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CHRISTMAS NUMBER 1946

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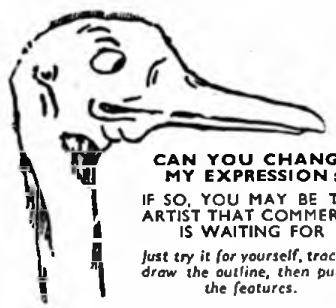

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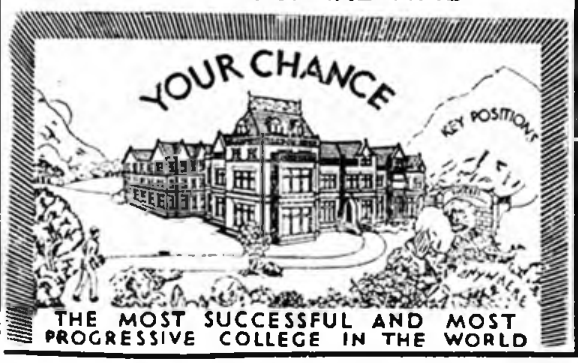

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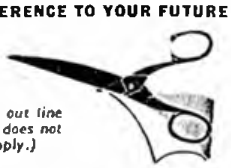

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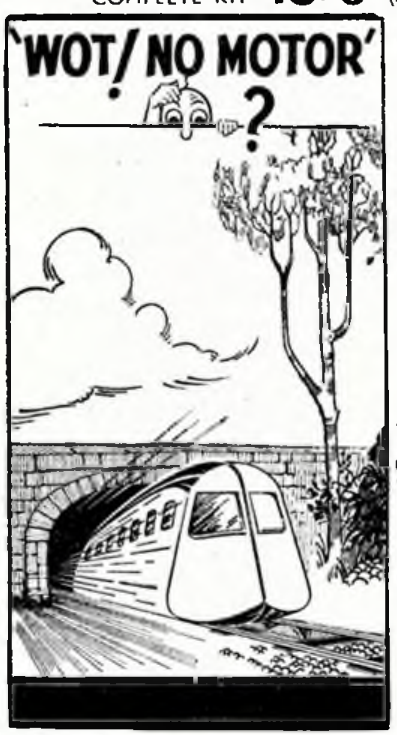

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The AEROMODELLER

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Contents

A MAN AND HIS MODEL.
C. Rupert Moore with his unique Flying Scale Tiger Moth that is fully described in this issue.

EDITORIAL

DORLAND HALL AGAIN

ENTRIES for the Third National Model Aircraft Exhibition—organised this time by the *Daily Express*, in association with the AEROMODELLER—will have been received by the time these notes are read, and in a few days (December 2-7) it will be time for exhibitors to deliver their models to Dorland Hall. In this connection, we would offer a reminder that Entry Form B should be prominently displayed on the outside of the box containing each exhibit.

The exhibition opens on Thursday, December 12th, and continues for just over four weeks, thus once again including the full school holiday period. Not only will this enable everyone wishing to see this "best ever" model show to find a convenient time, but will afford really keen aeromodellers the opportunity of thorough examination through the medium of several visits. Closing day is Saturday, January 11th.

The organisers have had no easy task in seeking to exceed the high standard of the previous exhibitions, but there is every indication that the carefully arranged contests are attracting a wealth of modelling talent.

We have already touched upon the improved set-up of the exhibition, whereby the very large number of models (there were over 2,000 last time) will be seen to the best advantage. The large showcases that proved so effective not only in providing an unusual and pleasing setting for the exhibits, but in protecting them from excited feet and fingers, will again be in evidence, but even more effectively placed in relation to the spectators, and a greatly improved system of labelling will add to the general convenience. Improvements have been effected, too, in the display of the tethered models, of which there will be five. Once again they will fly from circular strips, but these will be screened beneath, so that when viewed from the mezzanine floor, the eye will not be distracted by colour and movement down below.

The immense prestige and publicity possibilities furnished by the participation of a great national newspaper like the *Daily Express* has also been pointed out, and there can be no question as to the response by the general public. Here we would content ourselves with urging that members of the aeromodelling community should make Dorland Hall their rendezvous, gaining thereby fresh information and inspiration from the achievements of their fellows and from personal contact with many whose names have been made familiar to them through the printed page. We have always felt that this constitutes one of the greatest attractions of such an exhibition.

To Dorland Hall, then, with your promised models, from December 2nd to 7th, and from December 12th to January 11th, for the great modelling show of the year.

Christmas

With this issue of the AEROMODELLER, which concludes yet another volume, we offer our readers the customary substantial addition to the number of pages in honour of the Christmas season, and we feel sure that it will be agreed we have not failed to provide the eagerly-awaited feast of good things.

We would take this opportunity of wishing them the compliments of the coming season, and only regret that under continuing austerity we are not able to express our good wishes in the 25 per cent. special discount on A.P.S. Plans as in former years. The position is that printing costs are still rising, and only a day or two ago we were confronted with a 15 per cent. increase in the cost of plans, an item that will apply to all future production.

We are *not* proposing to pass on this increase to our readers, preferring to rely on increasing sales for a sufficient profit to keep the wheels turning. But it will readily be appreciated that at a time when we are having to meet increased charges, we do not feel able to offer discounts.

This having now been said, may we repeat that we wish every reader the seasonal greeting, none the less sincere because oft-repeated! The happiest Christmas possible, and may 1947 bring clearer skies and fairer weather!

Service

Many readers will recall the booklet issued some years ago, giving details of the services available to modellers through the Harborough group of enterprises. An entirely new and greatly amplified volume, on similar lines, is now available under the title "A Complete Service for the Modeller."

For the benefit of those who did not see the early book, we may say that the new version, like the old, is far more than a catalogue. A very large proportion is given over to a complete and eminently readable account of the various Harborough enterprises, Eaton Bray, the Plans Service, text-books, modellers' periodicals, and so forth, and this is followed by a detailed classified list of every book and plan available.

Starting off with a description of the 100-acre Eaton Bray Model Sportsdrome, and its many features—it goes on to deal with the Plans Service started six years ago. This service has now produced 150,000 plans of flying models of every conceivable type, and over 1½ million copies have been sold to date. As to the Harborough range of modelling books, which includes Mr. S. S. Rushbrooke's popular "A.B.C. of Model Aircraft Construction," Mr. D. A. Russell's "Design and Construction," and books on sailplanes, petrol models, diesels and radio control, it gives the total sales to date as 750,000, including 50,000 of a single title.

Finally, there are the magazines issued, which, apart from the AEROMODELLER, include *Air Review*, the *Model Mechanic* and *Model Cars*. No serious modeller should be without a copy of "A Complete Service for the Modeller," obtainable from any model shop, or direct from the AEROMODELLER, at Allen House, Newarke Street, Leicester, price 1s., post free. Full details of the book appear on the back cover of this issue of the AEROMODELLER.

Notes on my Latest WAKEFIELD

BY "BOB" COPLAND

MANY people may wonder why the decision was made to modify this model rather than design a completely new model, so perhaps a few remarks on this will not go amiss.

In the first place, just what would constitute a new design? Wakefield models (particularly the streamlined type) are fast becoming stereotyped and tend to look alike if of the shoulder-wing variety; thus, merely changing the fuselage or wing shape does not necessarily mean that it is a new design. Radically altering the shape, say, from a true streamlined form to that of a pod-and-boom variety might well be classified as a new design, as airflow and side areas would be greatly changed and alterations to fin and rudder area would necessarily follow. However, as in most things, the best way to achieve success is by careful development along one particular line, and it was mainly with this in view that the final decision was taken to modify the model.

The first place where a real modification seemed necessary was in the wing shape and aerofoil section. Past experience with the model had proved that there was a slight tendency to lateral instability, coupled with a very slight fore and aft instability. With this in mind, it was decided to increase the span and, consequently, the aspect ratio of the wing. The amount of dihedral however, was not increased, as it was felt that the lower aspect ratio on the old wing, together with a very generous dihedral angle, was some of the cause of the slight wallowing tendency. The reduction of the wing root chord from 6½ ins. to 6 ins., whilst still retaining a generous tip chord, now gave the span as 47 ins. as against the 43½ ins. of the old wing. However, the major change in the wing design was the decision to change from that of an R.A.F. 32 aerofoil section to a Davis wing section.

Experiments with this particular Davis section over the past two years has shown that a flatter and slower glide was obtained from it, and yet little difference was made to the climb. As there is no low speed data available on this particular section, all the results are, of course, practical tests and not mere theory. Due to the alteration of the aspect ratio of the wing, the wing fixing had to be changed in position. After some consideration it was decided to leave the rear fixing where it was and move the front fixing aft. This, of course, meant that the nose became relatively longer and the distance between the centre of pressure of the wing and tail slightly less. As this distance was already large, no adverse effects will take place by this shortening, whilst on the other hand, the lengthening of the nose will mean that the sliding trimming weight may now be dispensed with, so saving weight on the whole model.

The next point tackled was the airscrew. As will now be seen, the decision was to go back to a freewheeling type. Many people will consider this a retrograde step, but there are some very good reasons for this change. Firstly, the whole essence of a contest model is consistency. With a folding propeller this is most difficult to achieve, as no matter how carefully the model is built and the propeller blades lightened, there is bound to be a C.G. change unless some counterbalance system is used. Since none of these systems are infallible, there is always the chance of something going wrong at a critical period—hence the desire to simplify the whole model is the over-ruling factor. The freewheeling propeller has a definite gyroscopic effect, and, as a result of this, does not tend to change the flight path as readily as a folding prop. This fact means that, of the two machines, the freewheeling propeller type is least likely to be affected by small gusts, and as there are very few days when these gusts are not present it seemed advisable to make use of the added stability rather than sacrifice this in favour of a type which may or may not be slightly more efficient theoretically. There is one other aspect on the folding propeller controversy which weighs in favour of the freewheeler propeller. In the case of a single-bladed folder it is almost impossible to statically and dynamically balance the propeller—hence there is usually a certain amount of vibration present. Where vibration takes place, there is a loss of power, hence one more point for the free-wheeler.

The major change in the model comes, however, not

in an aerodynamic form, but in the form of an addition to the model. That is the inclusion of a de-thermalizer system. Present-day trimming and flying has reached such an advanced stage that as long as the contest rules remain for pure duration only, it is beginning to boil itself down to who gets the model back each flight. Various systems of bringing the model out of a thermal have been tried, but, so far, the most successful method has been that system using a parachute to drop the model. One point must be clarified here. There is no real method of getting a model out of a thermal if the thermal is strong enough, as once the rising speed of the air becomes greater than the terminal velocity of the model, the model will, of course, start rising. Therefore, the object of the parachute is to bring it down out of light thermals only. Using a parachute, of course, has the added advantage that the model is brought to earth reasonably gently: a fact which is not always the case when such methods as spinning the model or altering the tail-plane incidence are used. Having decided on the parachute system, the only thing that remained was to find a good system of operating it.

Two systems immediately suggested themselves: that of a spring-loaded door in the top of the fuselage, as used in full-sized spinning trials, and that of dropping the 'chute out of a trapdoor in the bottom of the fuselage. From a point of view of simplicity, the latter system was used. At this stage the necessity to keep the weight to a minimum became very apparent. An airdraulic timer could have been used, but this in itself weighs over ¼ ounce, plus some withdrawal pin arrangement, and was ruled out because of the weight, added to the fact that in the Wakefield rules there is a stipulation that all parts of the model must be made by the entrant. The fuse system was therefore used. This system in itself has certain drawbacks. One being the fact that the fuse is hanging out in the airstream and must, of course, add a certain amount of drag, however small. Another snag with the fuse system is the fact that if the fuse contacts any solid part of the machine it is liable to be put out. This, of course, rules out any system of enclosing the fuse. However, the system as used has proved reliable over a period of time, and, briefly, is as follows:—The box in the fuselage is built up 1/32 sheet for lightness and a trapdoor made to fit the opening. The trapdoor is pivoted on a light wire frame, having the pivot point fairly well aft to allow the door to swing well away from the fuselage. The reason for using a door which swings aft is to help increase the drag when the 'chute opens.

The trapdoor is held in position by a pin, which is spring-loaded to keep it in a *disengaged* position. The parachute line has a small hook attached to it, and the method of keeping the door closed is to loop the cotton thread loop in the fuse over the withdrawal pin and on to the hook on the line. The loop on the fuse must be short enough to ensure that when the line and the pin are held together by it the pin engages in the front of the trapdoor, so holding it shut. When the fuse burns through the loop, the spring-loaded pin withdraws from the door, allowing it to swing down. In order to assist in this movement, a rubber band is inserted in the parachute line in such a way that it is extended when the door is shut. When the door is released, the rubber band jerks the 'chute out of the box and avoids any possibility of the 'chute being caught up. The parachute size was found mainly by trial and error. The larger the 'chute the slower the descent. Since, however, a rapid descent was aimed at, the 'chute size was cut down

till the model assumes a near vertical attitude without a tendency to pull out and stall. The size best suited for this particular model was found to be about 100 sq. ins. A square 'chute was found to be just as effective as a circular 'chute, and since it had the added advantage of only having four shroud lines, this type was decided on. Some means of ensuring that the 'chute would open every time was found to be necessary, and the solution lay in a small spacer about ½ in. square, near the bottom of the shroud lines.

The fuse itself does not hold many problems, and the best method of manufacture has been found to be that of soaking fairly thick white string in a saturated solution of saltpetre for about half an hour. The string is then allowed to dry and is cut up into convenient lengths for use. The thread loop at the top of the fuse should pass through the fuse and should not be tied tightly round it as this sometimes causes the fuse to go out. On the average, the burning speed of the fuse is about 1 inch in 90 seconds.

As a precaution against burning the fuselage, a small piece of mica should be cemented to the fuselage local to the fuse. No matter how much improvement is made in the design and layout of the model, no benefit will result unless the machine is properly trimmed, and it is with this object in view that the following notes are written. Finding the correct trim of a model is largely a matter of trial and careful noting of the model's behaviour on test flights.

Before attempting any flights, the following check must be made:—

(1) Check for C.G. position. The C.G. should be positioned 2·40 ins. aft of the leading-edge of the wing at the centre section.

(2) Check the mainplane and tailplane incidence. The mainplane should be rigged at 3 degrees positive angle to the fuselage datum and the tailplane at 0 degrees incidence to the same datum.

This check is essential, as during building it is easy to build in a slight positive angle on the tailplane platform, and this will certainly kill any chance of obtaining good trim.

Adjust the incidence, if necessary, to comply with the figures stated.

(3) Check the mainplane and tailplane for warps. It is useless trying to fly the model if there is a warp in one side of a wing. *Note*—a slight wash-out on each tip will have a beneficial effect on the stability of the model, but this wash-out must be of equal amounts on each side of the wing. Wash-in will cause a stalling tendency, and consequently instability, and as a result cannot be tolerated.

(4) Check the thrust-line settings. The thrust-line should on no account be tilted upwards relative to the datum line of the fuselage, but a small amount of downwards tilt on the prop. shaft will not harm. A slight amount of right-hand side-thrust will also be found to be beneficial. Approximately 1 degree right-hand side-thrust and 1 degree down-thrust will be found to meet all conditions satisfactorily.

(5) Check the fin for trueness. The fin should be in line with the fuselage datum and must not be warped in any way.

(6) Check that all fixings, *i.e.*, wing, tail and fin, are secure and that no movement of these surfaces can take place.

(7) Check that the freewheel on the propeller is working and that the propeller is free to rotate.

Once these points have been settled, the first procedure is to test for glide.

(*a*) Test glide the model. If all is correct, the model should have a flat, slow glide. If the model dives, a slight amount of negative incidence on the tailplane is required. If more than 1/16 in. packing is required, re-check the whole line-up of the model. If the model stalls, a slight amount of positive incidence is indicated on the tailplane. It must be pointed out here that if the model has been carefully built and rigged, none of these changes should be necessary.

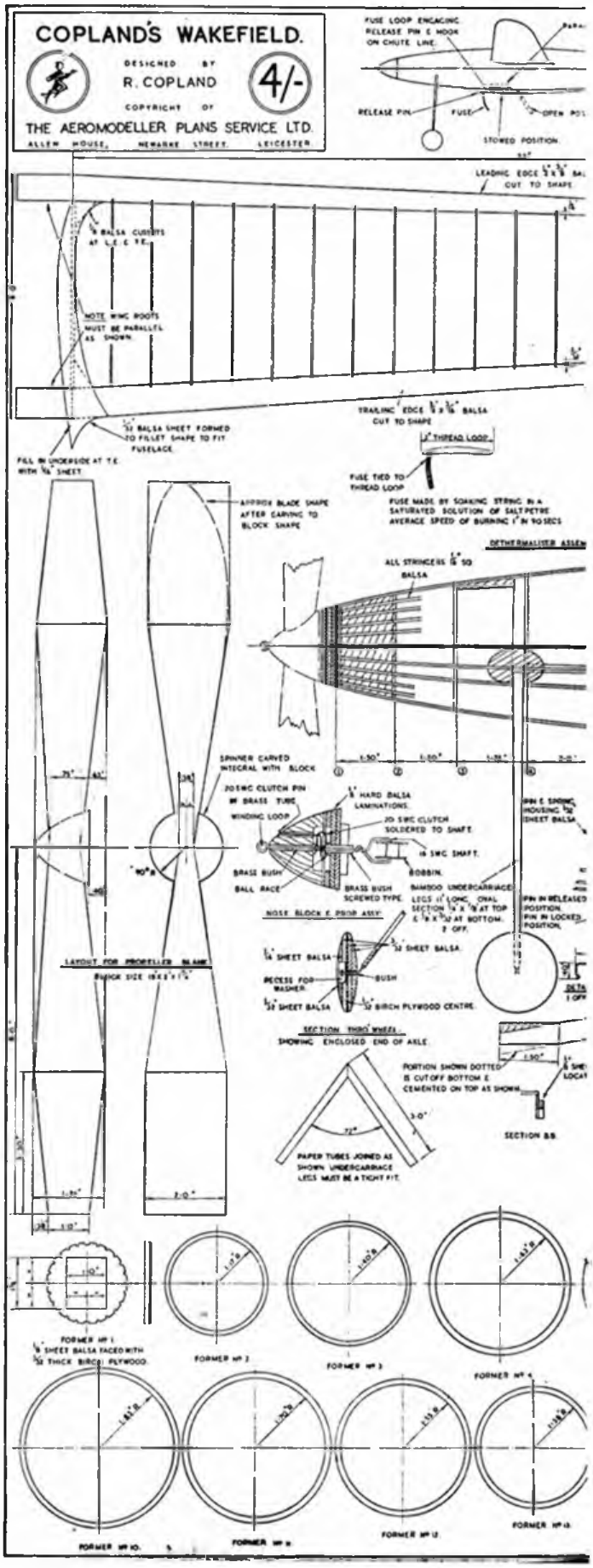
(*b*) Once a glide has been achieved, and not before, apply a few turns to the motor and launch the model. On about 200 turns the model should climb slowly to about 30 ft. and then glide down to earth. The circle should be steady and in about 100-ft. diameter circles. If the model flies straight, and turns to the right or left on the glide, the indication is that the fin is offset or that a warp exists in the wing. If the circle is of a medium size to the right, no alterations to the wings, tail or fin need be made, but if it is to the left, the offending warp must be found and straightened out. A slight amount of right-hand side-thrust, combined with a little right rudder, will then make the model circle and glide in a steady right-hand manner.

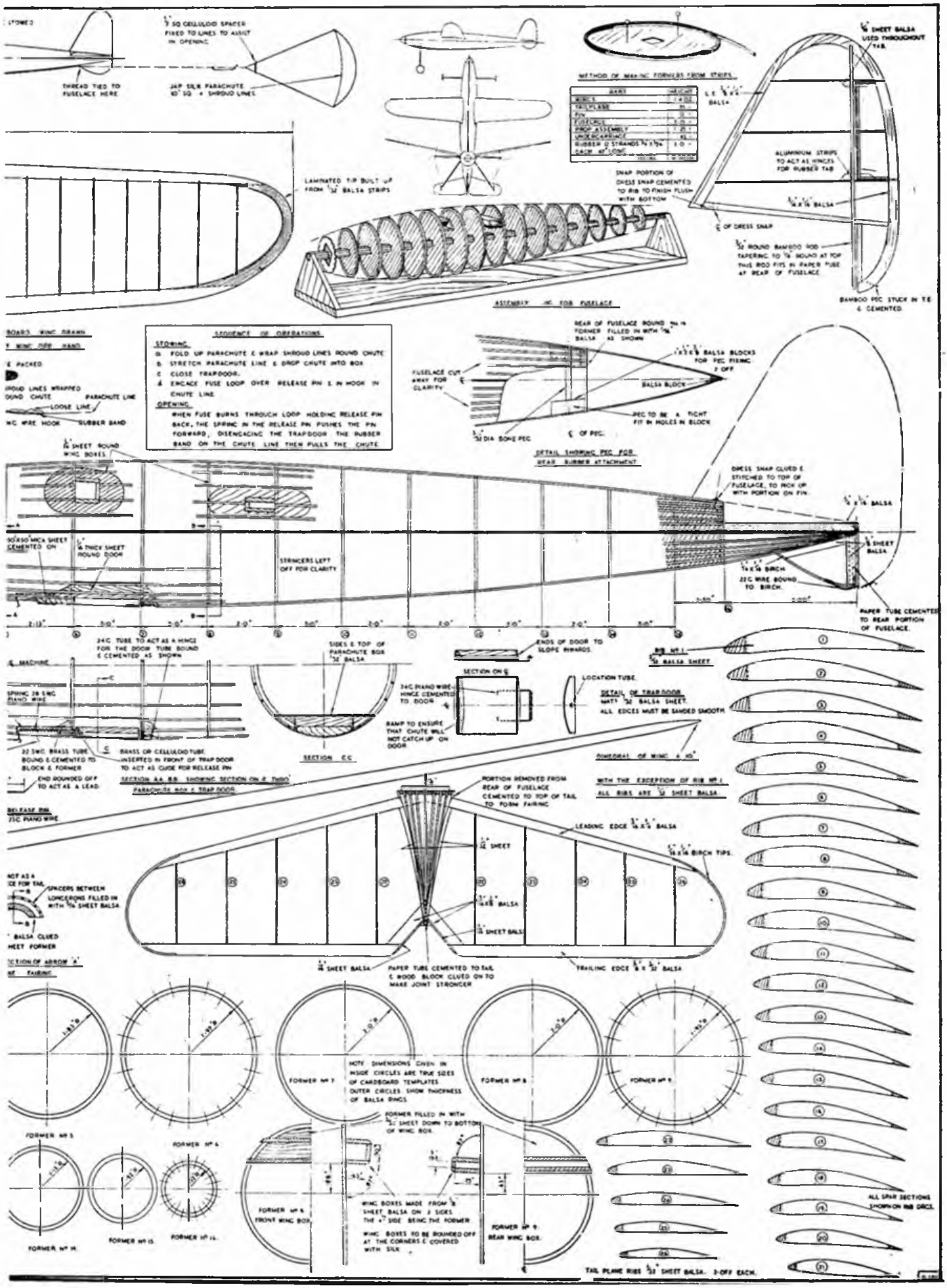
(*c*) By slow stages, gradually apply more power, and, if necessary, check any stalling tendency by the introduction of a little down-thrust and additional side-thrust. If more than $\frac{1}{8}$ in. packing in either direction is necessary, re-check the model and correct any faults found before proceeding.

The ideal duration type of flight is that in which the model does a stall turn, *i.e.*, instead of stalling, the model falls away from the stall on one wing. This system ensures that the model will climb at its steepest angle without mushing.

These few notes, whilst in no way completely covering the whole system of trimming, will, if followed, produce good results, but the final ultimate in trim can only be achieved after painstaking testing, time after time, in still air conditions.

A $\frac{1}{4}$-scale reproduction of the fully detailed drawings is given on this page.





THE season of good cheer being at hand, Gadget Review and Consus both indulge in a little colourful decoration. We hope the new perspective presentation by Bagley also meets as much with your favour as it does with ours. The pubs are getting one extra pint of beer in every forty, so let no one say he cannot be happy. If this page seems a little blurred before your eyes, there is still no cause for worry; just write to Consus, who will explain everything!

There is nothing like a spot of spot-welding, V. M. HARVEY-FULLER, of Woodbridge, Suffolk, assures us; and to prove it he sends in details of a very neat little apparatus he concocted for the purpose. The model mechanic who makes his own engines will find it especially useful on the numerous occasions when it is necessary to fix together small steel components with the minimum of distortion. Shown in Fig. 1, the device consists of a copper tube brazed on to a copper rod to form a "T." A carbon stick is inserted in the tube and secured with a grubscrew. A yard of high-tension (sparking plug) cable is fastened to the copper rod inside the beech handle and the other end is attached to a crocodile clip. Operation is simple—the work is connected to the negative terminal of a six or twelve-volt battery or accumulator and the apparatus connected by means of the crocodile clip to the positive. Spot welding is then carried out by touching the required spot with the point of the carbon rod.

Undercarts to the fore once again (after all, that is the best place to put them) with the original type favoured by J. CLARK, of Oldham, featuring some pieces from an old expanding curtain rod of the Woolworth variety which are sweated on to the undercarriage legs in the requisite positions, thus giving springing in all directions. According to this chappie, this system is the goods, as he has used it over a period without any trouble after even the heaviest of landings. Fig. 2 shows a detail of the scheme.

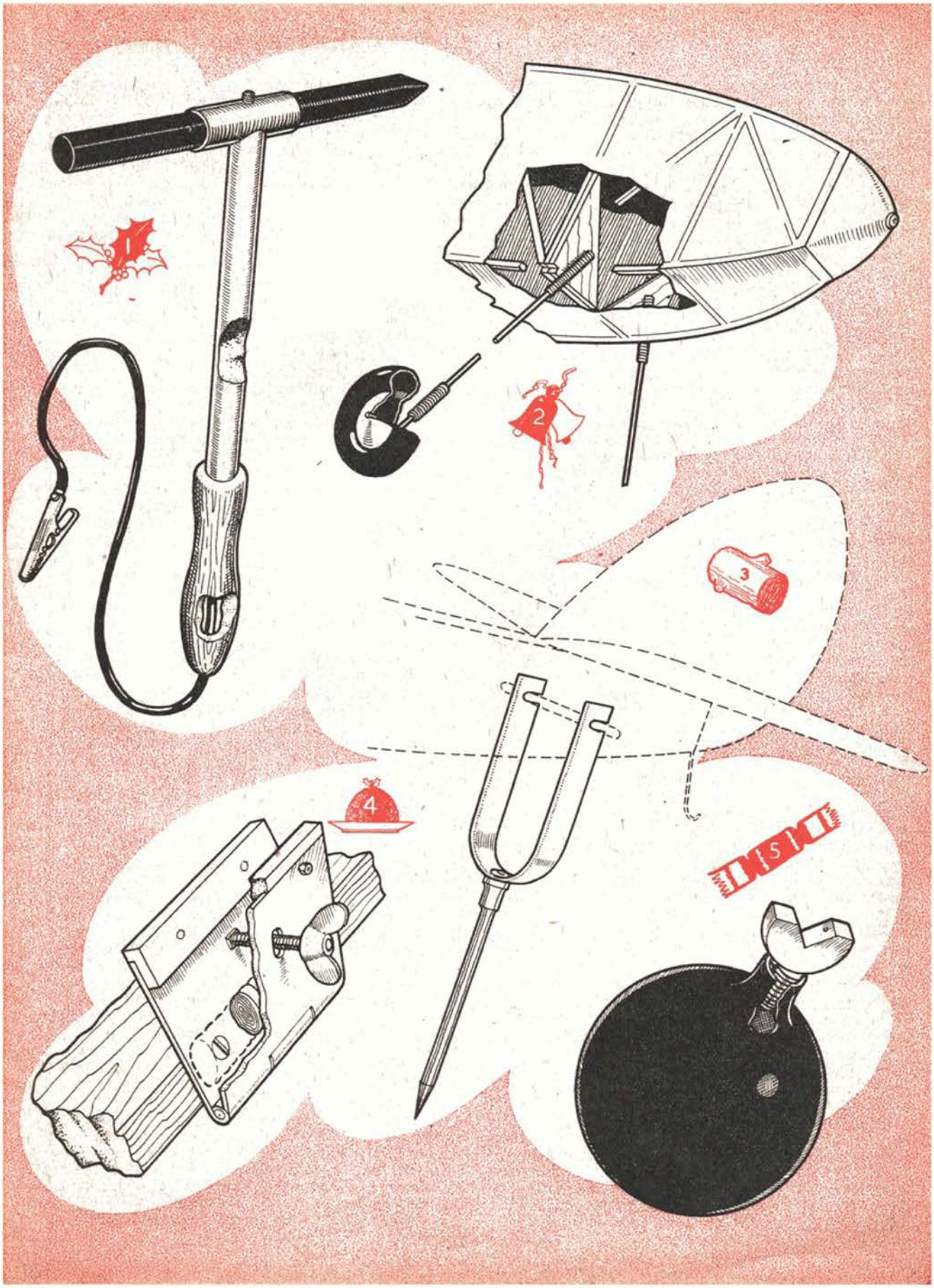
Many an ardent aeromodeller has missed the opportunity a fine day offers for flying because of lack of a "mechanic" to lend a hand. J. HOBBS of Doncaster, being amongst their number, thought hard and evolved the apparatus illustrated in Fig. 3 to enable him to stretch-wind when out for a bit of solo flying. It is made from the stirrup from a bicycle roller-type brake, the shaft of which is cut off and filed to a point. The brake block clips are unbolted, and the holes left in the stirrup are extended with a hacksaw to form two rearward pointing slots. After removal of the two prongs by sawing through the stirrup just above the holes, the apparatus can be used by sticking the pointed shaft firmly into the ground, and inserting the model between the sides of the stirrup which are bent to accommodate it. The model is held firmly against the pull of the stretched rubber by the extended motor peg which rests in the slots in the stirrup.

The joints in miniature accumulators have an annoying habit of giving up at awkward times, and in view of this D. H. BRYCE, of Edinburgh, experimented with methods of producing seamless plastic shells. He finally found that the best way to make them was by painting a small glass bottle of the required size with cement, applying at least six coats, letting each one dry thoroughly before applying the next. The bottle is then set aside for one day, after which the plastic shell must be worked off the bottle. If this proves difficult the bottle may be broken by pouring boiling water over it and then quickly immersing in cold water. When the shell is detached it may be trimmed and the necessary fittings added.

