MODEL *Aircraft*

IN THIS ISSUE

JUNE 1951

1'6

THE JOURNAL OF THE SOCIETY OF MODEL AERONAUTICAL ENGINEERS

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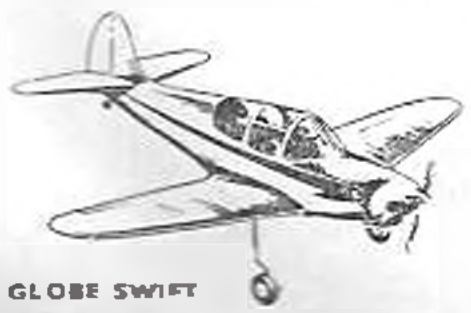

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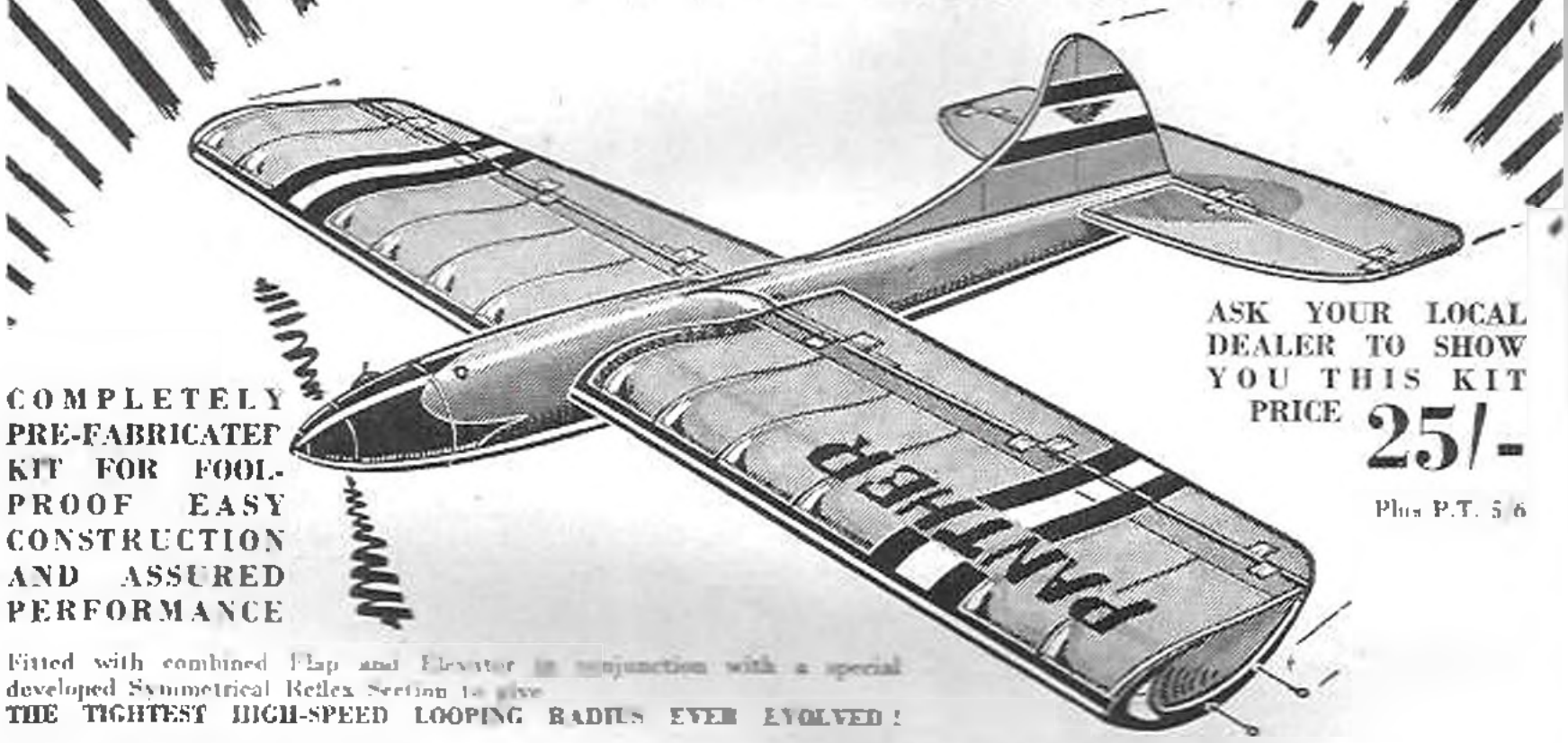

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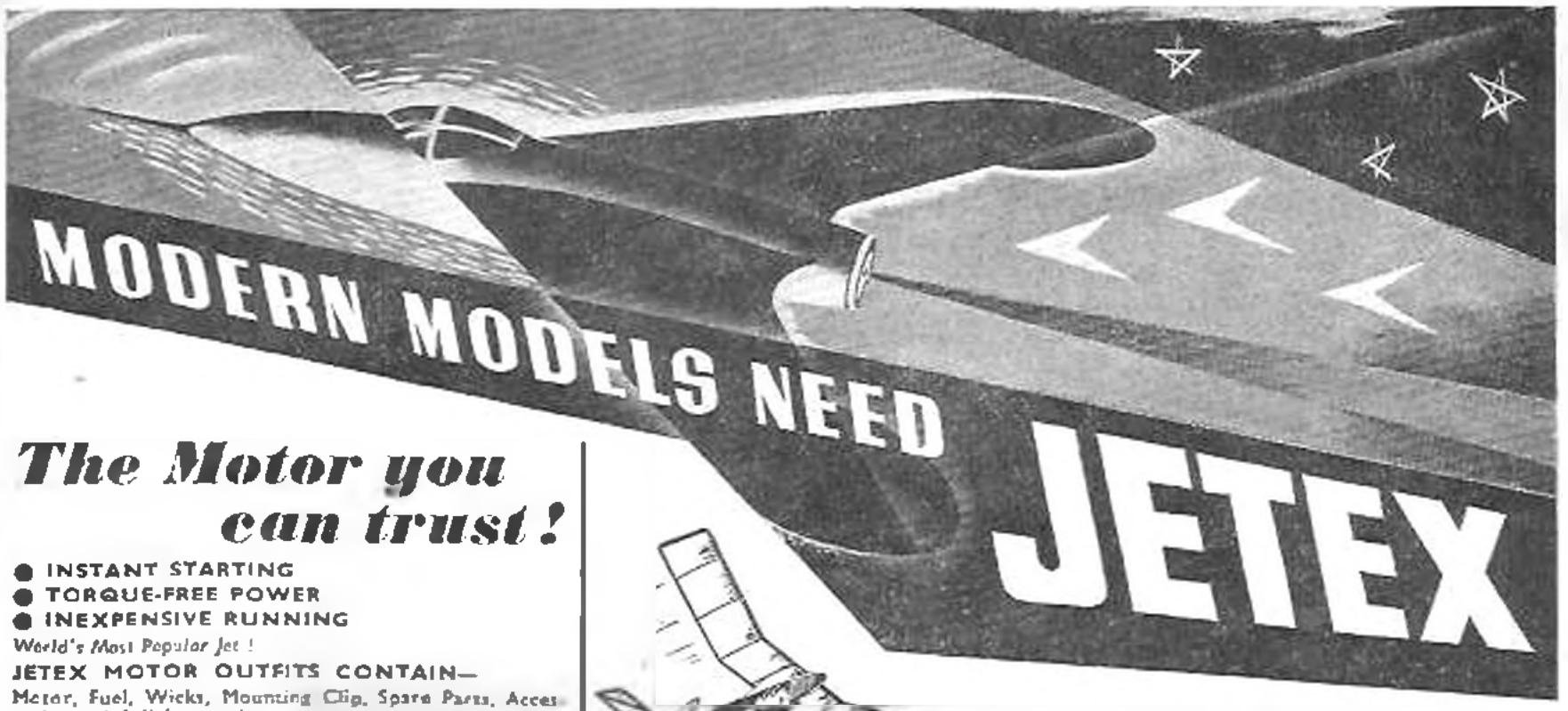

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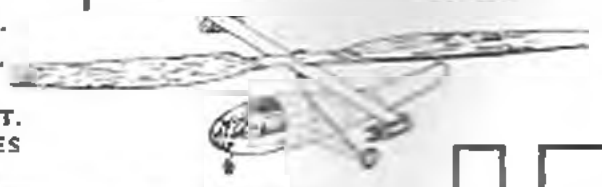

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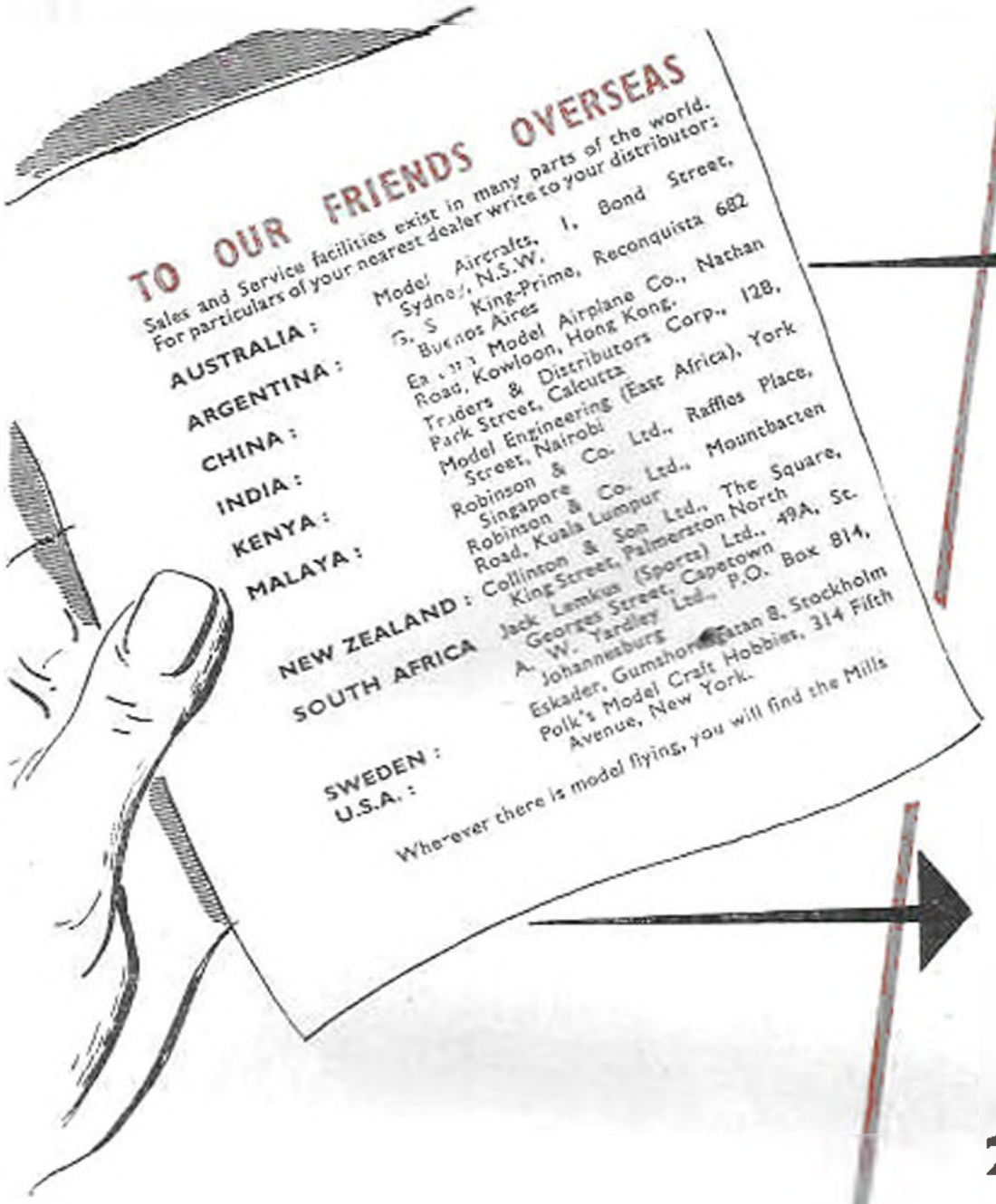

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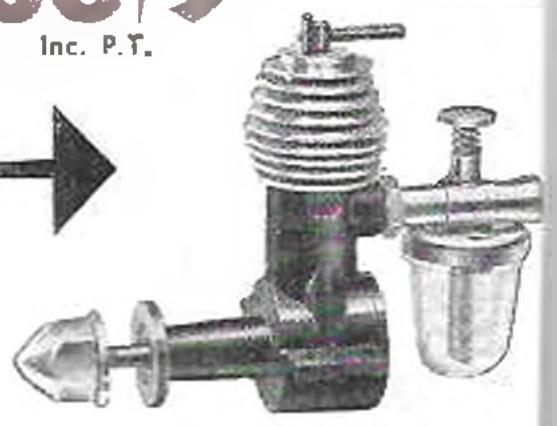

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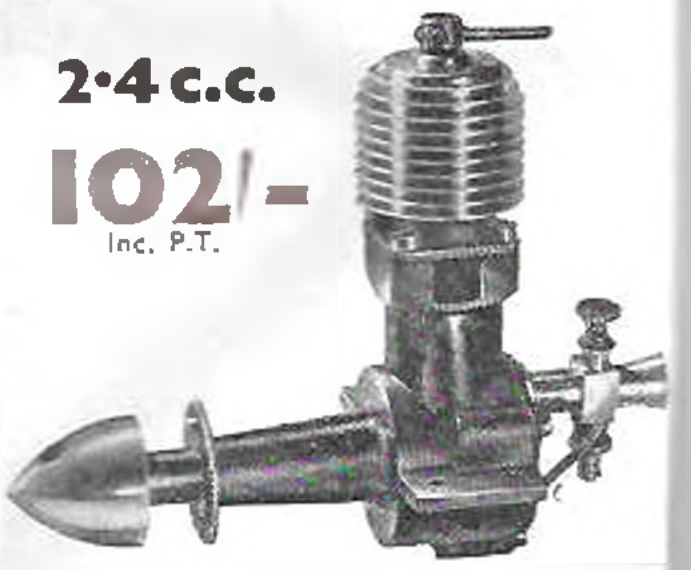

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JUNE 1951 VOL. 10 No. 6

Contents

EDITORIAL

Once again the attention of the Council of the S.M.A.E. is focused on the problem created by the ever-increasing volume of work which now has to be undertaken by the Society's Hon. Secretary, Mr. D. A. Gordon, and his Secretarial Assistant at Londonderry House, Miss C. Philpot.

Some indication of the size of their task can be gained from the fact that every week some 250-300 letters are received at the S.M.A.E. Offices and in addition to dealing with these there are the myriad other duties to be coped with.

The Council has long been aware that the growth of the model aircraft movement since the war has been so great that it is now almost impossible for the Society to function really efficiently, especially if it is to be entirely dependent on the spare time efforts of voluntary officials to carry out its important work.

Two years ago the clubs rejected at the Annual General Meeting a Council proposal that the affiliation fees be increased in order to make possible the appointment of a full-time paid secretary. It is still considered by the Council that this step must be taken soon and that it would be necessary to raise the affiliation fees before such an appointment could be made. Faced by the possibility of a complete breakdown in the administration, the Council have now asked the clubs to reconsider their previous decision.

It is all too easy to criticise the S.M.A.E., to expatiate on its real or imagined shortcomings, but it should be realised by all that, as in most other things in these days, you get what you are prepared to pay for. It now seems obvious that if the Society is to function efficiently as the controlling body, its affiliated clubs must be prepared to contribute more to its funds in order to make this possible.

Cover Story

Launching large gliders in a strong wind is a difficult procedure which calls for skilful team work.

At the recent Surbiton Glider Gala held recently on Epsom Downs many models came to grief before they could be successfully launched. Our cover picture shows the entry by D. Bradford getting away.

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Here and There

THE EDITOR COMMENTS ON CURRENT TOPICS

A GOOD SIGN

Although the competition season has only just started it is already obvious that this year we shall see a phenominal increase in the number of entries in S.M.A.E. contests. At the time of writing only five such contests have been held, one of these, the Ripmax R/C event, attracted only 35 entries due to the prevailing weather on the day of the contest being hopelessly unsuitable for R/C flying. In the Gamage Cup contest, however, there were 156 entries, in the Pilcher Cup event 272, whilst the S.M.A.E. Cup and Astral Trophy contests had 507 and 307 entries respectively. Thus the total number of entries in the five contests were 1,277, which exceeds a third of the total entries in S.M.A.E. contests during *the whole of last season.* What this year's total will be it is impossible to estimate, but with 35 S.M.A.E. events still to be held it is obvious that all previous records will be broken by a very large margin.

It is difficult to [illegible] astounding, but nevertheless very welcome, growth in the interest in contest flying. Certainly improved weather conditions cannot be held to be entirely responsible as although there has been some improvement in this direction this year, the five contests mentioned were held in anything but ideal flying conditions. One fact is clear and that is that the Nordic A-2 class glider has definitely "caught on" in this country—helped no doubt by prospect of entrants in the trials winning a trip to Yugoslavia in August as members of the British Team. At any rate, given reasonable luck with the weather, a "best yet" contest season is assured.

BLACK MARKS FOR COMP. SECS.

From Capt. S. D. Taylor, the S.M.A.E. Competition Secretary, we have learned a less pleasing feature of this year's contests than that mentioned above. It seems that at present his biggest problems are caused, not by the large number of entries—about which he is very pleased, but by Area and Club competition secretaries who are apparently incapable of doing their jobs efficiently. He tells us that his biggest headaches are due to the following:—

(a) Indecipherable writing on the entry forms.
(Block capitals and initials in future, please.)

(b) Entries not given in the correct order of placing.
(This causes a great deal of extra work in tabulating the final results.)

(c) Times entered in seconds.
(They should be in minutes and seconds.)

(d) Junior entries not entered as such.
(This makes it impossible to allocate junior prize awards.)

(e) Variation in the entry fees charged to juniors.
(The correct fees are: Power contests 1s. 6d., *other events* 6d.*)*

(f) Some Areas making no deduction from the entry fees sent to the S.M.A.E., and others deducting 10 per cent. or 15 per cent.
(All Areas should deduct 15 per cent.)

If attention is paid to the above points, not only will Capt. Taylor's difficult task be made much easier, but it will also be possible to announce the results of the contests earlier than at present. May we suggest that next time you feel like complaining about the late publication of the results, before doing so you check up to find out if *your* particular Area or club competition secretary is one of the culprits.

