing gear, and particularly good visibility from the pilot's cockpit. It was essential that good manœuvrability was obtained in addition to high speed; and a long range and short take-off run for deck operations were of the utmost importance. The incorporation of an observer's cockpit naturally enhances the machine's reconnaissance value.

The name Firefly was first given to the single-seat fighter biplane of 1925 which was fitted with a Fairey Felix (or Curtiss D–XII) motor. This design was progressively developed through the Marks II and III, but was not accepted by the Air Ministry. Both the Firefly II and the Hawker Fury, similar in appearance, were produced at the same time, and it was the Fury which was finally accepted for issue to R.A.F. squadrons. Actually there was little to choose between the two types, but the Fury was considered slightly better by the Air Ministry.

The Firefly, however, was supplied in quantity to the Belgian Air Force, and was built under licence by the *Avions Fairey* company at Gosselies. At the time of the German invasion of the Low Countries, the Firefly was still in service, and, together with the Fox and Battle two-seat bombers was operated with success until the Capitulation.

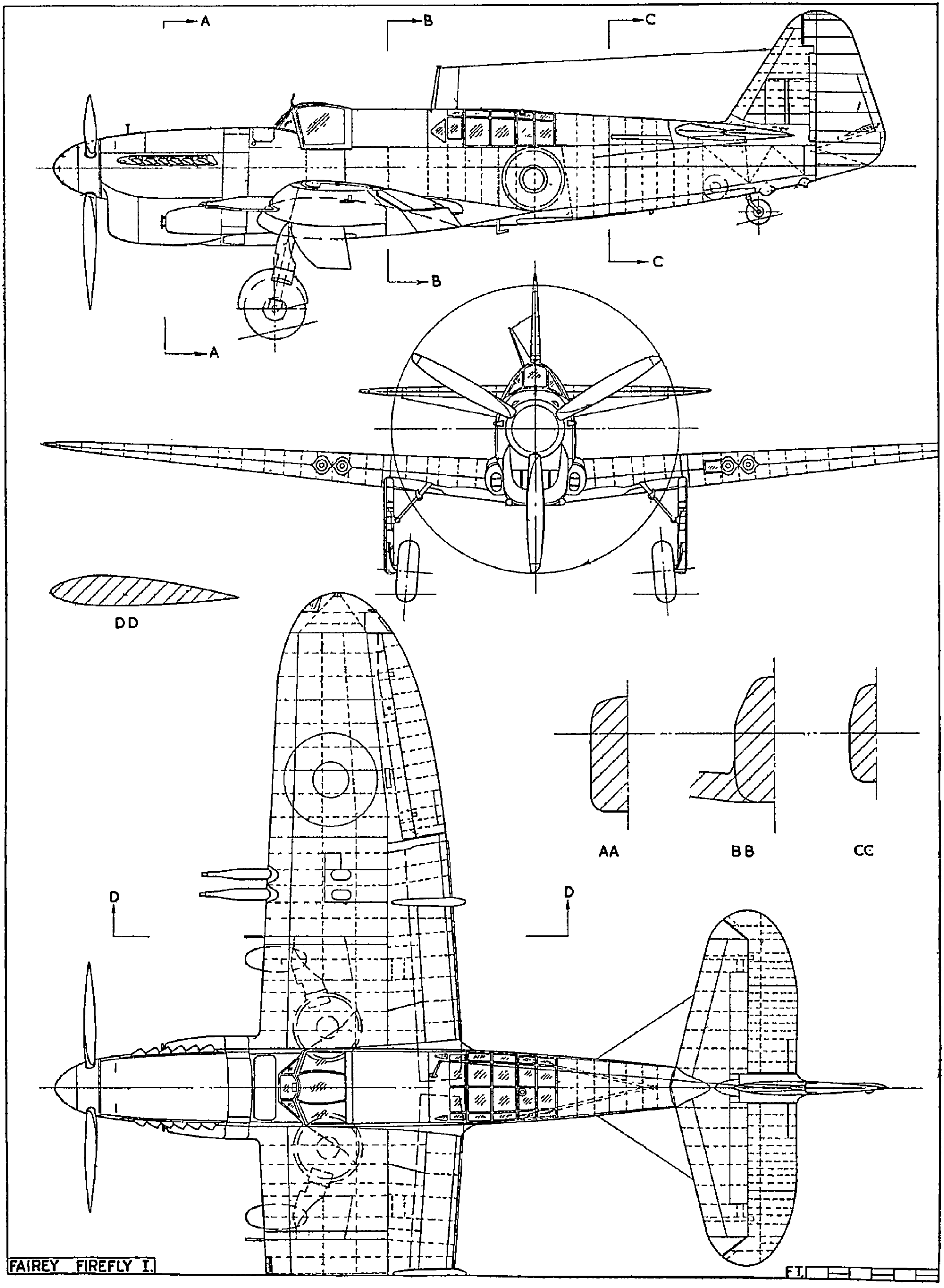
The new Firefly is the seventh Fairey design to be operated during this war, and the fourth of the seven to be fitted with a Rolls-Royce motor. The joint success of the two firms, Fairey and Rolls-Royce, proved in the Battle, Fulmar and Barracuda, and many of the earlier biplanes, is thus perpetuated by the production of the Firefly with a Griffon motor.