The man without a vice is not, paradoxical as it may seem, a rare specimen! In nine out of ten cases he remains the man without a vice until some catastrophe occurs with one of his peculiar makeshift contrivances, and in a fit of remorse he buys the genuine article. No words of warning from me, but W. F. COOK, of Shorncliffe, thinks one of his little vices may save the catastrophe, so we show it to you in Fig. 4. The main items consist of a large hinge and a ¼ in. bolt with a wing nut. The ready-drilled screw holes in the hinge plates may be used for attaching the gripping jaws which are best made from wood. The spring is very simply made from a length of cycle inner tubing, rolled and bound, which is inserted between the jaws and held firmly by the pressure caused by the tightened wing nut.

With the new types of English tissue on the market greater care than ever has to be taken when water-shrinking, as these tissues, although extremely strong when doped, are very fragile indeed when saturated with water. A brush stroke, however gentle, is almost certain to separate the fibres and break the surface. The remedy is either not to water dope at all or to spray it. Here is the old problem of obtaining a spray gun, and here is the solution provided by D. R. MITCHELL, of Culford, Suffolk. His arrangement is illustrated in Fig. 5. A new burner from an acetylene lamp is fitted into the neck of the rubber bag from an acid hydrometer, which has first been filled with water. The two jets from the burner converge to form a spray which can be easily directed by manipulation of the bag, the amount of pressure on which also controls the force of the spray.

Trouble brewing! At any rate domestic strife if the covering methods of F. WOOLDRIDGE, of Hounslow, are universally adopted. He gaily informs Consus that *he* uses ladies' silk stockings, obtainable as he informs us from "mothers, sisters, secretaries, or girl friends!!" (*Yeah?*—ED.) Cut the silk to shape, fix one side to the top or bottom longerons and let it dry *thoroughly*. Attach to remaining framework, allow to dry, warm by fire and dope. Note that water will not shrink the silk, and that when doped the silk will not ladder—perhaps



that is the solution to many a female's problem! Well, go to it, the more venturesome amongst us—but first catch your stockings. . . . Consus will read the results in his Sunday newspaper with interest.

Small models of the flying scale category are usually quite hard enough to get into the air for any length of time without hanging them around with intricate and weighty retracting undercarriages. For realism there remains only a fixed undercart which allows R.O.G. flying but looks all wrong in the air, or no undercart which looks all right in the air but prevents realistic take-offs. Or *is* that all? Reader J. D. WALLIS, of York, thinks not. His model flies without an undercart, yet makes perfect take-offs. Of course, it drops it, or rather, rises off it as soon as it becomes airborne, and how it does it is drawn for you in Fig. 6. No trouble is experienced as long as the wire prongs are a good loose fit in the tubes.

While on this subject it is a good opportunity to study a tool invented by D. INMAN, of Manchester, for bending the wire of an undercarriage leg where proximity to the wheel makes the operation rather difficult. A piece of 16 gauge mild steel, ½ in. wide by about 3 or 4 ins. long, is all that is necessary. At one end a saw-cut is made to a depth of ¼ in., about 1/16 in. from the end, and the tool is used as in Fig. 7, gentle leverage bending the wire at a sharp angle.

Perhaps many readers, like K. W. GOODALL, of Chessington, have experienced the difficult task of obtaining two blades of dead accurate proportions when carving their props. A cunning way of getting over the trouble is to use his method of making props of laminated pipe lighters. A number of common or household spills are taken (about twelve are usually sufficient for a 6½ in. diameter prop) and a pin is pushed through the middle of the bunch which is sanded very gently to remove the rough edges. The pin is then removed and alternate spills are coloured with dark brown water-colour. When dry, each spill is well covered with cement, assembled on the pin with dark and light spills alternating and fanned out slightly to give the required blade width; it is then dried under pressure. It will be found that this has overcome one major difficulty, that of preserving symmetry. When dry, carving may be carried out, when it will be found that the lines formed by the dark brown colour on the outer sides of the laminations form an accurate guide, as any deviation from accurate carving results in a wavy line. While the lines remain smoothly curving all their length it is known that the blade is the correct section. The only drawback is the fact that the diameter of the prop is limited by the length of the spills. Normally these are about 6½ ins. long, so unless the rather scarcer spills of greater length are obtained, this system is limited to small models.

Bringing home the balsa is often a perplexing matter. If you cycle it doesn't seem to make any difference where you put your strip balsa, it always seems to arrive home in a considerably greater number of pieces than when you left the shop. C. G. BAKER, of Earlsdon, Coventry, has foiled the Gremlins with great cunning, as he puts all his pieces of balsa in a 37-in. length of 1-in. diameter light gauge tube, tightly corking both ends.

Ideas, like troubles, hardly ever come singly, and this chap gives a second instalment with his free-wheel clutch shown in Fig. 8. It is made very simply by taking a piece of brass tubing of suitable length and flattening it all but a small portion at each end. It is then bent to form a U and the two unflattened ends bent upwards and bored through to take the shaft, on which it is firmly sweated in position.

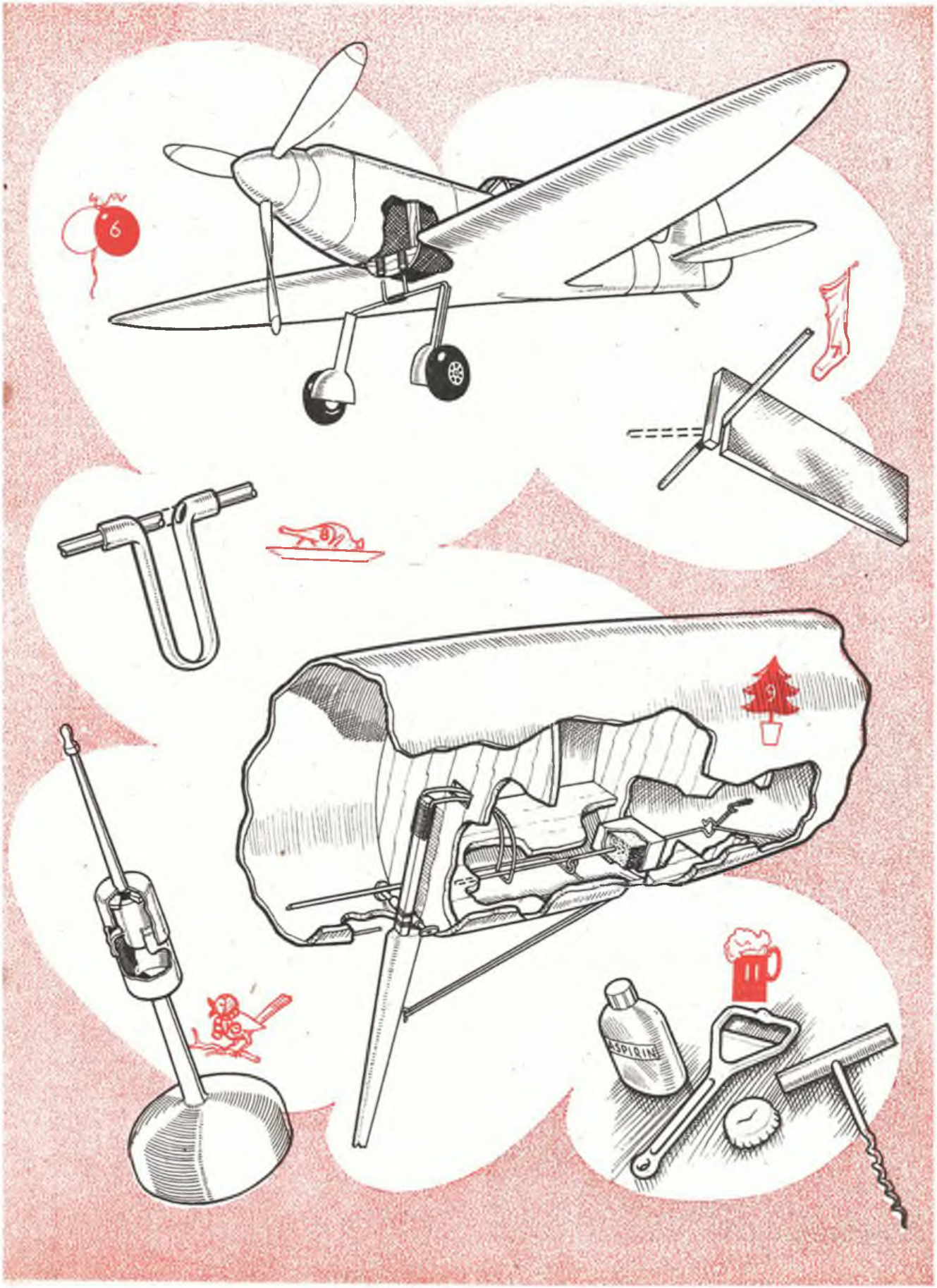
Retracting undercarriages have held the attention of experimenters for a long time, but B. R. ALDRIDGE, of Romford, has struck out in a new line with the type shown in Fig. 9. The heart of the scheme is the friction-box. This is made from sorbo rubber compressed and enclosed in a small box best made from thin ply, and strongly bound and cemented to take the strain. The rate at which the pin is drawn through the box is controlled by the strength of the rubber band and in turn controls the moment at which the leg retracts. Optimum time lag was found to be in the region of eight seconds, which gave ample time for the model to be well clear of the ground, and left no chance of premature retraction.

Also from this chap comes a useful tip for those solid fans who have been troubled by the old bugbear of a good matt finish, never an easy achievement. The ideal is, of course, a sprayed finish, but for many of us the outlay involved would cut off our beer and baccy for far longer than is comfortable. A dull matt finish, however, can be obtained with colours blending most professionally by applying several layers of the colours equally, carefully following the outline of the first coats, and waiting till quite dry. Then, very, very gently rubbing the model all over with the finest grade of emery cloth available, whereupon the edges of the colours blur correctly and the whole surface assumes an even matt finish.

Every petroleer knows only too well the effect of a bit of dirt in the juice which, infected with the wanderlust, always ends up in the jet orifice, to provide that frustrating crackle from the engine which quickly dies away, and the popping and intermittent firing which is the best that can be hoped for. J. BROOKS, of Bournemouth, never has this trouble owing to his filter oil can illustrated in Fig 10. The filter was made from an old propelling pencil lead container, half of which, suitably drilled, was soldered on to the lower half of the oil can spout, which had been cut in half previously. The other half, again suitably drilled, was soldered correspondingly on to the upper part of the spout. The remaining components were the chamois leather washer which is the actual filter, and a tube made from tin which was soldered inside the male half as shown to hold the chamois washer firmly in position. To this end care must be exercised to make sure that the length of the tube is just right for the purpose.

A model all-rounder, Mr. Brooks also sends a scheme for making more realistic dashboards and similar equipment on solid models. Artists' scraper board is the medium chosen, and with the aid of a few simple tools easily fabricated from sharpened pieces of steel wire, razor blades, etc., the board in between the required parts is scraped away and the instruments, dials, etc., are left in relief. Mr. Brooks' own set of tools consists of a small pair of dividers, a penknife with a finely ground tip, a darning needle with a screwdriver point, and one or two splinters of wood with tiny pieces of very fine sand paper glued to the ends used for cleaning up the spaces between the various instruments. The background is painted in suitable colours and the dial markings, needles, etc., are left white. This gives an unusual but very realistic effect.

Once again bearing the occasion in mind, Consus rounds off the selection with his own particular gadgets which will see hearty use over the festive season. Of course, there may be no need for the one at this end, but in the logical sequence of things (From Consus to un-Consus? Ed.) he fears that it will be served quite as heavily as the others. . . . A very merry Christmas then—and don't eat too much pudding!



Line-up of model Mosquitos mass produced by G. Massey-Collier.

AIRCRAFT IN MINIATURE

PART ONE OF A NEW SERIES BY

W · O · DOYLEND

Above: Short Empire Flying-boat—a class of aircraft always popular with modellers.

Below: Mercury and Maia—a rather more ambitious project. Both of these models are by the author.

INTRODUCTION to a Hobby. To have asked the average "man in the street" some six or seven years ago to explain the difference between a Spitfire and a Wellington would merely have resulted in a blank stare or a shake of the head or, perhaps, a counter-question on the lines of one so much used by a prominent radio character as well as judges, "What are Spitfires and Wellingtons?" Indeed, to most people at that time, an aeroplane was just something with wings on. They would probably admit that some were larger than others and that some had only one "fan" whilst others had more than one. But to all intents and purposes each one looked much the same as another and anyone, apart from the schoolboy, who could tell you more than that was usually regarded as something of a crank or a fanatic.

But not so today. Six years of war has brought about an immense growth in the average person's knowledge of aircraft. Many men and women have been brought into close touch with the subject either through the medium of the Services, industry, or the various Civil Defence organisations such as the Royal Observer Corps, Spotting Clubs and the A.T.C. And amongst those who have been thus engaged during the war years there must be many who will retain the interest that has been aroused and who will wish to keep in closer touch in the future with the progress of this absorbing branch of science.

In a large number of cases this increased interest in aircraft will inevitably find expression in the construction of scale models, and it will not be the schoolboy alone, but many other people as well, the man in the office or in the shop who likes to do something with his hands in his spare time, who will find an outlet in this fascinating hobby. The art of reproducing the well-known lines of familiar aircraft types in miniature replicas complete in every detail and colouring, is finding an ever-increasing circle of adherents.

For the benefit of the reader who has not yet made up his mind about tackling such a hobby and who desires first to find out more about it, let us examine briefly the scope offered by scale model work. He can range from the single model upon which his interest is solely centred to the dozen or so types with which he has become familiar, either in the factory or through his experience of having flown in them as pilot, a member of the aircrew or as a passenger. He may confine himself to models of aircraft used in the recent war, or again, he may keep exclusively to civil and commercial types, air liners and light aircraft. Or he may prefer to model only those types produced by one particular aircraft

The ever-popular Supermarine S.6 and the Handley Page H.P.42 are included in the author's large collection.

company or by one particular country. At the other end of the scale, he may envisage the gradual building up of a representative collection large enough to illustrate the development of the aeroplane right from the earliest days. The modeller who takes the trouble to build up such a collection will find it a task that will give a great many hours of interest and pleasure.

Such a collection as the latter often presents many useful applications. Models have been used in large numbers for instructional purposes and, no doubt, they will continue to be used in this capacity. Further, opportunities of arranging displays and exhibitions in aid of charitable causes and institutions are continually arising.

In the following pages an attempt has been made to smooth the way for those who are about to embark upon this hobby, in addition to providing helpful ideas and suggestions for those who are already engaged in model making. The various methods of construction, the making and fitting of detail parts, and the methods to use in painting and finishing are those which have been found, during the course of a number of years' experience of the hobby, to be the most simple and the most effective. An attempt has been made to cover all the contingencies that might arise in the construction of a wide range of different types. All the little snags and pitfalls which the novice may encounter are discussed, and suggestions made as to the best methods to employ for their avoidance.

The reader should not, however, form the opinion that there is anything difficult in the application of this hobby. Provided that he goes about the job in the right way there should be no great difficulties attached to it, and he will find, as type follows type, that his own skill will grow rapidly until he is able to tackle the most involved model with complete confidence and success.

Before embarking on the construction of the first model, one important point should be decided, and that is the selection of the most suitable scale. If it is intended to build up a collection of several models, it will be most satisfactory to build each of them to a single uniform scale so that all types will bear similar proportions one with the other. The use of a uniform scale also enables a certain amount of standardisation to be obtained in many detail parts, and, in addition, comparisons and contrasts between types will be more apparent.

A popular scale is 1/48 full size, or four feet to one inch, but if an extensive collection is aimed at, this scale may prove to be somewhat large, resulting in time in an acute "housing problem" for the completed models. Therefore, the slightly smaller scale of 1/72 full size, or six feet to one inch, is recommended as the more suitable, and it is on this scale that the notes contained in this book are based, though in their main essentials they may be equally well applied to the larger scale mentioned.

The 1/72 scale is neither too small to render the inclusion of details difficult, nor too large to provide a problem in keeping the completed models. In addition, it is possible to obtain a wide range of aircraft drawings and small accessories to this scale, facts which should weigh heavily in favour of its adoption. The time involved in preparing one's own drawings is alone considerable, and any saving of time on this can be devoted instead to the actual building itself. Any measurements or scale drawings which appear in later chapters will refer to the 1/72 scale.

Having settled the scale which will be used, the next question is the particular aeroplane type to be tackled first. In this matter don't be too ambitious. A simple model with the minimum number of bits and pieces is by far the best for the novice. There is nothing more disheartening than to attempt a large and complicated model with little or no experience of the art. Numerous difficulties seem to crop up and nothing will go right. The disillusioned modeller is then liable to throw the whole thing up in despair before he has given the hobby or himself a fair chance.

So start with a small, simple model. Then, if mistakes are made, and one is bound to make a few to begin with, it will be much more easy and far less tedious to put them right than would be the case with a larger type.

The modeller must cultivate the quality of patience and the ability to take infinite care in all stages of his work. Once these have been acquired, the possibilities that arise in the model-making field are boundless.

Tools, Equipment and Materials.

Wood is the only successful medium for the construction of lasting scale models, and it is, perhaps, safe to assume that the majority of would-be model makers will already be acquainted to a greater or lesser extent with the art of working in wood and will only need to adapt this art to its application to modelling.

A well-equipped workshop is a great asset, but the novice may have to make a start with limited accommodation and the minimum of tools and equipment, gradually building up his kit as he progresses and as his requirements grow.

The serious modeller should look beyond the penknife and razor blade methods right from the start and

(*continued on page* 40.)

SUPERB ALL WING SAILPLANE DESIGNED BY A · J · COCKLE

SCYLLA

Characteristic views of Scylla, which give some idea of its magnificent appearance. The model depicted follows the original experimental design; that given on the plan has improved finning to avoid "blanketing" on the line.

CONSTRUCTION of the Scylla is quite straightforward, the main point requiring careful checking being the 5 degree washout at each wing tip.

The Pod. Simple in construction, this can be built in two ways ; all solid, using laminations of ½ in. block balsa, or rigged up from extra root ribs and sheet covered. The former is the stronger fairing and is easier to shape.

The main keel is cut from 3/16 in. plywood, and the wire carrying an adjustable tow hook is cemented in place. Upper and lower fin braces are next fitted, followed by the two wing fixing boxes. Care should be taken to ensure that these are fitted at exact right angles to the keel. The block balsa sides (cut to keep shape minus the upper and lower fins) are next fitted, and root sections added. Shape to streamlined section, leaving final sanding until wing is in position.

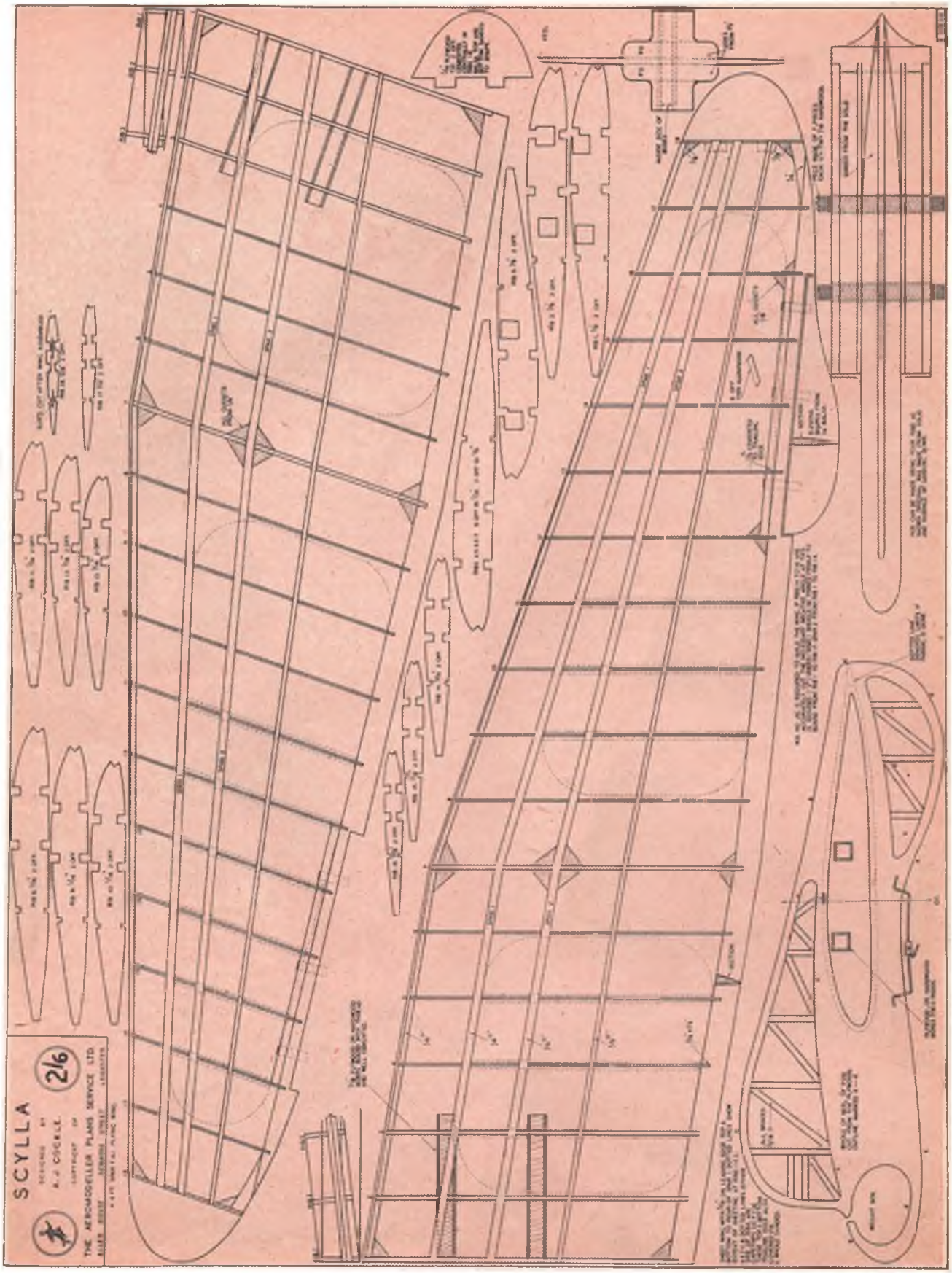
The Wing. Pin spar 1 (lower) to the board for its whole length, and spar 2 (lower) from rib 1 to rib 14. Fit ribs, making sure that rib 1 inclines at angle shown. Cement spar 1 (upper) and leading edge, noting that the latter does not rise towards the tip. The trailing edge is steamed into a smooth curve to meet rib 18, which should stand about ½ in. from board. Use packing under the trailing edge from rib 14 to 18.

Now cement in place spar 2 (upper) and the upper rear spar, followed by the peg boxes. When thoroughly set, remove from board and cement the remaining spar in place. Spars will stand above the ribs from 14–18, and should be trimmed with a sharp chisel rather than a knife or sandpaper. Sand whole wing until smooth.

Slot rib 18 and fit ply tip, fairing top and bottom with scrap balsa. Sheet cover from leading edge to rear of spar 1, both top and bottom, also section from ribs 1–2 and 6–8, as indicated by dotted lines. Trailing edge is also sheet covered top and bottom, and the remainder of the ribs showing are capped with ¼ in. by 1/16 in. strips. Sand the whole down to about 1/32 in.

Cut elevons, and fit to training edge, using thin aluminium hinges. For a "super" finish, dope and sand the whole framework three times before covering. Cover with medium heavy tissue, then dope and colour.

Full-size working plans (see ¼ scale reproduction) can be obtained from AEROMODELLER PLANS SERVICE, Allen House, Newarke Street, Leicester, price 2s. 6d., post free.

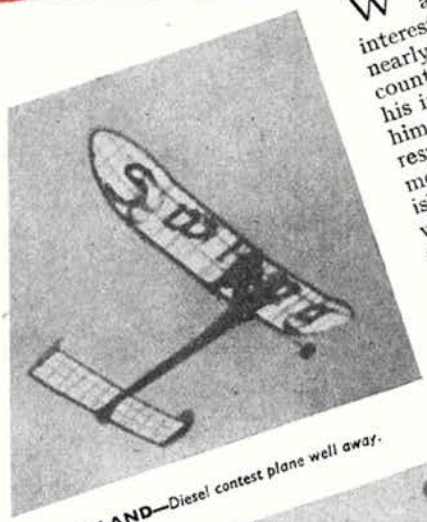


THE BOFFIN'S NEWS OF MODELLERS OVERSEAS

The Boffin hopes to fill your stocking
With literary features shocking,
But as printers won't set 'em
Till his editors vet 'em
The juicy bits are rather locking.

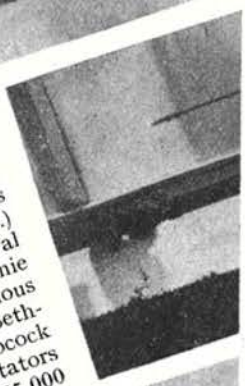
OVER TO YOU

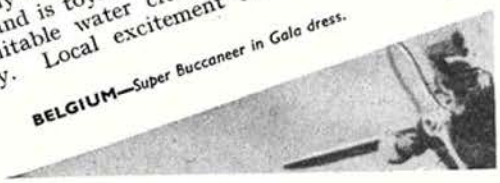
WITH a certain degree of surprise the Boffin can announce his first anniversary—readers may be interested to know that in the twelve months past nearly three thousand letters from forty-seven different countries in practically as many languages have taxed his ingenuity in finding out just what they were telling him. There are still one or two countries who have not responded. The Boffin is anxious to hear from aero-modellers in Fiji and a number of the smaller Pacific islands, a few more Russian correspondents would be welcomed, while, of course, he can never have too many letters of the mixture as before from those who have already written. This perhaps will also serve to excuse him if some letters have not yet been answered personally, and if really interesting gen would seem to lie neglected in the "In" tray.



FINLAND—Diesel contest plane well away.

AUSTRALIA—Petrol entries at Elsternwick M.A.C. Gala, Victoria.





BELGIUM—Super Buccaneer in Gala dress.

Line up for the Queen Elizabeth.

Edgar Deigan, of New Rochelle, N.Y., sends news that will doubtless embarass steamship and air lines with an increasing number of stowaways. He reports two model meetings where the first prizes were a full-size Ercoupe Sportsplane presented by U.S. newspapers sponsoring the events. (British papers please copy.) Winner at the first meeting, held at Willow Grove Naval Air Station, proved to be nineteen-year-old Ernie Babcock, who piled up a total of 305 points in the various classes to win. The next meeting took place at Bethpage, Long Island, and, believe it or not, Ernie Babcock turned up again and won another Ercoupe! Spectators were on the same lavish scale as the prize list—75,000 attending at Willow Grove by official Navy count, while 150,000 were present at Long Island, to the disappointment of the organisers who had expected over 200,000. These figures are particularly noteworthy as the airfields in both cases were in rural areas—without any special travel facilities. Perhaps next season at Eaton Bray . . .

Mandarin Modelmakers.

Hugh Martin writes from a R.A.F. station near Singapore of modelling activities. Here they are fortunate enough to possess a small model shop where certain supplies are available; before this the boys used to tear the old Missies to pieces. In really super weather they are able to knock up some splendid times, while the sea locally is glass smooth for miles. Hugh has a Gwin Aero and is toying with the idea of a speed boat or some suitable water craft rather than waste the opportunity. Local excitement runs high when the

BELGIUM—*Sartorial delights at Grinbergen, Nr. Brusse's.*

SHANGHAI (top)—*Brian Hewitt's troopship conceived petrol model.*

U.S.A. (centre)—*Unusual entry at Willow Grove, Pa., Meet.*

U.S.A. (above)—*First prize at Willow Grove Meet.*

U.S.A. (below)—*90 m.p.h. Target Drone on launching ramp at Bethpage, L.I.*

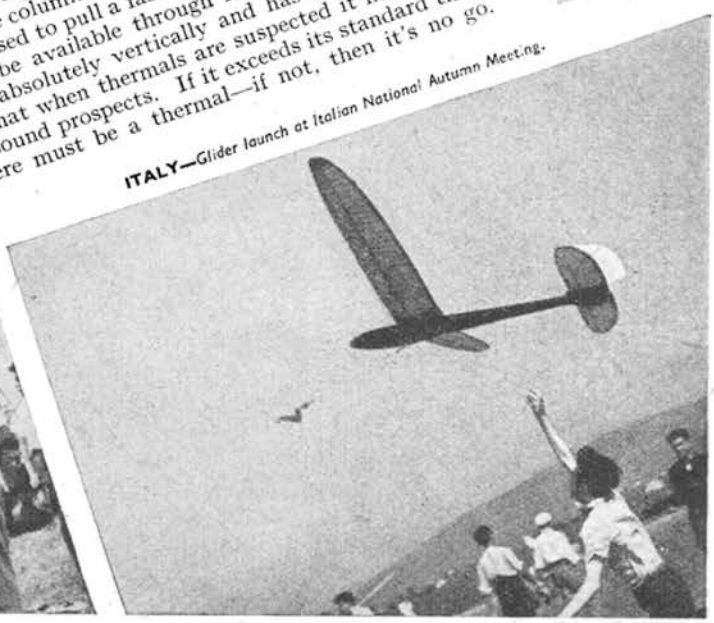
Maltese Cross.

Another R.A.F. enthusiast in Takali, Malta, G.C., gives a stirring account of thermals there. His Condor Clipper went up and up for nearly half an hour, disappearing in cumulus. Watched with flying control's binoculars it later reappeared at about 1,000 feet, and then broke into pieces—certainly enough to make a Maltese cross. Three Clippers in all have gone the same way, and Robert Monk is hard at work on number four. Only cloud on the horizon is the rubber situation—stocks apparently do not stretch as far as Malta.

Watteyne Wins.

Our good friend Arnold Watteyne, of Brussels, has been experimenting with a new type of model and reports his smashing victory at the French Helicopter Championships when he swept all before him with his new rotorplane Vega. Pictures have already appeared in these columns of this interesting design, and the Boffin is pleased to pull a fast one and announce that plans will soon be available through A.P.S. This curious model flies absolutely vertically and has fixed still air times, so that when thermals are suspected it may be sent up to sound prospects. If it exceeds its standard time then there must be a thermal—if not, then it's no go.