BLIND 'EM WITH SCIENCE

We were discussing the problem of the advancement of model design with one of the country's leading modellers the other day and came to the unanimous conclusion that a little applied science would be a very good thing. The one vital factor of design which remains relatively unknown is the *true airspeed* of the model at any particular time or attitude. If we knew this, we could really *design* propellers, for a start.

Neither our expert friend or ourselves could think of a satisfactory airspeed indicator—or, preferably, airspeed *recorder*—which could properly be applied to a model in flight. Nor did a club discussion help. We are sure that one pet scheme advanced—in all seriousness—of tying a length of cotton to the model, knotting the cotton at ft. intervals, launching the model and counting the number of knots paid out per sec. must have a snag in it somewhere, literally!

We should like to put this problem up to readers. Try it out as a subject for club discussion—and let us know the results. The pages of this journal are open for the publication of a practical airspeed indicator or recorder and we are prepared to consider and test out, if necessary, any suggestions which show promise.

Broadly speaking, the chief requirements are :— The instrument should have minimum weight (say

¼ oz. maximum to enable it to be used on rubber models and small gliders). It should not affect the trim of the model to any marked extent. It should, preferably *record* airspeed over the whole flight. It should be capable of being calibrated accurately

A.M.A. RULE CHANGES Changes in the American contest rules for the 1951 season give considerable prominence to the Wakefield specification. For outdoor rubber events all the existing classes are scrapped and two new classes introduced. These are, unrestricted (no size or loading figures, launching optional), and Wakefields (as per Wakefield rules and specification). Maximum flight time for the "unrestricted" class is 6 min.

Other rules affecting outdoor free flight include grouping towline gliders into two classes—Class C (130 to 260 sq. in. wing area) and Class D (over 260 sq. in.) There are no changes in the free flight power classes, although CO_2 has been eliminated as a separate record or contest class. Indoor free flight rules eliminate the r.o.g. and r.o.w. stick classes.

In control line, models can now be flown on one control line instead of two, if desired. This probably follows the introduction of Stanzel's successful *monoline* control system which uses a single line and operates the elevator linkage by means of torque applied to that single line. Minimum line diameters for single line operation are as under. Figures in brackets refer to twin lines.

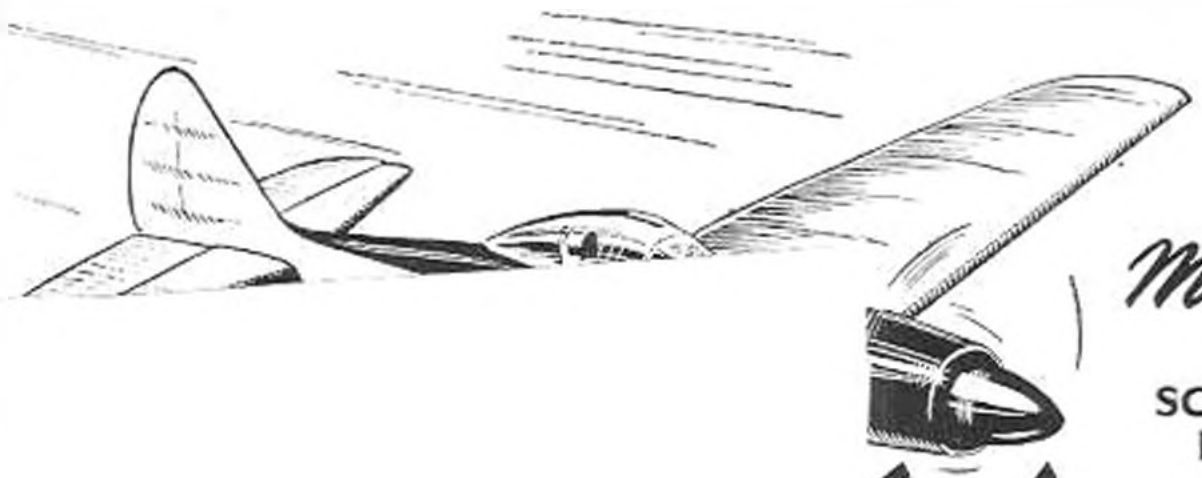
Class A	0.016 in.	(0.010 in.)
Class B	0.018 in.	(0.012 in.)
Class C	0.020 in.	(0.014 in.)
Class D	0.024 in.	(0.016 in.)

And just in case readers are still unaware of the American class sizes. Class A is 0.00-0.20 cu. m.: Class B, 0.201-0.30 cu. m.; Class C 0.301-0.50 cu. m.: and Class D 0.051-0.65 cu.m.

American stunt control line rules remain the same, except that the "special manoeuvre" has been dropped from the schedule.

THE WAKEFIELD "100" As our contemporary has rightly pointed out, it is considerably more difficult to get a place in the Wakefield team than to win or place in the first six in the Wakefield itself. Record number for any Wakefield was 89 entrants, in the 1949 event, when 19 nations competed. In 1948 there were only 30 entrants.

Getting a place in the Wakefield team, then, would appear at least as outstanding as winning some minor decentralised event. The new S.M.A.E. prize winners' badges have been exceptionally well received and it occurs to mind that a timely gesture would be to present the six Wakefield team members with "winners'" badges and, to get the records straight, start with the 1948 team. How many people now can quote the six members forming that team? Chesterton should be easy, for he won the 1948 Wakefield; Copland (for he has been in each of the three British teams to visit the United States but can you name the other four?



M. W. Payne's SCALE CONTROL LINE MODEL Wyvern

THE DESIGNER . . .
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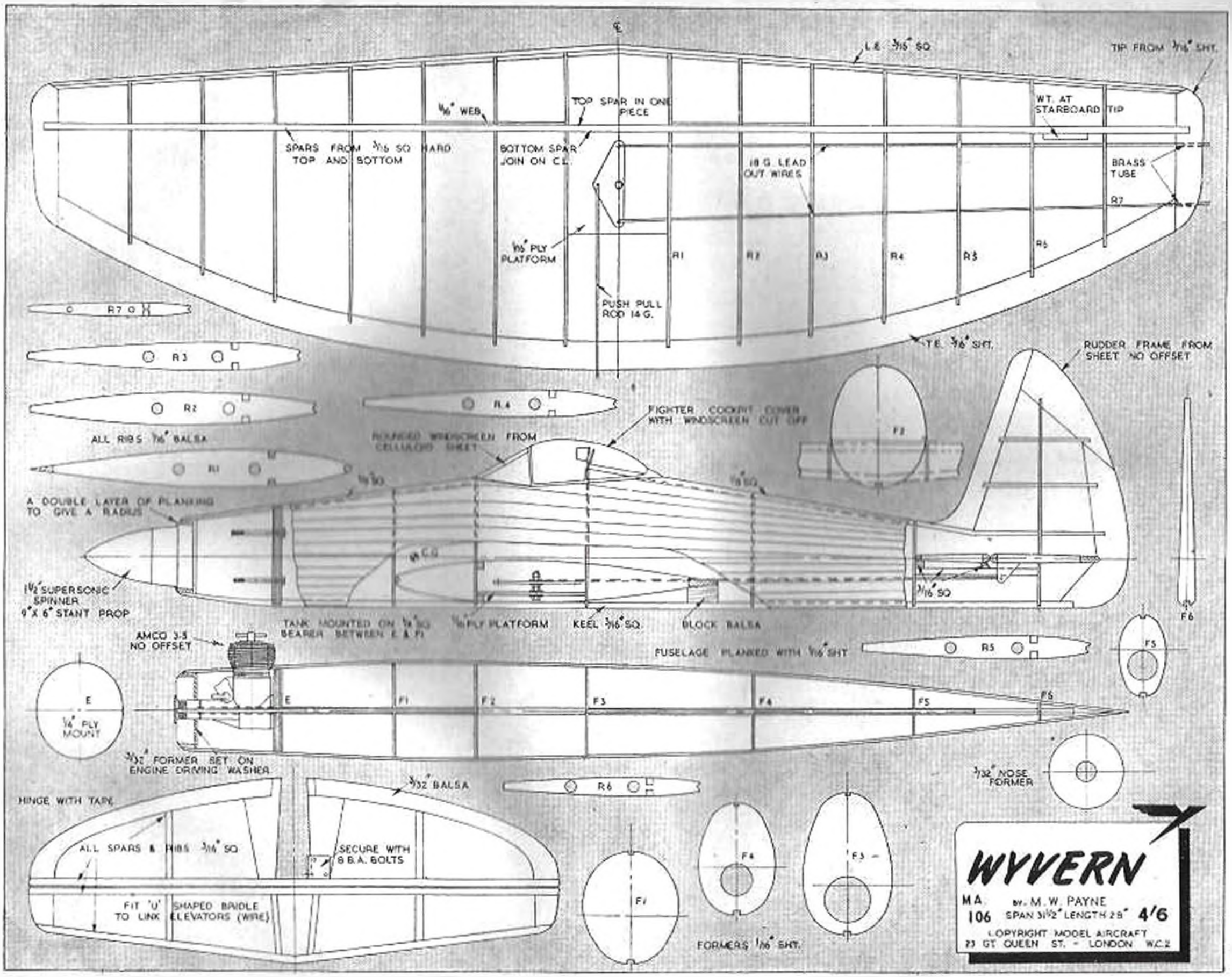
$\frac{3}{16}$ in. sheet cut to shape. Web the spars between *R*1 and *R*3.

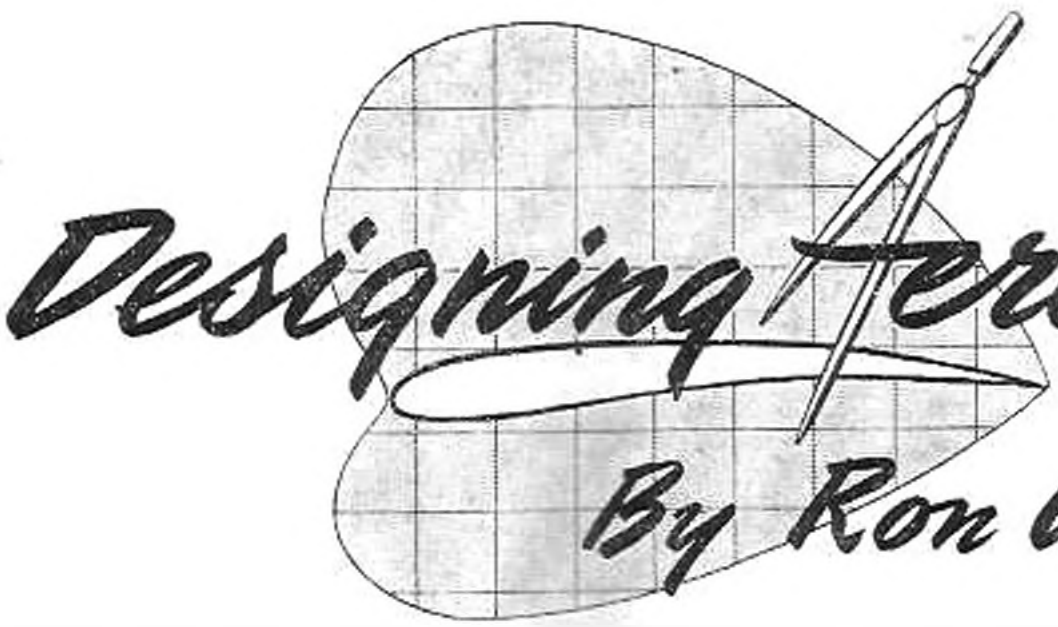
The tailplane and elevators are normal with tape hinges and a 16-gauge wire bridle to brace both elevator halves together. Mount the completed tail on blocks set on a length of $\frac{1}{4}$ in. sq. between *F*5 and *F*6. This permits ample "down" elevator movement. The leading edge should cement against the rear face of *F*5. The control system may now be fitted on a platform in the centre section, the port *R*1 being suitably stiffened for safety. Lead-out wires of 18-gauge pass through the ribs and emerge through brass tubes at the tip, and the push-pull rod is of 14-gauge wire. Trim the holes in the formers to allow absolutely free movement, and the rod should be able to rise along the port side of the tailplane mounting when the elevator is "up." Adjust the movement for more "down" than up, since the long wing chord tends to blanket the elevators when "down" is most needed.

Rudder ribs may now be fitted, and *E* complete with engine can be cemented in place, a hole for fuel feed having been drilled in the appropriate place. Greater strength can be built in at this point if pieces of $\frac{1}{8}$ in. sheet are cemented on the rear of *E* and sanded flush with its outline in order to provide greater surface contact with the planking. This is recommended as plywood alone will readily break away from balsa cement. Now install the tank, bound to two $\frac{1}{4}$ in. sq. strips between *E* and *F*1 and pinned through the latter. Their position depends upon the type of stunt tank used. Finally cut a hard 3/32 in. sheet former, exactly circular, to fit over the extended driving washer of the Amco 3.5, and with it in place, commence planking the entire fuselage with strips of $\frac{1}{8}$ in. × $\frac{1}{4}$ in., beginning at 12, 6, 3 and 9 o'clock to hold this front former in place. The rest is quite straightforward; a hole should be cut where the cockpit cover seats. The windscreen is replaced by a longer, sloping, rounded shield both

(Continued on page 271)



FULL SIZE DRAWINGS ARE OBTAINABLE FROM YOUR LOCAL DEALER, OR BY POST FROM THE "MODEL AIRCRAFT" PLANS DEPARTMENT, 23, GREAT QUEEN STREET, LONDON, W.C.2. AT 6d. POST FREE



Designing Aerofoils

By Ron Warring

LET'S strip wing theory of all its mathematics and get a practical working knowledge of why different wing sections have different characteristics. In other words, let's take a wing section to pieces to see how it is made, and how we can put it together again and get different results.

First of all, if only to make it more convenient for ourselves and save a lot of needless repetition, it is necessary to get a clear idea as to just what the typical graphs associated with aerofoil characteristics really mean. Graphs are the simplest way of showing how lift, drag and other characteristics vary, when we alter something that we can measure. And for any one particular section being analysed, the simplest variable to measure is the angle of incidence or angle of attack. This, basically, is the angle at which the aerofoil is inclined to the airstream, the difference between, and the reason for using, two terms being explained as follows.

The *angle of attack* is the actual angle which the aerofoil has relative to the airstream. The *angle of incidence* is the angle which the aerofoil has relative to some datum line—such as the centre line of the model—and unless this datum line is itself parallel to the airstream, the angle of incidence has a different value to the angle of attack. In the case of aerofoil tests, the datum line *is* the direction of the airstream itself and hence angle of attack equals angle of incidence.

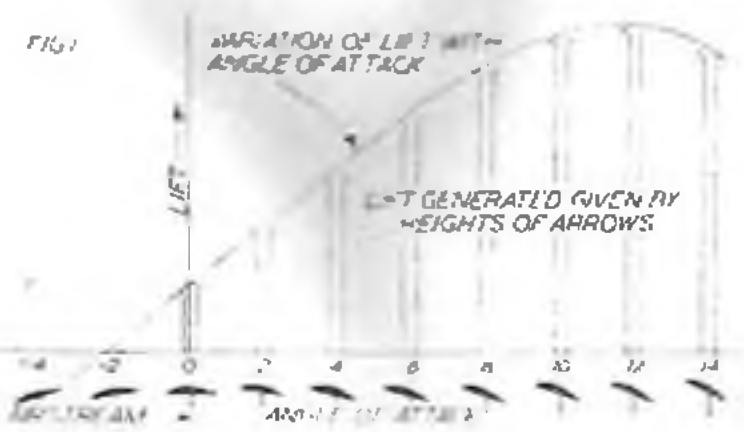
Now it is very well known that the lift (and drag) of an aerofoil varies with the angle of attack. Set at an angle of some six or seven degrees, for example, a wing produces more lift (and drag) than the same aerofoil at one or two degrees. The reaction from setting an aerofoil at some angle of attack to the airstream is actually one single force, inclined upwards and backwards, but for convenience we always consider this as made up as two separate forces—*Lift*, acting upwards perpendicular to the airstream; and *Drag* acting backwards parallel to the airstream. It is these forces, Lift and Drag, the two components of the resultant force, which are actually measured in wind tunnel tests, and which are used in design analysis.

Taking Lift first. If we take any aerofoil (i.e., a wing) and incline it at some negative angle, the Lift force it generates will be inclined downwards. As we decrease this *negative* angle of attack the negative lift force will grow smaller until it finally disappears, and the attitude at which this occurs—i.e., the wing is generating no lift force whatsoever, either upwards or downwards—is known as the angle of attack for zero lift. All very straightforward, but it must be understood that this particular angle of attack is not necessarily zero. For most conventional cambered sections it is still some minus angle. Only for purely symmetrical sections does the angle of attack for zero lift correspond to an angle of attack of zero degrees. This is not of particular importance in model work, except possibly for speed C/L design. It may be summarised: at zero angle of attack, all sections other than purely symmetrical sections, generate some lift.

As the angle of attack is increased from this point, Lift also increases, until a point is reached when, with further increase in angle of attack, instead of *increasing*, the lift *decreases*. This is because the airstream has broken away from the aerofoil which has become *stalled*.

All this is shown diagrammatically in Fig. 1, the vertical height of the arrows corresponding to the amount of lift generated at that particular angle of attack. If we now draw a line joining the tops of all these arrows we get what is known as the *Lift curve* for that aerofoil, showing clearly how lift varies with angle of attack, and it is in this graphical form that such characteristics are usually presented.

Similarly with the Drag force. The resultant force is never truly vertical (i.e., all Lift and no drag) although it can be truly parallel to the airstream

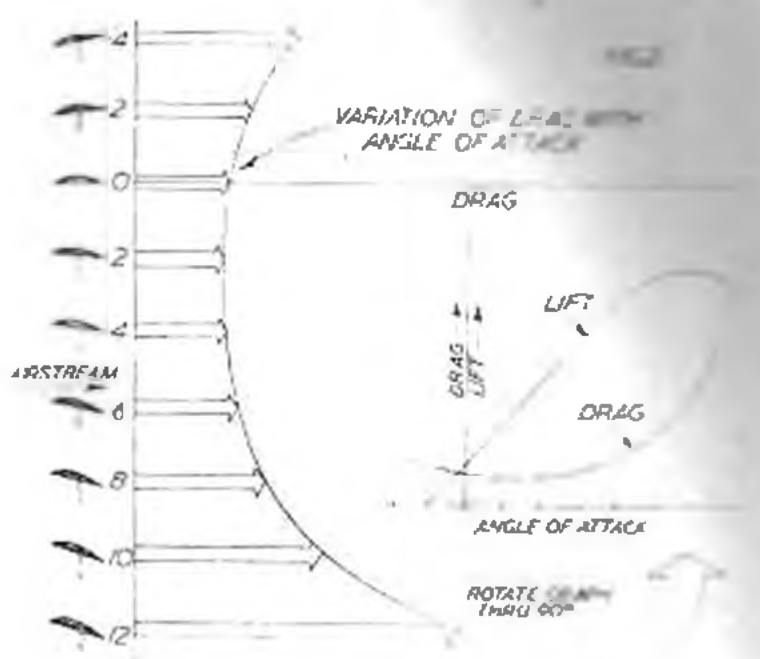


(i.e., all drag and no lift), at the angle of attack corresponding to zero lift. But wherever lift is obtained, there is always an associated drag force. This again is shown simply in Fig. 2. At a coarse negative angle of attack there is a fair amount of drag, decreasing as the angle of attack gets finer and reaching its minimum value at some small angle of attack. Again this does not correspond to zero angle of attack, except in the case of symmetrical sections. Once past this point, drag increases again with increasing angle of attack, and is particularly noticeable as the stall condition is approached.