A.T.P. Photo.



When the Firefly was first conceived, the Griffon motor was not properly developed, but in view of their past successes with Rolls-Royce motors, Fairey's decided to design the Firefly around the new motor, and the ascendancy of the Firefly is evidence of the wisdom of their faith.

The Firefly was first demonstrated to the Press on 1st November, 1944, when its splendid lines were made apparent, and it



A
B
C
DD
AA
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D
D
FAIREY FIREFLY I.
F.T.

was revealed that it had been in operation for some months. Fireflies were used to escort the bombers which attacked the *Tirpitz* in Alten Fjord, and shot down a number of German fighters which were attempting to intercept the bombers. They also attacked a destroyer and other craft with success.

At the demonstration the Firefly was flown by Flt. Lt. F. H. Dixon, who was appointed chief test pilot to Fairey's after the death of Flt. Lt. C. S. Staniland, who did much of the testing of the prototype Firefly.

The Firefly took off after a very short run with the retractable Fairey-Youngman flaps used to full advantage, and undercarriage and flaps were completely retracted soon after the wheels were off the ground. The Firefly put up its nose at 35 degrees and reached a couple of thousand feet in a very few seconds. A full roll was executed on the way up, without losing any height, and thereafter the Firefly was put through all the usual aerobatics with very unusual effect. Loops and rolls were performed with ease, and a steep dive was followed by a flat-out run over the aerodrome at 20 ft. Unfortunately, performance figures may not be revealed, but the fact that no rear armament is fitted indicates that the Firefly is not expected to be caught. Naturally it is not quite as fast as contemporary single-seaters, but there is good reason to believe that the Firefly is the fastest aircraft in its class.

Flt. Lt. Dixon then flew across the aerodrome with flaps and wheels lowered at what appeared to be about 65 m.p.h. After that he disappeared for half a minute, and just when everyone was wondering where he had got to suddenly leapt over the hangars with a few feet to spare, going full out. Fleet Street was immensely pleased, but the photographers were not ready for such tactics!

A slow landing speed is essential for a carrier-borne aircraft, and the Fairey design team has made use of the Youngman flap as fitted to the Barracuda in obtaining a satisfactory result. An improvement over the Barracuda is that the flaps retract.

The Firefly is a typical all-metal design. The wings are two-spar structures built in five sections; the centre-section, including undercarriage attachments; two outer panels mounting the cannons, and detachable wing-tips. The entire wing, including the movable control surfaces, is covered with a stressed metal skin flush-riveted.

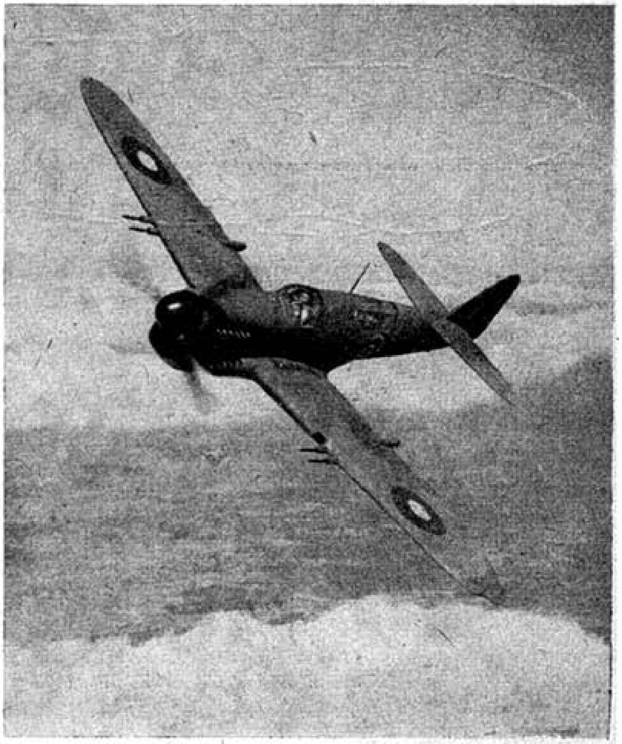
The flaps are hydraulically-operated by the Lockheed system, and when retracted lie flush within the wings. There are flap positions for take-off, landing and cruising.