SWITZERLAND—*M. Degen and Dr. Dolfuss, Research Chief and Public Relations Officer of Swiss Aero Club. (Aeromodelling Section.)*



ITALY—*Glider launch at Italian National Autumn Meeting.*

OFF THE SECRET LIST!

Electric R.T.P. flying has come a long way since the "Aeromodeller" first published Mr. Hassall's scale Magister in 1943. Development of this intriguing branch of aeromodelling has progressed steadily and a vast amount of experimental work by the "Aeromodeller" Research Department under Squadron Leader Hunt has resulted in the magnificent display at this year's exhibition. Readers may not at first appreciate the tremendous achievement that the Vampire model represents. We of the "Aeromodeller" staff were almost unanimous in our opinion that the model would not fly and after several attempts, all without success, even the designer, P. H. Hunt, was having his doubts. However, perseverance and continuous experimentation eventually won the day and Britain's First Air Jet driven model was airborne one October evening before the triumphant gaze of a group of weary research workers. Three months of continuous work had finally borne fruit. — [Ed.]

By PETER H. HUNT

ON first thoughts, a preview of the flying models on view at the 1946 Dorland Hall Exhibition might rather be taking the gilt from the gingerbread, but all visitors will agree that a little knowledge of their working adds greatly to the pleasure of seeing the models perform.

This year, our Exhibition Architect, Mr. John Lansdell, A.I.R., I.B.A., has been able to create extra floor space at the Dorland Hall by erecting a false floor above the main hall, thereby enabling us to devote greater scope to r.t.p. flying, and visitors will find five models, each one unique in its class.

On the main flying floor the scale model Vickers Viking is the first to be seen. As many readers will know, this already famous model, now resplendent in British European Airway colours, is powered by two 9-ounce 18-volt motors, each delivering nearly ⅓ h.p., while tucked away inside the fuselage is the miniature motor and gearing used for raising and lowering the undercarriage in flight. The remote controls are operated from the controller's box at the head of the flying floor. It will interest readers to know that the Viking has just returned from the Paris Salon Aircraft Exhibition, where Continental visitors in their thousands have stood to watch it.

The next model is the ever-popular semi-scale Jackdaw, designed by Mr. C. Rupert Moore.

In the slightly strengthened centre section of the fuselage is housed a specially designed 24-volt universal motor, which turns the 10 in. diameter, 8 in. pitch propeller at about 2,500 r.p.m.

Designed by the AEROMODELLER Research Staff, this 24-volt motor has been developed for r.t.p. use. Running free at 24 volts, the motor turns at 15,000 r.p.m. and consumes 0·75 amperes, but when running under load, the current consumption can be increased (by loading) at 2·25 amperes, when the motor will run for long periods (70 minutes under test) without serious heating effects.

Heavier loading at 3·5 amperes results in hot running, which has no lasting effect if the running period is kept down to three or four minutes. The motor cools rapidly owing to the generous use of iron in the field and armature, and the exposed field winding dissipates heating rapidly.

It must be remembered that at 3·5 amperes the motor is dissipating 84 watts—nearly 1/9 h.p., and this for a weight of 6½ ounces!

At the far end of the flying floor is a scale model of the De Havilland Vampire. Yes—a true jet-propelled aircraft, powered by the AEROMODELLER motor.

The development of this model has involved many hours of painstaking experiment and labour, and it is of interest to outline briefly the history of the failures and successes experienced during its construction.

A miniature jet unit sounds simple enough—all that is necessary is to draw in air, compress it, and exhaust it, still under pressure, through a suitable efflux, to produce a thrust sufficient to fly the model.

Now the shape of the Vampire fuselage immediately suggests the use of an axial flow compressor; the experiments soon showed that the volume of air handled in any given unit of time was totally insufficient to produce appreciable thrust. It must be borne in mind that the keynote of the difficulties encountered was the word "SIZE."

The unit to be made was limited to 4½ in. max. width, 3½ in. max. height, and 3½ in. max. depth—clearly not a big volume.

These dimensional limitations were laid down mainly by the necessity to keep the C.G. in the correct position and the fact that the heaviest unit, the 6½ ounce r.t.p. motor, had to be mounted as near the C.G. as possible.

Discarding a true axial flow compressor, the next experiments involved a two-stage centrifugal blower, which, although handling a greatly increased volume of air, only gave an inadequate static thrust (⅜ ounce).

By discarding one stage of the blower and by making careful pressure measurements at various stations in the blower housing, it became evident that the air from the moving blades should be ducted off peripherally and tangentially, and not ducted back axially as was necessary with the two-stage blower.

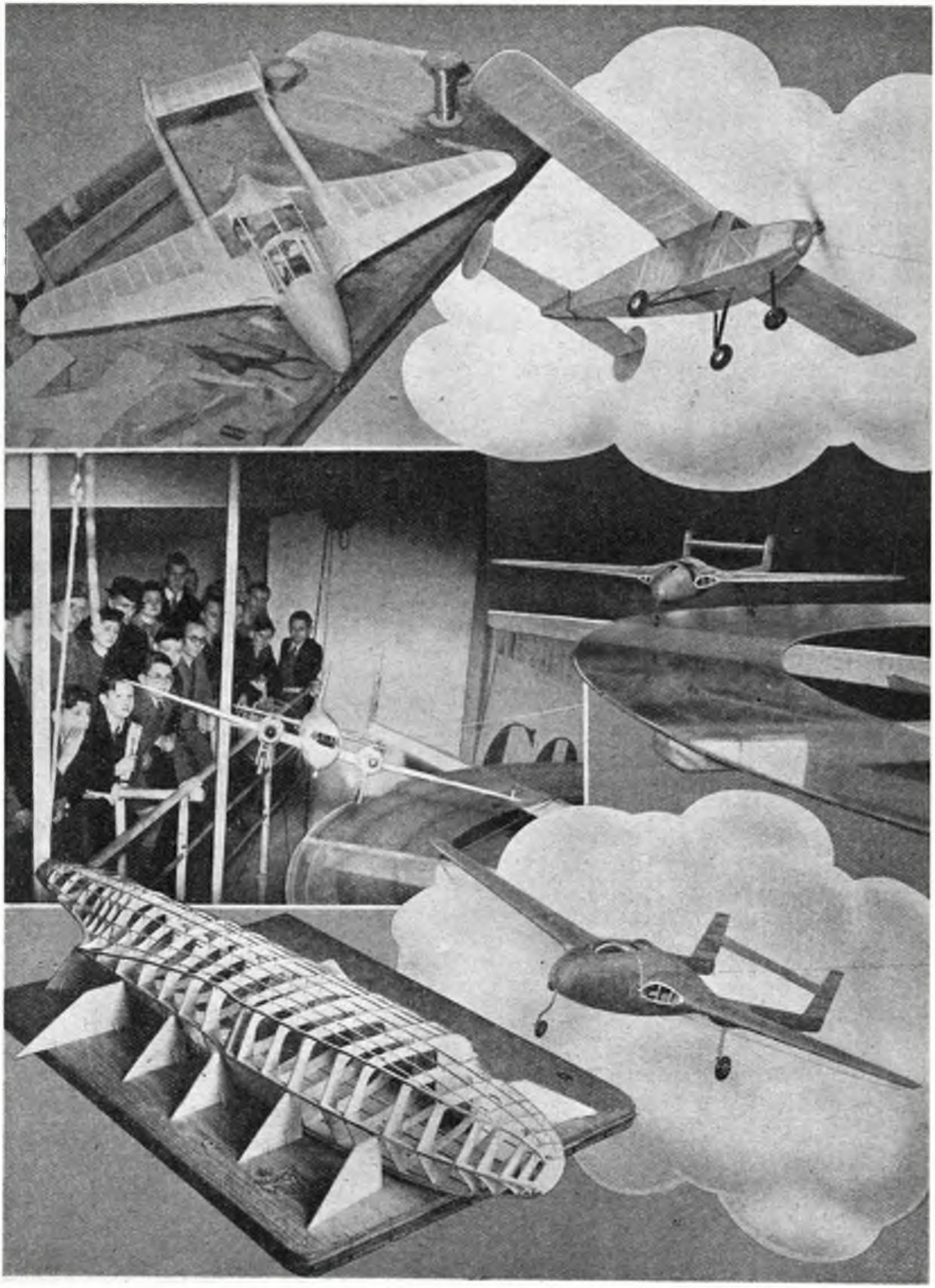
Accordingly, a mock-up centrifugal compressor was made of shim brass and balsa wood. Powered by a 1 ounce motor, the unit weighed exactly 2 ounces, and fitted with a light tricycle undercarriage would propel itself along a comparatively rough wooden floor at 4 m.p.h. The static thrust measured was ¼ ounce.

With this encouraging result, a two-sided impeller was finally built, the shaft running on ball-races, and the whole built into the Vampire fuselage, the ducting being integral with the fuselage itself. This unit gives a static thrust of nearly 2 ounces—sufficient to fly the model at an all-up weight of 16½ ounces.

After the Vampire comes the now familiar "Dorland," this time powered with the r.t.p. motor and using a near-scale propeller. The model flies round at about 14 m.p.h. max. speed, landing evenly on its tricycle undercarriage.

Last, but by no means least, is the scale model "Sandringham," designed by the AEROMODELLER Research Staff and which is yet another model powered by the AEROMODELLER r.t.p. motor.

At the time of writing, this model has not yet flown, but flotation tests show very promising results, and visitors will all agree that, for imagination and majesty this model, floating at its buoy on the giant circular water anchorage in front of a modernistic flying boat base, is one of the high-lights of the Exhibition.



18" SPAN R.T.P. MODEL

DIZZY

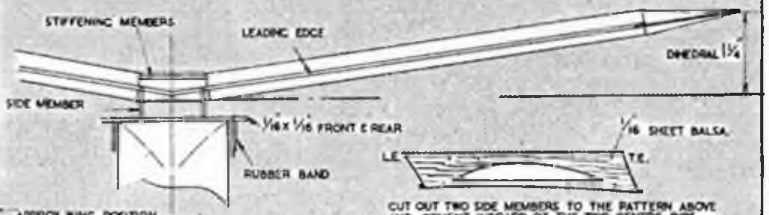
DESIGNED BY

S. WARD.

THE AEROMODELLER PLANS SERVICE LTD.

ALLEN HOUSE NEWARKE STREET LEICESTER

1/6



CUT OUT TWO SIDE MEMBERS TO THE PATTERN ABOVE AND CEMENT INBOARD OF THE TWO CENTRE RIBS. WHEN DRY ADD THE 1/16 x 1/16 CROSS MEMBERS THESE MEMBERS ARE ALSO USED AS ANCHORAGE FOR THE RUBBER BANDS.

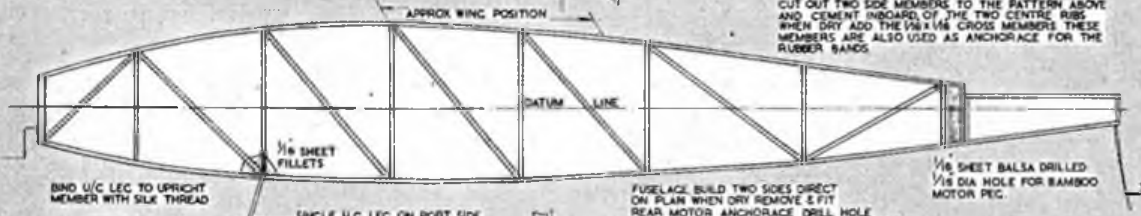
MATERIALS REQUIRED

SHEET
1 SHEET OF 1/32" x 3" x 18" BALSA
1 SHEET OF 1/16" x 3" x 18"

STRIPS
8 STRIPS OF 1/16" x 1/16" x 36" BALSA
1 STRIP OF 1/8" x 1/16" x 36" BALSA
1 STRIP OF 3/16" x 1/16" x 36" BALSA

MISCELLANEOUS

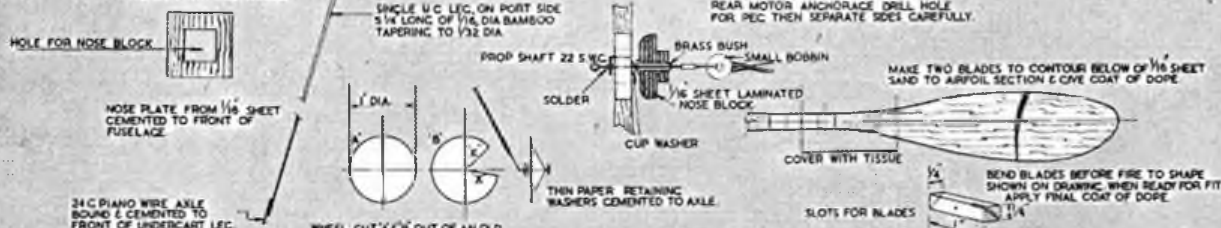
1 BLOCK 1½" x ¼" x ¼" BALSA
6" OF 22 S.W.G. TUBE CEMENT.
3 YDS 1/16" x 1/16" RUBBER
CUP WASHERS
BAMBOO STRIP
22 S.W.G. BORE BUSH
2 SHEETS LIGHT WEIGHT TISSUE
BANANA OIL
SILK THREAD



BIND U/C LEG TO UPRIGHT MEMBER WITH SILK THREAD

FUSELAGE BUILD TWO SIDES DIRECT ON PLAN WHEN DRY REMOVE & FIT REAR MOTOR ANCHORAGE DRILL HOLE FOR PEG THEN SEPARATE SIDES CAREFULLY.

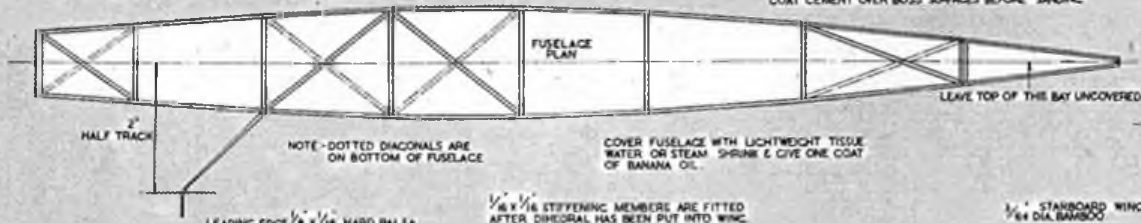
TAIL PLANE RIB MAKE 5 FROM 1/32" BALSA.



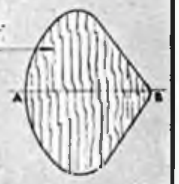
DETAIL OF PROP BOSS. BLADES CEMENTED IN SLOTS & BOSS THEN SHAPED GIVE ONE COAT CEMENT OVER BOSS SURFACES BEFORE SANDING.

COVER BOTH SURFACES OF TAILPLANE WITH LIGHT WEIGHT TISSUE DO NOT WATER SHRINK OR DOPE.

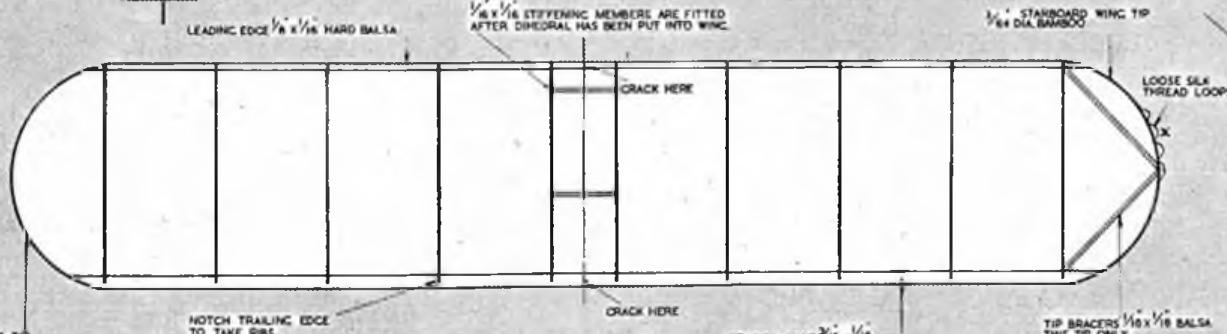
ALL LONGERONS & SPACERS FROM 1/16 x 1/16 HARD BALSA.



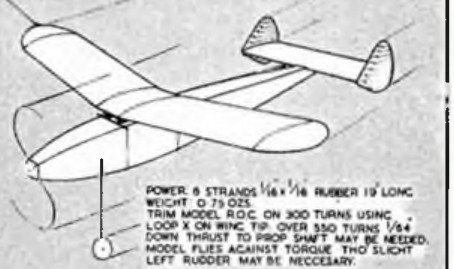
FINS MAKE TWO FROM 1/32 SOFT BALSA & FIX TO TAIL-PLANE CEMENTING LIGHTLY AT A & B ONLY



WING RIBS CUT 10 FROM 1/32 BALSA.



COVER BOTH SURFACES OF MAINPLANE WITH LIGHTWEIGHT TISSUE DO NOT WATER SHRINK OR DOPE.



POWER 6 STRANDS 1/16 x 1/16 RUBBER 19" LONG WEIGHT 0.75 OZS. TRIM MODEL R.O.C. ON 300 TURNS USING LOOP X ON WING TIP. OVER 350 TURNS 1/64" DOWN THRUST TO PROP SHAFT MAY BE NEEDED. MODEL FLIES AGAINST TORQUE TWO SLIGHT LEFT RUDDER MAY BE NECCESARY.

1/24 B

R·T·P· NOTES *by R·H·Warring*

SUCCESSFUL round-the-pole flying is by no means as easy to achieve as it may appear to anyone watching a "crack" model turning in its three and four minute plus flights. Most people when they start, find it quite hard to beat the 60 second mark—and even if they persist seldom exceed two to two-and-a-half minutes. Yet the experts consistently turn in flights of well over the four minute mark and the present record is not many seconds short of six minutes.

There are not more than three or four aeromodellers in the country who can be reckoned on to exceed five minutes duration R.T.P. and they have only got to this advanced stage *by lengthy and painstaking development* over the past three years. They have spent many, many hours with their models, carefully trimming and adjusting them for peak performance.

The average club flier is generally satisfied with about 90 seconds. Quite a few of them can beat the two minute mark on competition days—some may even reach the three minute stage occasionally. But it is a long step from here to the four, five and six minute stage.

Now let us try to find the reason for this.

In the first place all the high-time models—without exception — have microfilm-covered wings and tail surfaces. When they first appeared many people criticised this as rather unfair, thinking that microfilm models meant ultra-light weight. But the real reason for using microfilm on high-performance microfilm models is quite different. A microfilm-covered wing or tail is *much more efficient* than a similar tissue-covered aerofoil—and strangely enough, since relatively thick microfilm is used for greater strength, these "mike" R.T.P. jobs are generally slightly heavier than their tissue-covered counterparts!

The main reasons for the greater efficiency are simply these. First, undoped tissue is quite porous, whereas microfilm is not. Hence air moving over a tissue-covered surface readily seeps through the covering—from the high pressure area under the wing to the low pressure area over the wing—destroying some of the lift. Second, microfilm is so much smoother and gives a truer covering than tissue.

Those aeromodellers who aspire to high R.T.P. times and have previously fought shy of microfilm should start getting in some practice right away. As an intermediary stage they might try microfilm covering *applied over the original tissue covering*.

That is only part of the secret of high times. It goes without saying that light weight and light wing loading are desirable, but the most important factors may be summarised as :—

(i) Low drag.
(ii) Best combination of propeller and power.
(iii) Trim.

Every fractional amount of drag saved will mean so much less power required to maintain flight—and thus so many seconds increased duration. Even a simple slabsided model can be streamlined—so avoid anything that may cause unwanted drag, such as blocking up the leading edge of the wing and letting the wing centre section "trap" the airflow.

Too much time cannot be spent experimenting with propeller and power combinations. The weight of the rubber motor should be roughly equivalent to that of the bare model, *i.e.*, a 50 per cent. power (total) weight ratio. The propeller diameter should be roughly 40 to 45 per cent. of the wing span. Propeller pitch, in combination with the *type of rubber* being used, is the deciding factor. The cleaner the model the less the power required to fly it, *i.e.*, the smaller the cross section of motor required—hence greater motor length, greater number of turns and greater duration.

The practical method is to choose that cross section (number of strands) of rubber which will *keep the model airborne* on about 10 per cent. full turns. For best results an R.T.P. model in the five-minute class should fly out about 90 per cent. of its turns in the air. Under full power many models of this type tend to be unstable—climbing and diving—due to excess speed caused by the greater initial thrust. Some modellers carve their propellers very thin so that they will flex forwards (increasing pitch) to combat this. Another very good plan is to let off a certain number of turns before releasing the model.

Another feature in common on high-performance models is that long flights are only made *on good rubber*. Failing torque tests—which is really the only satisfactory method of testing and matching rubber motors—a rough test can be made by timing the duration of propeller run with a new motor. If this is considerably less than 80 to 90 per cent. of the duration of flight, then the actual power output from that motor is not good enough. Rubber motors can be "matched" in this way, once a "standard" motor has been found which gives satisfactory results.

Finally, trim. Until comparatively recently it was generally accepted that a model trimmed for satisfactory R.T.P. flight would be considerably under elevated with the same trim in free flight. Although quite high times were reached with models so trimmed the *majority* of R.T.P. were—and still are—flown too fast. In other words, the models flew with the wings at a relatively low angle of attack, demanding speed to maintain lift—and more power to get that speed.

Much of the secret of high times lies in *slowing the model up*—or getting the model to fly with the wings at a high angle of attack without stalling. The ideal high-time R.T.P. trim is that trim for *free flight*, although this is often extremely tricky to establish on the line. Modern R.T.P. trimming technique also demands that the tailplane should contribute towards the total lift.

For the relative beginner—concentrate first on getting a light, clean model. Start with a propeller of approximately 40 per cent. of the wing span and a pitch/diameter ratio of about 1·75 : 1. Experiment with power as mentioned—and particularly with different brands of rubber—and try to get the model flying as near free flight trim as possible.

For those who would like further information on the subject of R.T.P. models and microfilm covering, the writer would recommend a study of his book "Indoor Flying Models," published by the Harborough Publishing Co. at 5/- and obtainable from local model-shops and booksellers. Plans of a simple model that will give a good average "club" performance without trouble are available in "Dizzy," which appears on the opposite page. Built normally it should serve as a basis for study of trimming problems, while with the modifications suggested above might well give surprising results. As usual full-size plans, price 1/6, post free, are offered by Aeromodeller Plans Service, Allen House, Newarke Street, Leicester.

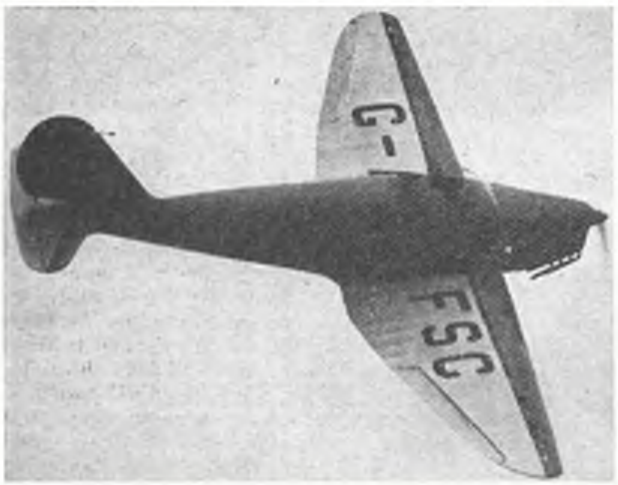
CIVIL AIRCRAFT No. 37

TIPSY

BY E. J. RIDING

One of the eleven S.2. single seaters to be built under licence for the Tipsy Light Aircraft Co. by Aero Engines Ltd. of Bristol

Photos E. J. Riding.



"FLIGHT"

Above. *An aerial view of the Model B showing the non-drag louvred slots cut in the leading edge at the wing tips.*

Below. *This photo taken at West Malling in 1936 shows the first Tipsy S.2. to be brought into this country. The engine (not shown) was a 750 c.c. Douglas flat twin.*

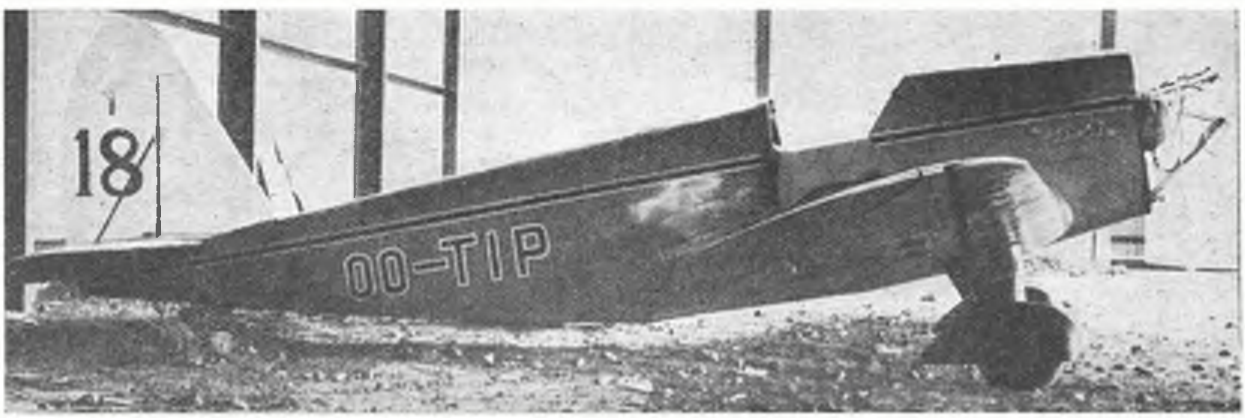
Right. *The pronounced wing tip incidence wash-out can be seen in these two photographs of the Model B trainer.*

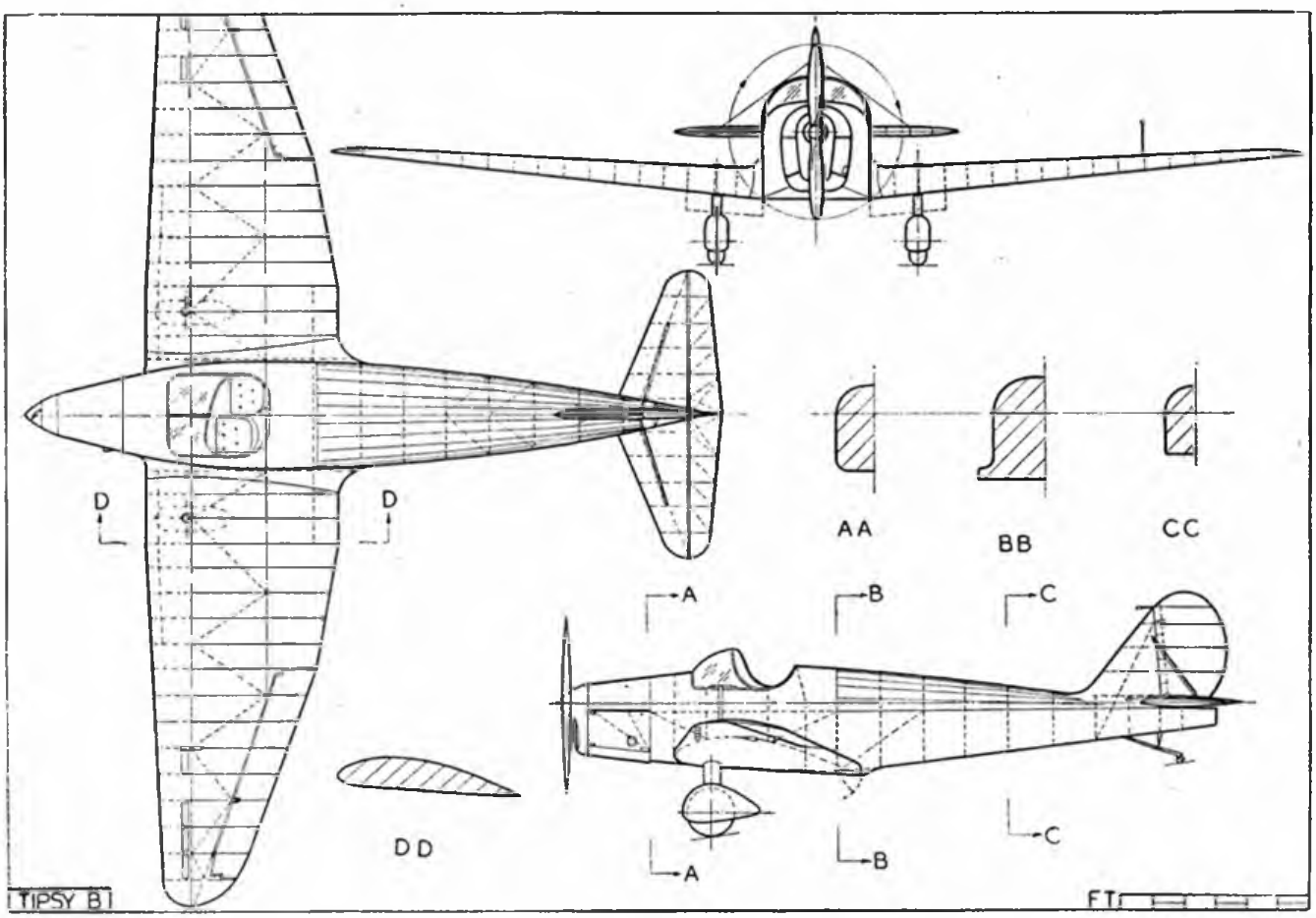
IN 1935, Mr. E. O. Tips, of the Société Anonyme Avions Fairey, designed and built a diminutive single-seater, low wing monoplane. A year later, an example of the Tipsy S.2, as the machine was called, was brought over to England, and in the hands of the late C. S. Staniland, OO-TIP fitted with a 750 cc. Douglas engine, became a familiar sight around the London aerodromes. Arrangements were then made for the S.2 to be manufactured under licence by the Tipsy Light Aircraft Co., of Hayes, Middlesex.

Following the success of the S.2, a two-seater side-by-side version known as the Model B Trainer was laid down, and in 1937 OO-DOS was brought over from Belgium, re-registered G-AFCM, and did a lot of demonstration flying up and down the country in the hands of the late Amy Johnson.