Join up the tops of the arrows as before and we have a characteristic Drag curve. However, it is not in its most convenient form, and we can also save a lot of trouble by plotting the Drag curve on the same graph as the lift curve, for one of the scales—the angle of attack—is common to both. The drag curve, as found in Fig. 2, is therefore turned on its side and superimposed on the graph of the lift curve previously arrived at, with different vertical scales for Lift and Drag, if necessary.

There is a third curve which is also found experimentally. The point of application of the lift of the aerofoil varies as the lift varies. With low angles of attack, for example, the lift force acts at from a point way back along the chord. As the angle of attack increases, this point moves forward, reaching its most forward position at the stall. The actual amount of variation, and the way in which it varies, depends largely on the shape and form of the section. Fortunately, in model work, it is one of those aerofoil characteristics about which we do not bother unduly. A large enough tailplane area generally takes care of even excessive centre of pressure (centre of lift) movements and for all practical purposes this particular aerofoil characteristic can be ignored, except in a very few specialised cases. But it is just as well to know what this curve really means when presented on an aerofoil characteristics graph.

The other two curves which are usually given are merely ratios, calculated from the Lift and Drag figures found experimentally, and they are ratios



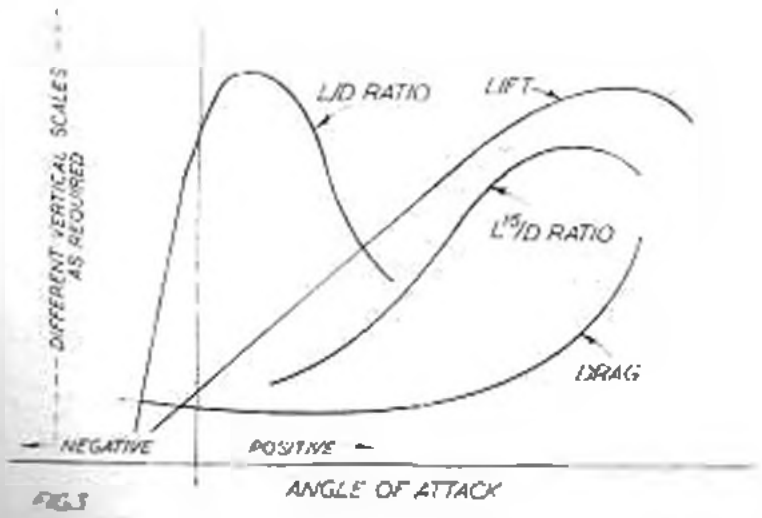


FIG. 3

which are very useful to have for design purposes. Both are, in their own particular way, a measure of the efficiency and suitability of any particular aerofoil for the design required.

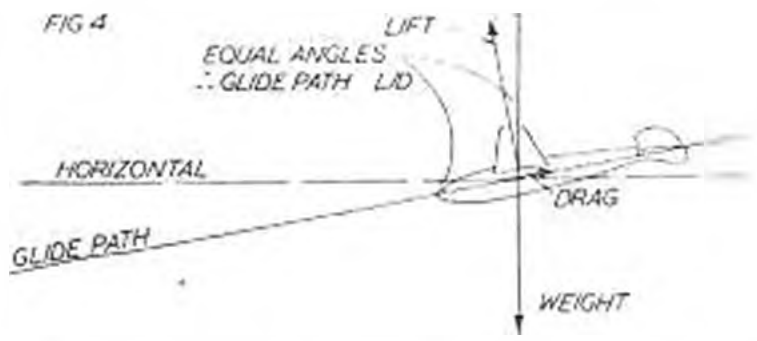
The first of these is the Lift : Drag ratio, known simply as the L/D curve, and is self explanatory. The higher the value of this ratio the greater the proportion of the resultant aerodynamic force producing lift, or, in more general terms, the greater the efficiency of the resultant aerodynamic force generated by the aerofoil. For most conventional aerofoils, the L/D curve follows the same pattern, reaching its maximum value at some fairly low positive angle of attack and falling away sharply on either side.

But efficiency expressed in this way is only one of the factors which must be taken into account during design, particularly for model aircraft. The combination actually giving the *lowest sinking speed* (which corresponds to best glide duration, or, roughly, best rate of climb for a given power) is the maximum value of a further ratio, Lift 1.5 : Drag or L1.5 D, and this is another characteristic curve of importance to the designer. Actually it is more important to the model aircraft designer than the full size aircraft designer and so where data has been prepared for full scale work, the L1.5/D curve is frequently absent from a set or graph of aerofoil characteristics.

Relating these graphical characteristics to practical results is not all that difficult. The CP curve we have already mentioned can be ignored. The significance of the other curves is then as follows:—

The L/D curve expresses the *gliding angle.* In gliding flight, the flight forces balance out as shown in Fig. 4 and the actual flight path of the model is in exact proportion to the L/D ratio of the model in that particular rigging. But before proceeding, there are two major points to clarify.

First, the characteristics of the aerofoil alone—the subject of aerofoil curves—are modified by the rest of the machine. If nothing else, the fuselage, tailplane, etc., contribute Drag, and so the L/D ratio of the whole machine will be lower than that of the aerofoil itself, thus making for a steeper gliding angle. But to combine all the possible factors affecting the final result is a complicated business, and liable to be considerably in error



unless *accurate* data is available. For the purpose of simple analysis, where our main aim is to choose the best aerofoil section for our model, we can safely assume that these " extra effects " are the same in each case and judge the respective merits of different aerofoil sections for the wings on the characteristic curves of the *aerofoil sections themselves*.

The second point which must be clearly understood is that when a model is " trimmed," i.e., it can fly stably, it means that a balance has been achieved between the various forces acting on it. In the simple case of the glider we are considering, this means that Lift, Weight and Drag are in equilibrium, the " Weight " effect being taken care of by locating the wings and tailplane positions and rigging incidences relative to the centre of gravity position. Whatever these incidences, it does not follow that the flight path of the model will be parallel to the datum line of the fuselage from which these incidences have, or can, be measured. The model may actually glide slightly nose up, or nose-down, so that the actual angle of attack of the wings may be more or less, respectively, than the rigging incidence. So that setting the wing at 3 deg. positive rigging incidence, for example, is no guarantee that the angle of attack during flight is three degrees. This will depend on the longitudinal balance of the lift (wings and tail) and weight (acting through the centre of gravity) forces.

Again the problem can be quite complex to analyse properly, particularly as it is very difficult indeed to actually *measure* the angle of attack of the wings in flight. About the only visible indication of angle of attack is when the model does actually stall with any particular set of rigging conditions, when we know that the angle of attack of the wings is then that corresponding to the stalling point. This, incidentally, is a very useful pointer in trimming for best performance, as we shall see a little later on.

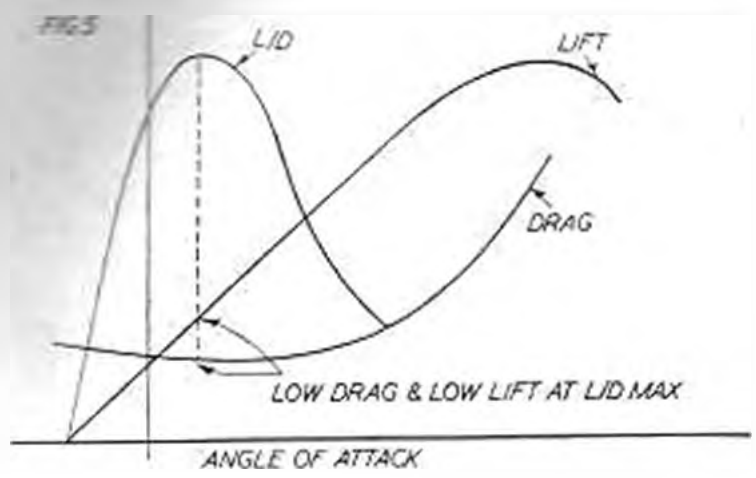
To return to the L/D curve. The best ratio—and consequently the *flattest* glide, is obtained at a relatively low angle of attack. This, in itself, does not mean a great deal, and so we must relate it to the Lift curve for further information—Fig. 5. Here we see that the actual value of lift is relatively low at the angle of attack for best L/D. This means, simply, that if the model is rigged for flattest glide (best L/D), the wings will be generating less than half the amount of lift they could produce at some higher angle of attack. Or, in other words, for a given wing *area*, a model so rigged would have to fly *faster* to produce enough lift as compared with the same model rigged to fly at a coarser angle of attack—See Fig. 5.

It can be shown, in fact, that where *duration* is the aim the best performance results when the model is rigged to fly at an angle of attack corresponding to the maximum value of L1.5/D. Despite the coarser gliding angle (as the L/D ratio at this angle of attack is very much lower), the forward speed necessary to produce the required amount of lift is so much lower that the final sinking speed or rate of descent is also lower.

Maximum L1.5/D occurs towards the upper limit of the useful range of angle of attack, and with fuselage, tailplane, etc., attached the effect is still more marked. The addition of these items tends to push the 1.5L/D curve of the *whole model* still farther over to the right hand side of the diagram until there is very little difference between the angle of attack corresponding to L1.5/D maximum value and the stalling angle. This, in fact, explains, and justifies, the method of trimming adopted by many contest modellers who trim their models to fly slower and slower until a stall occurs, and then go back one step again to eliminate this stall. They have, by practical means, got very close to the position of L1.5/D maximum for that particular model. This is more marked on glider models than on other types, since the effect of thrust considerably modifies the trimming conditions under power. The greater the thrust the greater the possible difference under " power-on " conditions, but glide conditions are the same in all cases, for free flight models.

The gap between theory and practice really exists in that the application of test aerofoil data is a very tricky business and only begins to be reasonably accurate enough to justify full mathematical treatment when there is enough experimental data available *at the same speeds and model sizes concerned* — the same Reynolds Number, in technical language. Unfortunately there is very little such data available and data evolved by purely theoretical calculation is always suspect until proven in practice. But knowing the significance of the various factors involved will go a long way towards giving the designer a better understanding of the various problems with which he is faced.

As far as selection of aerofoils is concerned, therefore, a study of characteristic curves of different



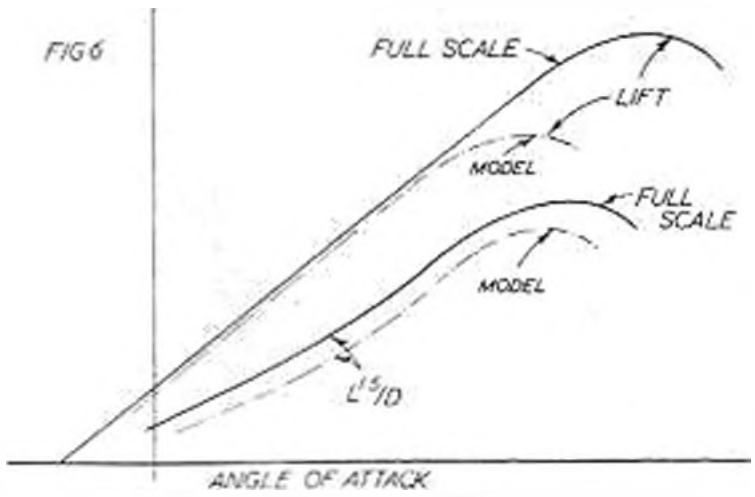
sections is still of doubtful value, unless specifically related to the Reynolds Number of the projected design (or, more simply, of the same aerodynamic scale in that the product of the chord and velocity of the airstream is the same in each case). A particular case in point is that it is known that the conventional sections such as R.A.F. 32, Joukowski and so on all stall at quite a moderate angle of attack under model conditions (around Wakefield size)—some 8 deg. as compared with higher Reynolds Number test figures of 15 deg. or so. But the L1.5 D curve does not appear to be so much modified in shape, at least and would appear to occur very near the stalling point. Fig. 6.

A warning must be given here with regard to many early wind tunnel test figures which were carried out with chord widths and airspeeds corresponding roughly to those of the present C/L speed models. The fact that here the Reynolds Number is roughly the same is, unfortunately, no indication that these figures are of direct value, as in many cases they are very inaccurate due to errors in measurement and uncorrected tunnel effects. Also since all such test data would, in any case, be corrected either to a standard aspect ratio or infinite aspect ratio before comparative study, the whole thing threatens to be far more mathematical than the average modeller is prepared to undertake.

Even so, there is fun in knowing the practical "whys and wherefores" and knowing what to look for in aerofoil characteristics can lead to interesting, and often profitable, lines of thought.

Summarising, briefly, the more important requirements for different types of models, we can say:

Gliders: High L1.5/D ratio; sufficient thickness of section for adequate spar depth as size of model increases; reasonable value of L/D at L1.5/D max.;



maximum L/D if the glider is to be used and rigged for distance flying; reasonable lift value for slow flight with flat stall point.

Rubber duration: High L1.5/D ratio; sufficient depth of section in larger models; reasonably low value of Drag at L1.5/D max. in order to get good climb.

Free flight power duration: High L1.5/D ratio for best glide; high L/D ratio for best climb; sufficient depth of section; low drag at L/D max.

Free flight power-scale: Good L1.5/D ratio for good glide; high lift values for slow flight; sufficient thickness for adequate spar depth; reasonably low drag figures to avoid overloading the motor.

C/L stunt: Good lift values at low speeds (high angles of attack), with "flat" stall feature; low drag; good L/D ratio throughout; good lift at low angles of attack; symmetrical characteristics.

C/L speed: Minimum drag at small angles of attack; reasonably good lift at low angles of attack; high L/D; high max. lift/min. drag ratio.

Wyvern

(Continued from page 266)

for better scale appearance and better streamlining. The double planking immediately aft of the spinner is diagrammatically explained by the plan.

Cover the fuselage and fin with Modelspan doped on (two coats), and the wing and tail with double strength, using plenty of strong glider dope. The original model has been twice dived vertically into hard earth at full speed and only the nose planking has ever suffered: so be generous with the dope. The finish is in standard naval camouflage—dark grey on top of wings, tail and fuselage, and cream beneath, over all the fin and up the sides of the fuselage to within ¼ in. of the cockpit. Apply standard roundels with broad white rings; no fin flash.

No difficulties should be encountered in flying. The model is fast and light—only 13 oz. with 215 sq. in., and in spite of a short moment arm it is smooth and steady with plenty in reserve. It leaps away from hand-launches and it has been standard practice from its third flight to climb away at 60 deg. and fly it straight into a high tight loop. At least 50 ft. lines should be used, and there is still full control at the very end of a long glide. The slightly raised position of the low wing and the slight dihedral obtained through tapering the lower spar holds the wing off all but the worst obstructions, and no damage has ever been caused by normal landings at low speed, and propellers last almost indefinitely with careful positioning on the shaft.

No offset either on fin or engine has ever been found necessary. Speed takes care of everything, and in fact the last three-quarters of a wing-over has been completed with absolute safety after a sudden cut in the climb. In flight, the model looks stylish and sleek, and very smart in its contrasting colours. It has proved its ruggedness and manoeuvrability, the former in spite of, and the latter because of its light weight. It is easy to build, and it lasts a long time.

Scale fans will enjoy building and flying the Wyvern and those who have not yet tried this fascinating branch of the hobby might well start with this model. They will not be disappointed with either its appearance or performance.

Build it and see.

CROYDON GALA

Held in rain and a strong wind at Fairlop Aerodrome, on March 25th, 1951, the Croydon Gala attracted quite a good entry. Only one contest was held and in this each competitor could enter either a power, rubber, or glider model. Alternatively three flights could be made with one model of each type. The highest aggregate of three flights with any one type of model gained first place.

The weather conditions favoured the gliders and rubber driven models were a distinct disadvantage. It was an interesting experiment, however, and we would like to see it repeated in more favourable weather conditions.

1. P. Gilbert of the Pharos Club launching his power model entry.
2. The winner of the contest and the Thurston Trophy, M. Bennett, of Ipswich, who totalled 12 min. 44 sec., with his Nordic A2 glider.
3. J. A. Gorham of the Ipswich Club launching his Wakefield model. He finished seventh.
4. St. Albans Club member, E. Higginbotham, with his power model entry.
5. Les Ranson (West Essex Aeromodellers) who entered a rubber-driven model.
6. Although looking quite cheerful, P. Gilbert was dogged by engine-starting trouble throughout the contest.

● PART TWO OF

TUNING for SPEED

By TED MARTIN

FROM the first part of this series the reader may have concluded that he is expected to improve, from casual knowledge, upon an engine designed and produced by specialists with several years of intimate knowledge and experience of that engine.

This is not strictly true, because neither the reader nor the writer can be expected to improve upon the fruits of expert research. We are, rather, trying to improve upon the workmanship of a mass produced article that has been sold at a price we can afford. In short, we are not altering the original design, but merely making the copies as good as the original. Our ultimate benefit comes in better performance and longer life. We are not mangling a perfectly good engine by "file and error methods," and we are not "hopping up."

Main Bearing Assembly

The first step is that of pushing the back ball bearing on to the balanced crankshaft. This should be done by pressure on the inner race with a piece of suitably dimensioned tube and a block of wood in a vice. The inner race should finally butt right up against the crankshaft thrust face.

Next, press the small bearing into the front plate housing, applying only sufficient pressure to ensure that it is right home. This pressure should be exerted via two flat and parallel surfaces to avoid rocking the bearing.