The wings are very easily folded. There is only one hinge point on each side, and the outer wing panels swing backwards and upwards to lie alongside the fuselage. A small retractable lug is fitted in the upper surface of each wing forward of the ailerons, and when the wings are folded make contact with further retractable and telescopic members in the fuselage just ahead of the tailplane.

The fuselage is a metal monocoque structure of a good oval section, and is built in two halves and joined on the vertical centre-line.

The tail-unit is an all-metal cantilever structure like the wings. It is entirely covered by flush-riveted stressed skin, except for the rudder, which is fabric-covered and fitted with an adjustable metal trimming-tab.

The hydraulically-operated undercarriage retracts inwards. The wheels lie just behind the front spar and are enclosed by plates attached to the legs and by two small doors. The tail wheel retracts forward into the fuselage and is enclosed by twin doors. When the



British Official Photograph

wheel is lowered the doors again retract to form a smooth contour underneath. A deck-arrestor hook is fitted below the fuselage.

The pilot's cockpit is covered by a sliding canopy which is bulged on top and at the sides for maximum visibility. A new type is being fitted on current production models. The observer is situated in the rear position, and between the two cockpits is the main petrol tank. The centre portion of the rear cockpit hinges downwards in two sections for access. A camera is fitted in the floor of the fuselage.

The power plant of the Firefly is the Griffon, the latest twelve-cylinder liquid-cooled in-line motor by Rolls-Royce, which is mounted as a "power-egg," enabling it to be detached complete with mounting and cowling. No details of output have yet been released for publication. A three-bladed Rotol constant-speed airscrew is fitted.

The radiator tunnel is of the beard type beneath the nose, and there are cooling intakes on each side, and further scoops above the ejector exhaust ports and below the main radiator tunnel.

Armament of the Firefly consists of four 20 mm. Hispano cannons mounted two in each outer wing panel. Smooth metal sleeves can be fitted over the barrels, but Fireflies usually operate without them.

Fireflies come off the production line in a camouflage colouring of dark slate grey and dark sea grey. The undersides are a light grey called officially "Sky." The usual roundels are carried: on the fuselage they are red, white, blue and yellow; under the wings red, white and blue, and above the wings are red and blue. The red, white and blue flash is carried on each side of the fin, and the words ROYAL NAVY are painted in black above the aircraft serial number on the fuselage.

Main dimensions of the Firefly are: Span, 44 ft. 6 ins., length, 37 ft. 7 ins.; height, 13 ft. 7 ins.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CLUB NEWS BY CLUBMAN

A photograph of various members of the Norwich M.A.C. sent by A. C. Jeeves.

WHILST the Aeromodeller Exhibition will be fully reported in the March issue of this Journal, I cannot let this first opportunity pass of being able to add my little quota of praise for a really fine show, particularly taking into account the current difficulties of staging such a display. I attended the opening ceremony anticipating an average affair, but the truly amazing number, variety and quality of models, combined with a really attractive display of stands, etc., made this an exhibition well up to peacetime standards. Congratulations to all concerned. I came away with the thought—" if this can be done under wartime conditions, what a wizard show can be put up when things are back to normal ! "

More news this month from B. E. D. Beckett, secretary of the MIDDLE EAST M.A.C. He informs us that the club is flourishing, numbering over forty members, among whom F/Sgt. I. Calverley (formerly of the Bradford M.A.C.) is the high " flier."

A model contest and exhibition was held in December by the Orkney Shetland Expeditionary Forces under the auspices of the O.S.D.E.F. Education Corps. Major-General J. W. Slater, C.B.E., M.C., said in his opening speech, " The men and women who made these beautiful things exhibited here to-day are achieving something a great deal bigger than many people realise." The absolute bugbear menacing forces in stations of this type is boredom, and modelling has helped a great deal in providing very necessary interest to all classes. Individual results were :—

1st. Gunner F. C. Mansfield. " Lancaster, Mk. II."

2nd. Gunner R. J. Mansfield. " Whirlwind."

3rd. Aircraftwoman M. Cursitor. " Lancaster " (1/144 scale).