Early in 1938 production of the Model B was well under way at the Hanworth Park works of the Tipsy Aircraft Co., Ltd., and from then until the outbreak of war fifteen machines fitted with the new 62 h.p. Walter Micron engine of Czech design had been produced.

Some of these were registered G-AFGF, G-AFJR to T, G-AFRT to V, and G-AFVN to P inclusive. But for the war, work would have started on a two-seater tandem version with a steel tubular fuselage and a Gipsy Major engine. The only example of this latter type to appear in this country, G-AGBM, was issued with the serial number FO222 and used extensively as a service hack by the Fairey Aviation Co., Ltd., during the early years of the war.





At the present time there are six Model B's flying in Britain, and an example of the S.2 G–AFFN can be seen lying at the back of one of Airwork's hangars at Heston.

Construction. Fuselage: Spruce and plywood box with tubular hoops carrying stringers supporting the fabric deck covering. Wing is detachable complete with undercarriage from the fuselage, and has spruce and plywood box spars, normal girder type ribs and diagonal members and with the exception of the leading edge the whole wing is fabric covered. Hand-operated split type trailing edge flaps are fitted. The seats are arranged side by side with the joy stick between them fitted with an extension piece on top for use when the machine is being flown from the passenger's seat, which is staggered slightly aft of that of the pilot. Twelve gallons of fuel are carried in a tank immediately aft of the engine bulkhead.

Colour. G–AFKP in the photo is "electric purple" all over with aluminium letters, and G–AFWT is painted as follows: Fuselage chocolate with cream letters and flashes; wings, spats, etc., cream with black letters.

SPECIFICATION.—Length: 22 *ft.; span:* 31 *ft.* 2 *ins.; height:* 7 *ft. Wing area:* 129 *sq. ft. Tare weight:* 624 *lbs. Max. weight:* 1,200 *lbs. Max. speed:* 110 *m.p.h. Landing speed:* 35 *m.p.h. Ceiling:* 15,000 *ft. Range:* 400 *miles. Price:* £550. *(Pre-war figure.)*

(*continued from page* 29.)
should provide himself with such tools as will enable him to pursue his hobby in a workmanlike manner.

A set of the usual woodworking tools may already be available, in which case the modeller will find amongst them all that he will require. Assuming, however, that he is starting from scratch, the following are the tools that will be essential.

Firstly, a rip saw for the preliminary cutting out of the rough blocks, and a tenon saw for smaller and finer cutting, will be needed. In addition, a fret-saw and supply of fine blades will be required for very small work.

A smoothing-plane will be used for the preparation and trueing up of the blocks, and many uses will also be found for a smaller metal plane with a blade width of about 1¼ or 1½ inches.

The well-organised modeller will, in time, build up a fairly wide range of chisels and gouges, but a start may be made with a ¾ in. chisel and a small gouge.

Two 6 in. files, one rough and one smooth cut, and preferably the half-round type, will also be required. A drill brace and a selection of small drills will be a useful addition, the drill sizes ranging from 1/32 to ¼ in. The small sizes will be used in drilling holes for strut fittings and the larger size mainly for the first stages in hollowing out cockpits and cabins.

A pair of fine-nosed pliers will be an essential part of the tool kit, and a pair of fine-point tweezers will facilitate the handling and fitting of small parts.

A 12 in. metal rule, a few sheets of sandpaper of various grades, a tube of plastic wood and a tube of glue completes the list of equipment needed to make a start.

As the modeller advances in his hobby and turns his attention to larger and more complicated types, he will form a good idea of his own requirements in the matter of additional tools and will build up his kit according to his own needs. The main additional items will include a spokeshave for shaping large-size wings, fuselages and flying-boat hulls, several more chisels (mainly the smaller sizes), and a set of gouges of various sizes for work on flying-boat and seaplane models. A small table vice which can be clamped to a bench or other working surface will simplify the making of many parts. The range of files can be increased, and included amongst them should be a few of the smaller kind such as those used by jewellers and watchmakers, a 3 in. flat, a knife-edge and a rat-tail being the most useful. For use in conjunction with these files a hand vice will be an asset.

Many metal parts will require to be soldered, and if an outfit does not already form part of the modeller's equipment, it should be added.

The cutting tools should at all times be kept sharp and the edges free from damage.

Working accommodation will, of course, depend upon the facilities available. The ideal is naturally the separate workshop. This need not be large; a small garden shed, 6 feet by 9 feet, can be turned into a very good modelling shop. Permanent benches can be provided and should be of a minimum size of 6 feet by 2 feet by 3 feet high. The main working bench should be fitted in front of a window where the maximum amount of light will fall on the work. It should be fitted with a woodworkers' vice and a planing stop. The block for the stop should be made of a hard wood and care must be taken that it does not become cut or damaged during use. It will often be necessary to plane strips of wood down to a very thin section for wings and tail surfaces, so that a true block and a smooth level surface upon which the wood will rest is absolutely essential.

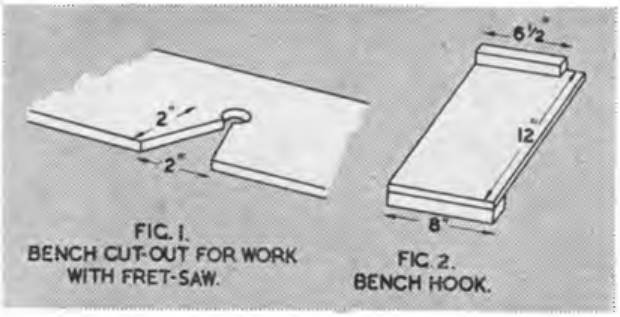


FIG. 1.
BENCH CUT-OUT FOR WORK WITH FRET-SAW.

FIG. 2.
BENCH HOOK.

To facilitate working with the fret-saw on thin wood, a small V-shaped cut-out can be made in the bench as illustrated in Fig. 1. When using the fret-saw, the wood to be cut is laid over the Vee, thus ensuring adequate support, and the blade of the saw works in the cut-out.

A bench hook is another useful gadget which the modeller can construct from a few odd scraps of wood, as shown in Fig. 2.

Racks for tools can be fitted on the walls over the bench, and shelves or cupboards constructed for such items as tins of paint, tubes of glue and small parts and materials. Shelves can also be fitted beneath the benches, on which lengths of timber can be stored, and it is a good plan to provide one or two drawers in which scale drawings and photographs can be kept clean and tidy.

The modeller will, in the light of his experience, be able to design many other gadgets of his own to aid his work.

The materials required for the models themselves should present no difficulty. Wood is the main medium, and any smooth wood having a fairly fine grain will be found suitable. It should not be too hard or it will be difficult to carve, but on the other hand it should not be too soft. It must be free from knots and other blemishes. Most kinds of ordinary deal are quite successful if chosen carefully, whilst American whitewood and satin walnut are ideal. The odd scraps of wood which are thrown away as waste in a carpenter's shop or builder's yard can quite often be used, and the modeller may find that all his requirements in the way of wood can be satisfied by obtaining these scraps.

Plywood is useless for scale model work and one should not be tempted to use it for wings or tailplanes. Balsa wood is also unsuitable for this kind of work. It will neither stand up to hard use nor will it take a good painting finish.

It is a good plan to keep a box or other receptacle in the workshop for small scraps of wood. Small waste pieces obtained when cutting out fuselages and wings from the main blocks can then be stored, and when, as often, the need arises for a small piece of wood for some detail part, the scrap box will invariably produce just the right size of material.

Several lengths of wire of different gauges will be required for struts, exhaust pipes and other details. Brass or copper wire is best for this. Many uses can also be found in models for ordinary pins, and a supply of 1 in. and ½ in. pins should be included amongst the spare materials.

Some tins of paint and one or two paint brushes will be required for painting the models, but all aspects of painting and finishing will be fully dealt with in a later chapter, so we may now pass on to the preliminary steps to be taken before commencing the construction of the models. (*to be continued.*)

A MYSTERY STORY by ROBERT JAMIESON
ILLUSTRATED by FREDDIE

WE all associate certain things with their appropriate seasons; to the farmer, seed goes with Spring, and Autumn means harvest. To the good aeromod., Summer means flying, and Winter spells but one thing—the great exhibition at Borland Hall. Once the long nights had set in, we thought and talked of nothing else.

Our speculations about the forthcoming show in London had rather a wistful note in them, for with rail fares at their present high level it was manifestly impossible for us to travel to the exhibition; and this fact was made the more galling by the sight of a huge box which was to carry Snooky Munro's sailplane south. If we could only travel to London at the same rate!

Maestro McGillicuddy, sitting in his usual corner at the fire, summed up all our thoughts by saying:

"Oh, big sailplane, now I would fain
Just see you in perdition;
And travel in your box myself to see the exhibition."

He took care, however, before uttering these sentiments, to make sure that Snooky was nowhere in the club; for the sailplane was the apple of Munro's eye, and dire indeed had been his threats of what would happen to anyone who even looked sideways at it.

As the days wore on, and exhibition time loomed ever nearer, our longing to attend grew stronger. Curiously enough, the Maestro seemed to loose interest in the whole thing, and had latterly ceased to take any interest in our talks about the exhibition—until the night Snooky Munro dashed into the club waving a paper.

"Look at this, fellas!" he roared. "Tork about luck—the stroke of a lifetime—I've won first prize in the Teucle Toorie Tombola—fifteen quid!"

In dazed silence we read the announcement in the paper, and then congratulated Snooky on his good fortune. "You'll be able to go to the exhibition now," McSwindle remarked.

"Betya life I will," cried the winner, sticking his thumbs in his waistcoat. "I'll be able to see my glider in the show—and collect me prize—and, what's more," he continued, beaming round on us all, "I'm not goin' alone—no sir! I'm havin' old Mac along with me for company." And, having made this statement, he swelled his chest and beamed round upon the company.

We all looked expectantly at the Maestro. Rather to our surprise he received Snooky's offer quite calmly, and did not seem to be at all elated.

"It's very kind of you, Snooky," he said, and reached out to stroke Drambuie, who was sitting on the arm of his chair, "but I think you should ask somebody else. Bob there, for instance—he'd give his back teeth to see the exhibition."

Despite the truth of McGillicuddy's words, we were too amazed at his refusal to take them in at first. Snooky was the first to recover.

"Don't you want to go? 'ave you gorn off yer onion or something?" he asked—then suddenly his voice changed to a truculent note. "Or maybe my company isn't good enough for you—is that it?"

"Not at all, Snooky," the Maestro replied soothingly. Then he glanced round at our faces before going on:

"I didn't want to upset you lads—or make you jealous—but I've already fixed up to go to the exhibition—as Mr. Dussell's guest."

In the dazed silence that followed this tit-bit of news McGillicuddy smirked complacently, and then went on:

"I suppose I shall be saying a few words at the opening ceremony and so on—and I'll be real pleased to see you lads there—not that I'll have much time to speak to you—for I'll be pretty busy."

The dazed silence continued, and before anyone could think of anything to say the Maestro stood up, yawned, stretched, and announced his intention of going home. It was some time after the door closed behind him that the excited babble of discussion broke. The sum of it was, as usual, hostile to the Maestro; the general opinion denouncing him as a close-mouthed perishing old twister. The gab-fest was at its noisy height when Joe Small walked in carrying a letter.

"It's for old Mac," he explained. "Got it from the postman down the road."

The postmark was London, and, guessing where it came from, we eyed it hungrily, wishing we could know the contents. Munro—ever the man of action—did what we would all have liked to do—only we lacked the courage. Without a moment's hesitation he seized the envelope from Small and tore it open.

"Now we'll know how much truth there is in that old twister's story," he said, as he extracted the letter. Quickly he read it, then, uttering a coarse guffaw of laughter, he sank into the Maestro's chair, hugging himself with delight. "The old blighter's bin countin' 'is chickens!" he cried. Then he caught sight of me and said: "'Ere, you're 'is best pal—you'd better deliver 'is mail," and tossed the letter across to me. It read:

Mr. H. B. McGillicuddy.

Dear Sir,

In reply to your suggestion of the 14th inst., that you should attend the forthcoming exhibition as Mr. Dussell's guest, I have to inform you that Mr. Dussell would rather invite a crowd of deadly rattlesnakes or man-eating tigers. With reference to your offer to say a few words at the opening, Mr. Dussell asks me to inform you that the forthcoming exhibition is *not* a fourth-rate variety entertainment, but a serious occasion; and that furthermore, he has given explicit instructions that you are not to be admitted to the exhibition under any circumstances whatsoever, and if your presence is reported within a mile of Borland Hall, he will set the dogs on you—a couple of large, fierce Alsatians being retained for that very purpose.

In other words, Comm, you've had it!

Yours faithfully,
for Mr. D. A. Dussell,
p.p.

Knowing what a cruel blow this epistle must be to the Maestro's hopes, I sealed up the letter and pushed it under his door—not caring to be present when he opened it. I decided not to make any mention of it when next we met, and, curiously enough, the others seemed to have decided likewise. Even Munro had the decency to say nothing; his desire to taunt the Maestro with his knowledge being kept in abeyance by fear of the Maestro's reaction should he learn his mail had been tampered with.

Despite our knowledge, however, we could detect no difference in the Maestro's demeanour, although he seemed a shade more thoughtful than usual. He did not accompany us to the station as we carted the huge box containing Snooky's glider there; though he turned up while Munro was booking our tickets for London.

To Munro's remark that he supposed that McGillicuddy would be travelling first-class—since someone else was paying—the Maestro did not deign to reply, beyond warning us to behave ourselves while we were in London, and repeating that he would try and snatch a few words with us if he could find the time. He did not accompany us back to the club, and when we left the station he was in deep and earnest conclave with the stationmaster.

It was while we were regaining our strength at the local—at Snooky's expense—after all it was his glider, and the box was huge and heavy—that Munro gave vent to his usual gloomy prediction that the perishing old twister had something up his sleeve. "Else what's 'e lookin' so happy about?"

But none of us had the answer to that.

I did not see McGillicuddy again before going south, though I rather missed him. Snooky grew rather a bore after a while, with his continual boasting about the virtues of his glider, and what a let-down it was for that old so-and-so after all his boasting. During the long trip south, however, he piped down on this theme somewhat, and the swarming turmoil of London subdued him entirely, though he still looked eagerly forward to seeing his glider in the exhibition. It was a certain prize-winner, he kept assuring me; he was confident it would be displayed in a place of honour.

The great exhibition had been open for several days before we arrived, but that did not dim his keenness, and as we made our way to the entrance, something of his excitement infected me. I was all eagerness to see

the show, but even so, could not help regretting that the Maestro was not present to share my pleasure.

We entered the great hall, and were soon in the happy daze enjoyed by all good aeromods fortunate enough to see the show. We must have wandered round for some time, feasting our eyes on the wonders displayed, when suddenly Munro remembered his glider. It was nowhere to be seen—and it was not the type of thing one could overlook easily—not with its size and the somewhat gay colour scheme Munro had decked it with.

Puzzled, we went back to the entrance and started all over again, but it was nowhere to be seen. At last we had to admit it; Snooky Munro's giant sailplane, the pride of his heart, had been safely despatched—but it was not on show.

Refusing to accept the evidence of his own eyes, Snooky set out on yet another round of the exhibits in search of his glider, but, before going very far, he spotted something we had overlooked before—and it gave him a further shock. Passing a case of durators, we noticed one that seemed vaguely familiar; closer inspection confirmed our suspicions. "The Cutty Sark"—designed and built by Mr. H. B. McGillicuddy.

"'Ow the perishin' pushers did that thing get 'ere?" Munro demanded indignantly. "'E never said 'e was enterin'."

He turned again to the model, shook his fist at it, then swung round with the air of a man who has made up his mind.

"I'm goin' ter get ter the bottom of this," he told me. "I'm goin' ter find the manager or Dussell or somebody."

He began to elbow his way through the crowds with a determined air, and I had to follow; but his efforts to find a sympathetic ear met with little success. Mr. Dussell was not in the building; the exhibition manager was engaged. The eyesome and umptous programme girls did their best to cheer Snooky up with smiles which would have sent him into an ecstatic dither at any normal time, but Munro had a one-track mind, and would not be diverted from his stern purpose. He was determined to unload his beef on someone.

He found a sympathetic ear at last, in the person of a much be-medalled commissionaire on duty at the door. This official listened to Snooky's tale of woe with every courtesy, then shook his head sadly.

"Pretty disappointing for you, sir, I'll admit," he said, "but it's only another mystery piled on top of all the queer things wot's been going on in this 'ere 'all since the show started."

"What do you mean?" asked Snooky. "What's been goin' on?"

The commissionaire leaned forward; his voice became hoarsely confidential.

"The Exhibition Manager's tearin' 'is 'air. Little Peter Punt is runnin' round in circles; Mr. Dussell 'as gone for the police—I shouldn't be surprised if they call in Scotland Yard."

"But what's that got ter do with my glider?" demanded Snooky.

"There's more than just a glider missing," the man replied, "and I'll tell yer the cause of it—the 'all's 'aunted; yus—'aunted—that's what's the matter—driving us all nuts."

He was now well into his stride; he thrust his face closer and sank his voice lower yet, glancing round to make sure he was not being overheard.

"Trouble started when they was getting the exhibition ready—late one night when the lads were unpackin' the models. Two of them had just carted down a big box; they laid it down to straighten their backs before they opened it—and," his voice became hoarse with drama, "before they could lay a hand on it, that box walked away on its own."

"Wot sort of box was it?" demanded Snooky.

"Funny lookin' affair with red stripes," the commissionaire said, obviously annoyed at being interrupted.

Munro let out a violent exclamation, but I dug an elbow into his ribs for silence. The man got into his stride again, teetering on his heels, hands behind him.

"I'm not saying, mind you, that the lights were full on at the time," he went on, "but that there box walked away on its own—and its feet had clogs on!"

"Of all the perishin' old twisters!" Snooky burst out, but the commissionaire ignored him and went on with his story.

"And that was only the start of it. Twice I've seen 'im with me own eyes. Comical lookin' little blighter. Dressed in a kilt and a tall hat. Just caught a glimpse of 'im once watchin' the R.T.P. flyin'—and again sneakin' round the back of one of the stands—but both times I missed 'im—before I could get through the crowds to 'im he was gorn."

"And that's not all of it. There's a whackin' great seagull flying round the place. Saw it perching on top of one of them there petrol models, and one afternoon when one of them electric planes broke down, a ghost voice says through the loudspeaker: 'Drambuie will oblige with a demonstration of stunt flying'—and there was that self-same bird, all got up in a kilt and a little tammie, flyin' round the runway neat as you please and smirkin' all over its silly face. Mr. Dussell didn't want to shoot it, and as for catchin' it—you might as well 'ave tried to catch a jet plane in a bucket."

"That night, Mr. Dussell called us all together. 'This business 'as got ter stop,' he says. 'You've got to catch that man—and his seagull. He's a slippery customer—but it's got to be done.' Well, we turned the place inside out searching—but not a trace. And all the time there's grub missing from the canteen—and drinks vanishing from the trade room."

Snooky Munro could stand no more.

"I'll lay your ghost for you!" he exploded. "I'll tear 'im limb from limb—I'll wring that bloomin' seagull's neck—I'll——."

But before Snooky could put any of his bloodthirsty designs into execution, the door behind us opened to admit Mr. Dussell, followed by a tall, amiable-looking policeman. Munro seemed about to buttonhole Mr. Dussell and plunge into the story of his woes, but the grave look on that gentleman's face held him back. The policeman beckoned to the commissionaire, who went over to them. While they were conversing in low tones, the exhibition crowd—all unaware that anything was wrong—swirled round them. Then suddenly Snooky Munro let out a wild yell and pointed:

"There he is—there's the old twister!"

Following his finger, I saw the Maestro, high up among the models, perched on top of a great showcase.

"Officer—arrest that man!" cried Mr. Dussell.

The bobby started forward, blowing his whistle and fumbling in his pocket for his notebook. The Maestro—realising he was in danger of capture—started along the top of the showcase at a good speed, Drambuie hovering over him and encouraging him with cheering squawks. The crowd around—wise to what was happening—let out a view halloo; Snooky Munro plunged forward—and the hunt was on!

The story of that wild chase through the august portals of Borland Hall will be told for generations to come. McGillicuddy displayed wonderful agility for one of his advanced years. With skill that Tarzan might have envied, he caught hold of a cable, and swung overhead on to the case at the opposite side of the aisle; then he disappeared over the top.

"Round and catch him in the trade section!" cried Mr. Dussell.

My own feelings as I followed were mixed. I hated to see the Maestro caught and hauled away ignominiously through the crowd; yet what else could be the outcome? He could not escape. Sure enough, a yell announced that he was cornered—stuck on top of the Bung-Ho Balsa Coy.'s stand. When I reached there he was smiling on the crowds below, quite unabashed.

"All right folks!" he called out cheerfully, "I'll come quietly." And with that, he dropped lightly to the floor.

"After all—I only wanted to see the show," he said as the bobby stepped up to him.

"Arrest that man!" cried Mr. Dussell, but the Bobby turned to him with a puzzled expression.

"Sure, Bud, sure," said the Bobby, with a rather surprising American accent, "but what's the charge—he only wanted to see the show."

In the pause which followed I became aware that McGillicuddy was gazing at the policeman with an incredulous expression.

"Do my eyes deceive me?" he asked, "or is it Thermal McGraw?"

The Bobby's eyes opened wide. "Hamish—you old hash-hunter!" he roared, and in an instant they were in one another's arms, pummelling each other on the back and dancing around with delight.

"Officer—do your duty!" Mr. Dussell cried again, and the policeman turned round, still with his arms round the Maestro.

"Have a heart, Bud," he pleaded, "he only wanted to see the show."

Mr. Dussell snorted with disgust. "So much for British justice. Looks more like a Caledonian society re-union than an arrest."

"Have a heart, Bud," pleaded the Bobby—now revealed as Thermal McGraw. "After all, it's Christmas!"

"Yes, it's Christmas," broke in Snooky Munro. "The only thing you could charge him with is gettin' in without payin'—and—he's a pal of mine—I'll pay for 'im."

"Well—after all——," said Mr. Dussell, obviously relenting.

"Thank you, gentlemen," said the Maestro, with simple dignity.

"Yes—but what about my glider?" demanded Snooky.

"Oh that," said Mr. Dussell. "It's at Seaton Dray—I want some photos for the 'Aeroyodeller'—you don't mind?"

"Not a bit," said the delighted Snooky. "It's a pleasure."

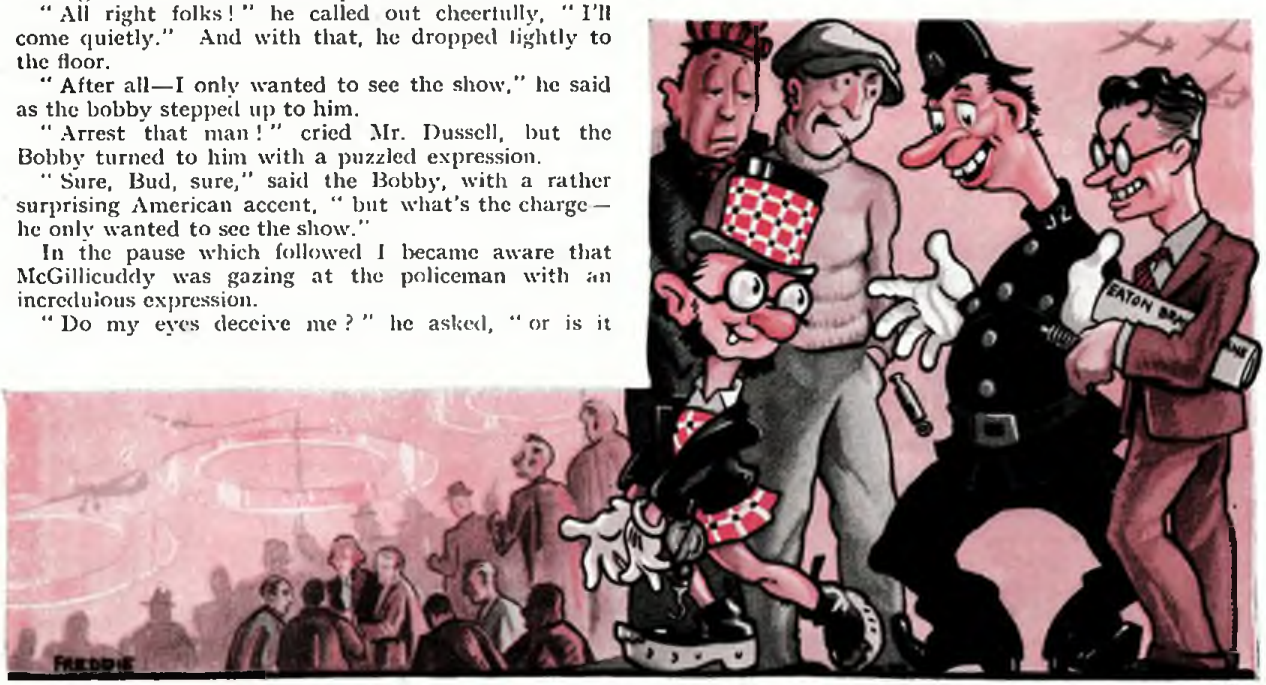
"But what are you doing here—and in the police?" McGillicuddy asked the Bobby.

"Aw, shucks—just a hankering for the old country," said McGraw. "You'll be seeing me at Auchengargle soon."

"I think, gentlemen," said Mr. Dussell, "that we could adjourn to my office."

As the Maestro fell into step beside him, Mr. Dussell asked: "Tell me, Mac—now you're here—what do you think of these new diesels—for dismantling, I mean?"

I walked behind them with a happy heart. The ghost of Borland Hall was laid for good.



A ⅛th SCALE
DE HAVILLAND

TIGER MOTH

BY C. RUPERT MOORE

The accompanying colour and flying photographs by our chief photographer Mr. D. B. M. Wright, splendidly illustrate the scale appearance of this unique model. Its authenticity both in flight and appearance are a pleasure to observe. So difficult is it to differentiate between the model and its full sized counterpart that we would mention here our cover painting. This is in fact a view of the original machine over the Wirral Peninsular, Cheshire, and, together with the photographs, will, we hope, tempt readers into building one of the finest scale models the "Aeromodeller" has yet published.

THE model here described is a second and greatly improved version of the original appearing in Plans Service in October, 1943, and incorporates the "Moore Diaphragm," a self-adjusting tailplane, a "knockoffable" false nose and airscrew, and other unusual features. In order to deal fully with certain features I shall have to skim over the more usual portions.

The Structure.

The centre-section struts are the key unit of this biplane, and, therefore, the top longerons are cut to allow them to continue unbroken to the bottom of the fuselage. The joints are reinforced with ply biscuits. The two sides, complete with centre-section struts, are built on a board and then assembled with temporary spacers in the top. Aft of the pilot's cockpit the stringers are braced with 3/32 sq. balsa after being fixed.

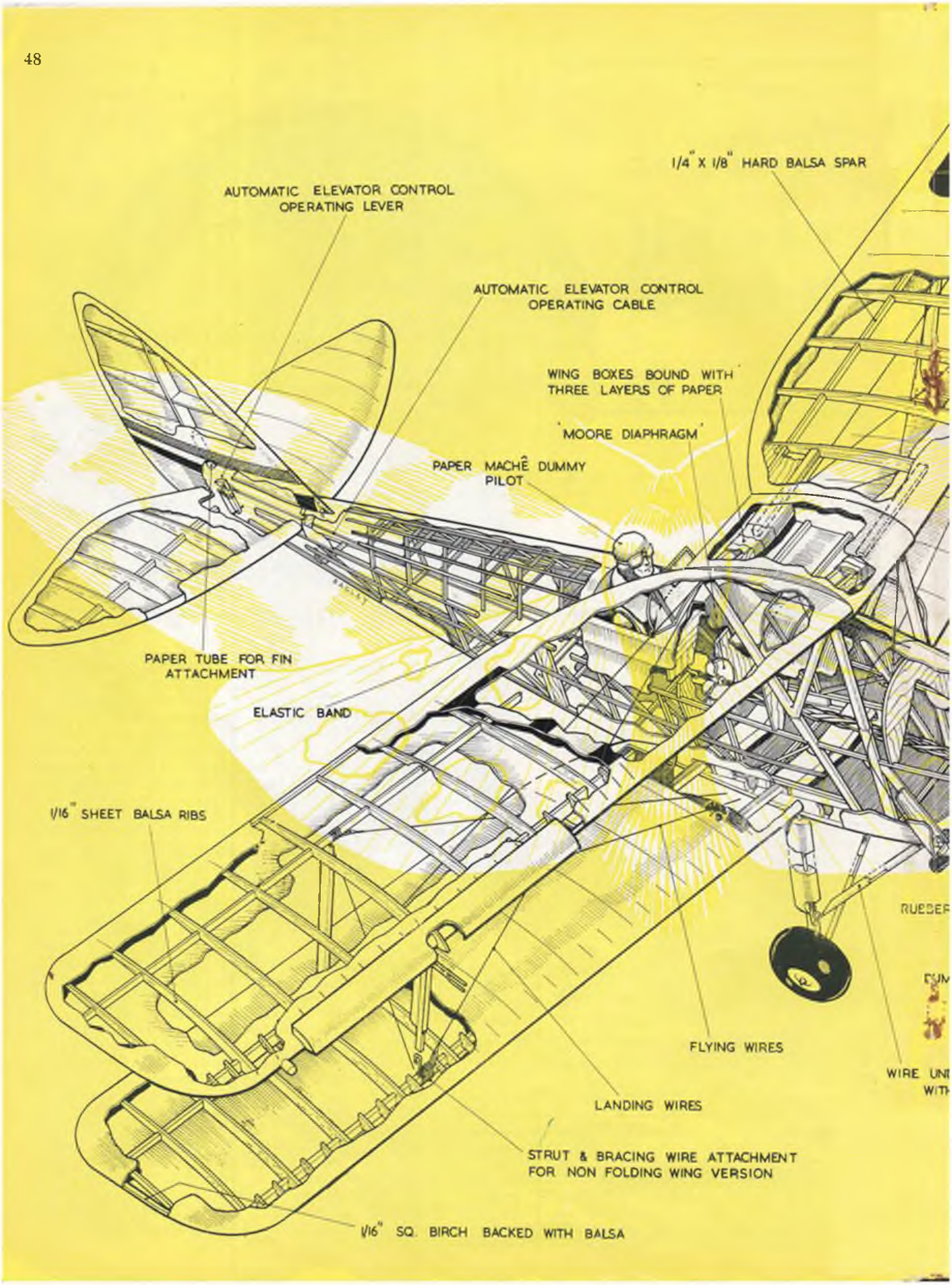
The Wings.