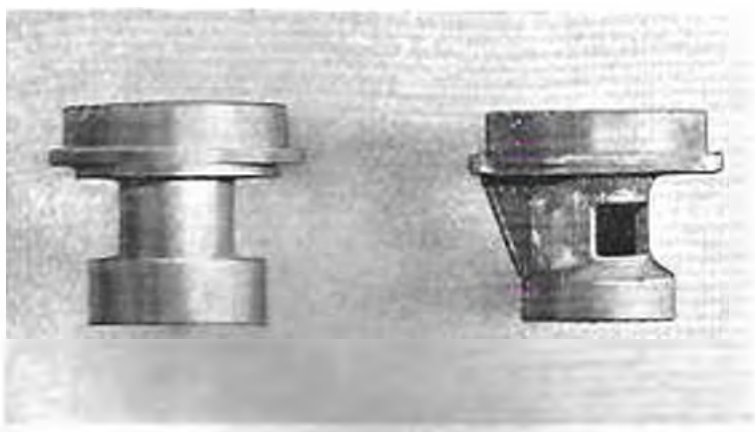


Fig. 1. Homemade .29 frontplate, turned from dural, to take standard Hoffman bearings (left). Standard .29 frontplate (right).

Always oil both components when fitting bearings to avoid "picking up."

Check that both bearings still run freely, and, having previously ascertained that the larger shaft diameter is a free fit in the front platebore, push the crankshaft into the front plate as far as you can by hand. Push it finally home with a piece of tube against the front inner race, a block of wood on the crank and disc and a vice.

Fit all the driving attachments, tighten the prop nut, and firmly tap the outer end of the shaft with a piece of wood. This method will relieve the end loading on the bearings. Finally wash the whole assembly in petrol and then check that the shaft spins freely.

If the bearings are not true in their housings the shaft will be lumpy to turn and you will have to strip the assembly and try again. However, the more often you remove them the looser the bearings become in their housings. If the bearings begin to creep the front plate must be replaced, which is at best a procedure involving much transatlantic negotiation.

In Fig. 1, the *Standard Redhead* 0.29 frontplate is shown against a home brewed version incorporating British Hoffman bearings, that is a ¼ in. × 7/32 in. × ⅜ in. front bearing in place of the smaller outside diameter original. The back bearing is of specified size.

This frontplate allows more convenient bearing replacement and as it is turned from dural, stands up to landing better than the original. The new 1950 *Redhead* 0.29, however, has a considerably stronger frontplate, thus eliminating a hitherto common source of failure.

Crankcase

Before starting work on this component the cylinder liner must be withdrawn. This is easily done with a 16 gauge piano wire hook, while heating the crankcase over, not on, a gas ring. The liner will drop out long before you reach the melting point of aluminium, but watch the temperature nevertheless.

Taking the liner first; on all models of McCoy up to 1950 the material used is high grade cast iron which can be filed, but later models have hardened

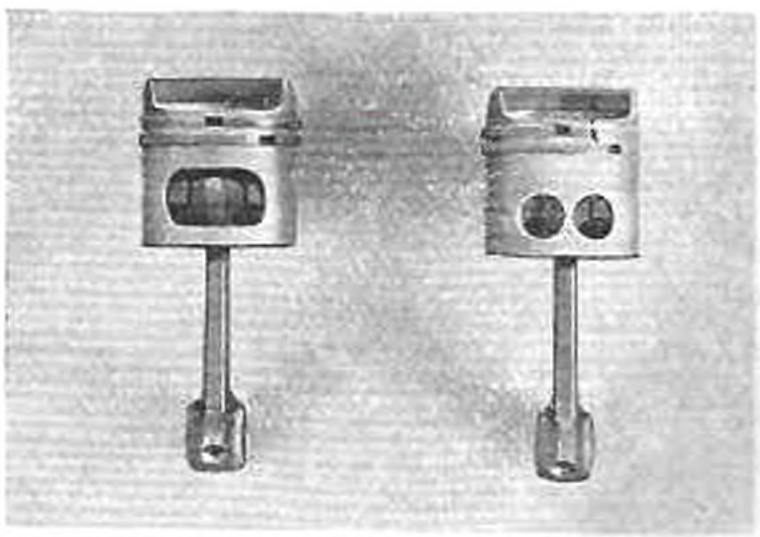


Fig. 2. Modified piston for the McCoy .29 (left), with a standard piston (right).

steel liners which must be ground, or softened, filed and rehardened, or just left as they are.

The modification consists of thinning the exhaust and transfer port bars down to 0.025-0.030 in. wide, taking great care not to make them too narrow on the inside.

Be careful that you do not alter the height of the ports as this will obviously affect the timing, and also take care to preserve the square corners.

As a matter of interest the writer has experimented a great deal with the exhaust and transfer ports of McCoys, and also with liner materials, particularly on the 0.19 which is the most critical of the family. There is no doubt that the port heights used are the best compromise for all round performance and no increase in height should be made.

On the 1950 and certain older models you will find two holes in the piston at B.D.C. For ease of production they are simply drilled holes, but for best results they should be filed square.

A definite improvement at high speeds can be attributed to this auxiliary transfer, and on the 0.19 and older 29s where it is lacking it should be added.

Fig. 2 shows a standard piston and an extreme modification. Squaring of the standard holes is quite adequate as long as you ensure that the corresponding holes in the liner coincide at B.D.C.

On the crankcase we have the opportunity of copying "all the best people" by turning the cylinder fins down to 1⅛ in. dia., and cutting away the back of the exhaust stack. The cylinder head should also be turned to match.

Fig. 3 shows the finished article and the thinned liner port bars on a late 1949 model.

Bench performance shows a small increase from this feature, but air testing seems to show its full advantage. Although there is not much metal left holding top and bottom together no breakage has occurred on any size of engine at this point.

One other small modification to the crankcase consists of counter-boring the mounting holes to accommodate the bolt heads. In this way you can avoid weakening the upper fuselage shell by carving recesses for the bolt heads, as they will be flush with the top of the mounting lugs.

Again, over a long period of flying no lug breakage has occurred as a result of this feature.

Finally, we come to the transfer passage.

It is almost traditional for the hot iron merchant to polish all gas passages, combustion chamber and working parts to a mirror finish as a matter of course, and generally speaking it pays dividends.

However, in the case of the McCoy transfer whether sand cast or pressure die cast, it is best left alone for the very good reason that, even with a first-class toolroom at your disposal, it is very difficult to polish properly.

Even with rotary files one cannot get at all the corners and the tendency is to chew lumps out of the wrong places, and the smallest polishing mop will give you beautiful curves just where you don't want them.

The deciding factor lies with the designers who, having to turn out the best possible job within the limitations of the casting at their disposal, have appreciated the deterring influence of the surface on gas velocity, and have correspondingly increased the transfer cross-sectional area to offset it. This applies only to the models produced from 1949 onwards. The older models with smaller transfers can be definitely improved by successful polishing.

In evidence, the writer went to great pains to polish up a series 20 transfer and found from results before and after that the only improvement came at 19-20,000 r.p.m. and upwards. Being beyond the useful speed range it was a waste of effort, although increasing the auxiliary ports did produce results.

Assuming that you have matched the auxiliary transfer ports on piston and liner the next step is to shrink the liner back into the casting by the method used for removing it.

Piston

Removal of the rings is the trickiest part of the whole process but is necessary for checking the piston cylinder clearance.

One can only prescribe care and commonsense, and make the observation that initially someone

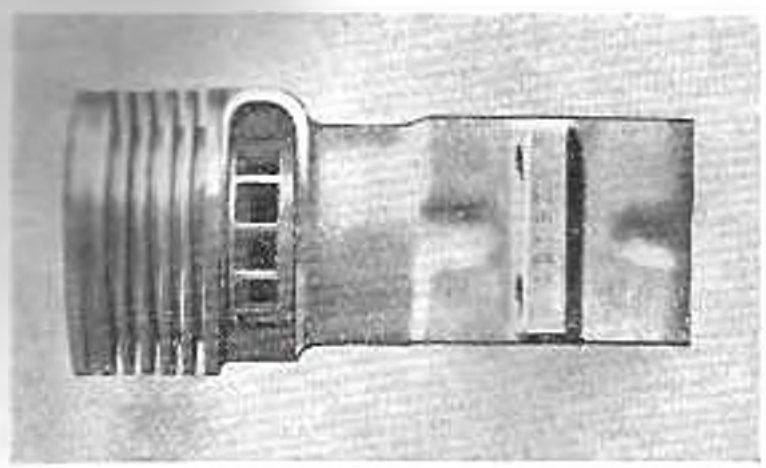


Fig. 3. Shows modification to a late 1949 Redhead .29 crankcase and cylinder liner.

managed to put them on without breaking them.

It is quite easy once you learn how.

In the case of the 0.19 and 0.29 the writer has found that modifying the piston crown in such a manner that all the exhaust ports are completely uncovered at B.D.C. shows a gain in performance. This would seem obvious, especially as there is plenty of metal to permit it. It seems odd that it is not manufactured this way in the first place. The larger McCoys on the other hand, have a most efficient combustion chamber and piston shape.

Polishing the crown of the piston is again, of doubtful advantage because a couple of minutes run on nitrated fuel will burn it back into a matt surface.

This applies particularly to the 0.19 and 0.29 which apparently reach higher temperatures.

With regard to the piston clearance, these should be 0.003 in. on the diameter for the 0.29, 0.49 and 0.60, and 0.002 in. for the 0.19. This means 0.0015 in. actual clearance in the former case, and 0.0010 in. in the latter.

These clearances are consistent within very fine limits and will not require alteration, however the common trouble found by the writer lies in ovality. This, incidentally, is neither consistent nor intentional, and is easily produced in a very thin walled piston. It is most evident round the skirt, and may be easily rectified by careful micrometer measurement and squeezing with the fingers. But do not be misled by the slightly reduced diameter about the ring grooves. This is to allow for a greater expansion of the piston crown.

Having produced a perfectly round piston its suitability may be checked by placing it in the cylinder bore, free of oil, and measuring the clearance, approximately, with feeler gauges. If a 0.0025 in. feeler will enter all round the piston of the larger engines it may be taken that the bore is sufficiently round. A final check lies in the fact that if all is well a dry piston should drop through a dry bore with no hesitation whatever.

Before leaving this subject it is probable that the diesel minded will be horrified by the finish of McCoy cylinder bores, particularly the older models. There are several good, if convenient, arguments in favour of slight roughness, so do not be tempted to lap it

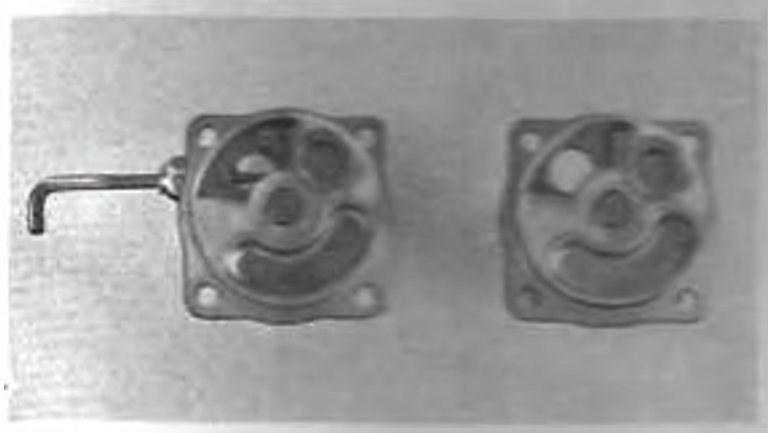


Fig. 4. A modified .29 backplate assembly with a .49 intake and new type needle valve (left). Standard .29 Redhead rotor and backplate (right).

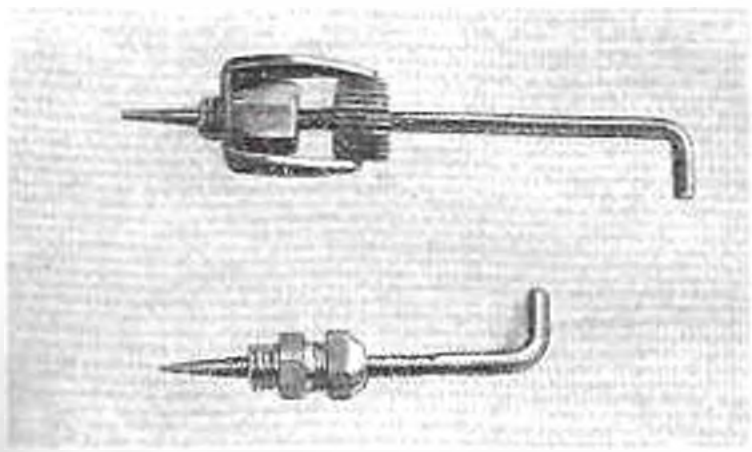


Fig. 5. Old type McCoy needle assembly (top). New and improved type fitted to the latest Redheads (bottom).

smooth. Loss of compression at operating temperature, and bad starting will result, and a tendency to overheating and loss of power. The rings are also fairly rough, and between the two surfaces a fair amount of metal is removed by the engine itself during running in. The result is a good compression seal.

When you are satisfied with the piston the rings may be replaced. The ring gaps should be arranged, when assembling the complete engine, to reciprocate on the unported walls of the bore, and on opposite sides from one another.

Conrod

The modification to this component consists of drilling oilways into big and little ends, as shown in Fig. 2, and then cleaning up the forging marks and polishing all over.

If you have the facilities a new gudgeon pin may be made and fitted with advantage. A certain amount of crankcase leakage occurs through the gudgeon pin bearings when the piston passes the exhaust ports. The sloppier the bearings the worse the charging efficiency becomes, therefore, a gudgeon pin should be ground to a really snug fit in the piston. Silver-steel, or better, case hardening nickel chrome should be used.

Finally, check that the conrod bearings are parallel with one another in both planes. Use appropriate mind drills inserted in the bearings and inspect visually for alignment. Mount cylinder head and backplate assembly and the various working parts checked for smooth frictionless operation. If satisfactory, the application of a little oil to the bearings will leave the engine ready to receive the backplate.

Backplate and Rotor

The rotor bearing pin may be removed in the case of the .29 and .49 by means of a piece of tube, a 6-B.A. bolt and the indispensable vice. Take great care not to damage the 0.001 in. spacer washer as it must be kept perfectly flat.

The 0.19 and 0.60 rotor require no alteration except balancing. The 0.29 and 0.49 rotor, however, should be opened out to match the induction chest in the backplate. Fig. 4 clearly shows the comparative difference. Under no circumstances is it necessary to increase the angular opening.

Much has been written on this last point with regard to McCoys and increasing the length of time in the cycle during which the valve is open has frequently been recommended.

Curiosity has led the writer into a great deal of tinkering with McCoy rotary valve timing-along with cylinder port timing and the results have not justified any increase. Rather the opposite has been found to apply. Experimental backplates with smaller angular openings but of considerably larger cross-sectional area have proved slightly superior, and, as a matter of interest, carburation and starting were improved.

The general idea is to get as much air as possible into the crankcase during the time allowed by the cycle of operations at the most useful speed.

As atmospheric pressure is the only force acting on the air entering a normally aspirated engine, there must be as little obstruction to the flow as possible.

The greater the resistance to flow the more the air expands and the less the oxygen induced into the crankcase.

However, as the air rushes in at high speed it gathers sufficient momentum to continue rushing in even after the piston begins its downward compression stroke. It will pile up inside the crankcase and then, in effect, bounce out again. If the rotary valve closes at exactly the right time the maximum amount of air will be trapped.

Any delay in closing caused by increasing the angle of dwell will allow some of this air to escape and thus reduce efficiency.

Most model engines spray fuel out of the intake when in operation, and this is a sure sign of bad rotary valve timing or leakage.

It will, therefore, be evident that one requires the biggest opening possible with the least obstructing, and many circle-burners fit larger intakes to their engines for this reason.

Whether you can do this depends entirely upon one thing. Do you fly clockwise or anti-clockwise? If you fly clockwise you will have fuel feed trouble by fitting a larger intake. There will not be enough suction to pull the fuel through the tube to the engine against centrifugal force. In fact, when flying clockwise it is necessary to fit a smaller intake to the Series 20-60 to get a decent flight at top speed. There are several ways round this, but they are not within the scope of this article.

On the other hand, if you fly anti-clockwise you only need enough suction to keep the fuel feeding on the ground, so large intakes are quite satisfactory. Centrifugal force more than meets the fuel demands of the engine.

A common modification is the fitting of a 0.49 intake to a 0.29 engine or a complete 0.36 backplate assembly to a 0.29.

The spraybar may be replaced in the 0.19 with a standard needle and jet, to reduce obstruction. Before balancing the rotor, reassemble it loosely, but without the spacing washer, and lap the two faces together with a mixture of oil and metal polish. Take care to exert pressure evenly over the entire

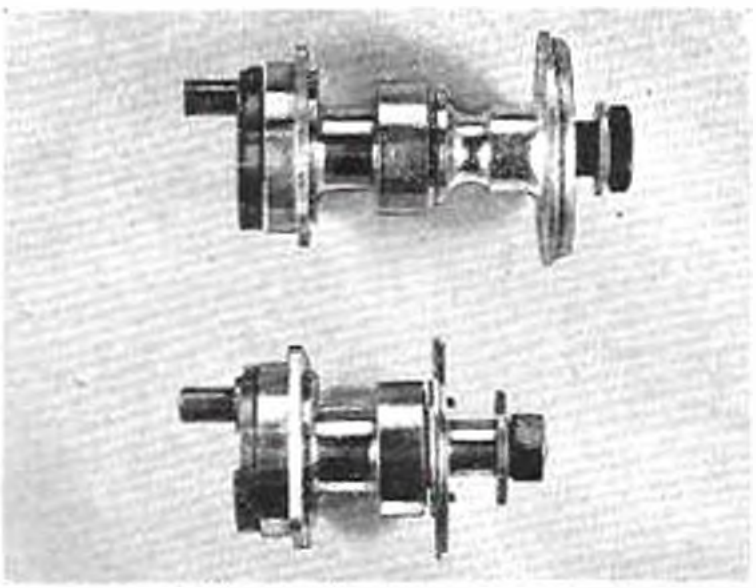


Fig. 6. Frontplate assembly using standard prop. driver (top). Assembly using turned spinner backplate as described in previous instalment (bottom).

area of contact during lapping, and only continue until the faces are mating evenly.

Polish the outer rotor face and diameter to a high finish and wash away all traces of metal polish.

Balance the rotor by mounting it on a piece of ¼ dia. silver steel rod and using the same method as for the crankcase.

Lightening holes should be drilled as necessary through the outside diameter inwards towards the centre. On no account drill holes through the face.

The unit may now be finally assembled, not forgetting the spacing washer, and leaving 0.002-0.003 in. clearance between the faces on the 0.19 and 0.29 and 0.003-0.004 on the 0.49 and 0.60. Check with feeler gauges and lubricate before fitting to the engine.

Needle Valve and Jet

Fig. 5 shows the difference between both types of McCoy needle assembly.