Confirmation of our news last month of a model club flourishing at Stalag 357 in Germany comes from R. C. Knowles, of Ulverston, whose prisoner brother writes : " They've formed a model club here, and some really beautiful gliders have been produced with some record times being made. I am designing one of my own at the moment, and am hoping for success."

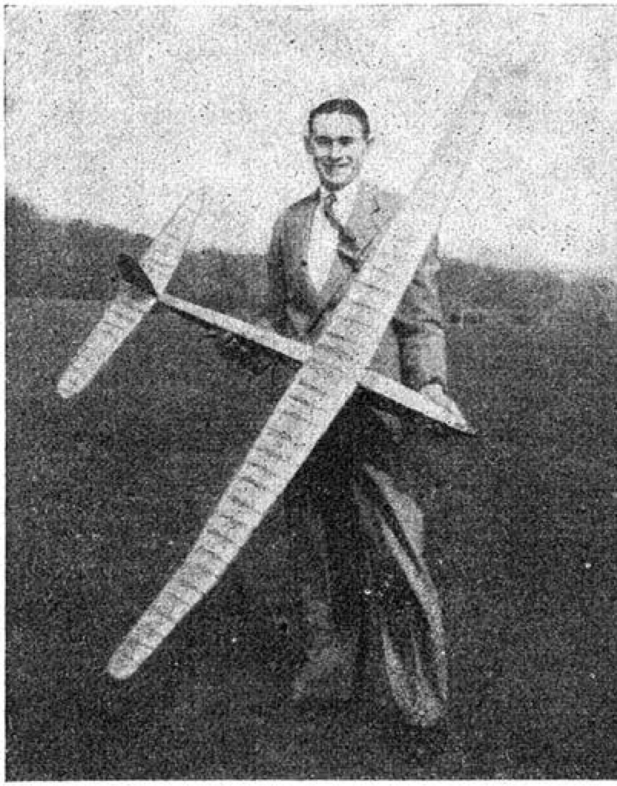
Indoor flying has commenced in the DONCASTER & D.M.F.C., some fine flying having been seen with B. Fore's " Tempest." M. Hetherington has a duration model with a claimed 4½ minute motor run—so some good flights are expected in the near future. (I wonder just how much that motor run will last under actual flying conditions. I usually find a noticeable difference between bench tests and flight performances.)

Commencing early in the new year the SHEFFIELD AIR LEAGUE SOCIETY (which now incorporates the Sheffield Aero Club and the Sheffield M.A.C.) intend to open out with some very interesting features to the benefit of its members, to be explained at a special meeting early in February. An open glider contest (Sheffield aeromodellers only) for the " Wilkinson Shield " will take place at Easter to commence the flying season.

Members of the Cheam M.A.C. were welcomed by the SURBITON & D.M.F.C. for the first round of the London Area R.T.P. contests, during which the Cheam lads showed their hosts a thing or two about indoor flying ! Rocket propulsion has been tried out with limited success, best flight to date being 25 seconds.

The NORTHERN HEIGHTS M.F.C. winter programme is now in full swing and indoor flying is playing a very prominent part. A contest is being run by the S.M.A.E. London Area Council on similar lines to the Football Association Cup, *i.e.*, a knock-out contest, and in the first round N.H. visited the Brentford M.F.C., where they put up an aggregate of 497 secs. against the Brentford aggregate of 159 secs.

D. Lofts established a new Club record with a flight of 3 mins. 16·5 secs., and R. Copland flew for the first time a new model partly covered in microfilm. A great deal of interest has centred around this model as week by week Mr. Copland has developed it, obtaining on his second outing a flight of 2 mins. 56 secs. The third week the model achieved a flight of 3 mins. 2·5 secs., and two flights of 3 mins. 10 secs. ; and on December 15th (when we were pleased to welcome members of Streatham



Photograph on the left shows Mr. Molyneux, chairman of the Wallesey Model Aero Club, out with his sailplane for a spot of flying.

Aeromodellers to our Club) Mr. Copland put up flights of 2 mins. 51 secs., 3 mins. 24 secs., and a final magnificent flight of 3 mins. 53 secs., which constitutes a new British record for this class of model, beating the existing record of 3 mins. 31 secs.

Many interesting speed models have also been flown at the Club, and several members are recording approx 25 m.p.h. for 8 laps round the pole.

After a not too successful season by the BRISTOL & WEST M.A.C. in outdoor flying, members are now thinking about 1945 perhaps a little wiser. In the past season M. Garnett distinguished himself by winning the Club Championship and Consistency Cups, and the Flying Scale and Twinfloat Seaplane Trophies, followed by K. Moon, who won the Club Glider and Biplane Cups. A. H. Lee carried off the Club Packer Cup for Wakefields for the *n*th year in succession.