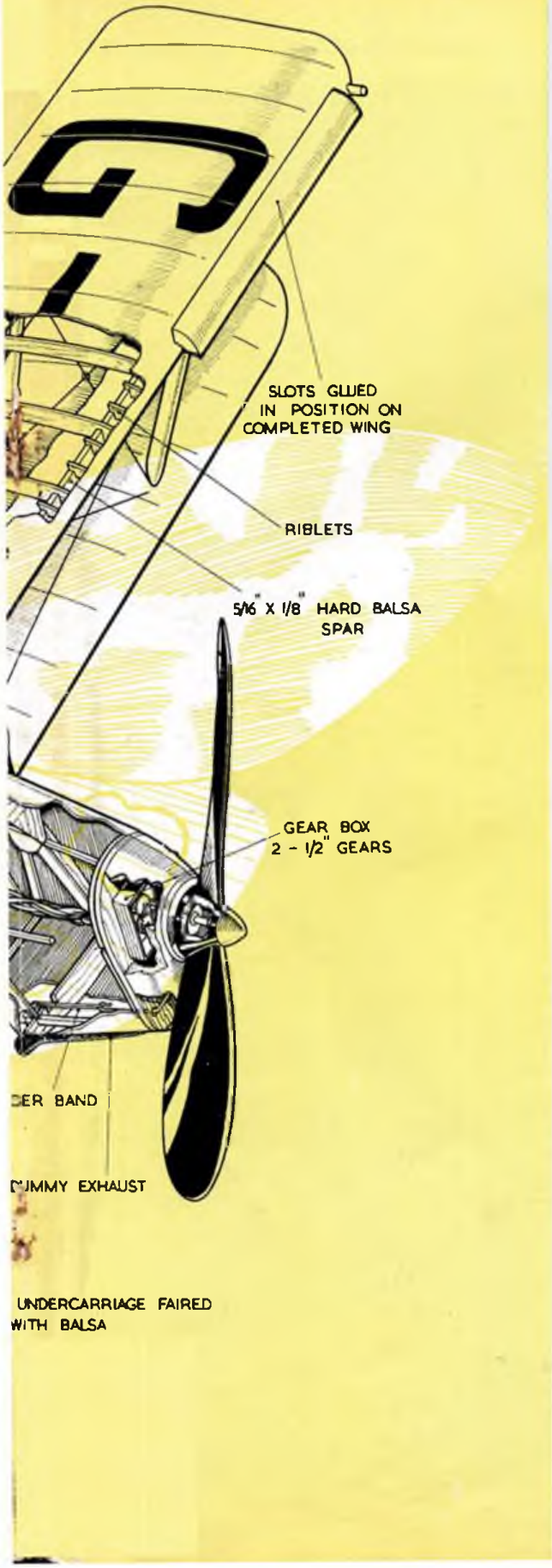
Dihedral and sweep-back differs on top and bottom wings, so sweep-back is built into wing peg boxes and dihedral into the wing pegs themselves. These peg boxes are wide to prevent breakage of pegs. The interplane struts are hinged in such a way that the top plane folds on top of bottom for transport.

The Undercarriage.

The undercarriage is a structure of piano wire, faired with balsa. Every joint should be tinned first, bound with fine copper wire (fuse wire) and soldered solid. The rubber band shock-absorbers pass through two holes under the motor cowling to a wire saddle, located through two holes, at the bottom of bulkhead No. 1. These rubber bands are tied with thick thread to their attachment loops on the undercarriage. *Note*—the holes under the cowling are much closer together than their attachment loops, which causes the rubber to absorb much of its own backlash. The wheels are my usual laminated paper structure (so is the pilot). A half model of the wheel is turned in wax or plasticine attached to a 1 in. oversized disc of plywood, through the middle of which is a bolt to facilitate holding in the chuck of a lathe or twist brace. The brace, if used, is held in a vice and convenient sized boxes used as tool rests. When the half wheel is finished, a cardboard wall is stuck round the edge of the plywood. Fine plaster of paris is mixed; about 2½ desertspoons to 2/3rds large cup of water, added by sprinkling into water. A film of plaster is brushed over the half wheel to prevent bubbles, and then the whole poured in. When set, remove from plywood and carefully remove model. With very slow heat, the mould should be dried out, painted, and, when dry, greased. The pressing is made from five layers of newspaper, the first being soaked only in water, and the others in Gripfix. Press from the middle outwards and over the edge like a hat brim (all five layers). Gripfix the inside, press in second layer and Gripfix—third—fourth and fifth.

After three or four hours, temporarily fill back of pressing with plasticine and turn out and allow to dry hard. *On no account use artificial heat.* When dry, banana oil inside and out and cement thick celluloid washers inside and out of hub. Lay pressing on its "brim," "crown" upwards, and with razor blade flat on "brim," trim off. Make and cement a balsa hub inside one of the pressings and allow to dry. Cement the edges and hub end and bring the two halves together. Thread on an axle, and, by twisting the pressings, adjust till wheel spins true. Edges can be pinned temporarily. Over the joint paste ¼ in. strip of newspaper and over that again a black bias binding tread, using 50-50,





Durofix and banana oil. Give four coats black dope. Remember when making moulds or taking pressings, vaseline prevents sticking.

The Gearbox and Nose Block.

The gear box and false nose are separate units, joined by powerful spring clips. The propeller shaft is cut in halves in order that the whole false nose and airscrew can knock off in case of obstruction. The rear half engages the front half of the propeller shaft by means of a simple fork and T-piece. Gears are used to throw the rubber motor below the internal structure.

Step-up gears were tried but found a disadvantage. The lower shaft has 1/16 in. (or more) forward travel and is spring-loaded. The top of the spring is so shaped that it comes into contact with a curved T-piece on the end of the top shaft, as tension dies away, the curved ends of this locking plate allow the spring to ride over it for several revolutions.

Before soldering the airscrew driving plate, the airscrew should be turned to a horizontal position so that it locks itself there out of the way. A freewheel on a model of this weight-airscrew ratio is less advantage than a good landing. The ¼ in. three-ply base plate is cut and built up with plug portion behind and also in front. It is then drilled to take brass-screwed bushes and also ⅛ in. holes for spring clips. The top shaft is cut a little too long. All shafts, gears, driving plates, etc., should be sanded bright with glass-paper. Inside the gear axle hole should be cleaned with suitable drill and the gear teeth painted with coloured dope. This makes sure solder sticks where it is wanted and does not stick to the gear teeth.

Tin the front ¾ in. of the shaft and wipe off all surplus solder with a clean rag while molten. Slide on gear and solder in place. Make the cross-pieces which hold the driving fork prongs by folding a strip of 20 s.w.g., brass double and drilling both together. Drills are easily made by filing piano wire to a square taper point. Build up between plates and also right up to gear face with two or three layers of fine tinned copper wire (fuse wire). It is wise to bind round the plates themselves. The holes for the prongs should be aligned by pushing match sticks through, then solder into one *solid unit*. Prongs should be cut, tinned and put in place (ends should touch gear face) and soldered. The other end of the shaft should be tinned and well wiped.

Put shaft in its bush and thread on paper washer (to prevent solder sticking to bush end). Next, put on locking plate and build up behind and up the face of plate, a conical collar of fuse wire, 3/16 in. long and ⅛ in. diameter, and solder solid. All soldering is done in this way.

Soft solder will not stand the strain of a heavy motor *unless it is spread over a considerable area*, so use fuse wire generously. One or two points about the lower shaft :—To allow for 1/16 in. travel, use cardboard in place of the paper washer. A ⅜ in. tin disc is soldered behind this card on which the spring rides. Behind this is a 1/16 in. bore brass collar (or fuse wire). Behind this again is the 16 s.w.g. silver steel or soft iron rubber loop which is also bound on and soldered into a solid unit.

When these gears are in place a box of cigar-box wood is built up round the gears, which are on the front of the base plate. This box acts as a locating plug for the false nose. The 1/16 in. plywood false nose back-plate should be cut to fit exactly over this box and then trimmed to the outside. The nose should be roughed out, well oversize, and the ¾ in. shaft hole drilled right through

The model coming in to land. Note the nose-up attitude obtained with the automatic trimmer.

Just after take-off in a steady climb, for all the world a full-size "Tiger."

it. Carve out block to fit snugly over box.

Fit powerful 20 s.w.g. piano wire clips through gearbox and clear wood from side of false nose cavity to accommodate them. Screw on doubled tin catches, then nose should snap on and off with considerable force.

The airscrew shaft should be made complete with driving plate. The bearing for this shaft is a brass bush which is screwed tightly through the centre of an ¼ in. thick plywood disc, and a locknut added. *This bush projects forward* and the back of the airscrew is hollowed out to clear it. With the false nose in place and the propeller shaft in its bush, place the disc on the front of the false nose. Add washers until the end of the propeller shaft just touches fork shaft. Cement back of the disc well and, spinning the shaft between the fingers, move disc about until it turns freely with no stiff positions. The false nose can then be shaped up. Leave ¼ in. of shaft beyond the airscrew and use plenty of fuse wire: it will need it. Finally fix the locking spring.

Covering, Doping and Colouring.

The fuselage is covered with heavyweight tissue, the wings with medium, and the tail and rudder with lightweight. Waterstretch everything and give two coats of banana oil (half and half). Coloured dope was sprayed on with a Flit spray. The model is in the livery of the Liverpool and District Aero Club and is an early version of moth. Fuselage: all struts and undercarriage—medium chrome; wings, tail and rudder—silver: registration letters—black; rudder bands—top: grass green, middle: gold, bottom: burnt umber (chocolate). Airscrew—silk covering: ocean grey; boss: french polished; L./E. (brass): gold-tarnished green.

Rigging.

Assemble the wings and check dihedral and sweepback by plan. The struts should be eased to take their natural angle and bound in position. The incidence wires should be cut to length and fitted and then the struts faired. (28 s.w.g. piano wire is used throughout for bracing.) Cut flying wires, fit at strut lugs and form loop at attachment end so that wire is ⅛ in. too short. A stout thread loop goes through wing to rubber tension band. Cut and fit landing wires in a similar way, ⅛ in. too short.

The Tailplane.

The adjusting mechanism is well shown on the plan.

Tail up, full throttle, and the model speeds off the tarmac at Eaton Bray.

Care should be taken that the tail in gliding position is as on plan, and packing under spar added to allow *only* 1 m.m. travel to "power" position. This packing can be cut away and downthrust removed gradually with experience.

The Rubber and "Moore Diaphragm" (Patented).

To overcome the necessity of ballast, I have evolved a method of installing the rubber so that a greater mass of rubber is in the front half of the motor. This is simply done by fixing a bulkhead or diaphragm, at right-angles to the rubber line, halfway between the front and rear rubber anchorages. In this diaphragm is a circular hole in which is located a circular plug, through the centre of which is a shaft running in a brass bush. This plug is free to dislocate and locate itself when winding and does so without help automatically. A very much overlength motor is divided into two unequal skeins (ratio about two to one), but containing an equal number of strands. These skeins are pre-wound and attached to the plug, the long skein in front and the short behind. The attachment is by means of pig-skin (soaked in castor oil) stitched firmly to the plug shaft ends and similarly to gearbox and tail shackle. When wound and nose block is in place, the plug prevents the short skein pulling the long skein through the diaphragm: hence there is *twice* the weight in *front* of the diaphragm.

The leather ends prevent all rubber bunching.

Testing.

Check for centre of gravity as plan. (If necessary, temporarily ballast.) Add 1/16 in. packing at top of nose block and give 100 turns. Lift tail and *fly off ground*. Adjust downthrust, adding 50 turns at a time *only*. C.G. can be adjusted finally by adjusting ratios of rubber skein lengths. Full duration tests have been impossible owing to poor quality rubber, but at pre-war rates, allowing 63 per cent. airscrew efficiency and 700 turns, power flight alone should be 700 feet, *i.e.*, 38 to 40 sec.

The original drawings of this outstanding model have now been completely revised and are available price 4/–, post free from the A.P.S. Allen House, Newarke Street, Leicester.

The designer displays the "innards" of the gearbox

Now which is it? Your guess is as good as ours

Compare the two! Only the airscrew betrays the model and incidentaly the flying shot above IS the model

AS promised last month, here is Fliar Phil's splurge of colour, and he hopes you like it. Whether you will want to find him inside your cracker, he doesn't know, and—er—you needn't write to tell him.

Our Model of the Month is a superb creation by Henry Ford, of Detroit, which many readers have admired shewing its paces at Eaton Bray. Originally designed for passenger-carrying, slight modifications were made to the rear of the cabin(!) to enable the transport of freight. Known as the Tudor, Model 28 it has an unloaded weight of 25 cwt. and a loaded weight of anything up to seven tons according to the amount of string handy. Has occasionally been known to function, but this is always accompanied by a pleasing uncertainty as to duration. Probably gives its best performance when on the towline. Maximum load on record is eleven people and four petrol-model carrying boxes. Once ran by jet propulsion, but this was found to be due to a hole in the exhaust pipe. The holoes of the crew are always carried in case of emergency. Should still be on view to Eaton Bray visitors next year, when five bob flips may be offered. A true aeromodeller's machine!

Top row centre is a most interesting tailless model of only 18 ins. span, flown by M. Gatard in International Week. The model flew very well.

Top right is our old friend Guy Berge of the Rhône Club with his glider, again at Eaton Bray.

Centre left is A. H. W. MacBean, of Bedford, with his flying wing glider powered with the American commercially-obtainable Minijet unit. The span is about 8 ft.; no tests have been made under power up to the time of writing, but static motor tests have been successfully carried out in the Research Department at Eaton Bray. (Lower photo.)

A very unusual solid subject has been used by R. D. Davies, of Colindale, to get that out-of-the-rut touch. Centre circle shows his 1/48th scale Flying Flea. Any other modeller make oddities like this?

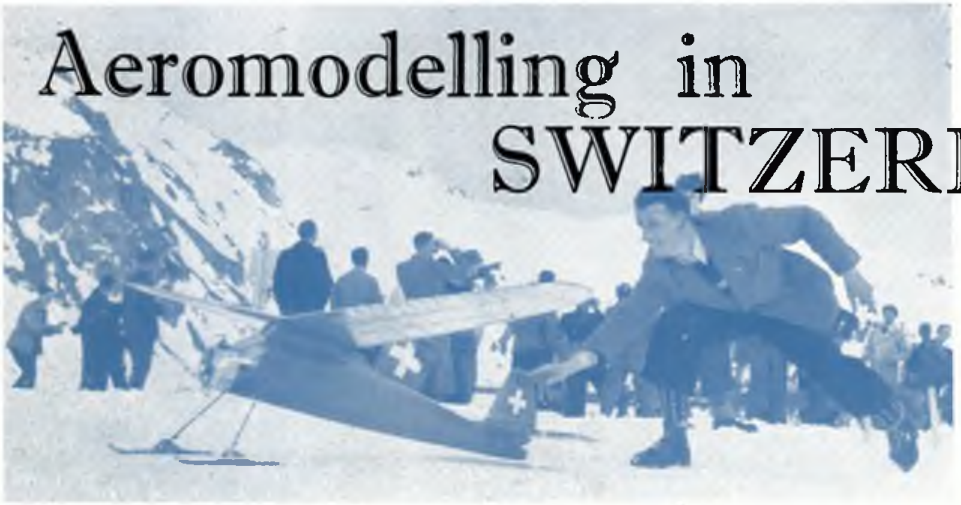
Centre right takes us back again to International Week, and one of the winning models of the man who took most of the prizes. Far more graceful than the average run of pylon diesel models, E. Fillon's effort had an amazing performance.

P. H. Lane never seems to have much luck with his 48 in. span Buccaneer modified with built-in slats. The bottom right-hand photo shows the model, equipped with a French diesel, during the power contest in the Southern Counties Rally.

Last, bottom circle, is a beautifully finished scale Tigercat, powered with two petrol engines. The photo was taken at a model meet at Bethpage, Long Island, America.

All for now, modelbods, so till more soberly clad January, Fliar Phil wishes you all the best over Christmas—may you all find a diesel in your stocking!

Aeromodelling in SWITZERLAND



A first hand account of Swiss activities obtained during a recent visit by

D. J. Laidlaw-Dickson

UNTROUBLED by anything more serious than an occasional Allied trespass over their skies, Switzerland has enjoyed exceptional opportunities during the past few years to develop aeromodelling. Light planes have been grounded for lack of petrol, so that, of full-size aircraft, only gliders have been able to fly, and that limited by the same lack of petrol for trailer transport and recoveries. A high proportion of experienced fliers have therefore been free to devote more time to advancing aeromodelling than might otherwise have been the case. In the same way the Swiss Aero Club has had ample time to devote to model interests. In no country in the world—even including Nazi Germany—has so much official encouragement been given to the movement, though here it is genuine disinterested help, without any thought of producing war potential.

Organisation. Aeromodelling in Switzerland comes under the control of the Central Secretariat of the Swiss Aero Club and

Heading: Petrol engined model fitted with skis being steadied prior to take off from the snowy Alps.

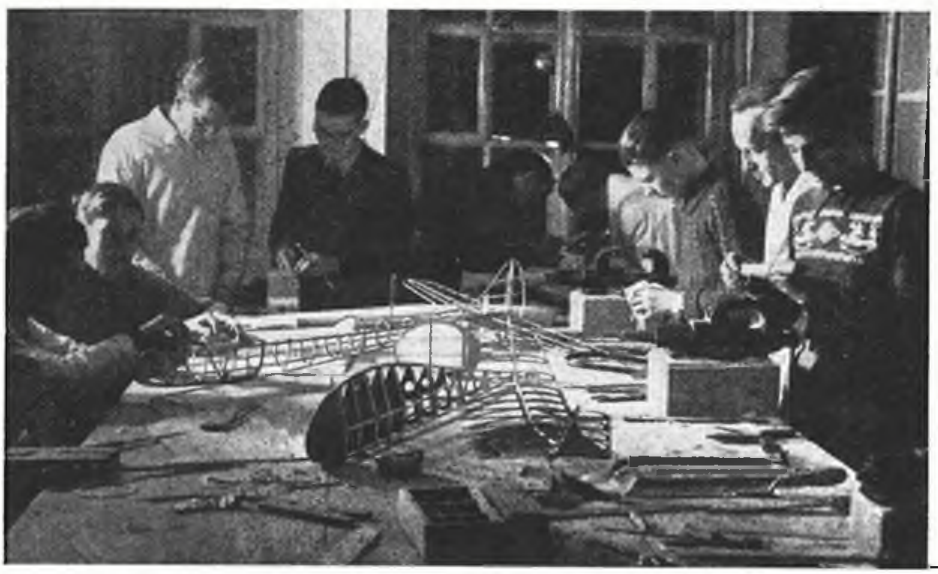
Centre: Slope soaring well above the snow line. Note the waiting aeromod on skis ready to pursue the model.

Right: Lunch interval—the models stacked while contestants investigate their thermos flasks.

forms one of the four main sections administered at that level. The country is divided into nine regions, which in turn are broken down into nearly one hundred and forty groups. The two largest regions, Zurich and Argovie, each number more than twenty groups. Members of each group or local club are classed as Cadets (12 to 16 years of age), Juniors (16 to 20), Seniors (over 20), patrons and honorary members. Though not absolutely compulsory, most groups are in charge of a qualified instructor who has passed an official aeromodelling course at one of the regular summer schools.

In addition to their valuable administrative work the Aero Club provide other useful services to aeromodellers. A compulsory third-party insurance scheme covers gliders for 1/3 and powered models for 3/6 a year. There is a full-time model research department at Zurich under the direction of Mons. Arnold Degen. A special department buys materials in bulk and re-sells to affiliated clubs at reduced rates.

First essential when starting a club is to acquire suitable club premises—not just a room for a weekly meeting—but adequate workshops which can be open for model making *every* day. Here, each modeller "clocks on" and records time spent on making his models, while the club instructor is there most nights to give advice when necessary. In this way, every member can receive individual help, while valuable data on building is constantly being gained. Naturally, few clubs would be financially able to organise on this basis and here the PRO AERO group steps in. Pro Aero is a non profit-making body under the joint control of the Aero Club and the Ministry of Air, formed to develop national airmindedness, to distribute propaganda, to acquire useful documentation and to collect and distribute funds for these objects. During the past five years, they have collected an average of £15,000 a year, which has been shared amongst gliding clubs, light airplane clubs and the aeromodelling movement. They pay a substantial portion of clubroom rents, stock them with tools and materials and distribute plans. Courses of instruction are also arranged each year, when in healthy open air surroundings, the instructors are taken from the simplest to the most complicated designs. So necessary is this permanent clubroom, that one well-known club, temporarily homeless, lost



Top : There is quite an active following amongst the fair sex in Switzerland.

Centre : A typical Swiss sailplane designed for hand 'aunching and slope soaring.

Left : Any evening in the Clubroom where most of the modelling is done.

sixty-five per cent. of its membership in three months for that reason, though immediately new premises were opened, it recovered full strength.

Model Approach. Swiss enthusiasts are without question the leading country in the world for model gliders and sailplanes, while it must not be forgotten that their country saw the birth of the Diesel—the famous Dyno I. Their gliders follow a definite national pattern quite different from that of any other land, developed, perhaps, by reason of their particular sort of terrain. Nevertheless, they have achieved notable success when attending recent meetings in other countries. It will be remembered that their tailless machines swept the world board at the Rhône International Meeting last summer, while Emil Glukin's G.41 sailplane holds a duration record of 2 hours 21 minutes, achieved when flown by T. Haslach in the annual regional contest at Zurich. Almost alone, their builders have not fallen for the lure of balsa. In spite of the comparative ease with which it has always been obtainable there, it is considered a much inferior wood to the standard hardwoods in vogue.

Their models are designed to give excellent directional stability. To achieve this end, their designers are skilful in disposing lateral surfaces equally in front and behind the centre of gravity, thus avoiding any tendency to swing round when side-slipping. This, of course, is not so suitable for models launched by towline, where larger fins are necessary. When launching from level ground in this manner, the Swiss employ small drogues, which assist stability on the line, though this method is not usually allowed for contests in other countries.

Contests. Three main contest classes are recognised: normal types, special types and machines with automatic or mechanical directional devices. It is interesting to note that their special class includes only tailless models, ornithopters and "Flying Fleas." Canards and Tandems are classed as *normal*. This should do much to convince doubters that, given sufficient interest, these two formulæ, still unorthodox by British ideas, can be developed to compete with any so-called standard type. There is an annual steering contest, when compass-directed and automatic-pilot types of glider meet to fly over a set course that may be directional or may include such evolutions as figure eights. The Swiss have developed this side of flying far in advance of anything yet attempted over here. The Swiss Nationals are held alternately in the mountains and in the plains, so that hand-launch slope-soaring experts and tow-line devotees have equal opportunity.

Review of Swiss Progress. It is remarkable to find that at the last national meeting only four entrants contested the rubber duration event—only the winning model being as small as Wakefield class. The others were built on large glider lines, with power added. Like everywhere else, Switzerland has lacked rubber during the war, but even when available in plenty, the cult of the rubber model has not caught on. The arrival of cheap diesel power in 1940 did not encourage any revival of the medium, and today, if a builder wants power he fits a trouble-free diesel.

Large-size models are the accepted thing; anything under six foot span is considered small and fit only for the cadets. A good average size would be eight foot span, silk covered, and all hardwood construction. Usually they are so strong that no carrying box is necessary—the parts are stuffed into a sack and carried that way, or even unwrapped, with wings strapped along the fuselage. Research into new aerofoils has proceeded apace, but a large degree of faith is still pinned on the Gottingen range of sections. Underfins and dihedralled tailplanes are in general use, and extended dorsal fins forming an integral part of the fuselage extremely popular. The G.41 is an excellent example of typical Swiss construction and forms the basis of a number of very similar models. For youngsters, the big oil companies have developed special cheap kits—most popular being the "Shell" and "Esso" models available as an advertising medium at the bare cost of material. Plywood formers and wing ribs even on small models like these are the rule.

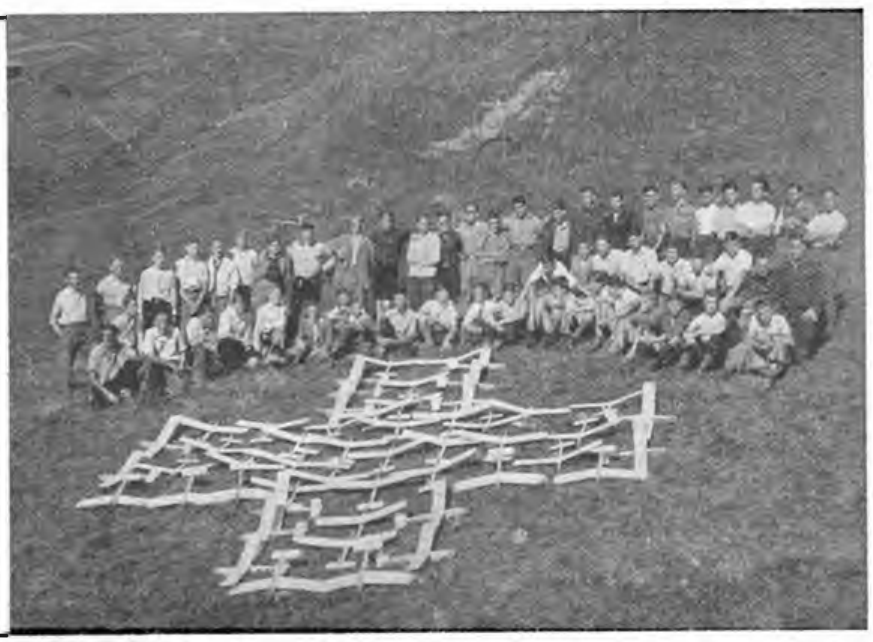
In the power field, Swiss designers claim to be responsible for the birth of the modern diesel. In airframe construction for some time they followed the American

Top right: Constructional details of a high performance sailplane fitted with automatic compass steering.

Centre right: "Shell III," one of the range of sailplanes introduced by the big oil companies.

Bottom right: Line up of diesel powered models. Except for the two pod and boom designs they follow orthodox lines.

Right: The Swiss Cross formed from Chuck gliders made by the instructors' class in the background.



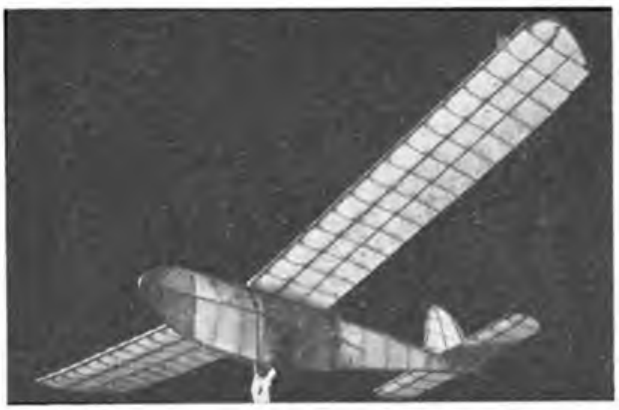
high-pylon technique. Recently, however, there has been a swing back to more conventional shoulder-wing designs, and these are entirely pleasing to British ideas of power models. The large amount of snow and ice readily available has led to a cult of ski-mounted under-carriages, which give delightful take-offs from the hard-packed snow.

Scale models have as yet gained few supporters, but lack of duration, which is a Swiss fetish, has prejudiced most modellers. However, the recent introduction of control-line flying to the clubs may awaken an interest.

In the lake districts, waterplanes have progressed further than in this country. Many novelties, such as canard flying boats, push-pull designs, as well as conventional sea-planes and flying boats, put up splendid performances.

Merit Badges. To encourage progress, special merit badges are awarded to modellers who beat the clock. The elementary badge is given for a hand-launch flight of three minutes and tow-line flight of six minutes; intermediate can be won with nine minutes hand-launch and twelve by tow-line. Advanced badge, open only to own designs, requires flights of fifteen and twenty-four minutes, respectively. Similar badges are available for rubber and powered models. The advanced badge in each group requires real skill to gain and is rightly treasured. Incidentally, only entrant's own-designed models can be flown in National contests.

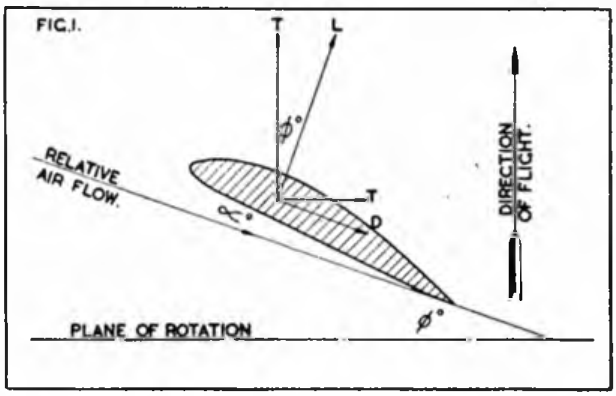
Conclusion. The co-operation of the Swiss Aero Club, from whom the magnificent pictures illustrating this article were obtained and who gave the writer facilities to inspect typical model club workrooms, is gratefully acknowledged. In considering the pros and cons of a measure of government control of the hobby, Switzerland has no little weight to load the scales in its favour. Here, control is entirely benevolent, and the actual subsidising association enjoys an independent existence, controlled only by its articles of association, on the lines of the B.B.C. Whatever may be thought of this, however, there is no doubt that the Swiss aeromodeller thoroughly enjoys it and has profited by its benefits to an extent otherwise impossible in so small a country.