The needle is now fitted to the 1950 Redheads, and has the advantage of more accurate and positive adjustment, as well as a tapered nut to take up thread wear.

Those who have built speed models around engines fitted with the old ratchet type needle will appreciate the great use of this new fitting. Where we require dead accurate fuel adjustment it is a big improvement.

With regard to the jet, a right-angle type is available which greatly simplifies fuel tube problems, and if not obtainable, is well worth the trouble of making.

A piece of brass tube soldered at right angles to the standard jet is quite satisfactory.

That completes the general cleaning up of a normal racing engine, and we hope later to deal with compression ratios, fuels and handling.

Meanwhile, however, you may be confident that nothing but good can come to your engine if you follow the procedure outlined here. It has been tried and proved worthwhile on nine different engines.

OVER THE COUNTER

A new Frog 1.5 c.c. diesel is scheduled for early production. Price of this new motor, which has been thoroughly type-tested, is expected to be under 50s. (including Purchase Tax) and first supplies are anticipated by retailers within the next month or so. International Model Aircraft also have a number of other prototypes of different sizes under test.

The Frog "500" is shortly to be issued in spark-ignition version, aimed specially at the radio control enthusiasts. It seems possible that two-speed contact breaker units may also be made available.

* * *

Model aircraft are, almost without doubt, one of the most fragile of all working models. "Crashproof" wing fixings, "crashproof" construction and features like that, so readily claimed, are seldom realised in practice—at least not to the degree of being *really* crashproof. We were somewhat staggered, therefore, to find a model which virtually is crashproof. This is the Challenger ready-finished control-liner, made by Caseloid and designed around the E.D. Bee engine. It is a moulded plastic job and when you buy the Challenger you can, if you have a bottle of fuel handy, go right along to the nearest open ground and get flying right away. It has a very handy performance in the "trainer" capacity and would appear to have an almost indefinite life, however badly treated. Quite an investment, in fact, especially for the novice or "Sunday flier."

LEEDS AEROMODELLERS SUPPLIES LTD.
94, WOODHOUSE LANE, LEEDS, 6

Started by R. Heppenstall in [illegible], it is claimed to be one of the best model shops in the North of England.

By giving first class service, Mr. Heppenstall has proved that it is possible to build up a successful model business without having premises situated in the centre of a town or on a main road.

In the heading photograph the popular shop manager, who, like the proprietor, is a keen modeller, is seen giving his weekly order to the Keilkraft Northern Representative, Mr. Jesse Woollard.

Japanese tissue has, again, become in short supply. Most of the usual sources of this favourite covering material appear to have dried up. Rubber model fans will be particularly hard hit by this. *Modelspan*—lightweight and heavyweight grades—has largely become the standard for power models and medium and large gliders. This British tissue is generally much more satisfactory than the American *Silkspan*, etc. Some modellers, however, cannot be persuaded to try it for Wakefields, yet 1950 team member, Adams of Northampton used it with success.

* * *

Halfax Models are, we understand, tapering off kit production, temporarily, at least, and concentrating more on their range of Titanine cements, dopes and finishes. Many of the Halfax kit models are excellent contest designs and anyone wondering whether or not to buy would be well advised to get one quick. The opportunity may not be there in a few month's time. The original *Flying Minutes* is probably the most successful commercial Wakefield ever (in this country). It featured in three Wakefield Finals.

* * *

Wilmot Mansour and Co. have been experimenting with thrust-augmenting devices for their Jetex motors and we understand that they have been getting some remarkably worthwhile results. When they are likely to be released for distribution, we do not know. The "Jetex" manufacturers have a reputation for most thoroughly testing out all their products over a considerable period before passing them for production and will not be hurried by the purely "commercial" aspect.

We visit B.M.A.

● A corner of the Dispatch Department

THE British Model Aircraft Manufacturing Co. Ltd.—B.M.A. to the trade—are manufacturers of the Skyleada and Skyrova ranges of model aircraft kits. Surprisingly enough the average "club" modeller does not appear particularly aware of these kits—surprisingly because they are one of the largest manufacturers in this country with a production figure of some 100 gross of kits *weekly* and a worldwide distribution. The range includes such excellent contest models as Dick Korda's record breaking Wakefield and the *Zipper* power duration model. We ourselves were guilty of noting the Korda kit "out of production" in our tabular analysis of rubber model kits (August, 1950, issue), which it is not, and never has been. Their complete range of kits is in production, and quantity production at that, as our recent visit confirmed. This includes 26 rubber driven flying scale models in three sizes (approximately 12, 16 and 26 in. wing span); three cabin duration models (including the *Hawk* which has been in production since 1939 and is still in popular demand) and the Korda rubber model; five gliders; two free-flight power models and five C/L.

B.M.A. are undoubtedly pioneers of the low-price kit in this country. They have preferred to concentrate on large numbers of the smaller "popular" models rather than a more limited range of specialised models at higher prices. That this policy is a sound one is endorsed by the fact that they have produced something like half a million kits a year over the past 12 years and still many of the older models are in as great a demand as ever.

To be able to produce a low priced kit and maintain first rate quality—which B.M.A. undoubtedly do—demands careful designing and efficient production. Once again we find an aero-modeller at the head of the firm, Mr. H. W. Paterson who is the managing director. Before the war Mr. Paterson was a very keen model flier and a member of several model clubs. Some of the older club members may remember him flying before the war a 10 ft. wingspan petrol model—a rarity in those days.

The other directors are Mr. R. S. Scanes, an expert on production and wood working machinery, and Mr. A. E. Pinder, Sales and General Manager in charge of the office. Mr. Scanes was associated with Mr. Paterson when the firm was originally formed, Mr. Pinder joining later and becoming a director in 1947 when the original organisation was reformed as a Limited Company. He has, however, been indirectly connected with the firm since its inception.

Back in 1937 Messrs. Paterson and Scanes devised a method of producing finished balsa wood propellers by machine—the first, and then the only concern in the country capable of doing this—and it was largely the demand for, and success of, these propellers that led them into the trade on a wider basis. A retail shop was opened in Mitcham, dealing exclusively with model aircraft items and kit production was started from there in 1938. A start was made with a range of 12 flying scale models retailing at 1s. per kit, production of which were considered impossible in this country at that time. These proved so successful, however, that B.M.A. quickly became a manufacturing company only and soon one of the "big" names of the model aircraft trade. Having pioneered the "shilling kit" in this country they have followed that policy ever since and even today the Skyrova Junior series still sells at only 2s., including purchase tax. This policy of producing kits within the reach of the most modest of pockets has without doubt won many thousands of adherents to aeromodelling by proving that the hobby need not be an expensive one.

More space was needed once large scale production got under way in the early part of the war. Part of their production was concerned with model aircraft kits, the other part in the manufacture of balsa rafts for the services, and so another factory was taken over in Mitcham. With this working to full capacity there came a near-tragic set-back. In 1941 a fire destroyed the mill, stocks, machines—everything. Many a lesser man would have given up but Mr. Paterson—on his own then, his other executives being in the Services—took over new premises at 176/180,

London Road, Mitcham, installed new machinery, worked day and night to get things moving again and by the end of four weeks was not only in full production once more but had actually delivered to wholesalers kits to a retail value of £2,000. B.M.A. have remained at this address ever since.

All the woodworking side is handled in the factory, including the turning of wheels, etc. Most metal parts and all plastic components are put out, as is plan printing. Printing of the sheet wood, however, is done on their own machines.

For the very considerable factory space they have, and the large production, the number of staff is relatively low. The works account for 15 people and there are six packers, but they are all expert at their job. A really skilled packer, for example, can pack a total of something like a thousand kits a day. By the time it takes an average person merely to unfold a carton and tuck in the flaps at one end to form a box, B.M.A's expert packers would have got four or five complete kits packed, boxed and sealed!

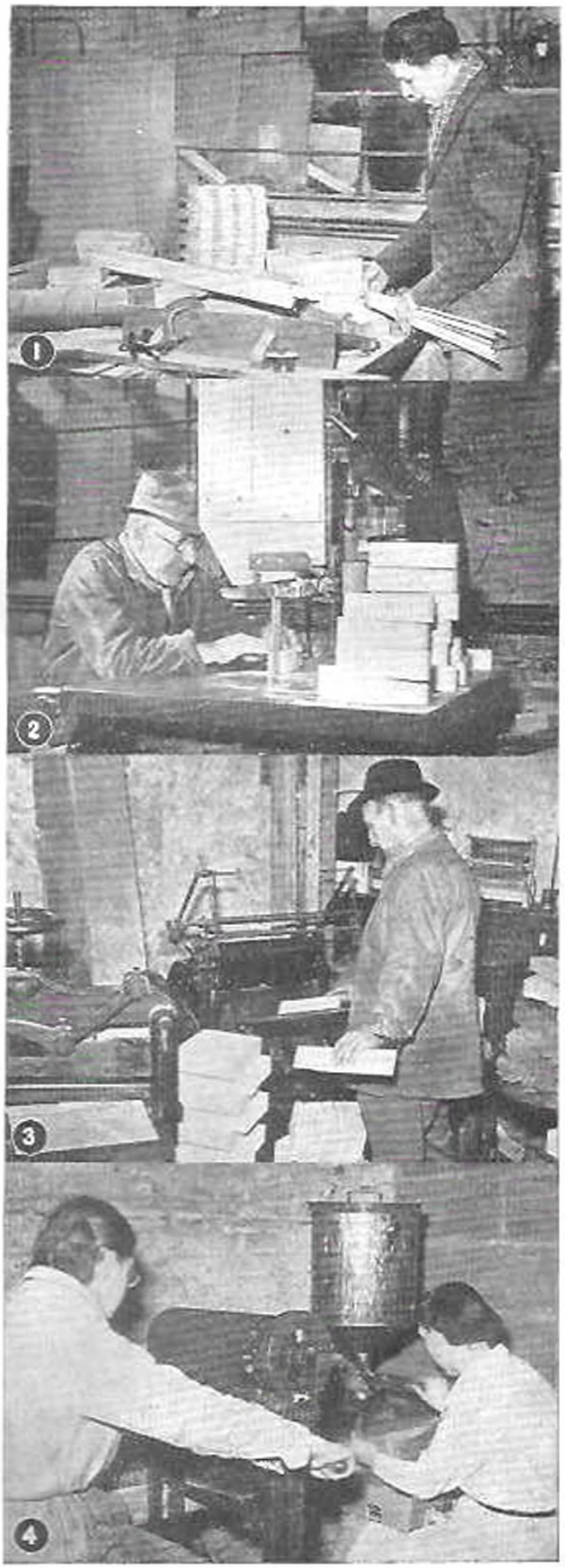
B.M.A's present production is largely confined to kits—a total of 42 in all, and four "plan packs"—but they continue to produce finished balsa propellers for the model aircraft trade, and also a range of power model propellers.

B.M.A. kits are distributed direct to some thousand retailers throughout the British Isles. They are also handled by five factors (or wholesalers). These are Model Supply Stores (Manchester), Model Aerodrome (Birmingham), Atlantic Models (Birmingham), Hunts (of Croydon) and D'Arby Distribution. B.M.A's chief overseas markets at present are Belgium, Holland, Germany, Switzerland, Denmark, Pakistan, India, Malaya and New Zealand. In the overseas markets there is the attraction that the prices are lower than those of comparable American kits, with the quality at least as good, if not better. Exports are being rapidly expanded and Skyleada kits promise to be as popular abroad as they are in this country.

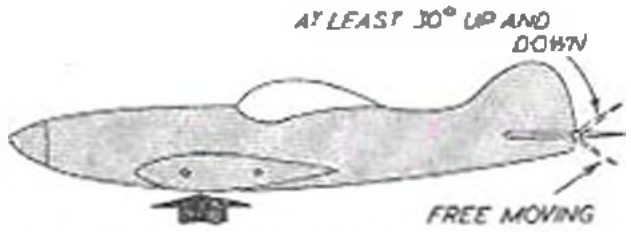
Currently the *Auster* C/L is their most popular kit and the *Auster* is also in the greatest demand in the other flying scale series.

With the re-awakening interest in flying scale we can confidently predict that B.M.A. will be even busier during the coming months and if some readers are of the opinion that small flying scale models are so many "toys" we think a fitting answer is given by the adult customer who wrote to B.M.A. to say:—

"I have been building model aeroplanes of all kinds and sizes for about 20 years: none has given me so much pleasure as your 14 in. Skyrosa *Grasshopper*. The sight of this true scale little model (scale flying surfaces and prop.) flying across the valley is in almost every way better than results from models four times as large and ten times as expensive. I like my planes small anyway!"

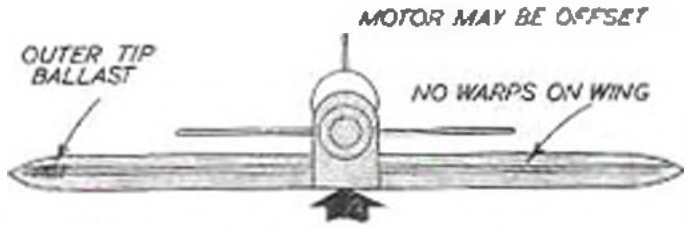


1. Cutting balsa strip.
2. Band sawing glider fuselage pods.
3. Printing balsa sheet.
4. Filling tubes with balsa cement.



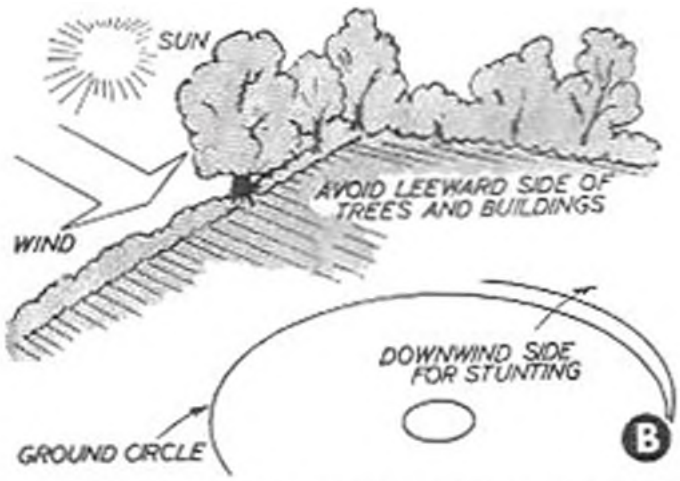
BALANCE ON OR BEHIND FRONT LINE

A



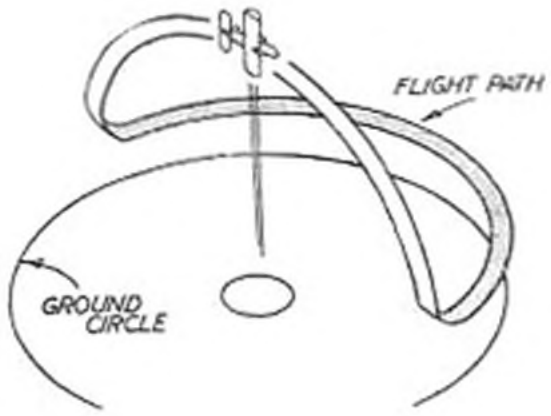
CHECK LATERAL BALANCE

C.G. POSITION AFFECTS MANOEUVRABILITY, ALSO LATERAL BALANCE



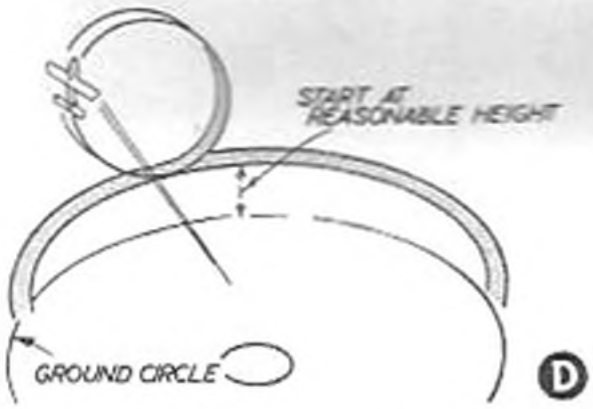
B

CHOOSE YOUR SITE FOR FLYING CAREFULLY



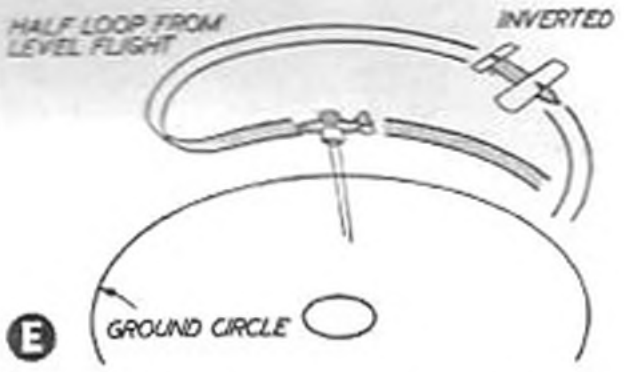
C

WINGOVER TESTS LINE STABILITY



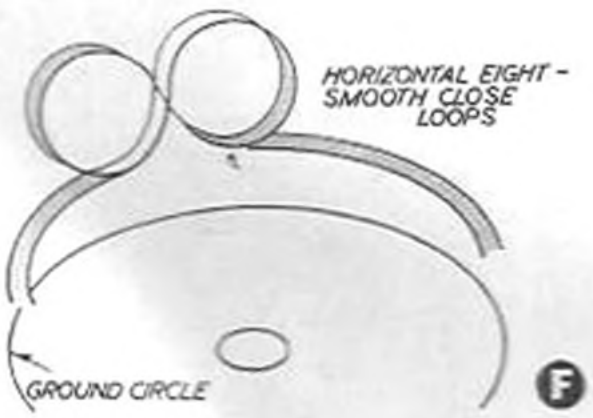
D

SIMPLE, THRILLING—THE LOOP!



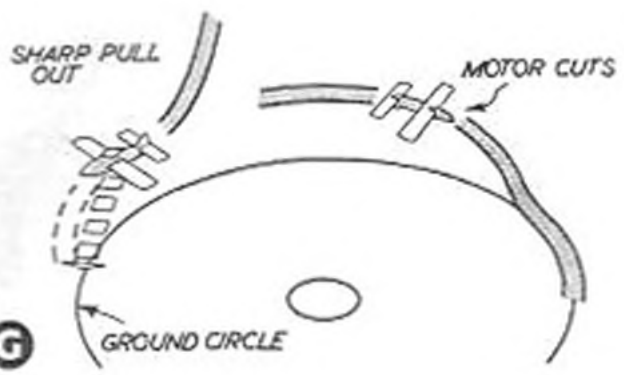
E

INVERTED FLYING NEEDS PRACTICE



F

HORIZONTAL EIGHTS SHOULD BE SMOOTH



G

TWO POSSIBLE TROUBLES IN STUNTING

(A) The modern C L model is very much more manoeuvrable and easy-to-stunt than its forerunners. With little previous experience even beginners can put up a creditable performance with most commercial designs—although crashes will probably be frequent, at first. For learning, the small model is definitely best since it is light and generally more robust, and turns and loops in a smaller radius.