The Club has been holding fortnightly indoor meetings which have been well attended. R.T.P. and free flying models have received attention, particularly the latter, as this is the first occasion for members for some years to fly this type. A junior, D. Jones, has shown particular skill in both microfilm and tissue covered models, clocking 80 secs. with his first attempt at both types, and winning a club contest for tissue models with 2 : 14·4. R. T. Howse has demonstrated very effectively that his trimming skill is not confined to outdoor types, but he had bad luck in the Club free flying contest by breaking the tail boom in test flying. Times are not likely to improve much owing to the rather fast drift down the hall. R.T.P. models have not received so much attention as yet, and best times in the S.M.A.E. class A and B are 75 and 85 secs., by M. Garnett and D. Jones respectively.

Ideas for next season's models are already being tried out. C. S. Wilkins and A. H. Lee are developing an expanding propeller in an attempt to control excess power with resorting to inefficient pitch angles. At least one petrol model is under way, and a 10 c.c. engine has been built for inverted running, and successfully completed its initial trials in this attitude, reaching 5,500 r.p.m. with a 14 in. dia. prop. The model to put this engine in has not yet been designed, and the Club would appreciate indications from the S.M.A.E. on ideas for post-war competition types.

The EAST BIRMINGHAM M.A.C. has concluded a successful outdoor season, the position in the Plugge Cup being considerably higher than last year. Flying scale models were popular during the season, the r.o.g. record being held by K. Thomas at 30 secs. A points scheme was instituted and was keenly contested by all members, the final score being :—

K. Thomas	300 points.
R. Jesson	275 points.
V. Phillips	250 points.

F. B. Adams, of 19, Wood Lane, Hednesford, Staffs., advises that owing to various causes the local club has been disbanded, but he will be pleased to know of any modellers in the Cannock Chase area. An interesting postscript to his letter states, "Have just read the Christmas issue of the A.M. and must agree with R. J. Howse on page 42. Some of the times in Club News should certainly be checked. From my experience, I have never known a plane remain in sight for more than five minutes from the point of launch *on a windy day.* I might add that Club News is the most useful part of the AEROMODELLER in that it gives lone hands and small clubs some idea of what to aim at in the form of times."

The italics above are mine, and I must say I fully agree with the point of view expounded. I have seen many flights of over ten minutes duration, and have, in fact, to date lost four models after purely thermal flights with the model disappearing from sight almost overhead. However, I should point out that I can only report here details as submitted by press secretaries, etc., and it is an utter impossibility to check any times or statements.

Another Club to "fold up" is the Tottenham M.A.C.,

A low-wing, tricycle undercarriage, petrol model, built by L.A.C. Matheson and powered with an Ohlsson 23.

owing to call up of the secretary, and the fact that no one could be found to carry on until better times.

The peace of the GUILDFORD M.A.C. club room has been recently disturbed by members trying (without much success) to produce really reliable powder rockets, while N. K. Walker has been sending unfinished models flying with the gale from his wind tunnel. The tunnel (which many interested readers had a chance of inspecting at the Aeromodeller Exhibition) has been specially designed for testing wing sections, in particular a new series of theoretical sections produced by Walker and R. Annenberg, which have proved very successful in the field, and are based on boundary layer control. The Club tow launch record has been raised to 2 : 30 by Annenberg's " Stafford Sailer," which has put up remarkably consistent performances throughout the year, and is expected to do even better with one of the new wings.

AYLESTONE M.F.C. were represented at the Birmingham Inter Club contests, W. Jones winning the Class B r.t.p. contest. The Club contest held on December 2nd resulted as follows :—

Senior Duration	W. Jones	6 : 08·6 aggregate.
Junior Duration	J. Bones	1 : 56·6 aggregate.
Nomination	K. Chandler	1·2 secs. error.