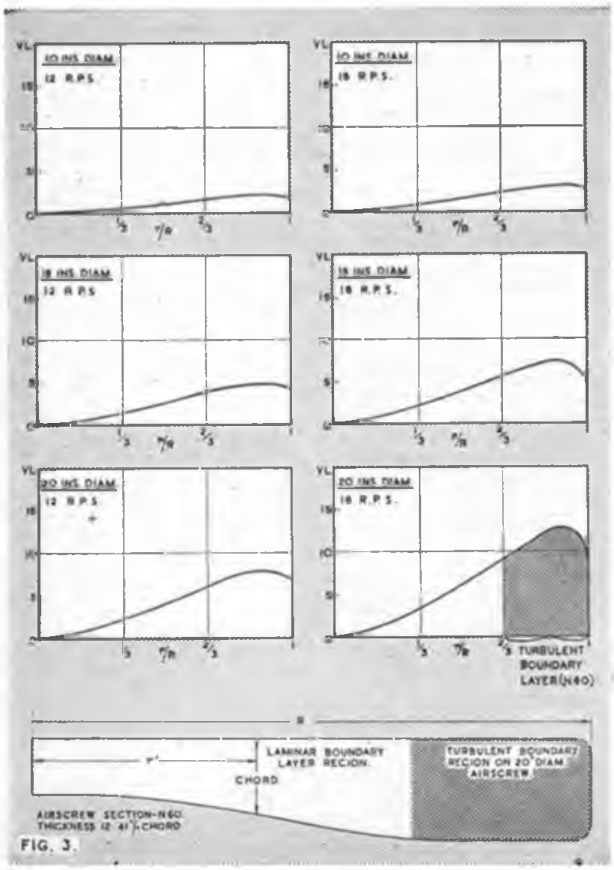


AERODYNAMIC DESIGN PT. III

BY JOHN HALIFAX

An interesting Italian Wakefield incorporating a retractine undercarriage by Signor Travagli of Rome.





IN last month's article on airscrews I explained how the blade section, operating revolutions per second, and the optimum pitch/diameter ratio are obtained. The remaining dimensions are diameter and area.

Airscrew Diameter.

For a given blade area, an increase in the diameter of an airscrew does not increase the average value of VL, thus diameter is immaterial in this respect. Because of other considerations, however, it is a fact that a large diameter is more efficient than a small one, and thus it should be as large as possible consistent with reasonable structural strength and weight, and practical considerations such as undercarriage height. An aspect ratio (radius/maximum chord) of 6 is about the largest practicable in ordinary materials, and little is gained by going over this.

Blade Area.

Now we wish to limit our motor run and r.p.s. to certain values (Part 1), and unless we can do this with a fair amount of accuracy, the airscrew will not be operating under the conditions for which it was designed, and therefore not at its maximum efficiency. The method of doing this is to arrange for a blade area such that the h.p. required to rotate it at the desired r.p.s. is exactly equal to the h.p. available from the motor (which we already know, of course—see Part 1).

By assuming the centre of drag of the blade to be at a point 0·7 of the total radius (R), the torque can be expressed in terms of area S, for zero speed of advance, as

Q (lbs.-ft.) $= \cdot 0000694\ C_D\ R.S.\ V_E^2$ .. equation 1.

where R = airscrew radius in inches

C_D = C_D for operative angle of attack (L/D max)

S = *total* airscrew blade area in sq. ft.

V_E = velocity of the blade element at 0·7 R given by the expression

$V_E^2 = 0{\cdot}1333\ n^2\ R^2 + 1{\cdot}21\ V^2$ .. .. equation 2.

where V is the forward speed of the aircraft = Zero for the above case.

For the sake of those more thoughtful readers, I might mention that the above formula, which is applicable to any speed of advance, is obtained by adding the square of the circumferential velocity 2π. r. n. to the square of the forward speed plus 10%. This last figure allows for the increase of the airstream velocity in the airscrew disc, and is of course an approximation, but is nevertheless quite accurate enough for this calculation.

When an airscrew is moving forward through the air,

as well as rotating, the computation of the torque is considerably complicated because L and D are not acting parallel and at right angles to the direction of flight (fig. 1). As this clearly shows, the airflow is at an angle ϕ to the plane of rotation of the airscrew, and this alters the values of thrust and drag.

Now at the blade element 0·7 R

$$\tan \phi = \frac{J}{2 \cdot 2} \quad \text{.. .. .. .. equation 3.}$$

where $J = \frac{V}{nd}$ as we saw last month

Torque $= \cdot 00001\ S\ V_E^2\ (6 \cdot 94\ C_D.\ R.\cos \phi + 119\ C_L \sin \phi)$

And since motor torque $= \frac{87 \cdot 5\ \text{B.H.P.}}{n}$ we get total blade area in sq. feet

$$S = \frac{8750000\ \text{B.H.P.}}{V_E^2\ n\ (6 \cdot 94\ C_D.\ R.\cos \phi + 119\ C_L \sin \phi)}$$

This looks rather horrible at first sight, but it is only a matter of simple arithmetic, and has only to be worked out once.

Example.—Now let us work through an example to tie up what we have done so far.

It is desired to determine the airscrew blade area of a machine from the following data :—

Motor weight 5 ozs. B.H.P. = ·0225 for a 60 secs. motor run. Average r.p.s. = 15. (Motor design and performance was dealt with in Part 1 of this series.)

Airscrew diameter = 14 ins. Blade section curved plate 417a (fig. 2) operating at $\alpha = 4°$ with $C_D = \cdot 025$, and $C_L = \cdot 85$.

Flying speed = 20 ft./sec.

From equation 2 we get velocity V_E^2

$V_E^2 = 0 \cdot 1333 \times 15^2 \times 7^2 + 1 \cdot 21 \times 20^2 = 1,954$

and from equation 3, $\tan \phi = \frac{1 \cdot 15}{2 \cdot 2} = 0 \cdot 522$

Therefore $\phi = 27 \cdot 5°$ (J is found from Nomograph No. 12).

This is all the information needed, and from it we get blade area

$$S = \frac{8750000 \times \cdot 0225}{1954 \times 15\ (6 \cdot 94 \times \cdot 025 \times 7 \times \cdot 887 + 119 \times \cdot 85 \times \cdot 4617)}$$

$= 0 \cdot 1372$ sq. ft. $= 16 \cdot 45$ sq. ins.

A folding airscrew assembly by Per Weishaupt of Denmark that weighs 1¼ ozs. Note the rubber tensioners on the blades for snap folding.

The Airscrew Boundary Layer

Fig. 3 shows a series of graphs which give a good idea of the VL values at which most model airscrews operate. I mentioned last month that a section such as N.60 could be used for very large airscrews, and this figure also shows the effect of using this on a large airscrew.

ORDINATES FOR AIRFOIL SECTION GEWÖLBTE PLATTE 417a

CHORD STATION AS PERCENTAGE OF THE CHORD X									
X	0	1·25	2·5	5	7·5	10	15	20	30
Upper Ordinates	1·45	3·0	3·65	4·7	5·6	6·3	7·15	7·75	8·6
Lower Ordinates	1·45	0·05	0·45	1·55	2·5	3·3	4·2	4·85	5·7
X	40	50	60	70	80	90	95	100	—
Upper Ordinates	9·8	8·45	7·65	6·9	5·7	4·25	3·55	1·45	—
Lower Ordinates	5·9	5·55	4·95	4·0	2·8	1·3	0·60	1·45	—

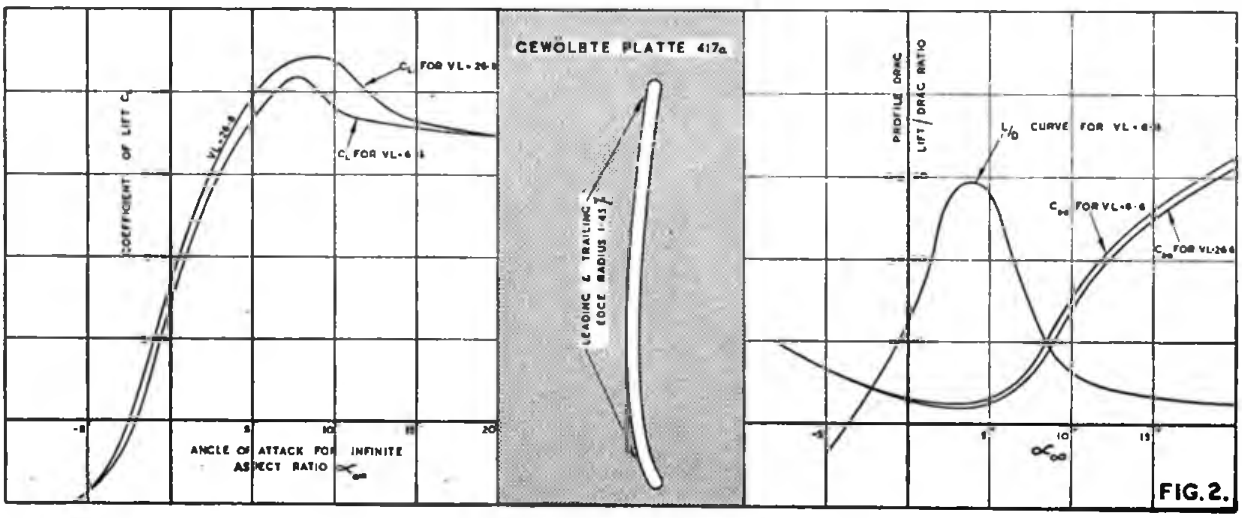


FIG. 2.

The AEROMODELLER 1946 CLUB SURVEY

CONDUCTED BY CLUBMAN

Above, Clubman takes time off from a duty spell at Eaton Bray during International Week to enjoy reminiscences with M. Fillon, now European Champion.

WITH the knowledge that the last AEROMODELLER Club List—published in 1943—is hopelessly out of date, and an ever-increasing postbag of requests for information from would-be club members, a circular was sent out from our offices in June this year in an effort to elicit up-to-date "gen" on club titles, secretaries' names, etc., etc. (Unfortunately, as with most positions undertaken in an honorary capacity, Model Club secretaryship seems to change hands with great frequency, and much time and trouble is wasted in chasing the wrong bloke!)

The response to our letter, and further notices that appeared in the AEROMODELLER, has made it possible to compile a list that I can claim is 99 per cent. correct. The other 1 per cent. is written off to those clubs we find it impossible to contact for various reasons, but I am satisfied that all the known clubs of repute are listed, and the information that follows is based on details supplied by those groups who obliged with their co-operation.

The following survey is based on a total of 333 clubs notified as at the beginning of October, 1946, and it should be stated here that no list, whenever published, can be absolutely up-to-date. Since this survey was compiled, more new clubs have come into being, secretarial changes have taken place, and membership fluctuated, so, while the list is possibly not 100 per cent. correct, it is a true enough statement of the situation at the present time.

The list compiled in 1943 gave a total of 185 clubs, so the first fact that emerges is an 80 per cent. increase in the number of clubs operating today compared with three years ago. This is a healthy sign, and confirms the view that the club movement is on the upgrade, and in the writer's opinion will show even greater progress following this first year of post-war settling down.

Omitting the few large organisations such as the "B.O.P. League," Air Rangers, etc.—who, whilst including aeromodelling in their curriculum, are not wholely model aircraft clubs—a total membership of 9,313 is recorded. This raises an interesting point. There are, at a rough estimate, 200,000 active aeromodellers in this country, and while agreeing that the club movement incorporates the keenest types in its (dare I say?) clutches, it is disturbing to realise how small a percentage of the total potential is organised.

Apart from a few groups enjoying large memberships, and one or two at the other end of the scale, the average club membership hovers around the 35 mark.

What are the ages of these enthusiasts? A great deal of vagueness was evidenced in the replies to our questionnaire on this point, and it is obvious that a surprisingly large number of clubs have no idea of the ages of their members. Seventy-five per cent. hazarded a guess at this vexed question, and answers ranged from 11 to 35. The general composition of an average aeromodelling club would appear to be a nucleus of old-stagers, leading a bunch of enthusiastic youngsters of from 10 to 20 years of age. The average age calculated came to 18, which I think is a fair figure, while 80 per cent. of the clubs show a membership average age of from 15 to 20.

A perpetual grouse, heard wherever clubs meet, is the difficulty of finding suitable club premises, and undoubtedly many clubs do operate under this indisputable handicap. It is a surprise, therefore, to find that no less than 210 clubs possess club-rooms, either on a whole or part-time basis. Many clubs have been helped in this direction through association with the Youth Movement, and some by virtue of being a school club or A.T.C. Squadron but the majority seem to have

THE SURVEY AT A GLANCE

Number of Clubs (as at 1/10/46) ..	333
Total membership	9,313
Average membership per club ..	35
Average age of membership ..	18
Clubrooms	210
Average subscription fee (Senior)	14/- per annum
Fees paid: Weekly ..	36%
" " Monthly ..	6%
" " Quarterly ..	3%
" " Annually ..	46%
" " Nil	9%
Entrance fees charged	12%
Fees paid at 3d. per week	12%
" " " 6d. " "	10%
" " " 5/- per annum ..	12%
" " " 7/6 " " ..	5%
" " " 10/- " " ..	10%
" " " 21/- " " ..	4%
Affiliations: A.B.A.	16·8%
S.M.A.E.	36·3%
(Both)	6·0%
Youth Movement ..	25·0%

scouted around and secured their own accommodation, which is a healthy state of affairs. (No indication is available regarding the magnificence or otherwise of said accommodation, but what matter so long as the needs are met!)

Probably the most interesting section of the survey deals with that very vexed subject—subscriptions, fees, or what have you. A terrific diversity of rates is apparent, and a careful study of the figures submitted, taken in conjunction with other factors, is most revealing. Let us take the actual groupings and study them one by one.

I am surprised to note that no less than 9 per cent. of clubs find it possible to operate with no income, but these are generally school or similar groups, or else very small clubs obviously composed of friends living almost on each others doorsteps. I presume, in such cases, possible expenditure is met by a whip round as the occasion demands.

Amongst the "cash customers" an enormous range of fees comes to light. The cheapest is 1/– per annum, and 13 per cent. of the total number of clubs operate on an annual income of less than 5/– per member. At the other end of the scale is the 6 per cent. who draw in over 30/– per member per annum, the majority of these charging at the rate of 1/– per week.

The most popular section is that paying a fee between 10/– and 15/– per annum, a total of 29 per cent. coming into this category. Analysis shows that 36 clubs pay a rate of 3d. per week, while 30 pay a flat rate of 10/– a year.

Next in popularity is the 20/– to 30/– group, comprising mainly the 6d. per week customers—a system that no less than 60 clubs operate. This section runs the previous group close with a total percentage of 27 per cent.

The only other "popular" payment is 5/– per annum with 30 supporters, while 15 go a shade higher and pay 7/6.

I find that 6d. per week is the most popular subscription rate, operated by 20 per cent. of the clubs, followed in turn by the 3d. per week and 5/– per annum groups at 12 per cent. each, and 10 per cent. for the 10/– per annum clubs. A multitude of intermediate rates are quoted, but the ones given here give the best all round survey of the financial angle.

Working on the grand totals, the average subscription per annum per head of membership works out at 14/–. All the foregoing figures are based on Senior fees, Junior rates being from 50 per cent. to 75 per cent. of the Senior fees.

It seems to me that some clubs would do well to study the foregoing, and compare their facilities and potential popularity in conjunction with their fees! How on earth any club can offer worth-while attractions at a bob-a-head-per-annum beats me, and emphasis is given to this point by reference to the fees paid by members of the nine clubs with memberships over the one hundred mark.

The two largest groups pay at the rate of 6d. per week. Then we have one at 21/–, one at 20/–, one at 12/–, three at 10/– and one at 7/6 per annum. Five of the nine run clubrooms, and in addition, one charges entrance fees to new members. (Incidentally, only 12 per cent. of the clubs charge entrance fees, and I think this practice is one that could be more widely adopted with advantage. Remember, each new member entails a certain amount of initial clerical work, and a small fee would not be out of place to cover such items.)

An important point I wish to make is the following: Increased membership depends largely on the facilities a club can offer. These facilities cost money, and this money can only be obtained by rating the fees at such a level that a surplus is available after the ordinary running expenses have been met.

Finally, to a subject of wide and equal importance with individual club statistics—affiliation or association with one or other of the National bodies.

Nine clubs are affiliated to the Scottish Aeromodellers Association, and three to the Irish Aeronautical Association. Of the remainder, 36·3 per cent. are affiliated to the S.M.A.E., and 16·8 per cent. to the A.B.A. (Incidentally, 6 per cent. are affiliated to both the S.M.A.E. and A.B.A.) Some 25 per cent. of all the clubs are associated with the Youth Movement.

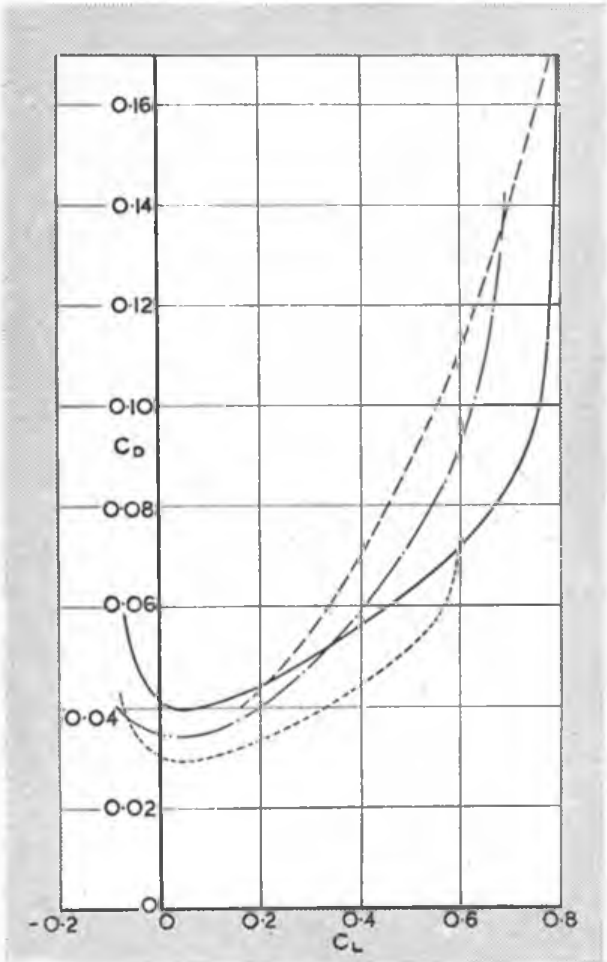
It is to be regretted that, of over 330 clubs, only some 53 per cent. are linked up under the National associations, even though the affiliated groups comprise some 6,000 modellers. The figure that strikes me most forcibly is the last one—only 6,000 aeromodellers under national guidance out of a potential 200,000! It makes one think, and I appeal to the "higher ups" and the clubs themselves to get cracking at this very serious deficiency without delay, and by some means or other reverse the position of those two significant groups of figures.

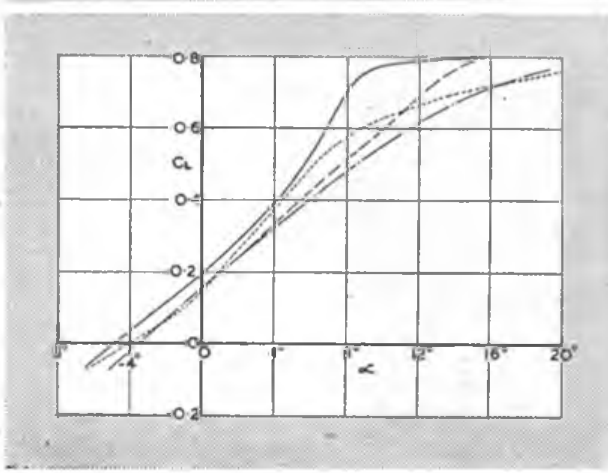
The Mildenhall Modelbods, R.A.F. contingent from Mildenhall, Suffolk, flew over to the A.B.A. Gala in a Lancaster, set up their own enclosure and marked its boundaries with lids from their model boxes—all tastefully decorated as shown! Then went on to clean up a large proportion of the prizes.

THE LOW SPEED AERODYNAMICS RESEARCH ASSOCIATION REPORT NO. 16

L.D.C.2 v. R.A.F.32

PRELIMINARY COMPARATIVE WIND-TUNNEL TESTS. BY N. K. WALKER, B.Sc.





THE graphs opposite show the relative results very clearly. However, a brief summary may be of interest.

The tunnel flow was rather turbulent, which probably accounts for the high drag values and low lift values arrived at. The conditions being the same for both aerofoils, however, the relative results shown here are fairly accurate and give a very good idea of the advantages of L.D.C.2. They are given for two tunnel speeds of 25 ft./sec. and 40 ft./sec.

The new aerofoil gives distinctly better values of both lift and drag than R.A.F.32, the maximum L/D ratio for L.D.C.2 being about 40 per cent. higher than R.A.F.32 at both Reynold's Numbers. Pitching moment results, also taken, provided an explanation of the increased dynamic stability noticed in models using the new aerofoil. In the case of L.D.C.2, the aerodynamic centre is at the theoretical point 25 per cent. chord, until the incidence reaches 6 per cent., when it suddenly moves back to 50 per cent. chord. The aerodynamic centre of R.A.F.32 is initially at 30 per cent. chord, and then moves forward suddenly to 25 per cent. chord.

The results conclusively prove the superiority of L.D.C.2 over R.A.F.32 for model work.

STOP PRESS !

Mr. Sanderson, a test pilot from Percival Aircraft, flew a model sailplane with L.D.C.2 section at an R.A.F. model aircraft rally held at a station in Buckinghamshire on October 30th. The official AEROMODELLER representative, who was invited to attend, wrote the following :—

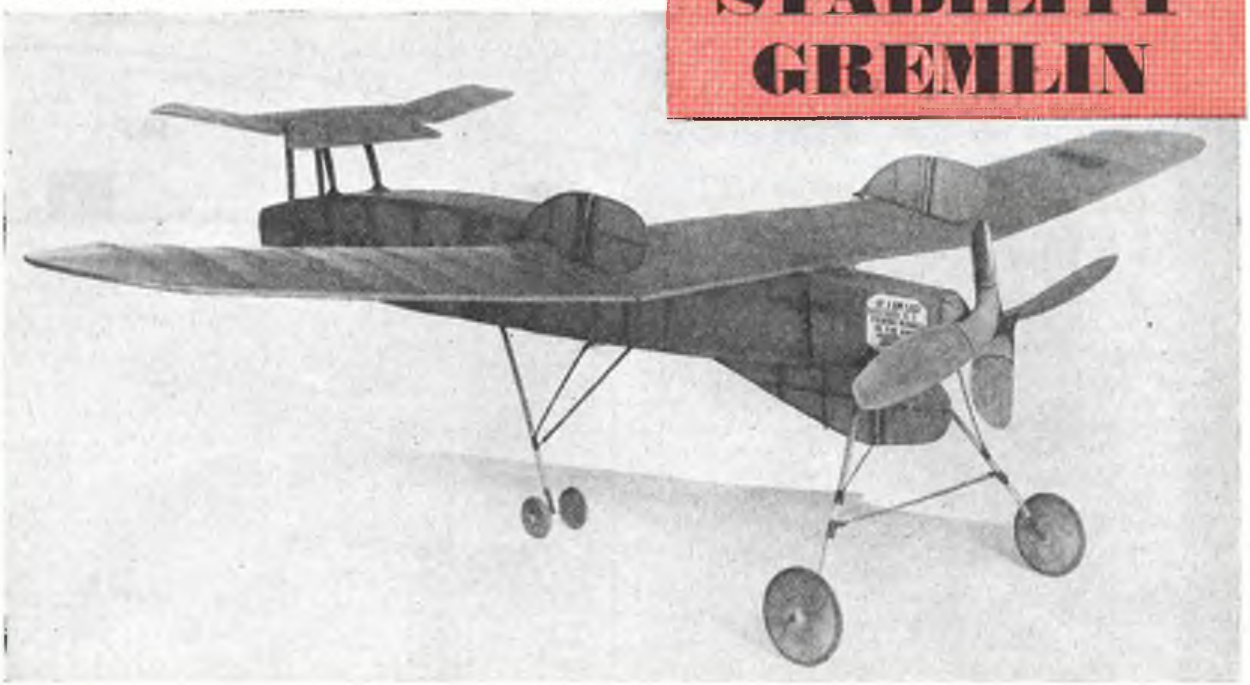
The model, 6 ft. 9 ins. span, was based on the "Sunnanvind" design, but with a redesigned wing, using L.D.C.2 section set at 5°–6° incidence, and a redesigned tailplane with Clark Y section and fins of fractional aspect ratio. Completed only for the contest, the model had never been flown previously. It was given a few hand-launch test glides and was then put up on the tow-line. Weather was bad and extremely cold, with a blustering wind. The model won the contest by a wide margin with three ensuing o.o.s. flights, first and last close on 2 mins., and the middle 2 mins. 32 secs. The model flew very slowly, was completely stable, not once rocking in the gusts, and went up on the tow-line like a dream, steady as a rock. No winch was used—the model was just kited up, the launcher not even moving until it was almost overhead (the line was not a full 300 ft.). On release, the model hovered into wind for an amazing time (on one occasion for more than 30 secs.), not losing height or moving in any direction. Slowly it veered round and out of wind in a huge circle, flying slowly and perfectly stable until out of sight. The performance in such weather conditions was amazing, and the sinking speed must be phenomenally low. It is better than the original Evander, which had the flattest glide I had ever seen previously. Everybody agreed its performance completely vindicated the theory.

We hope to publish photos of this model in the near future. Those many "practical" aeromodellers who would like to try substituting the **rough** formula 'L.D.C.2 & 5°-6°' for the **equally rough** 'R.A.F.32 & 3°'. They should remember that the section must be faithfully preserved, unbroken by spars, etc., or the laminar flow is destroyed.

ARTIFEX.

AN EXPERIMENTAL PUSHER CANARD DESIGNED BY FRANK HUGHES

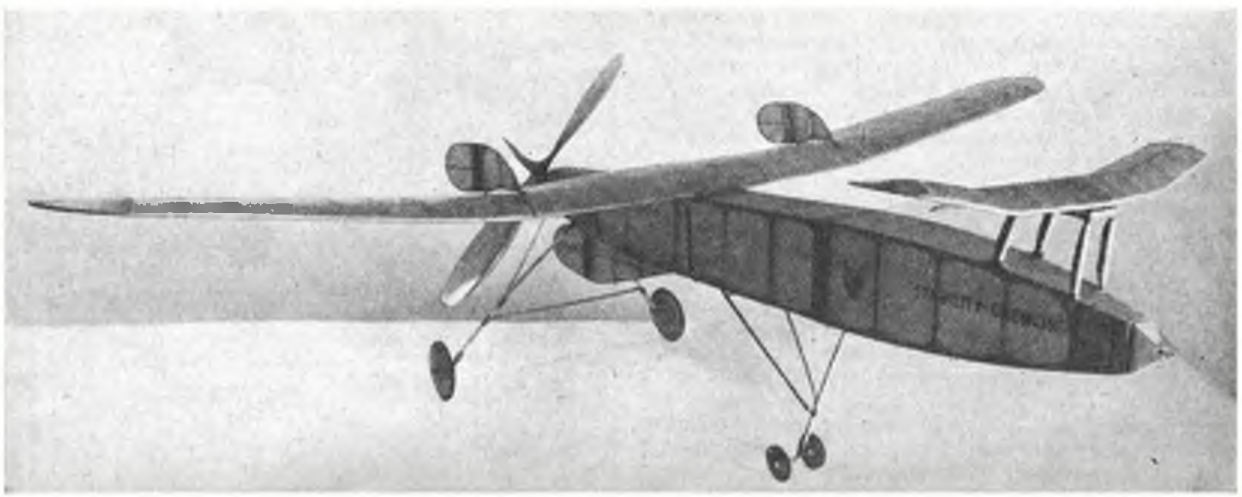
STABILITY GREMLIN



THIS machine is the result of many years of experimental work, and as its name implies performance with stability was my chief goal. The model is a "pusher" which has lived up to its name, taking off beautifully on exceptionally low power and flying with a nice glide and landing at the end of its flight.

The Fuselage is entirely of ¼ in. sq. hard balsa, and every joint is gusseted on all sides with ¼ in. sheet. The front and rear bays are covered in completely with 3/32 in. sheet. The noseblock and the rear-block are built of balsa laminated with two layers of 1/32 in. three-ply birch, which makes a strong, yet light job. The noseblock carries the winding-hook which when wound is replaced into a brass socket on the block for that purpose. Both front and rear blocks are bushed with brass tubing, 18 s.w.g. fitting for front, and 16 s.w.g. fitting for rear block. Both blocks are attached to their respective ends of fuselage in the usual "flange fitting" manner. The fuselage is built in two sections, for ease of transport, the two halves fitting together with dowel and socket fittings. The front half of fuselage also carries the brass socket, let into underside to take the "front undercarriage" legs. The rear legs of front undercarriage are attached into sockets at the sides of the rear half fuselage. This half also carries the complete "rear undercarriage"—the legs of which are attached in the same manner, all to the fuselage sides. All sockets are made from brass tubing to fit 18 s.w.g. piano wire. To the centre, on the underside of the "rear fuselage"

The unconventional nature of this model is well portrayed in these two views.



half is permanently attached the Under Fin with its adjustable rudder, the rudder being hinged with aluminium hinges, and they "stay put" as required, operating between the legs of the rear undercarriage.