A free moving control system and correct balance is considered essential. The elevators should droop with the model at rest and lines not connected. If lifted up with the finger they should fall down again under their own weight. They will then continue to respond on partially slack lines.

Centre of gravity position is generally between the front line and the pivot point, never farther aft and seldom in front of the front line. The former will tend to make the model come in on the lines. A forward c.g. position will make the model nose heavy. Correct lateral balance is also helpful. Ballast added to the outer tip for balance or overbalance—the weight of the lead-out wires is now common practice. Offset motor mounting is still used, but not so prevalent as previously. Most models still employ an offset rudder. The wing should be free from warps.

Shorter moment arms on the modern stunt model have led to reduced elevator movement. Forty-five degrees up and down used to be the accepted standard. Now a thirty-degree up and down movement is generally adequate.

(B) An experienced stunt flier does not usually worry too much about wind strength or even direction, but for a start it is as well to pay these factors a certain amount of attention. The leeward side of tall trees and buildings is always turbulent and such areas do not make for smooth flying. Rather choose a more open area, even if the wind strength does appear greater. It will be more steady.

There is also the position of the sun to consider. The pilot has to watch the model the whole time and this may frequently involve looking into the sun. The result is temporary loss of vision which, if only for a second or so, can be disastrous. A good pair of sunglasses, therefore, is a " must " for stunt work on sunny days.

Normally most stunts are carried out on the downwind part of the flight circle so that the wind is actually helping to keep the lines taut. Loops or similar manoeuvres carried out upwind—particularly with light models—can lead to loss of control. At the same time there should be space to retreat downwind, if necessary. In other words, do not fly immediately to the windward side of trees or buildings.

(C) A wing-over requires that the model be pulled up into a vertical climb with full " up," then easing off elevator to hold this attitude over the top of the arc. Recovery is with full " up " at the opposite side of the circle. Judgment is needed to get a truly correct ninety-degree wing-over and this is good practice for a beginner. If the model shows signs of slackening right off on the lines at the top of the arc then more line stability is required otherwise it is likely to get into trouble in more advanced manoeuvres.

(D) The first " real " stunt the beginner attempts is then the loop. Most modern stunt models will loop readily from level flight simply if full up elevator is applied and held on, easing off as the model comes over the top into level flight once more. The older, more sluggish models generally needed putting into a steep climb first and then pulling over into a loop.

(E) Inverted flight requires practice to master for here the controls are reversed. Once inverted, " up " becomes " down " and " down " becomes " up." The instinctive movement to correct any deviation from the flight path is the wrong one !

The safest way of entering inverted flight is from the top of a loop, easing on down elevator and then taking just enough off again to maintain level (inverted) flight. The common fault is to pull the model into the ground with " up." In case of trouble apply full " down " which will then bring the model round in a loop from the inverted position when it can be recovered to level flight once more when the correct way up at the top of this loop.

(F) Horizontal eights, which can be performed consecutively with only moderate power, are a very pretty manoeuvre to watch, if carried out properly. Since it is so easy not to get the two loops of the eight together and even, this is an excellent lesson in stunt flying for the stunt beginner.

(G) Two troubles which may be experienced—one avoidable and the other not—is " mushing " at the bottom of a sharp pull-out. Excessive elevator power stalls the wings and the model sinks downwards instead of recovering to normal level flight. Reduced elevator power is the cure—the recovery from the " mush " a touch of " down " elevator. The other trouble—motor cutting when in the inverted position—happens to most stunt fliers. Some have managed to recover to normal attitude without power, but the general rule is simply to land the model inverted. It will come to very little harm, if any—far less harm than an attempted half loop, without power and the model plunging in vertically !

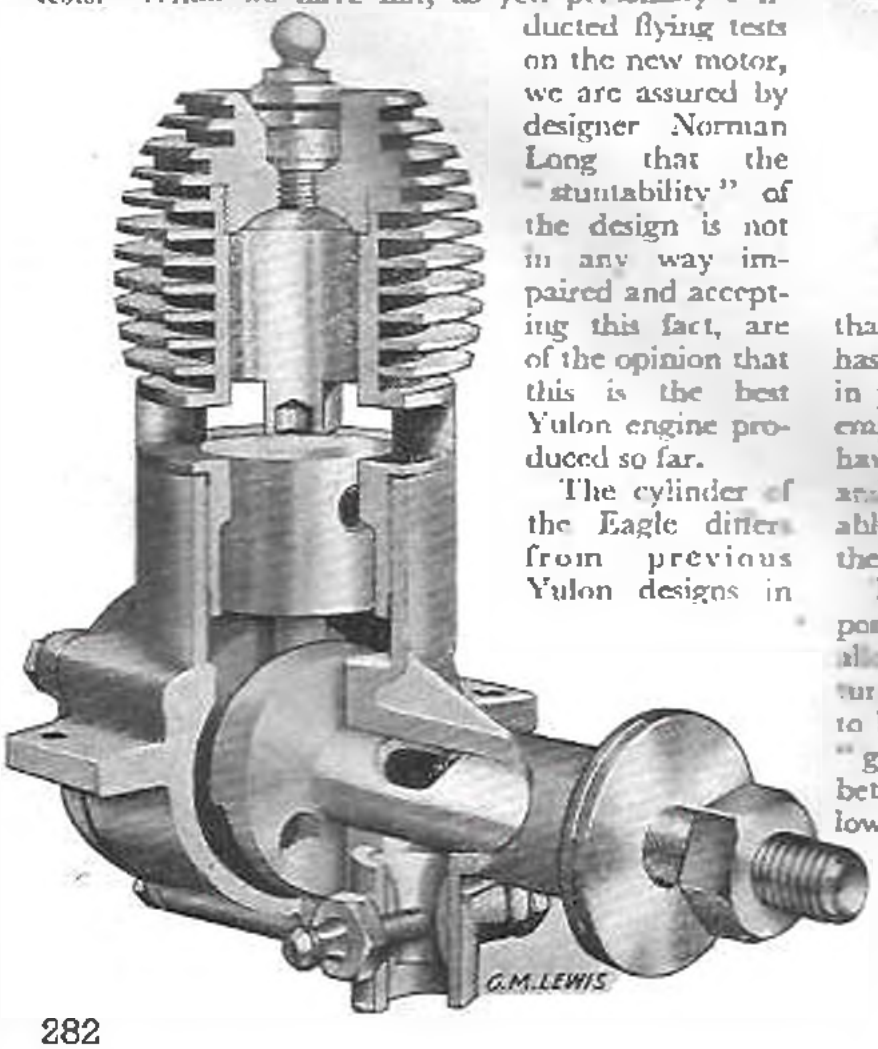
MODEL Aircraft ENGINE TESTS

NO. 24.—THE YULON EAGLE

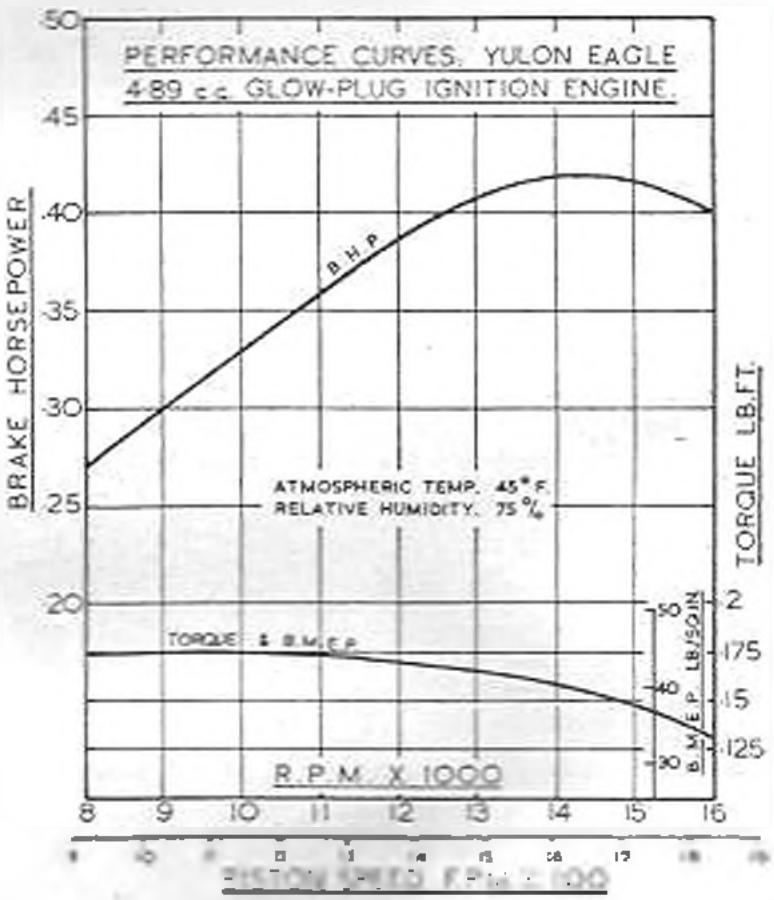
THE Yulon Eagle is the fifth Yulon engine to have been tested by the writer. Two previous tests have been published in this series: on the first Yulon model, the "30," in the July, 1949, issue, and on the "49" type in the September, 1950, issue. Other tests have been made on another, later type, "30," and on last year's "29."

Against these earlier tests, therefore, the performance of the 1951 "Eagle" model was watched with considerable interest. Although similar externally, the new model departs from previous Yulon practice in both design and construction and in two main essentials—porting arrangements and cylinder construction.

On inspection of the Eagle, it was remarked that the new features should result in improved performance and running characteristics, and that this is, in fact, the case, was subsequently borne out by the tests. While we have not, as yet, personally conducted flying tests on the new motor, we are assured by designer Norman Long that the "stuntability" of the design is not in any way impaired and accepting this fact, are of the opinion that this is the best Yulon engine produced so far.

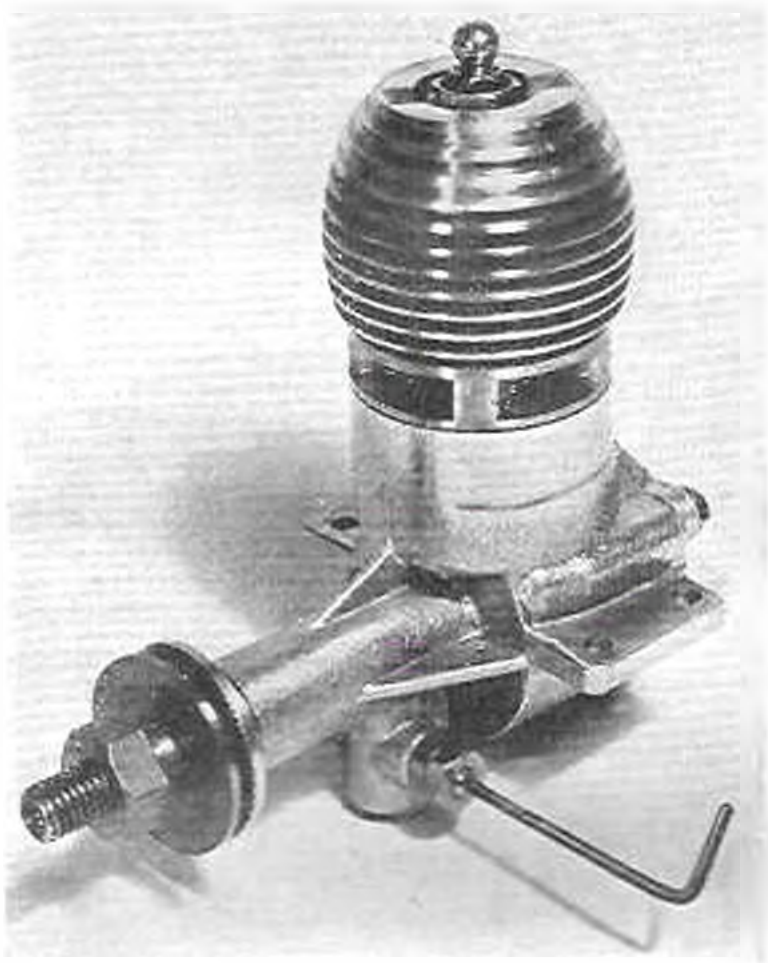


The cylinder of the Eagle differs from previous Yulon designs in



that it is of steel instead of meehanite and now has integral, turned fins, with an aluminium head, in place of the screwed-on finned barrel previously employed. The merits of this form of construction have been frequently mentioned in MODEL AIRCRAFT and the improved running characteristics attributable to the new cylinder were most marked during the tests.

The new porting layout features four deep exhaust ports which substantially increase port area and now allow considerable sub-piston induction. This, in turn, has allowed a smaller carburettor choke-tube to be fitted. Transfer is effected via four very deep "groove" type passages. These are arranged between the exhaust ports and extend above their lower edges, thus overcoming the usual 360-deg. port disadvantage of a limited transfer period and/or a badly timed exhaust period, due to the transfer being entirely below the exhaust. The Eagle port design is believed to be original and different



from that used by any other commercially-built model engine.

The crankcase is similar to the previous Yulons, having an integral main bearing and detachable rear cover, but now has a plain aluminium finish instead of the black "crackle" finish which characterised the "30," "29" and "49" Due to the absence of a separate cylinder barrel, the overall cylinder diameter is substantially reduced. With the new all-steel cylinder, the weight of the Eagle has gone up very slightly to a checked figure of just on 6-oz. (The makers' leaflet gives weight as 6¼-oz.) This fractional increase, however, is but a small price for the advantages gained and is more than compensated by increased performance.

Specification

Type: Single - cylinder, air-cooled, two-cycle, glow-plug ignition. Rotary-valve induction through crankshaft. Circumferential exhaust and transfer porting with sub-piston supplementary air induction. Lapped flat top piston and hemispherical combustion chamber.

Swept Volume: 4.89 c.c. (0.298 cu. in.).

Bore: 0.743 in. Stroke: 0.687 in.

Compression Ratio: 7 : 1.

Stroke/Bore Ratio: 0.925 : 1.

Timing: Rotary-valve opens 155 deg. before TDC, closes 35 deg. after TDC. Transfer opens 55 deg. before BDC, closes 55 deg. after BDC. Exhaust opens 70 deg. before BDC, close 70 deg. after BDC.

Weight: 6 oz.

General Structural Data: Die-cast DTD.424 aluminium alloy crankcase with removable end-cover. Cylinder of EN.36 nickel-steel, hardened, ground and honed. Mechanite piston, ground, honed and lapped. Nichel-chrome-steel crankshaft, ground, hard-chromed all over and honed. DTD.424 aluminium alloy connecting-rod. Tubular, silver-steel gudgeon-pin. Cylinder-head machined from DTD.424 alloy.

Test Engine Data

Total time logged: 30 minutes. (See text below.)

Ignition equipment used: K.L.G. "Miniglow" long-reach glow-plug. 1.6 volts to start.

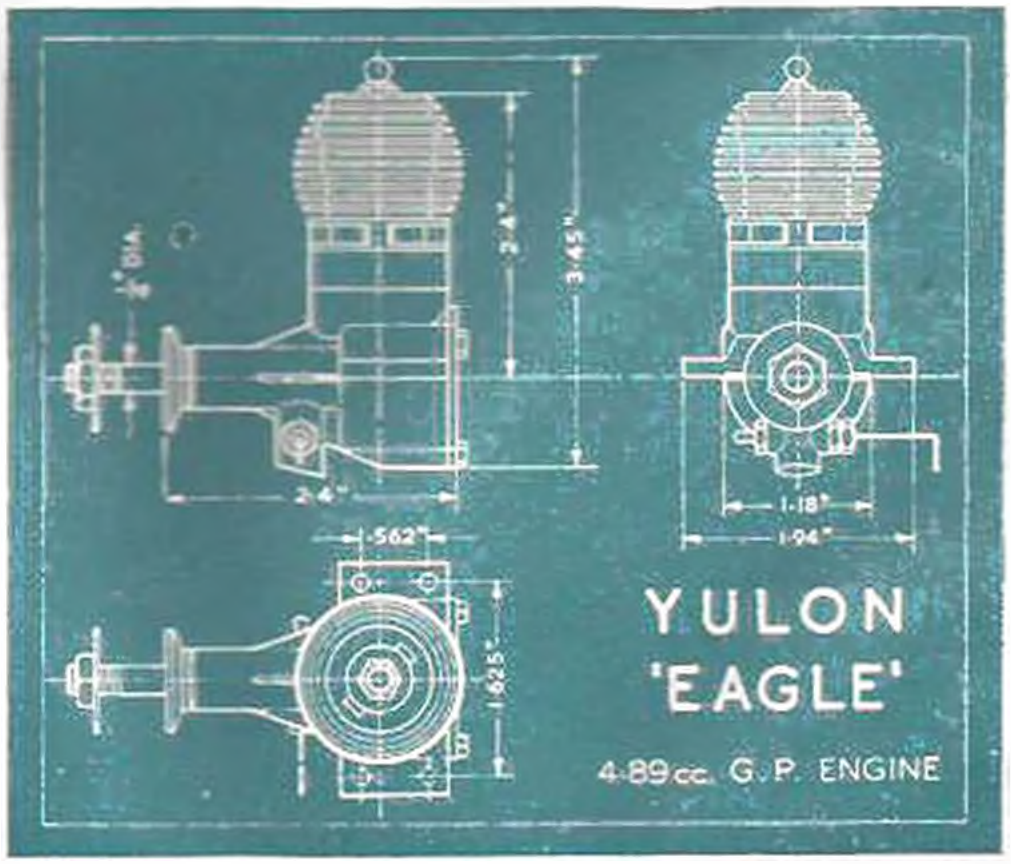
Fuel used: Record-Powerplus Racing Blend.

Performance

One advantage of the large ports of the Eagle is that one can prime the engine accurately and positively. The test engine showed extremely good compression seal and when choked and primed fairly generously, proved to be an unfailing quick starter. From cold, the engine was started practically on the first flick and a similar performance was obtained hot and without priming being essential.