At a later meeting J. Bones raised the free flying record to 3 : 52 aggregate for three flights, while W. Jones aggregated 5 : 53·2 r.t.p. Good times are evidenced in the latest list of Club reports :—

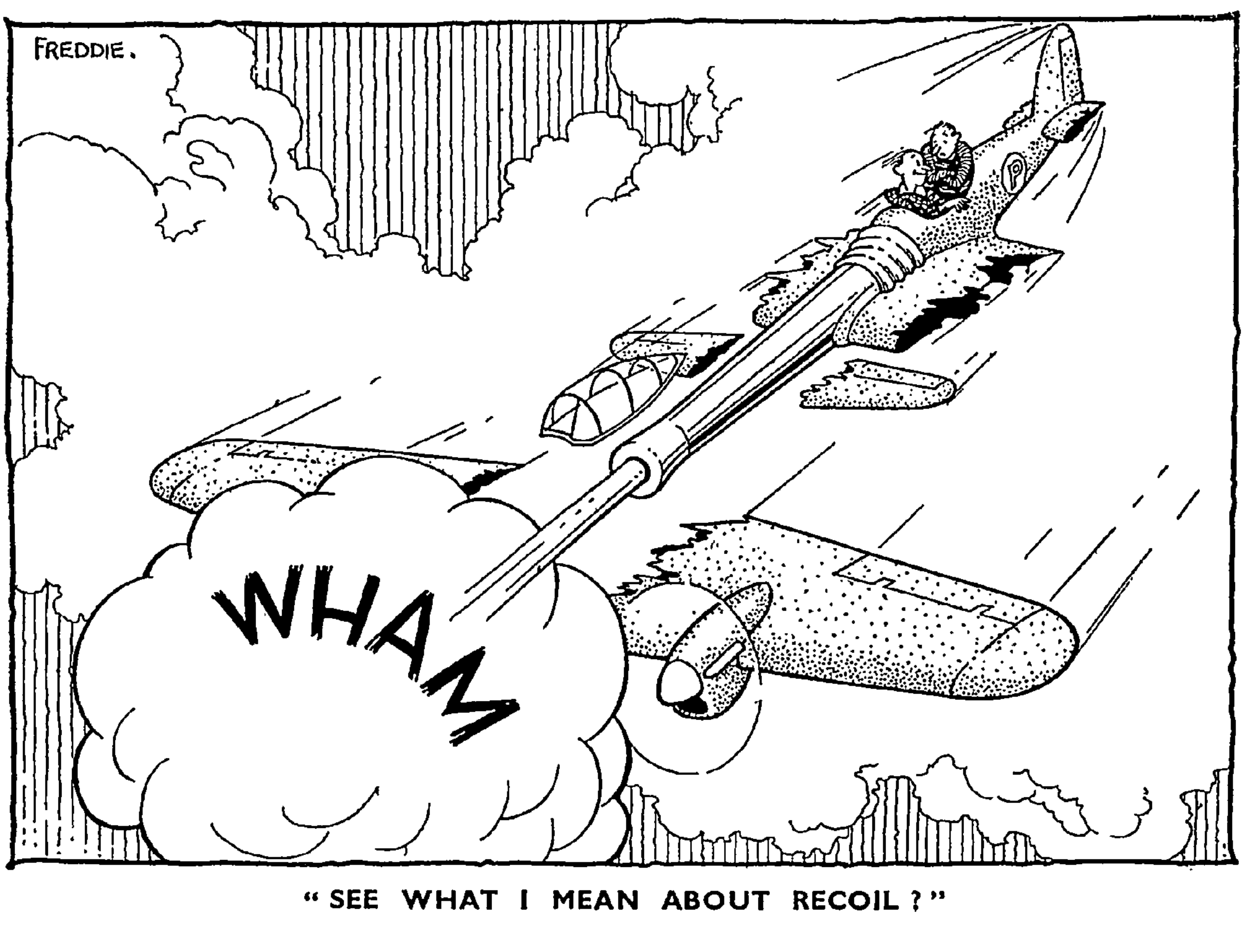
Senior R.T.P., H.L.	2 : 35	W. Jones.
Junior R.T.P., H.L.	1 : 45·4	P. Jones.
Free flying	1 : 20·5	J. Bones.

The CHINGFORD M.F.C. turned out in force for their first Club R.T.P. contests, confining their attention to Class A models owing to the restricted area of the only available room in the district. This did not deter the members, however, and a very interesting afternoon was spent in keen competition. Best flight of the day was achieved by S. L. Menhinick with a time of 75 secs. Other good flights were made by Messrs. A. and B. Hand, these two eventually finishing first and second, with Menhinick and P. Russel tieing for third place.