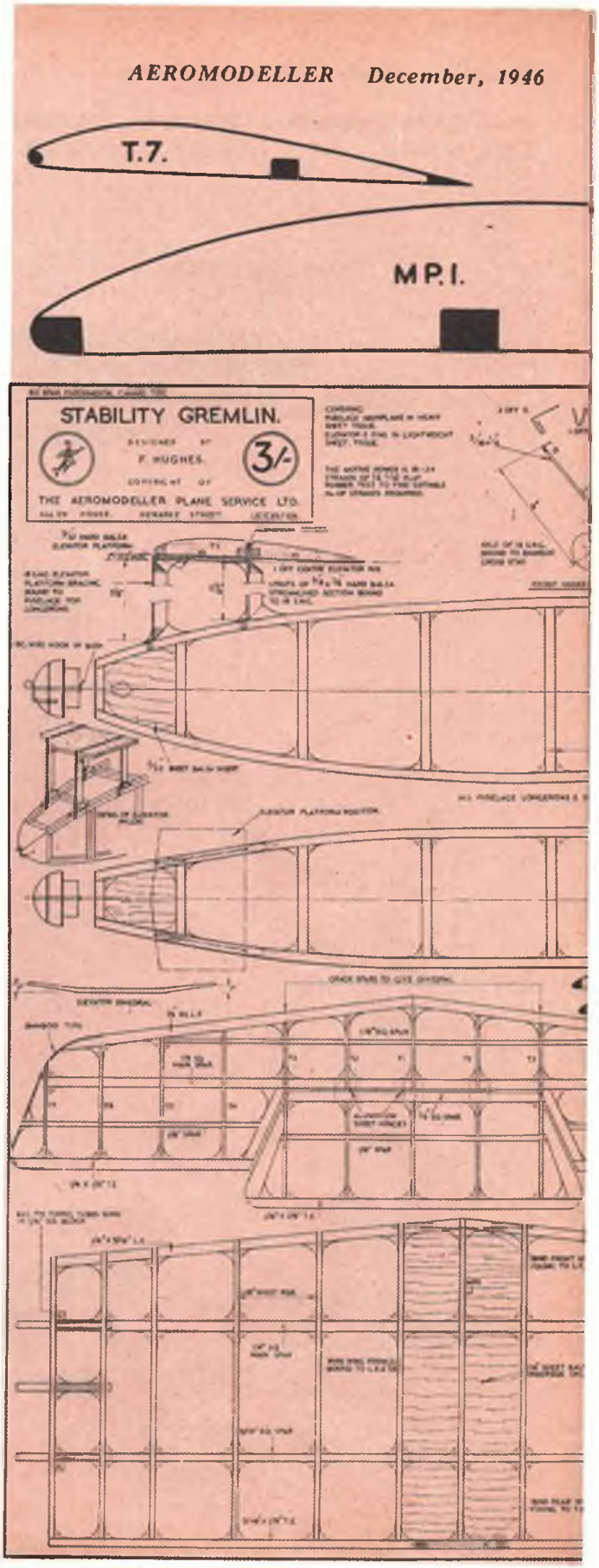
The Undercarriages are made entirely of split bamboo, carefully selected for the job and papered down to streamline shape, with piano wire prongs and hooks bound on with "Silko" thread.

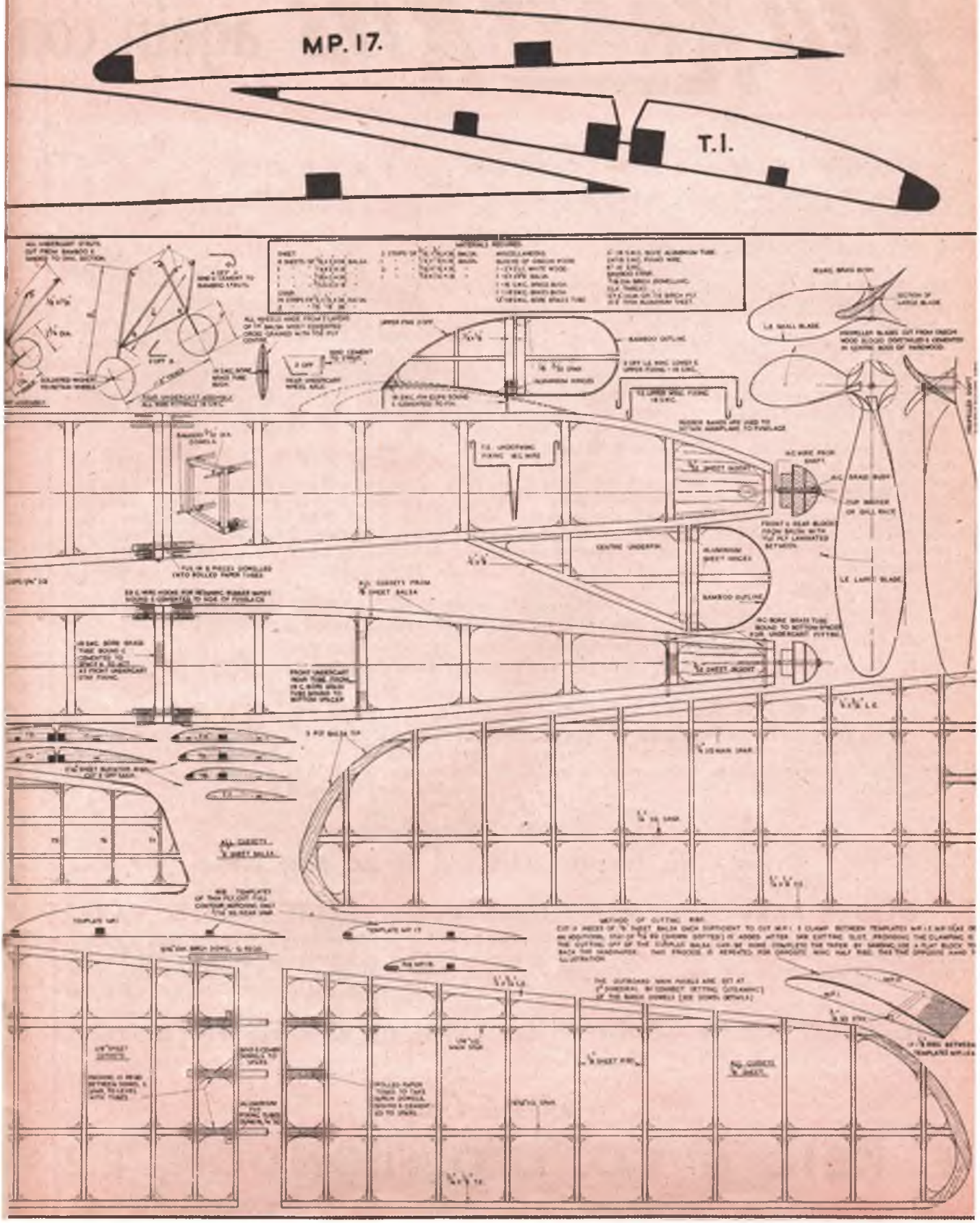
The Wheels are laminated of 3 ply 1 mm. birch and hard balsa, they are made in two halves for each wheel, each half being hollowed out and cemented together with a reinforced rim for additional strength, the whole being then finely papered.

The Elevator is of very sturdy construction. The central adjustable trimming elevator is hinged and of the "stay put" variety; this trimmer is efficient and works in an uninterrupted airflow. This is made of $\frac{1}{4}$ in. sq. for leading edge, $\frac{1}{4} \times \frac{1}{8}$ in. for trailing edge and spar, with balsa tips papered to the flow lines of the main elevator itself. This central trimming elevator allows of very fine adjustment, which adds remarkably to its longitudinal stability.

The Main Plane is built in three sections, mainly for ease of transport. Each wing is attached to three dowels projecting from the extremities of the centre-section—the dowels make a very rigid fixing, but sufficiently short enough to allow the wings to knock out in emergency. The three centre ribs of the centre-section are covered, on the underside only, with 1/16 in. sheet, this operation being done after the attaching hooks have been bound on to leading and trailing edges with "Silko." The wing tips are shaped from 3-ply hard balsa. All ribs are cut from $\frac{1}{8}$ in. sheet and are cut away, saving a little weight without sacrificing strength unduly. The main plane is of zero incidence and lies in flat alignment on fuselage. All the surfaces are covered with Jap tissue, and are given one coat of clear dope.

We now come to **The Propeller**—this I call my "Super-Thrust," and it is of quite original design and right away from orthodox practice. It is carved in four separate blades, from carefully selected obéchi wood, as straight grained as possible. Each blade is then "dovetailed" into the centre "boss," which is of American white wood. The design is the result of much practical experimenting with this type of prop, which I have devised. I have tried them out on many smaller models of various designs, and of different diameters, and I find on "pusher" type machines particularly, that the performance is undoubtedly immensely improved when using this type to any other. I cannot describe it as a "two blader"—as a "three blader" or as a "four blader"—as actually, of course, it is in a way. Perhaps a "two and two-half blader" is a more accurate description. The two longer blades are 17 ins. diameter, and the two shorter blades of 7 ins. diameter. The shorter blades are set at a much coarser pitch than the longer ones. The entering edge of the shorter blades are staggered forwards, and when in motion over half of the width area of these blades are working in air undisturbed by the longer blades. The idea is, of course, to make up for that area of an "airscrew" near the boss, which is a necessary evil, but which does practically no useful work. This propeller develops great thrust, without great torque.





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5/- each, ⅜" & ½". Dopes, Cements, Tissues, Celluloid Wheels, Birch and Spruce in 4 ft. lengths, etc. etc.

KEIL KRAFT KITS

MEET THE MODELLERS

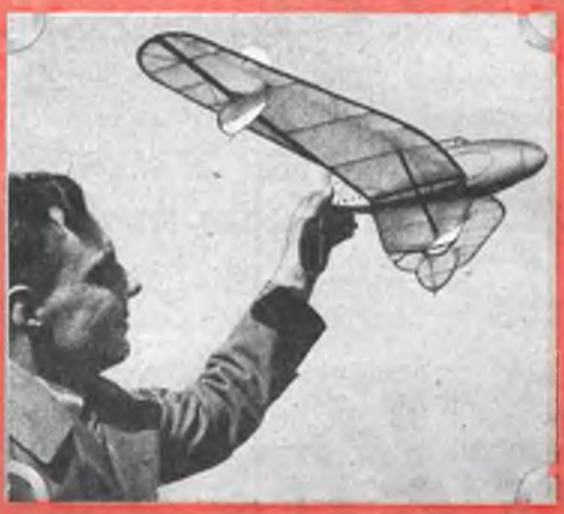
KEN TANSLEY — petroleer pride of Northern Heights —with the sleek grey model with which he won the Sir John Shelley Cup this year and with which he was a familiar entrant at most of the big petrol contests . . .

(Below) S/LDR. H. E. HERVEY, M.C. and Bar, with a semi-scale tailless model of his own design. He is well-known to gliding enthusiasts both over here and in Australia, and to visitors to Eaton Bray, where he is now Aerodrome Manager, and is seldom to be seen without some kind of rubber model or glider close at hand . . .

(Above right) F/LT. JACKSON-WYNCH, D.F.C., who, like many R.A.F. personnel, derives great enjoyment from "busman's holidaying" in his spare moments. This photo, showing him with his sailplane, was taken by his friend, F/Lt. Brookes . . .

(Below) R. J. NORTH, a shining light of Blackheath M.F.C., caught with his 1946 lightweight model by the camera of J. A. Marett. The model shown has distinguished itself by consistent flying, particularly in the M.E. No. 2 Cup, when three flights were made in pouring rain, to give a 4½ minute aggregate with a water payload of 2 ozs. . . .

BILL WHITE (in the centre), also of Blackheath, has put in many an appearance in the last two years with his elegant scarlet petrol model, powered in the past, so rumour has it, with the first Brown Junior that ever reached this country, and which unfortunately behaved like it. Engine efficiency restored, the model has now fulfilled its early promise and is a delightful flyer in every way. Note the intricate construction of the flying surfaces which has protected the model many times from structural damage in a hard landing.



Monthly Memoranda

BY O. G. THETFORD

(Top) Mosquito VI fighter-bomber of No. 487 Squadron, R.N.Z.A.F. This squadron originally had Venturas. The letters "EG" are now used by No. 16 Squadron, R.A.F., equipped with the Tempest II. (Crown Copyright Photo.)

(Right) Blenheim IV bombers of No. 101 Squadron, later equipped with Wellingtons and Lancasters. No. 101 will be remembered as the pioneer "medium" bombers with Sidestrands. (Chas. E. Brown Photo.)

(Below) Blenheim I bombers of No. 90 Squadron in 1939. This picture is historic in that it was the first to show the code squadron lettering on its introduction. No. 90 Squadron later changed their letters to "WP" and re-equipped with the Fortress I. They now fly Lancasters. (L.N.A. Photo.)

(Planet News Photo.)
A Blenheim IV bomber of No. 88 Squadron. This unit formerly flew Battles and later equipped with Bostons.

(Photo: "The Aeroplane.")
A Blenheim IV bomber of No. 18 Squadron.

(Flight Photo.)
A Hudson bomber of No. 206 Squadron, Coastal Command, in 1941.

(Crown Copyright.)
(Above.) Ventura bomber of No. 464 Squadron (R.A.A.F.). This Squadron had red letters, nose and spinners.

(Below.) A Wellington III bomber of No. 425 Squadron, Canadian Group Bomber Command. Later equipped with the Halifax.
(Photo: "The Aeroplane.")

(Planet News Photo.)
A Mitchell bomber of No. 180 Squadron, which operated with the 2nd T.A.F.

IN this double number of the AEROMODELLER we present for the first time a representative album of British bombers in the recent war, complete with battle paint, code letters, and notes on squadrons. We believe this feature will be of lasting value to scale modellers and ex-R.A.F. readers.

It is hoped to present a similar feature on British wartime fighters in a forthcoming issue, so if any readers have any special information or pictures which they would like to see published, they are welcome to contribute.

To supplement the photographs accompanying this article, we are presenting a list of the code letters employed by British bomber squadrons in the recent war, other than those illustrated. This first instalment will be continued next month.

Lancaster Squadrons.

No. 9. Sq. (WS); No. 12 Sq. (PH); No. 40 Sq. (BL); No. 44 Sq. (KM); No. 49. Sq. (EA); No. 61 Sq. (QR);

(Above.) Hudson III reconnaissance bombers of No. 48 Squadron, and (below) a Wellington IC bomber of No. 311 (Czech) Squadron, Bomber Command.
(Crown Copyright Photos.)

(Below.) A Manchester bomber of No. 83 Squadron, formerly equipped with Hampdens and later with the Lancaster.
(Central Press Photo.)

(Photo: "The Aeroplane.")

Mosquito IV bombers of No. 105 Squadron, the first to be equipped with the Mosquito bomber.

No. 75 Sq. (AA) ; No. 90 Sq. (WP) ; No. 97 Sq. (OF) ; No. 100 Sq. (HW) ; No. 101 Sq. (SR) ; No. 103 Sq. (PM) ; No. 106 Sq. (ZN) ; No. 109 Sq. (ZP) ; No. 115 Sq. (KO) ; No. 150 Sq. (IQ) ; No. 153 Sq. (P4) ; No. 166 Sq. (AS) ; No. 170 Sq. (TC) ; No. 207 Sq. (EM) ; No. 218 Sq. (HA) ; No. 227 Sq. (9J) ; No. 300 Sq. (Polish) (BH) ; No. 460 Sq. (AR) ; No. 467 Sq. (PO) ; No. 514 Sq. (JI) ; No. 550 Sq. (BQ) ; No. 576 Sq. (UL) ; No. 582 Sq. (60) ; No. 617 Sq. (KC and YZ) ; No. 619 Sq. (PG) ; No. 626 Sq. (UM) ; No. 627 Sq. (AZ) ; No. 630 Sq. (LE) ; No. 635 Sq. (F2).

Halifax Squadrons.

No. 51 Sq. (MH) ; No. 78 Sq. (EY) ; No. 102 Sq. (DY) ; No. 138 Sq. (NF) ; No. 161 Sq. (MA) ; No. 171 Sq. (EX) ; No. 192 Sq. (DT) ; No. 199 Sq. (GY) ; No. 297 Sq. (CS) ; No. 298 Sq. (8A and 8T) ; No. 420 Sq. (PT) ; No. 427 Sq. (ZL) ; No. 429 Sq. (AL) ; No. 431 Sq. (WL) ; No. 466 Sq. (HD) ; No. 502 Sq. (YG) ; No. 620 Sq. (QS) ; No. 640 Sq. (C8) ; No. 644 Sq. (2P and 9U). *(To be continued.)*

(Flight Photo.)

A Stirling I bomber of No. 7 Squadron. This was one of the most famous Stirling squadrons. It later received the Lancaster.

(Crown Copyright Photo.)

We cannot identify the above squadron (Wellington II coded "EP") but perhaps some reader can help us

(Below.) Wellington XII with Coastal Command radar aerials belonging to No. 38 Squadron. (Photo: E. J. Riding.)

(Photo: "The Aeroplane.")

A Halifax II Series I (Special) bomber of No. 10 Squadron, formerly with Whitleys. No. 10 Squadron is now in Transport Command.

(Fox Photo.)

A Halifax II bomber of No. 405 Squadron, Canadian Group, Bomber Command.

(Above.) A Halifax III bomber of No. 77 Squadron, which also had a flight of Halifax VI, coded "TB." (Below.) A Halifax I of No. 76 Squadron, one of the first Halifax units.

(I.W.M. Photo.)

(Air Review Photo.)

A Halifax III of No. 158 Squadron, which was displayed to the public at the Oxford Street Exhibition in 1945. Notice the tactical markings on the fin and rudder.

(Photo: E. J. Riding.)

A Lancaster III bomber of No. 15 Squadron, showing the serial number below the wings, re-introduced shortly after "V J" Day.

(Planet News Photo.)

A Lancaster III bomber of No. 619 Squadron, 5 Group, Bomber Command.

(Photo: "The Aeroplane.")

A Lancaster II bomber of No. 426 Squadron, Canadian Group, Bomber Command.

(Barratt's Photo.)

A Lincoln bomber of No. 57 Squadron, bearing the black and white tropical camouflage of aircraft destined for the Far East in 1945.

(Crown Copyright Photo.)

A Lancaster I bomber of No 83 Squadron.

(Keystone Photo.)

A Lancaster III bomber believed to be of No. 156 Squadron.

("Illustrated" Photo.)

(Above.) Lancasters of No. 50 Squadron, and (below) a Lancaster III of No. 35 Squadron, coded "TL," which visited the U.S.A. recently.

(Photo: Martin and Kelman.)

AEROPLANES DESCRIBED XLVI

BRISTOL BRIGAND

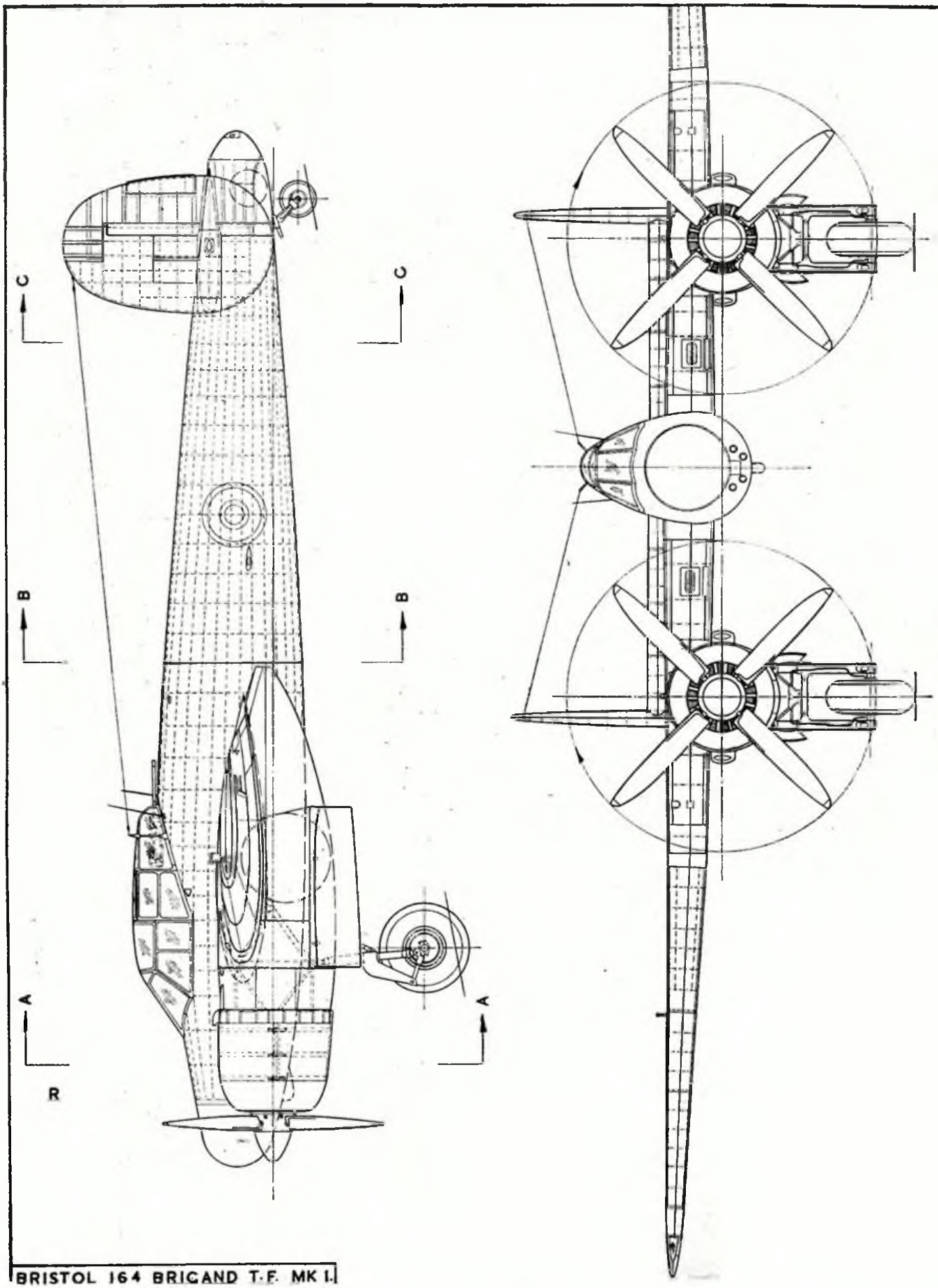
THE Bristol Type 164 Brigand was first introduced in 1945 as a replacement type for the well-tried Beaufighter with Royal Air Force torpedo squadrons and was to have played an important part in the Pacific if the Japanese War had continued. Brigand contracts were reduced after VJ-Day, but production continued on a reduced scale through 1946, though at a rather slow rate. One of the Coastal squadrons scheduled to receive Brigands is No. 254 Squadron, stationed at Thorney Island, but at the time of writing it had received Mosquitos as interim replacement types for its Beaufighters.

The Brigand was the outcome of a 1942 specification (H 7/42) which called for an improved version of the Beaufighter for long-range torpedo work and shipping strikes. For reasons of economy, and to expedite production, it was decided to use the same wings, tail unit, undercarriage and power plant as the Buckingham bomber, about thirty of which were built by Bristols. For the Brigand, a completely new fuselage was designed in which the cross-sectional area was reduced to a true oval and the crew of three grouped together, forward, in a manner reminiscent of the German Junkers 88. The crew consists of pilot, navigator/bomb-aimer and radio-operator/air gunner. The radio operator sits beside the navigator, facing starboard, and either of them can stand to operate the rear gun. For torpedo-aiming, the navigator has a special seat on the front spar just behind the pilot. Comprehensive navigational and radio equipment includes a radio-altimeter and an A.S.V. radar scanner unit housed in the plastic dome forming the nose.

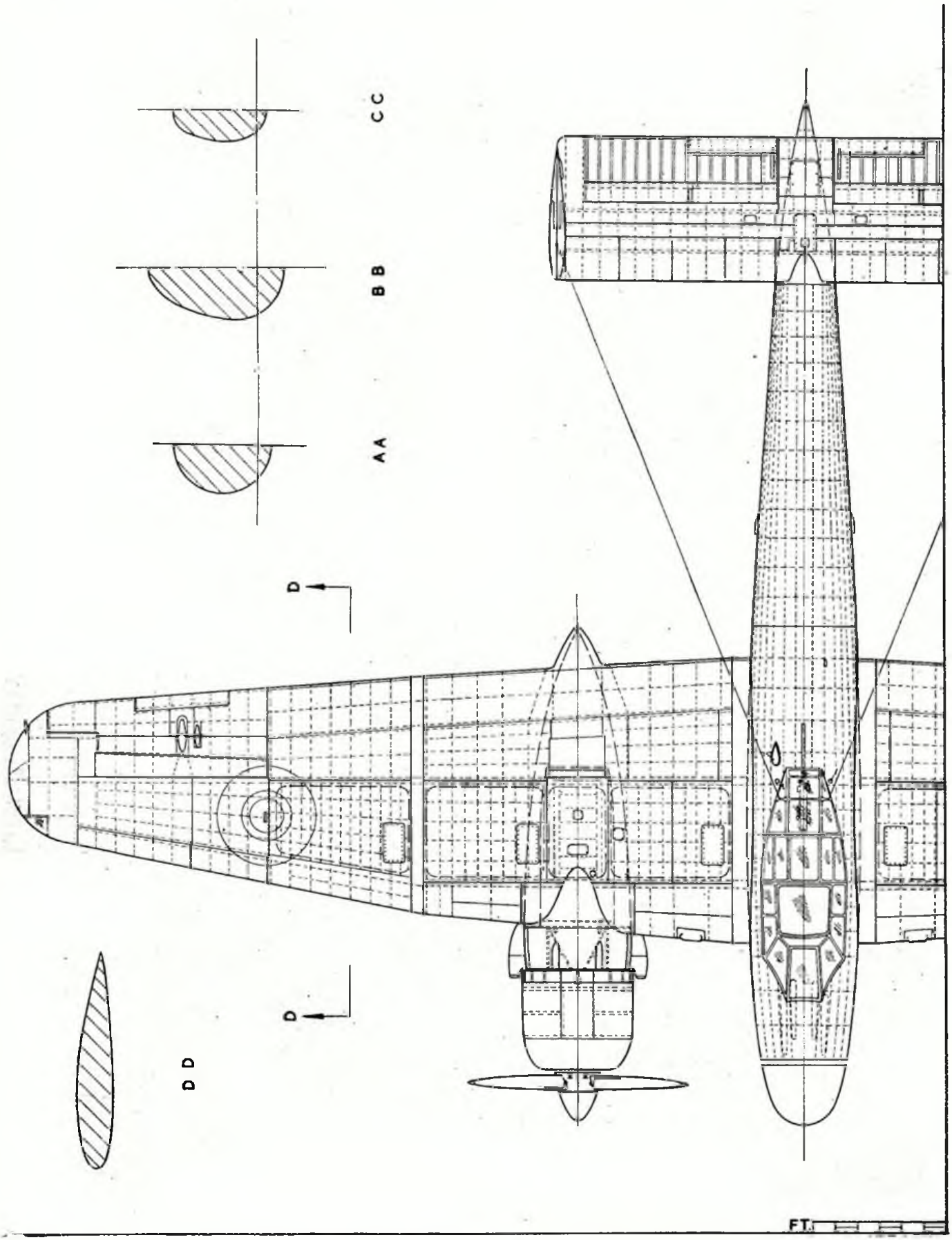
The Brigand initiates a new class of R.A.F. machine—the all-purpose strike aircraft. The Beaufighter performed these tasks admirably but was not originally designed for such duties. The Brigand is notable for its formidable and wide variety of armament installations. For long-range escort duties it can be fitted with a single 200-gallon auxiliary fuel tank beneath the fuselage and two further 90-gallon drop tanks beneath the wings.

The four prototype Brigands were numbered MX 988, MX 991, MX 994 and TX 374, and they mounted the Centaurus VII motor, which is replaced in production aircraft by the Centaurus 57, which has RAE-Hobson fuel injectors and the methanol-water injection system for emergency combat power. Production Brigands are camouflaged sea-grey on the top surfaces and "Sky" underneath and carry their serial number in black beneath the wings as well as on the rear fuselage. There are no roundels beneath the wings. Those on the fuselage are encircled by a yellow ring and the roundels above the wings are plain red, white and blue. Production Brigands are numbered RH 742, RH 743, RH 744, etc.

SPECIFICATION: Three-seat long-range strike aircraft, for use as torpedo-bomber, dive-bomber or rocket-firing fighter. Two Bristol Centaurus 57 eighteen-cylinder sleeve-valve radial motors, each of 2,585 h.p. All-metal stressed-skin construction and retractable undercarriage. Span: 72 ft. 4 ins. Length: 46 ft. 5 ins. Height: 16 ft. 4 ins. Wing Area: 718 sq. ft. Empty weight: 27,500 lb. Loaded weight: 38,200 lb. Maximum fuel tankage: 1,440 gallons. Maximum level speed: 358 m.p.h. at 13,700 ft. Climb: 1,500 ft./min. Service ceiling: 26,000 ft. Maximum range: 2,770 miles. Four fixed 20 mm. cannon firing forward and one manually-operated ·50 inch machine-gun aft. Provision for sixteen rockets beneath the wings, one 22 inch torpedo beneath the fuselage and two 500 lb. bombs, or a total bomb load of 2,000 lb



BRISTOL 164 BRIGAND T.F. MK I.



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increased supplies of the following **Joy-plane** *products are now becoming available !*

Cellulose Wing Dopes .. .. .. ½-pint **4/-**

Cellulose Banana Oil—No. 1 Thick, No. 2 Thin .. .. ½-pint **4/-**

Plastic Balsa Wood .. .. .. ¼-lb. **1/3**

Balsa Wood Cement .. .. .. Tubes **5d.**
(Display Boxes of 3 dozen.)

Field Cement .. .. Tubes **7½d.**

Tissue Paste .. .. Bottles **7½d.**

Silver Dope .. 4-oz. bottle **2/9**, ½-pint **4/6**

Model Dopes (Cellulose) .. .. ½-pint **4/-**
Colours :
Camouflage Matt—Brown, Green, Duck Egg Blue, Heinkel Blue, Light and Dark Grey, Black and White.
Camouflage Glossy—Brown and Green.
Glossy—Yellow, Grey, Red, Light and Dark Blue, Light and Dark Green, Black, White, Cream, Stone and Chocolate Brown.

Grain Filler (White & Grey) .. .. ½-pint **4/-**

Rubber Lubricant .. .. **9d.**

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MODEL AIRCRAFT TRADE ASSOCIATION

CLUB NEWS

By Clubman

When Irish eyes are smiling—From Brian Crawford of the Ulster M.A.C. comes this picture of three prominent Irish modellers. They are left to right, Dr. Charles, E. W. Little and T. H Daulman.

SWEEPING my ever-lengthening white beard from the keys of my typewriter, I once again wish all my readers the very best of good wishes for the Festive Season, and may 1947 see even greater zest in the model aircraft world than was evident in 1946—by no means a year of stalemate. This movement is growing at a rapid pace, and I look forward to even greater advances than have been made during the past season.

I am pleased to record the early preparation of the S.M.A.E. programme of contests for 1947, the list being decided at a Delegate Meeting on the 20th October. I was in attendance at this meeting, and can state that this was one of the most business-like affairs it has been my pleasure to attend, with everyone anxious to get down to brass tacks. In consequence, the programme is settled in time for clubs to make their own arrangements in plenty of time, and thus avoid the unfortunate clashing of dates that was so evident in the 1946 calendar.