The first thing that was noticed about the running characteristics (and one which had, in view of the new cylinder construction, been looked for) was the engine's complete freedom from any tendency to lose power as it warmed up. There was, in fact, a marked tendency, at speeds above 10,000 r.p.m., for the Eagle actually to pick up speed after the first few

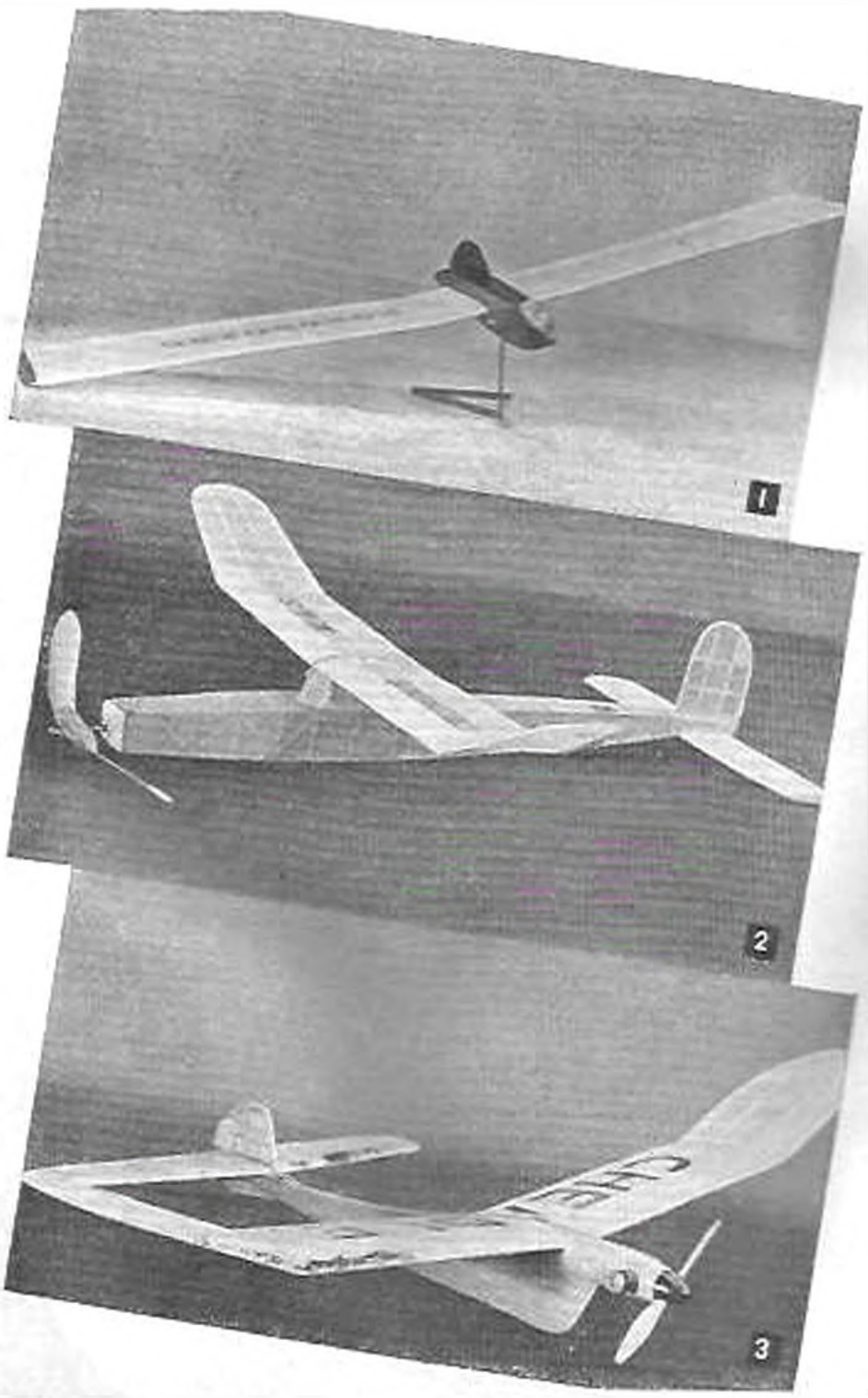
(*Continued on page 306*)



3rd Northern Models Exhibition

Organised by the Northern Associat of Model Engineers in collaboration w the International Radio Control Mod Society and the North Western Area the Society of Model Aeronauti Engineers and held in the Corn Exchan Manchester, on March 16th-18th, 1

The winner of the Champions in the model aircraft class, C. Fitzpatrick, of Southport M. & E. receives the *Aeromodeller* Trop from Mr. W. J. Bassett-Low M.I.Loco.E. The Exhibition Manag R. Lawton, looks on.



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SOME very fine examples of model aircraft des and workmanship were to be seen at the th Northern Models Exhibition, and it would be exaggeration to say that they "stole the show The 66 aircraft entries represented almost hal the total number of models on show at the exhibiti and the North Western Area Committee of S.M.A.E. are to be congratulated on arranging su a splendid display.

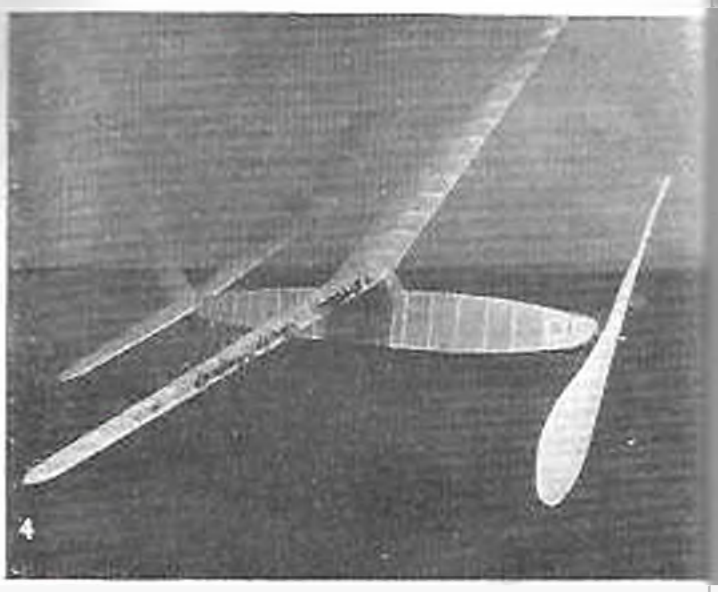
The judges, Messrs. D. Galloway, C. S. Ru Turnbull and E. F. H. Cash, had a very difficult ta in deciding upon the winning models, particula

1. The Nordic A2 Tailless Glider by R. A. Faulkner Whitefield M.A.C. which won first prize in the Jun Sailplane Class.

2. Winner of the Junior Rubber-Driven Class. F.A.I. rubber-driven model by G. Evans (Cheadle D.M.A.C.)

3. A very original power duration model by A. Bailey, of Cheadle & D.M.A.C. which won the pow model class.

4. Neat construction and finish won first place in Intermediate Class for this fine model by C. B. Jackson Ashton M.A.C.



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in the flying scale class. The winning entry in this class, a fine 2 in.-1 ft. B.A.C. *Drone*, by W. B. Hegginbotham, of Ashton, was a very workmanlike job and quite apart from its excellent finish it looked capable of having a very good flying performance. It was a close thing for first place, however, between this model and the D.H. *Comet*, entered by R. D. Johnson, of Southport. Other flying scale models which attracted our attention were a 1½ in. to 1 ft. G.A. Monospar *Universal*, by two Ashton modellers, H. Parrish and E. Ward; also two fine models of Avro aircraft by R. Booth, of Dilsbury, the 1½ in. to 1 ft. *Avian Sports*, and the prototype of the ¾ in. to 1 ft. *Club Cadet* which was featured in last month's MODEL AIRCRAFT.

The championship model in the aircraft section was a semi-scale sailplane by C. D. Fitzpatrick (Southport). The finish of this model was superb, the fuselage in particular having an almost plastic-like appearance which was obviously the result of many hours of painstaking work.

The arena was rather small for C.L. flying, but nevertheless members of the Oldham, Ewart Power, North Manchester and Sale Clubs flew on 18 ft. lines a variety of models from team racers to speed jobs. On the Sunday afternoon Harry Glew, of Huddersfield, decided to taxi his 6 ft. span *Superfortress* for the first time. The model, which weighs 7½ lb. and is powered by four Amco 5.5 engines, after a few laps with only one engine running, decided to get airborne much to the consternation of its owner.

We understand that only six of the 30 clubs in the North Western Area of the S.M.A.E. supported the exhibition, and while this is to be regretted in some respects, it is obvious that if the majority of these clubs *had* entered models the aircraft section would have overshadowed the rest of the exhibits even more than it did this year. Whether this would have been a good thing or not from the organisers' point of view is problematical.

5. Barry Hassman, of Liverpool M.A.S. with his Avian field which gained second place in its class.

6. W. Gregory (Sheffield) won first prize in the R.C. class with his L-7A Monocoupe.

7. A Class B team racer by C. R. Sinclair, of Southport M. & E.C., winner of the C.L. (other than scale class).

8. Winner of the Championship and first placed in its class, a fine semi-scale sailplane by C. D. Fitzpatrick, of Southport.

9. The winner (and only entry) in the Static Scale Class—a 1/6 in. to 1 ft. Bristol *Brabazon* by H. Parrish, of Ashton M.A.C.

10. The Flying Scale class was won by W. B. Hegginbotham, of Ashton M.A.C. with this B.A.C. *Drone*.

11. A scale C.L. model of the B29 *Super Fortress* entered by H. Clegg (Huddersfield S.A.M.) was a class winner.


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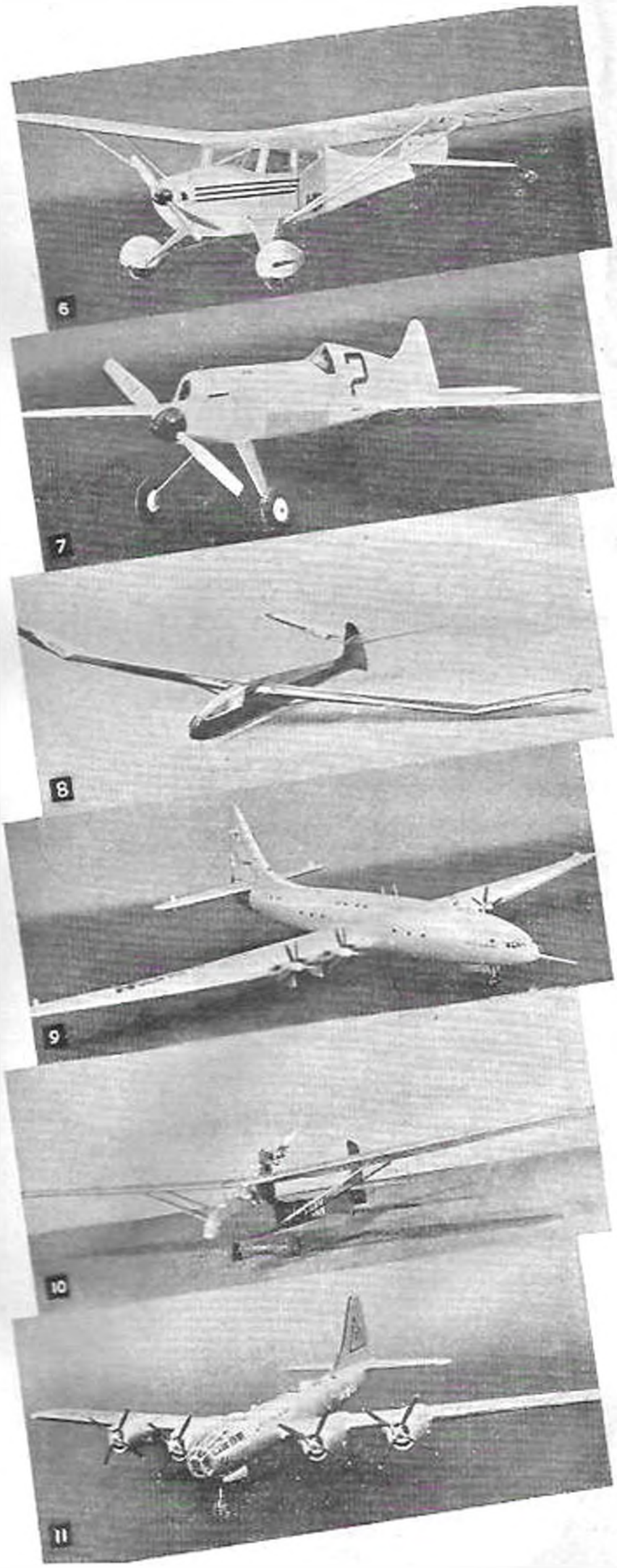
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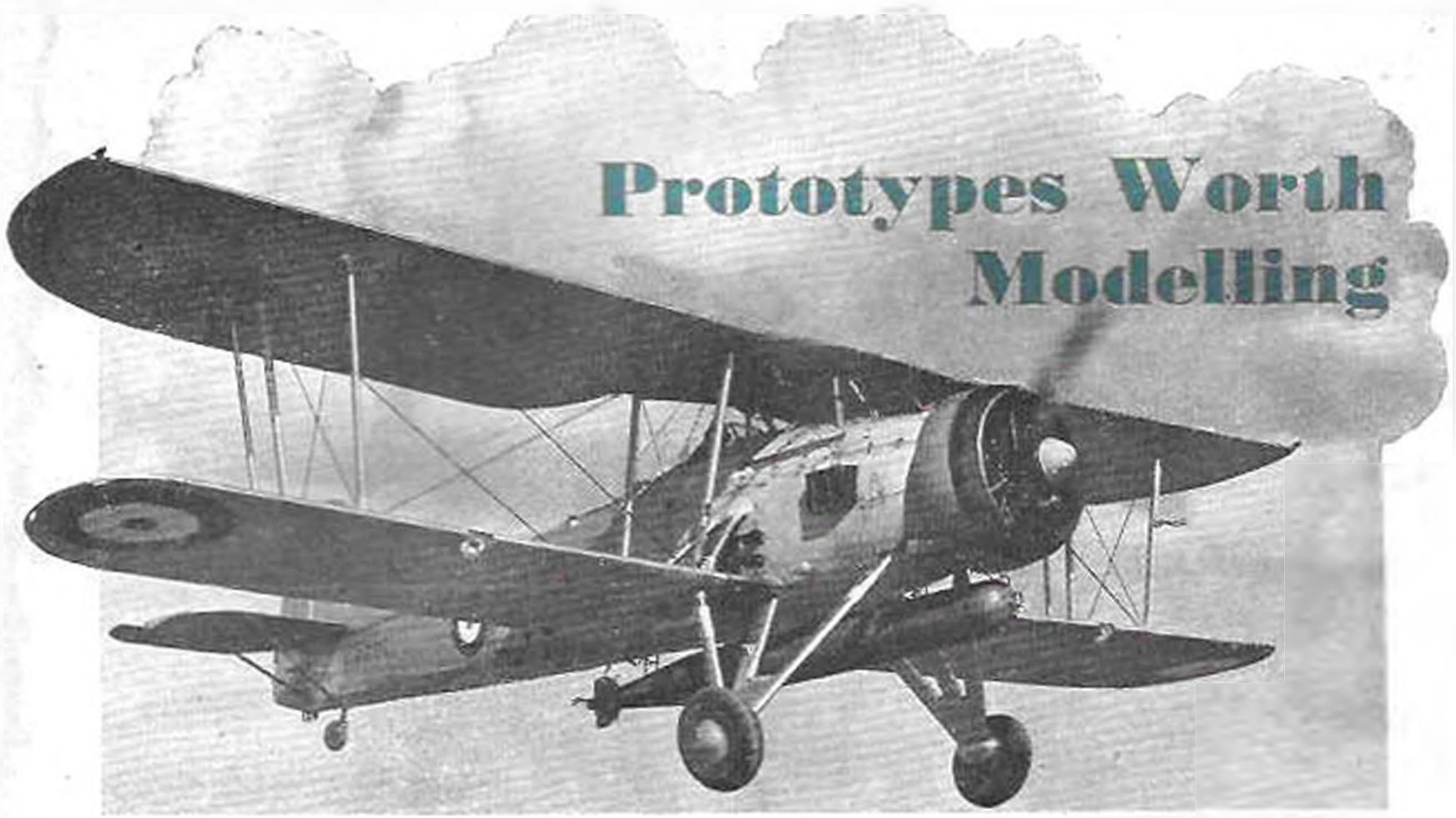
Prototypes Worth Modelling



(Photograph by courtesy of "Flight")

No. 11. THE FAIREY SWORDFISH

BY C. B. MAYCOCK

OUR choice of prototype this month will no doubt raise nostalgic memories for some. This aircraft had probably the longest record of any in operational service and one of the most honourable. It has a lot to commend it for a free flight model, long moment arm, wide track undercarriage and general ruggedness.