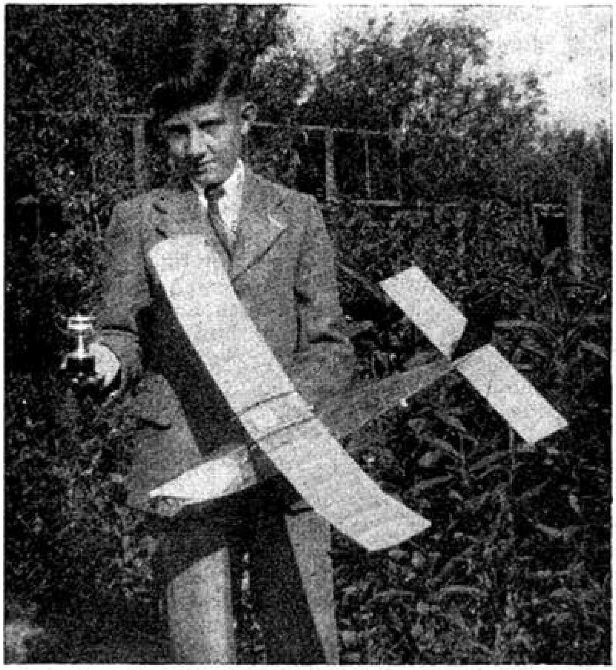
The BISHOP'S STORTFORD D.M.A.C. are still going strong, new Club records set up during the past few months being :—

Tow launch glider	5 : 15 o.o.s.
Open duration	2 : 10
R.T.P.	1 : 07

R.T.P. flying takes place every Wednesday evening with the NORTH KENT M.A.S., the gymnasium at the Crayford Central Schools being ideal for this purpose. Times are improving, the three minute having been reached, while Mr. Rainer has had some nice flights with a microfilm model, one just passing 2½ mins. Junior "Basher" Bennett has built a glider with a "swordfish" nose, which has already been christened the "Killer."



" SEE WHAT I MEAN ABOUT RECOIL ? "



M. G. Marcus holding his modified Mick Farthing light weight which has twice broken the Croydon and District M.A.C. Junior light-weight record with a time of 8 mins. 21·4 secs. o.o.s.

It has already split two trees, stabbed a dog, and attacked one member in the rear!

J. A. Lambert of 11, Crooked Usage, Finchley, N.3, has been trying for about nine months to form a model aero club in his district. Will interested modellers get in touch with him as soon as possible?

A number of new clubs have put in an appearance this month, full particulars being appended. It is encouraging the way these new groups are forming, and augers well for post-war activities. It will not be long now before every town of any size has its model aero club.

Well, that's the lot for this month, and I trust that by the time you read this the weather has cleared enough to make you start thinking of thermals and picnics. May 1945 be a better year all round, and once again may we hope for the end of hostilities and a return to the piping days of peace, balsa and bags of rubber!

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A. Simpson, 46, Tenterden Drive, Hendon, N.W.4.

KIRKCALDY & D.M.A.C.
J. Thompson, Golf Club House, Burntisland, Fife.

CHARNWOOD M.A.C.
R. E. Bekov, "Derri Mau," Newtown Lane, Markfield, Leics.

PLESSY YOUTH AERONAUTICAL SOCIETY.
F. Drinkwater, 146, South Park Road, Ilford, Essex.

SILVER END M.A.C.
B. A. Stait, 61, Francis Way, Silver End, nr. Witham, Essex.

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J. Drinkwater. Beckitts Buildings, Knottingley, Yorks.

STRETTON M.A.C.
F. N. Dowson, 47, Mosley Street, Burton-on-Trent.

WANTS——
(1) AEROMODELLER, 1936, Xmas Number, 1937.—S. Taylor, 8, Laurel Crescent, Keighley, Yorks. (2) Petrol engine, with coil and condenser, any capacity.—R. R. Cozens, Croftop, Costessey, Norwich, Norfolk. (3) AEROMODELLER, January–April, 1944, good condition.—R. S. Welford, 1, Dunkirk Terrace, Corbridge-on-Tyne, Northumberland. (4) Plan of American Monstrosity to suit 2·5 to 6 c.c. engine.—W. Edwards, 8, Watersmeet Grove, Stoke, Coventry. (5) "Aircraft of the Fighting Powers," Vol. II.—J. Choules, 5, Stoats Nest Parade, Coulsdon, Surrey. (6) AEROMODELLER, March, 1944.—M. J. Hurn, 106, Tring Road, Aylesbury, Bucks. (7) Compressed air motor.—W. Good, 22, East Mount Road, Blossom Street, Yorks. (8) Ignition coil for small petrol motor.—J. R. Millson, The Durham Castle, 40, Cronin Road, Peckham, London, S.E.15. (9) AEROMODELLER, November, 1940, September, 1942, November, 1943.—G. Priestman, Crosby House, Oundle, Peterborough. (10) Timer and 4 in. airwheels.—M. J. Cowburn, 22, Grange Road, Lytham, St. Annes, Lancs. (11) "Aircraft of the Fighting Powers," Vol. II.—R. Coble, 41, St. Michael's Church Road, Liverpool, 17. (12) Frank Zaic's Year Books and American model magazines and AEROMODELLERS previous to 1939.—R. A. Parker, 54, Grange Drive, Green Dragon Lane, Winchmore Hill, N.21.