The state of affairs I criticised in my last chat has been greatly alleviated by a condensing of the S.M.A.E. programme into a space of ten week-ends, with contests nicely spaced out over the general flying season. This has been brought about by grouping certain contests on four of the week-ends, and by the institution at long last of a **BRITISH NATIONALS.**

This meeting will be held over the Whitsun holiday Sunday and Monday, with six contests comprising open and formulæ contests for petrol, duration and glider type models. Ownership of one each of the three types of model will enable any competitor to take part in all six events, and in particular this meeting will carry the Individual Championship as an added attraction. In addition, the Women's Challenge Cup will be staged as an attraction to the large number of lady modellers expected at the meeting.

Followers of my monthly notes will know that this kind of meeting has been a " plug " of mine for some years now, and I trust that the innovation will meet with the approval I think it merits. Too often in the past have provincial enthusiasts been handicapped by the necessity of making a number of trips to the London area for centralised events, but now, for one expense, six of the main centralised events (plus championship) can be taken in one trip, and I forsee this meeting becoming as popular as its American parallel, the Nationals, of which we have heard and read so much.

The Plugge Cup, awarded to the top-ranking club in all-round flying, will be taken care of at the two Area Semi-Centralised events, comprising both open and team events. These meetings should be popular in view of the added facilities obtained through the combined activities of a number of clubs flying together.

The balance is kept nicely by the five De-Centralised events, which still gives each club plenty of scope for using its own ground. Boiled down to essentials, the programme requires five meetings on home grounds, two short distance journeys (to Area grounds), and one two-day meeting on fully centralised terms, which should be well worth everybody's attendance. For those who specialise in petrol and tailless types, there are two other centralised meetings.

For years now we have heard criticism of the " lucky thermal flight," and many and complex have been the remedies suggested. Next year a method will be tried out at each of the two Area events, when a " five-minute maximum " will be applied to each flight made in the open rubber and open glider contests staged. I have already laid a £5 bet that no one will show a score of three five-minute flights in one contest—but am quite prepared to lose as the feat will be noteworthy. In the unlikely event of a tie with maximum times, a fly-off will be arranged. It will be extremely interesting to see how this scheme works out in actual practice.

Some details are to hand regarding the altered conditions for model regulations tabled at the recent F.A.I. Conference held in London. Mention was made in last month's Editorial of the timekeeping aspect, and the arrangements finally agreed by the attending Delegates state that the " stationary timekeeper " system advocated by the S.M.A.E. has been agreed to for contest purposes, but that timekeepers should follow the model and/or use optical aids for record purposes.

Certain design formulæ changes are introduced, chief being that from now onwards the total area of all horizontal surfaces shall be taken into consideration when calculating wing loading, in order to give greater freedom of design, and to relieve the tailless type of machine of its present handicap. This means now that both main and tailplane areas shall be added for calculation purposes, and this also affects the fuselage cross section requirements—the overall length of the model no longer being taken into consideration.

For future design purposes, the total area in square inches of the combined horizontal surfaces, divided by 26, will give the required minimum fuselage cross sectional area. In the case of gliders the dividing figure is 50. In

Members of the newly formed R.A.F. Errol Model Aero Club photographed on their flying field, a spacious unused R.A.F. 'drome.

most cases this gives a slightly smaller requisite cross section than the old method, so models built to the old standard are still well within the new regulations.

A method has at long last been devised whereby the vexed question of just where the wing begins, and what comprise the fuselage on some unorthodox, super streamlined designs, can be settled. It is impossible to give the details without illustration, and I await the official sketch from the authorities before trying to explain this point fully.

The maximum length of line for use in launching gliders is now restricted to 100 metres, and contestants can now run in the case of either a running or winch launch, with no restriction as to distance of run. The catapult method of launching has been eliminated as being obsolete, and rarely used.

The flight made by N. Marcus's (Croydon) model, mentioned in the November issue, has been accepted as a new British record for flying scale types. This flight, of 5 : 21·75 with a " Fokker D.VIII," will take a lot of beating. Other recent British records are a hand-launched glider flight of 6 : 57·5 by G. D. Pickett, of Bradford, and 2 : 31 with a free flying indoor biplane model by R. Rock, of Streatham.

Following the lead of the Manchester clubs, the Liverpool and district groups have formed themselves into a combined council to be known as the **MERSEYSIDE COUNCIL OF MODEL AERO CLUBS**. Under the chairmanship of Mr. R. F. L. Gosling, the Council soon got down to the business of electing suitable officials, and much good work has been done in the short time since formation. Communal assistance with flying grounds in particular has been a good start, and special trophies have been acquired by the group for special area contests.

Lack of foresight in the programme relating to competition matters, etc., was given as the main reason for lack of progress in the **LONDON AREA COUNCIL** at their recent E.G.M. A revision of the constitution was discussed, and this has been placed on the agenda for the forthcoming Area A.G.M. Certain members advocated the limitation of the number of Galas, and the arrangement of four well organised centralised contests in 1947. (It remains to be seen just what effect the new S.M.A.E. programme will have on these suggestions.)

The **BRENTFORD & CHISWICK M.F.C.** Rally was held on Hounslow Heath on the 29th September, after being postponed from the 8th owing to inclement weather. The meeting was well attended, with over one hundred entries from the London and surrounding clubs. The weather was generally fine, with a strong wind, and no spectacular flights were made. Results :—

Open Rubber.

Harris, G. W.	(Croydon)	4 : 44·2
Lofts, D.	(Northern Heights)	4 : 20·2
Clarke, A.	(Streatham)	3 : 33·3

Open Glider.

Clarke, A.	(Streatham)	3 : 52·3
Winsley, N.	(Brentford)	3 : 21·5
Stowalk, R.	(Kingsbury)	3 : 09

Power Event.

Guest, F.	(Bushy Park)	2 secs. error
Warring, R. H.	(Zombies)	3 " "
Harris, G. W. W.	(Croydon)	3·5 " "

Team event.

Streatham M.A.C. Hayes & D.M.A.C.

Most outstanding contest winner of the 1946 season in the **BLACKHEATH M.F.C.** has been young A. Foreman, who flies lightweight jobs with tons of wing area, long moment arm, and plenty of power! Tailless types are coming in for plenty of attention, Sam Crow putting up average durations of 2–3 minutes with an improved version of his now famous " Crowfly." Galbreath is testing a new job of 9 ft. span, with 45 degrees sweepback, centre section dethermaliser flaps, and inverted auxiliary airfoils above the wing tips—fully adjustable for angle of attack, etc. Total weight is 33 oz. Most exciting flying meeting of the season was the inter-club event against the " Zombies " in the second round of the London Area Cup. After 24 flights, the final aggregates were separated by only ·9 secs.—Zombies scoring 1,281·3 to Blackheath's 1,280·4. Certainly a record for close finishes, I think!

The last open competition of the year with the **BELFAST F.C.** attracted a large entry, including several well known modellers from Dublin. Weather conditions were windy, with occasional showers. Nevertheless, a keen contest developed, the highlight being a three-cornered fight between G. Drew, S. Young and N. Osbourn. Each led in turn until Osbourn eventually won with an aggregate of 6 : 09. He also won the petrol event, with R. Nelson second. Osbourn and Young travelled to Dublin to compete in the Open Rubber event staged by the Pheonix M.A.C., and carried first and second places. Nice flying, lads!

The **CHELMSFORD M.A.C.** in conjunction with the local Society of Model Engineers, held their fourth annual exhibition in the Shire Hall, where over 3,000 people saw some 64 exhibits in the model aircraft section alone. The Challenge Shield was won by G. Foden with his high wing, twin-fin monococque free lance design, powered by a 3-cylindered compressed air engine. The Junior Cup went to L. Sayer for this " Temple Tribute," this chap also winning the r.t.p. contest staged on the last evening with a time of 1 : 07.

A. Shenton, of the **HORNCHURCH M.E.C.** has been doing some good flying with his " King Falcon."

He holds the club record with this machine with a time of 12 : 20 o.o.s., but the job was lost a few weeks ago after a flip of 4 : 15. G. R. Watts, a junior member, managed 11 : 30 with a 50 in. glider of his own design, while yet another youngster clocked 4 : 08 with his " Invader." D. Basden made some spectacular flights with his flying wing model, losing it after a few tests when the machine flew o.o.s. in 5 : 03. The owner will be very glad to recover it !

A move towards concentration is taking place in the Birmingham area, where the late East Birmingham, King's Heath, and Hall Green M.A.C.'s have amalgamated into the new **SOUTH EAST BIRMINGHAM M.A.C.** Indoor flying is well under way, new records being held by K. Thomas, 2 : 06 r.o.g., r.t.p., and D. R. Oliver, 1 : 30 free flying (microfilm class).

News from the **WALTHAMSTOW M.A.S.** this month concerns the win by B. E. Lanham in the K. & M.A.A. Cup with a time of 11 : 29·3 flying a lightweight biplane, E. H. Aylward placing third with a 20 in. span model.

Welcome back to the old **WARRINGTON M.F.C.** now back in circulation after a wartime hiatus. It is hoped to obtain use of a local aerodrome for outdoor activities, but a good clubroom is already in use. Club records to date are : Glider 7 : 57, Rubber Duration 1 : 03, and 59 secs. for the biplane class.

The **DEWSBURY & D.M.A.C.** held their first flying contests on the 6th October, and unfortunately the occasion seems to have overawed the junior members, not one making an entry ! Come on, lads, the old 'uns can't eat you ! ! All the comps had to be hand-launched as some helpful type had swiped the take-off boards, but three club records were set up, so the day wasn't too bad after all. A glider record of 1 : 45 with his " Mick Farthing " glider, Farrance made the same time with his " Isis " in the over 30 in. class, and 1 : 06 in the under 30 in. section.

The **AIR LEAGUE** of the **BRITISH EMPIRE** (Southampton Branch) propose to hold an Exhibition and competition of Model Aircraft during the first week in January, when prizes will be awarded in each of four main classes as follows : rubber powered, petrol and diesel, gliders and scale. Full particulars can be obtained from Mr. J. Dyman, of Folland Aircraft, Ltd., Hamble.

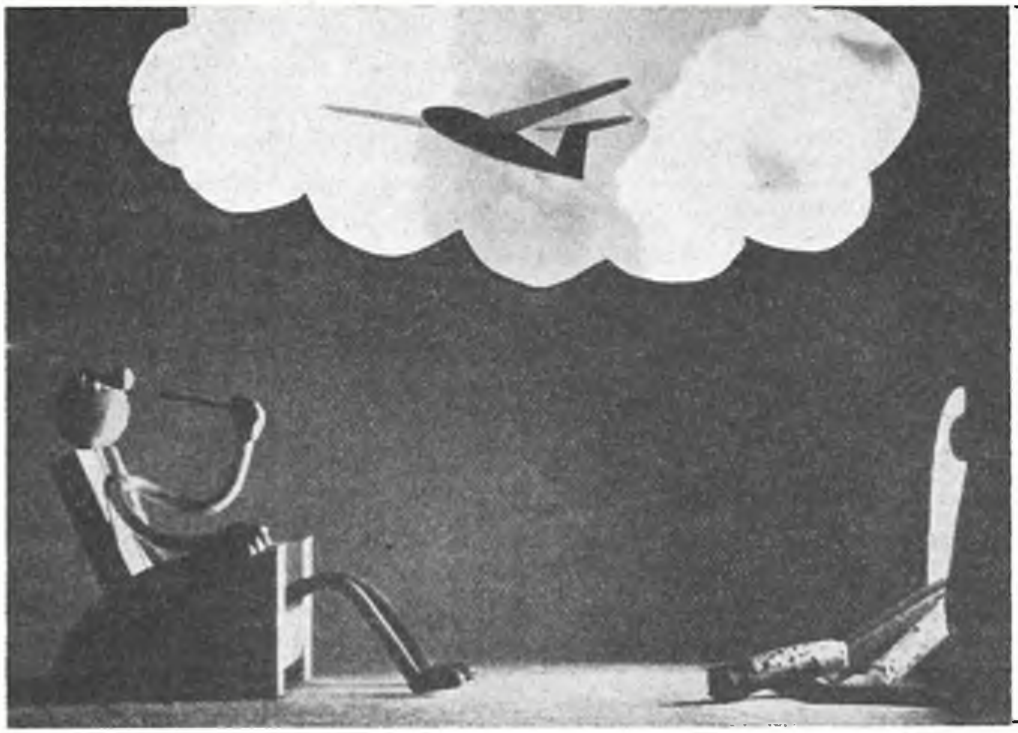
After the first four " Sunnanvind " gliders flown in the **HULL & D.M.A.C.** Rally had been lost o.o.s., the remaining competitors restricted the length of towline to 150 ft. Results were as follows :—

Open Glider.	**Hoyle, P.**	**4 : 06**
	MacLeod, P.	**4 : 06**
	Lucas, R.	**2 : 44**
F.A.I. Glider.	**Lucas, R.**	**2 : 33**
	Littlewood, K.	**2 : 31**
	Magee, E.	**2 : 18**
Open Rubber.	**Hollie, P.**	**3 : 57**
	Ward, P	**2 : 55**
	Lake, H.	**1 : 44**
" Sunnanvind."	**Waterson, N.**	**3 : 03**
	MacLeod, N.	**2 : 28**
	Littlewood, K.	**2 : 18**

Much excitement was caused in the Luton area following the publication of a column in the local newspaper regarding the loss of R. Hinks' deisel-powered model. This took place during the course of a contest held by the

"I TOLD YOU THAT THIS WAS NO PLACE FOR PRE-WINDING"

BEN TWYRE • By J. H. MAXWELL



The inner-man content with Christmas fare,

Ben sinks into a yielding easy-chair,

And, by a log fire's soft illumination,

Breaks a dozen records—in imagination.

LUTON & D.M.A.S. won eventually by C. Houghton. During the run of this event it was noticeable that the diesel engines were prone to over-cooling when climbing into a cold wind, the winner suffering from this trouble, but having no bother when the wind was on the side or behind the engine. Now, then, you slide rule experts, what's the answer ?

Following the success of the rally held this year by the **DARLINGTON M.A.C.** arrangements are in hand for a similar event next June, and interested modellers are asked to contact J. T. Walker, at 86, Cleveland Avenue, Darlington, as soon as possible. W. Dent won the club's " Neasham Cup " with an aggregate of 3 : 45 in the over 30 in. class, also taking top places in the two other events held.

An inter-club event held with the Swadlincote boys under the auspices of the **BURTON-ON-TRENT M.A.C.** resulted in two of the Swaddies carrying off the first and second places, best time of the day being 2 : 45. (By the way, the glider record of 5 : 35 credited to the Burton club in the October issue should read for the Swadlincote lads. Postmark was misleading, and no club name was given in the letter ! The Burton record for this now stands at 12 : 20, set up by D. Clarke's " Mick Farthing.")

The highest **CROYDON & D.M.A.C.** time in the S.M.A.E. Cup event was 4 : 12·2 by J. Hall, which gained him sixth place. He was also the winner of the club's President's Cup with a time of 13 : 12, followed by Dean 12 : 53·5, and Marcus 12 : 32·8. In the Junior Cup Denyer was first with 5 : 48·2, second Watkins with 5 : 22·8, and third Barnes 5 : 21·8.

The **R.A.F. ERROL M.A.C.** has all the facilities laid on for a first-class club, workrooms being backed up by a disused aerodrome ! A/C Turner holds the glider record at present with a time of 3 : 00 o.o.s., whilst A/C West holds the H.L. duration figure with 3 : 16. The r.o.g. figure is held by Secretary Woodings, his " Northern Arrow " clocking 8 : 40 o.o.s. A visit to the Dundee club rally resulted in three out of a possible six places being gained—quite a nice day's work.

Membership of the **CHEADLE & D.M.A.S.** is soaring, the fifty mark now being passed. Power models are well on the go in this bunch, several French diesels having been wangled over. Opinion of the English counterpart is pretty low, judging by the prop flicking of a certain member !

In spite of cold, unfavourable weather, the **KINGSBURY M.F.C.** recorded several o.o.s. flights when flying for their " Bird Cup." P. Haley placed first with a 9 : 01 aggregate (model lost on second flight), R. Skinner was second with 8 : 04, and J. Bowerman third 4 : 35. Best flight of the day was Haley's 7 : 06.

H. Castledine, of 441, Chorley Road, Swinton, Manchester, intends starting up a club in the Swinton district, and wishes all in that area who would like to join to contact him immediately.

Modellers in the Hawick district are asked to rally round and support the re-forming of the **HAWICK M.F.C.** T. K. Telfer is back on the job, and thinks it is time the lads got cracking once again, so those interested get in touch with him at 13, Teviot Crescent, Hawick, and put this club back into circulation.

And so to bed ! As I write this, the weather has really taken on that frosty aspect, and I am getting ready to hibernate in true aeromodelling style, with balsa,

dope and tubes of cement. Yes, I am really going to build a model this winter! And so, once again I wish you the best for Xmas, and may you fare well in spite of " peacetime " rationing.

THE CLUBMAN.

NEW CLUBS.

EAST HAM & D.M.C.
R. Fidler, 8, Station Road, Manor Park, London, E.12.
TODMORDEN POWER M.A.C.
I. Ellison, 7, Back Fair View, Longfield Road, Todmorden, Lancs.
DEVONPORT HIGH SCHOOL M.A.C.
T. L. Pick, Langden, Goosewell Hill, Plymstock, Devon.
WIGAN M.A.C.
H. Winnard, 4, Lindon Avenue, Orrell, Nr. Wigan, Lancs.
WOKING COUNTY SCHOOL M.A.C.
D. Reeve, 2, Nursery Cottages, Church Road, Bisley, Surrey.
RADLEY COLLEGE M.A.C.
M. Dyke, Eason's, Radley College, Abingdon, Berks.
GREENFORD M.A.C.
N. L. Colwill, 20, Downing Drive, Greenford, Middlesex.
LATYMER UPPER SCHOOL M.A.C.
90, Spring Grove Road, Hounslow, Middlesex.
LIVERPOOL M.A.S.
B. V. Haisman, 12, Acuba Road, Wavertree, Liverpool, 15.
KIRCALDY M.A.C. (late Fife M.A.C.)
R. Young, 16, Baldwin Crescent, Kirkcaldy.
NORTH EAST DERBYSHIRE M.C.
J. B. Chambers, 7, King Street, Creswell, Nr. Worksop, Notts.
LOUGHBOROUGH M.A.C.
G. S. Peet, 63, Frederick Street, Loughborough, Leics.
SOUTH EAST BIRMINGHAM M.A.C.
J. Sawyer, 1836, Coventry Road, Yardley, Birmingham, 26.
AMPLEFORTH M.A.C.
R. A. Twomey, Saint Bede's House, Ampleforth College, York.
BERKHAMSTED M.A.
J. Brewer, 67, Greenway West, Berkhamsted, Herts.
WESTON-SUPER-MARE & D.M.C.
M. Wells, " Lyndale," Milton Park Road, Weston-super-Mare, Som.
CHIPPERFIELD A.M.
M. Gough, " Windrush," Wayside, Chipperfield, Herts.

SECRETARIAL CHANGES.

WILLESDEN & D.M.A.C.
A. J. Tinsley, 163, Bentworth Road, Westway, London, W.12.
SEAHAM M.F.C.
G. Smith, 4, Queen Street, Seaham, Co. Durham.
PORTSMOUTH GRAMMAR SCHOOL M.A.C.
R. H. Bradfield, 8, St. Andrews Road, Southsea, Hants.
STRETFORD M.F.C.
K. Booth, 4, Canute Road, Gorse Hill, Stretford, Manchester.
CHESHAM M.A.C.
L. F. W. Howe, Hospital Close, Berkhamsted, Herts.
MONTROSE M.A.C.
C. S. Oberbeck, 26, Graham Street, Montrose, Angus.
BRENTWOOD & D.M.A.C.
D. Geary, 31, Robin Hood Road, Brentwood, Essex.
WARRINGTON M.F.C.
J. West, " Brooklyn," Mill Lane, Latchford, Warrington, Lancs.

CLASSIFIED ADVERTISEMENTS

PRESS DATE for February issue—January 1st
ADVERTISEMENT RATES;
Private **Minimum 18 words 3s. and 2d. per word for each subsequent word.**
Trade **Minimum 18 words 6s. and 4d. per word for each subsequent word.**
Box numbers are permissible—to count as 6 words when costing the advertisement.
COPY should be sent to the Classified Advertisement Dept. the "Aeromodeller", The Aerodrome, Billington Road, Stanbridge, Beds.

REQUIRED.

" A.F.P.," Vol. II.—K. A. Lewis, 43, Baden Road, Gillingham, Kent.

" A.T.C. Gazettes," Vol. 1 and 2. Jan.-July, Vol. 3.—Buchanan, 44, Rosebery Avenue, Tottenham, N.17.

" Janes Book of Aircraft," 1930-38, excluding 1937 issues. Any condition. Good prices.—Write Hadley, Cedars, Warlingham, Surrey.

" Air Review," Vol. 7, Nos. 1, 2, 3. " Aeronautics," October, 1944, to October, 1945.—R. Freeman, Stud Farm, Dedham, Essex.

Full price for following, in reasonable condition: AEROMODELLER, November, 1944: " Air Review " Nos. 1, 2, 3, Volume 7.—Jefferies, 504, Gloucester Road, Horfield, Bristol, 7.

Will pay reasonable price for " Aircraft of Fighting Powers " Vol. 2. In good condition. A. E. Currie, 113, Woodcote Grove Road, Coulsdon, Surrey.

Cash paid by American enthusiast for Numbers 1, 2 and 3, Vol. 7, " Air Review," in good condition—Box 43.

Aeromodeller, aged seventeen, returned from abroad, would like to contact aeromodeller of similar age interested in discussing possibilities of modelling as spare time work.—Tim Ellison, 35, Deodar Road, S.W.15. Tel. Putney 8096.

DISPOSAL.

5 c.c. petrol engine, £8. 10s. 0d. 3½ in. gauge powerful model locomotive, pulls 30 children, £125. Steamboat, £10. Fine 4 ft. sailing yacht, £12.—Mills Radio, Northfield, Birmingham.

Hall racer, all wood, requires engine cowl and trimming; 2·8 Moteur " Micron " Diesel, as new.—Box 41.

O.K. Super 60, 10 c.c. engine, with all accessories. Test-run only. Perfect condition, £8.—Hardman, Norris Hill, Heaton Moor, Stockport.

Post-war American " Scrapper " 4·75 c.c. petrol engine, with coil, cond., prop., timer and brand new mini-accumulator. £7. 10s. —P. Roberts, 60, Cirencester Road, Tetbury, Glos.

New 6 c.c. " Whirlwind 6 " engine, complete except for coil. Bench-tested only. Must sell, cash urgently required. £6. 10s.—A. S. Bailey, 6, Stockport Road, Cheadle, Cheshire.

Complete set diesel engine parts, crankcase accurately machined—bargain, 30s. Also Meccano 20-volt motor, 15s.—Teal, 2, Green Road, Kidlington, Oxford.

6 c.c. engine, crankshaft, rotary valve, 4,500 r.p.m. Plug, coil, condenser. Bench-tested only. £5. 5s.—Bland, 26, Essex Park, London, N.3.

AEROMODELLERS. March, 1941-present. February, 1946, missing. Offers to:—A. Ecott, 29, Beaconsfield Road, New Southgate, N.11.

" Sky-Rocket " petrol plane, 8 ft. span, fitted 18 c.c. Comet engine, easy starter. Flies in rough weather. Packed in two strong cases. Ready to fly. £16. 10s. Also " Trojan " 3·5 c.c. engine, roller bearings, complete with mini-accumulator, flight timer, air-wheels. £5.—Dorin, Cinema, Tetbury, Glos.

AEROMODELLER, December, 1944, to November, 1946, 9d. each or 10s. per Vol., unbound. " Air Review," Nos. 3, 5 and 7 of Vol. 7, 2s. each. D. A. Russell's " Design and Construction," 7s. 6d. All in excellent condition.—Enquiries: J. R. Allanach, 99, Cross Flatts Avenue, Beeston, Leeds, 11.

Aircraft books, books, toys, games, jigsaws. S.A.E. for list.—Hewlett, South View, London Road, Warmley, Bristol.

88 consecutive AEROMODELLERS, May, 1938-October, 1945, 35s. 83 consecutive " Flying," 12s.—Quinnell, Broadview, Speldhurst, Tunbridge Wells, Kent.

4 c.c. engine, brand new, with H.I.C.4 coil, condenser and 2 plugs. £3 lot.—Wright, Brick Barns Farm, Gt. Leighs, Chelmsford.

Aeromodeller disposing stock: balsa, plans, part-finished models, 12 props., catalogue. 50s., offers.—Harrison, 162, Edge Lane Drive, Liverpool, 14.

" A.F.P.," Vols. I to IV, like new, £3. 3s. 0d. AEROMODELLERS, December, 1940-45, inclusive. Good condition. £2.—C. D. Hardman, 45, Victoria Estate, Ilkley.

8 ft. span scale De Havilland " Leopard Moth " monoplane, silk covered, with 10 c.c. American engine, all accessories. Complete, ready to fly. Perfect condition. £25 or near offer.—Box No. 40.

Club Conquest 5 ft. 6 in. wingspan, complete with " auto-knips " timer. 6 c.c. " Baby Cyclone," with coil, condenser, spark plug, 13 in. prop. All as new. Offers.—Passmore, 58, Deepdale Lane, Lower Cornal, Dudley.

100 aeroplane magazines for sale. " Airstories," " Flying," " Flight," etc. 30s. lot.—D. Greenslade, Sunnyhome, Park Street, Torquay, Devon.

Set of Hallam " Nipper " engine castings, partially machined. Blue prints and additional drawings. 25s.—J. Wheatley, 53, Springfield Crescent, West Bromwich, Staffs.

" A.F.P.," Vols. I, III, IV, V, as new, £3.—R. Brightman, 42, Kingsbrook Road, Bedford.

55 consecutive " Aeroplanes," from August, 1945. " Spotters," November, 1942, to date. " Aeronautics," November, 1945-February, 1946. Perfect condition. Offer?—Bull, 7, Warwick Road, Redland, Bristol, 6.

6 c.c. " Baby Cyclone," less coil, control-brake; needs attention. Otherwise perfect. £3.—Trebilcock, " Trehayne," Playing Place, near Truro, Cornwall.

Classified Advertisements Continued.

AEROMODELLERS, December, 1944–December, 1946. "Camouflage, 1914–18 Aircraft," various other mags., excellent condition. £1 or offers.—Rawling, 9, Glenmere Road, East Didsbury, Manchester, 20.

5 ft. span gas model. Wings covered in silk, rest in bamboo paper. Air-wheels, complete with new 6 c.c. engine. £10.—Stone, Fire Station, Rose Road, Warborne, Birmingham, 17.

75 consecutive AEROMODELLERS (May, 1939–July, 1945), 28 "A.T.C. Gazettes," 9 "Popular Flying," 13 "Flights," 15 "Aeroplanes," 19 "Flyings," all perfect condition. £4. 10s.—Ayrton, 23, Westfield Avenue, Redcar, Yorks.

Draughtsman—ex-R.A.F. pilot, keen aeromodellist, desires position in model aircraft industry. London area preferred but not obligatory. Fully equipped for private work.—P. E. Brett, 29, Worple Way, Harrow, Middlesex.

"Aircraft of Fighting Powers," Vols. 1–5. Excellent condition. £4. 10s.—338, Marine Road, Morecambe.

"A.F.P.," Vols. I, II, III, IV, V, VI, as new. £5 the lot.—Write: Mitcham, 125, Huntingtower Road, Grantham, Lincs.

Reeve's 6 c.c. engine, prop., coil, condenser, tank, plug, 3-in. m.s. airwheels. £7 lot.—7, Regis Road, Tettenhall, Staffs.

Kits:—2 Club Super Duration, 10s. each. 2 Club Planer Gliders, 4s. each. 1 Club Gladiator (FS), 6s. 6d. Or the lot, 45s.—Hockenhull, The Heath, Sandbach, Cheshire.

1 Atlas 3·5 c.c. petrol engine, complete with Atlas HIC-4 coil and condenser. Nearly new, slight attention required. £7. 10s. or nearest offer.—L.A.C. Skuse, R.A.F. Hospital, Rauceby, Lincs.

"Comet II" record-breaking 6-ft. span petrol model. No engine. Perfect condition. What offers? or exchange?—Minchin, 13, Denmead Road, Boscombe E., Hants.

Aerograph "A" model airspray. Hardly used, guaranteed as new. £4. 10s. or near offer. S.A.E. full particulars.—E. Roberts, 115, Devons Road, Bow, London, E.3.

Pre-war "Wasp" 6 c.c. engine, rotary inlet valve, complete with coil, condenser and prop. Perfect condition. £7.—P. Hicks, 27, Coronation Road, Tetbury, Glos.

66 AEROMODELLERS, May, 1941, to present. Good condition. 35s., or offers.—A. Imrie, 2, Station Cottages, Humbie, E. Lothian.

Bowden Contest petrol plane, fully complete and perfect condition. £10 or sell separately.—T. Leach, 63, Daisy Street, Bradford, Yorks.

Vols. I, IV, V, "A.F.P." in perfect condition. £2. 12s. 6d., or will sell separately.—D. Hughes, 70, Orsett Road, Grays, Essex.

45-in. streamlined semi-scale control-line model. New 6 c.c. Mechanair engine, bench-run only (cost £8. 8s.). Also coil and condenser (£1). Take £10. 10s. for complete aircraft, engine, prop., etc.—Box No. 39.

85 American aviation magazines: "Air Trails," "Skyways," "Model Airplane News," etc. Offers over £4 or exchange for diesel engine.—Ian Mitchell, 16, Appin Road, Glasgow, E.1.

1/36 plans. Tutor 504K, Fox, Moth 9s, Gladiator, Hind. 10s. 6d. each or 52s. 6d. the lot.—Townsend, 97, Kennington Road, Willesboro' Lees, Ashford, Kent.

15 c.c. o.h.v. "Kiwi" engine, less coil. As new. Bench-run only. £9.—Chapman, 109, Perne Road, Cambridge.

54 "Model Airplane News," January, 1935–June, 1939, £3. 27 "Model Aeroplane Constructor," 17s. 6d. 5 "Popular Aviation," and 8 others, 5s. 380-page manual, "Model Aircraft Builder," 10s.—"Marill" Pilley, Lymington, Hants.

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