DISPOSALS——
(1) AEROMODELLER, August, 1942–January, 1944. Good condition.—D. J. Finlay, 425, Blackburn Road, Wheelton, Chorley, Lancs. (2) Flying semi-scale D.H. Puss-Moth, span 40 in.; flying scale Foster-Wickner "Wicko," span 32 in., perfect condition.—A. E. Landon, 4, Goodwin Road, Shepherd's Bush, London, W.12. (3) AEROMODELLER, January, 1938–December, 1941, "Model Aeroplane Constructor," January–October, 1938, Frank Zaic's Year Book, 1938. Sell or exchange.—1465632 Cpl. Landymore, R., R.A.F., 9, King Edward Road, Brentwood, Essex. (4) AEROMODELLER, August, 1943–September, 1944, "A.T.C. Gazette," "Aeroplane Spotter," Nos. 54, 57–72, 78, 84, 86, 88, 108–110, 112 and 115, "Aeroplane," August 6th–November 12th, 1943, "Flight," August 12th–November 11th, 1943.—R. Harwood, 145, Belmont Road, Astley Bridge, Bolton, Lancs. (5) AEROMODELLER, January–July, 1942, June, September–December, 1943, January–August, 1944, single copies or 15s. 0d. the lot. "Aircraft of the Fighting Powers," Vol. II, 18s. 1d., Ace duration model with several yds. of rubber, 5s. 0d.—R. W. Scott, 16, Tod Point Road, Warrenby, Redcar. (6) "Aircraft of the Fighting Powers," Vols. I & II, 30s. 0d. pair.—R. Baker, 85, Victoria Road, Oldbury Birmingham.

EXCHANGE——
(1) Slightly damaged 9 c.c. engine for a 3 c.c. approx. engine.—T. Armstrong, 37, Aston Drive, Bramley, Leeds.

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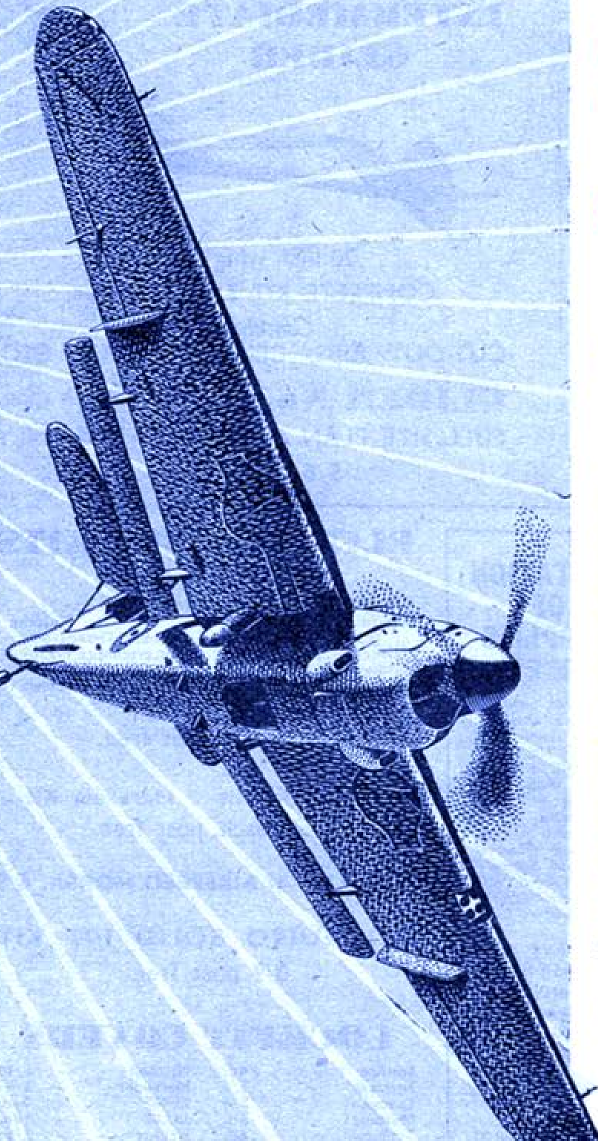

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