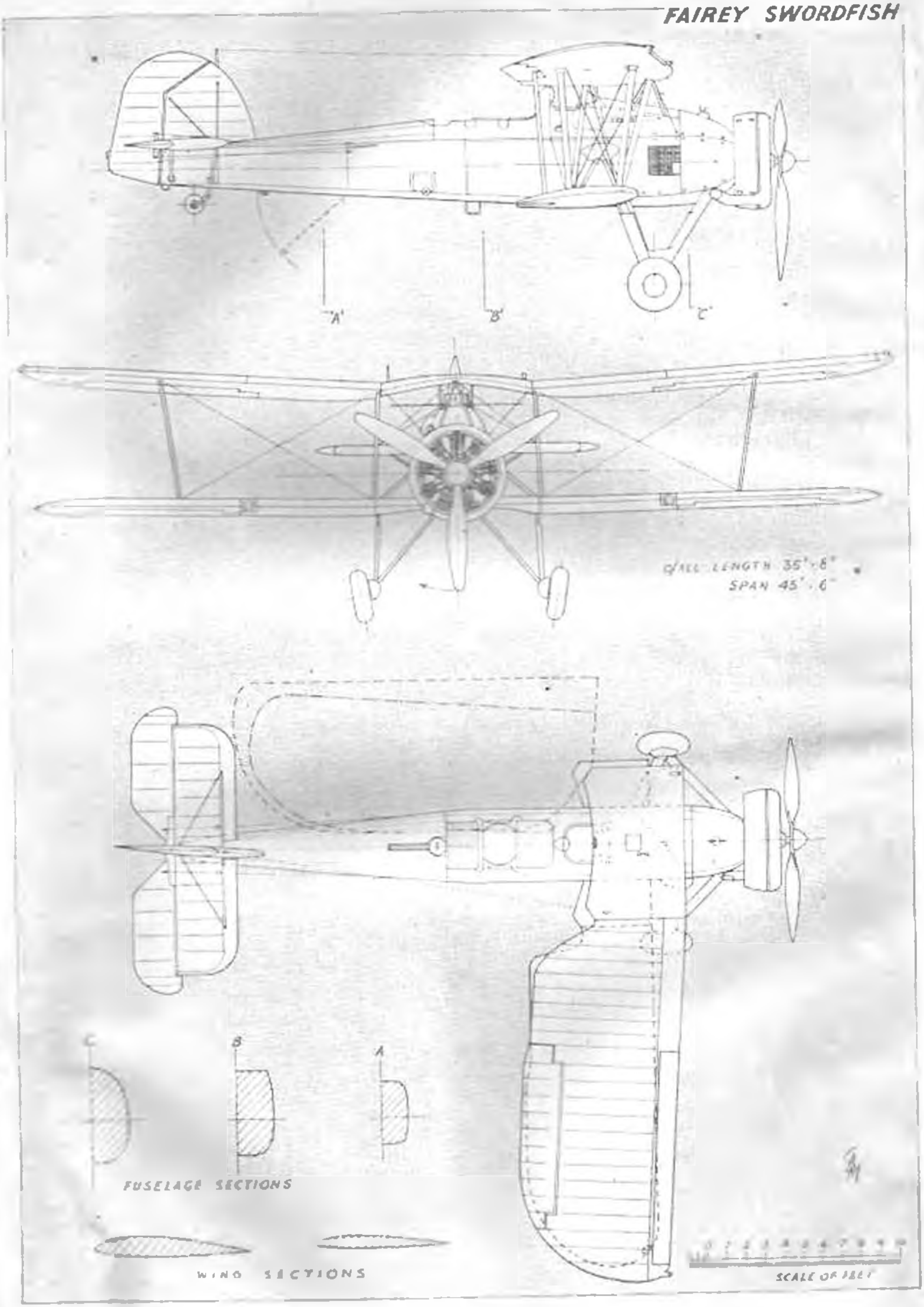
The *Swordfish* followed typical biplane construction. The fuselage had a basic structure of tubular steel built up into box form. Forward of the centre cockpit was covered in detachable Alclad panels and fabric aft. The centre section struts were composed of a group of four in pyramid form forward and two short struts just in front of the windscreen. As the wings folded it necessitated the fitting of two interplane struts at the wing roots of the wing bays. An inverted vee strut to take care of landing loads braced the lower centre-section.

One of the most noticeable features on the fuselage was the large finned oil cooler which was placed on the starboard side only. Just above this feature on the nose and lined up to fire over the motor cowling was a Vickers .303 machine gun. The only other defensive gun was a single .303 machine gun on a Fairey mounting fitted to the aft cockpit. A crew of three was the usual complement, pilot (in front), navigator, and wireless operator-rear gunner. The split undercarriage gave room for a standard 18 in. torpedo, or a parachute mine, and in the later marks of *Swordfish* an A.S.V. scanner in a streamlined fairing. This mark also had two R.A.T.O.G. rockets just aft of the centre-section. The motor was a Bristol Pegasus XVIII or a Pegasus 30 nine-cylinder air-cooled radial, giving a level cruising speed of 129 m.p.h. at 5,000 ft. Duration of about 5½ hours. The wings followed usual practice all metal construction with high tensile steel spars and drag members. The ribs were duralumin. The leading edges of the top wing had Handley Page automatic slats. The tail unit followed the same mixed steel and dural construction and all flying and control surfaces were fabric covered. A Fairey-Reed three-blade airscrew, which was in effect a flat sheet metal to shape, deck arrester hook, catapult points and the fully castoring tailwheel complete the list of main items.

Up until 1939, when the *Swordfish* had already seen three years' service, they were silver doped all over with the aircraft carrier to which they were attached colour identification band, sometimes aft and sometimes forward of the roundel on the fuselage sides. This band and the aircraft aircraft combination of letters and numerals in numerals only, white on blue, red, black, green or black on yellow. Here are a few examples. Air Ministry No. L7701 on rudder and fuselage just forward of tailplane leading edge, no colour band, single letter K in black on fuselage sides forward of roundel. A.M. No. L2742 as previously, numerals 3½ in. white, full depth of fuselage sides on diagonal colour band aft of roundel. L9781 with large white tips on three colour diagonal band forward of roundel. L7672 was A4F, and L2731 was A4G both on a similar three colour band.

During the war they were shadow shaded dark sea grey and dark slate grey for northern waters, sometimes black underneath and sometimes duck egg blue. The latest marks were white all over except for the dark sea grey and slate grey upper surfaces and the undersurface of the upper centre-section was matt black to reduce glare. Pre-war airscrews were finished natural metal with the after surfaces matt black; subsequently they were matt black all over with the usual target yellow 4 in. tip.

FAIREY SWORDFISH



TOPSY

A SEMI-SCALE SPORTS MODEL

By I. D. Carnegie

TOPSY " just growed " from the desire to make a nice model for general purpose flying. It is a sport model in the real sense of the word—being capable of putting up a good performance in any reasonable weather conditions.

Fuselage

Begin by selecting two pieces of good medium hard $\frac{1}{8}$ in. × $\frac{1}{4}$ in. strips. Pin these on to the plan and assemble the crutch in the usual manner, go sparingly with the cement or the formers will not fit accurately. Cement formers 2-9 (2 complete with undercarriage) in position and double coat the joins in the crutch. Use a set-square to line up formers and check to see that they remain upright whilst the cement is drying. Now fit the cabin roof, top and bottom keels, and allow the whole framework to dry for at least two hours.

The $\frac{1}{8}$ in. sq. stringers are now cemented in position. Engine bearers of $\frac{3}{8}$ in. × $\frac{1}{4}$ in. are added after being drilled and fitted with toggle bolts, the engine bolted in temporarily and *F*1 lined up to give sufficient clearance for the particular prop./spinner combination that is to be used. The cowling should now be made from soft balsa block. It is made in three stages.

(1) The lower cowl.

Cut and sandpaper the ends of the block until it is a snug fit between *F*1 and *F*2, then lightly cement in position. Cut away surplus wood and sand the outside to correct shape. Remove from fuselage and hollow to $\frac{1}{8}$ in. thick walls at the side, widening to $\frac{3}{16}$ in. at the bottom.

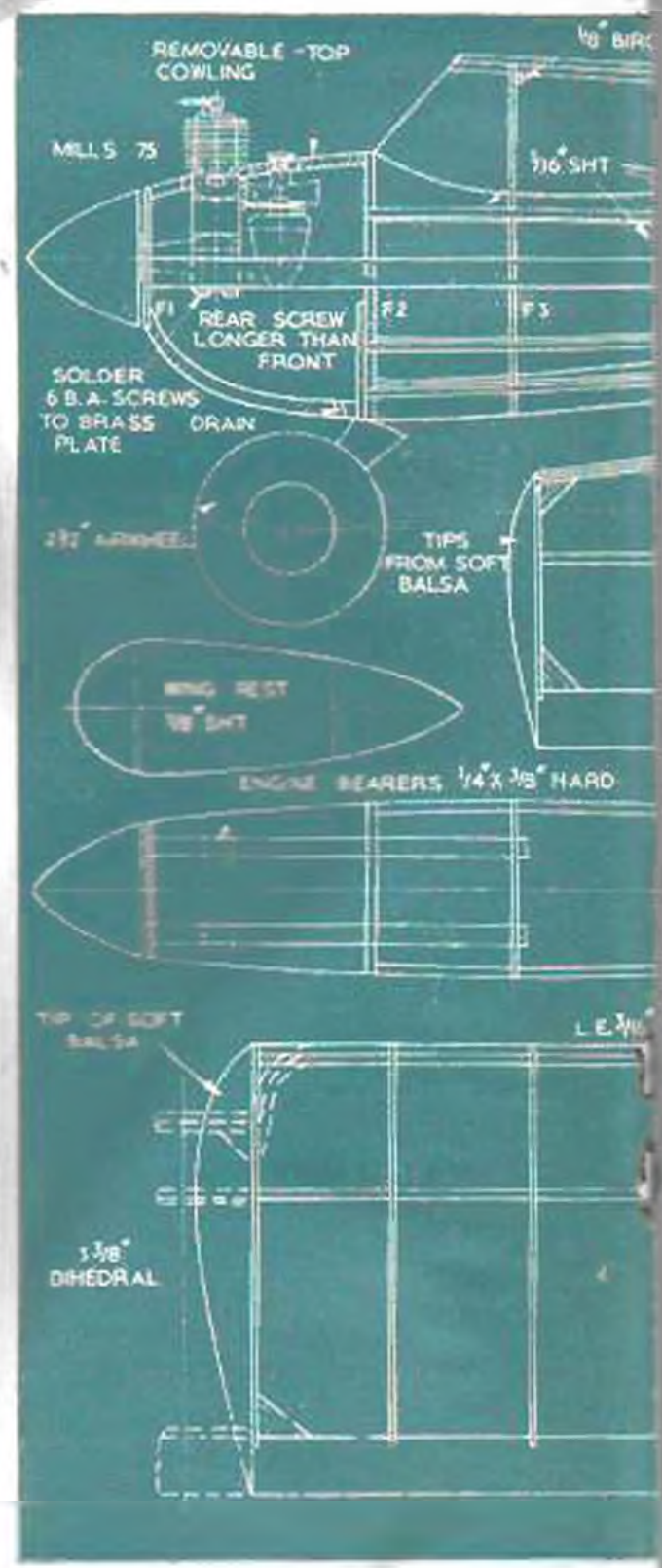
(2) The top cowl

Construction as above. Hollow walls to $\frac{1}{16}$ in. thick all round and cement $\frac{1}{4}$ in. × $\frac{1}{4}$ in. hard balsa spacers at each end of it to avoid distortion.

(3) Fill in the space between the top and bottom cowls (the depth of the engine bearers) with $\frac{3}{8}$ in. soft sheets and sand to shape.

Cut the necessary holes in the cowl and sand all surfaces smooth.

The leggings are cut from $\frac{1}{4}$ in. sheet and sanded to a tear drop section. Slots are cut along their leading edges with a round needle file and razor blade. This slot houses the undercarriage.



FULL SIZE DRAWINGS ARE OBTAINABLE FROM YOUR LOCAL DEALER, OR BY POST FROM THE "MODEL AIRCRAFT" PLANS DEPARTMENT, 23, GREAT QUEEN ST., LONDON, W.C.2. 3s. 0d., POST FREE

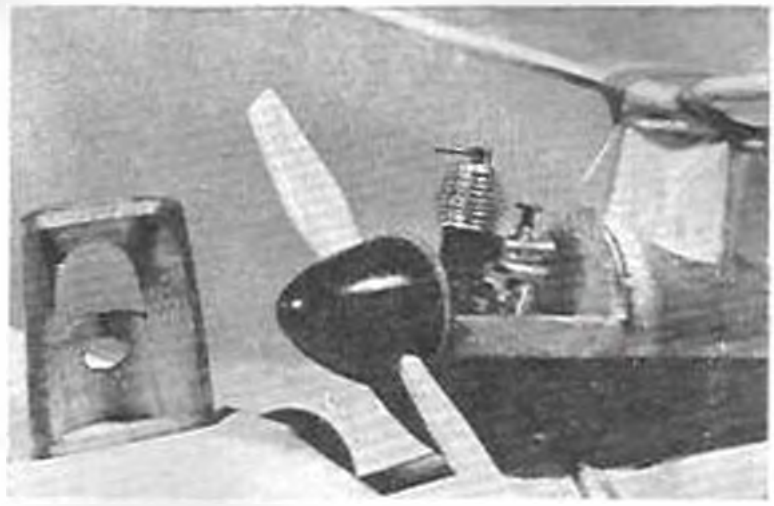
The leggings are fixed in position with the pin (which is soldered to the undercarriage—not shown on plan) and bound on with strips of rag tissue soaked in dope. Do not attach leggings until fuselage is covered and doped.

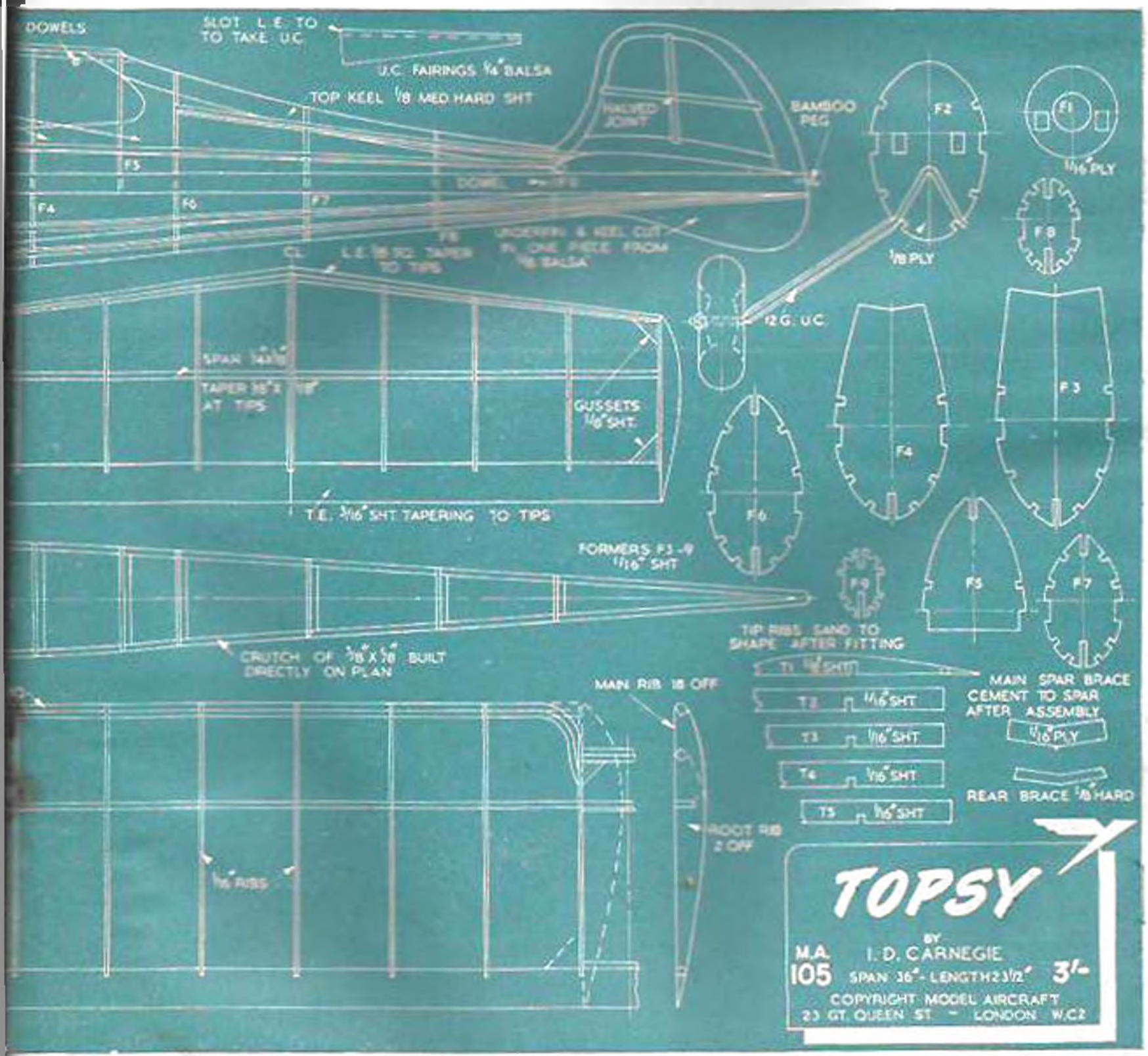
To make the cabin outline start by filling in all the spaces round it with scrap sheet and transfer the actual outline from the plan by measuring and pin-pricking with dividers. Finish by cutting along this line and sanding the edge.

Wing

Start by cutting out all ribs. Make a template by tracing the profile of the rib on to a piece of paper and

(*Continued on page* 306)





Topical Twists

Clerical Errors

Recent publicity has been focused on a "flight" of S. African Wakefields, which finished up elsewhere but their Finnish destination. Failure of these models to participate in the Wakefield event is alleged to be due to the dim-witted action of an airline clerk in misdirecting the precious cargo to quite another part of the globe.

Not that he is by any means the only clerical type to be held responsible for models failing to reach the Wakefield Finals. There is another, and more notorious one who has been blamed for the mis-routing, not of a few Wakefields, but whole squadrons—mostly on the short route to Australia via the tarmac.

I am referring, of course, to that senile old sinner known as the Clerk of the Weather.

* * *

That three new world records have been claimed can be taken as Red.

* * *

A Fateful Day

We hear the lament from home and abroad
That the Wakefield event, our premier award,
No longer enhances
The novice's chances
And poor Lady Luck has gone by the board.

"It's too scientific, Dear Editor Sir,
With gadgets prolific and expense to incur,
And totally unfit
For the five shilling kit
And any old thermal the fates might confer."

Such cries of dismay, now growing apace,
Bring nearer the day, that day we must face,
When world fame will invest
He who flies best
His fourpenny balloon in a novelty race

* * *

Model Exhibition-ism

Do you fly model aircraft simply and exclusively for the good, clean, wholesome fun of it? Do you disdain the goggling admiration of the spectatorial hordes, and wish only to retreat into some quiet corner of the airfield where to fly the humble rubber or sport model in peace and solitude?

You do?

Well, read no further, my self-effacing friend, for the advice I am about to give is not of your concern. I seek only to instruct those who aspire to the cutting of a nifty dash in the glory of the centre-field limelight.

Well, boys, having thus disposed of the pleasure-boat mob, let's get down to brass tin-tacks.

About those forthcoming rallies. Now, I know it's a bind having to blush unseen in the back row of the chorus while the radio, ten-foot glider and scale jet types are getting all the up-stage spotlight treatment, but even if you don't happen to be a genned-up genius or work-bench weasel, there is no cause for despair—absolutely none. In fact, quite a goodly gasp can be squeezed from the gaping gallery with nothing more elaborate than one soiled rubber model and a couple of wild-eyed oppos. An optimistic claim? Not a bit of it. At least, not with the super-special "Mystery Man" technique; a sure fire winner in any rubber-necking stakes.

First requirement is your "Mystery Man" outfit; some highly dramatic get-up such as full motor-cycling regalia, duffle coat and jack-boots, or, equally effective, a fur-lined airman rig.

Thus arrayed, the next step is to lurk on the fringes of the field and await your cue. Don't be over eager, but give the comp. plenty of time to warm up. Then, when you see the arena surrounded by a dense mass of gaping gargoyles, the stage should be all set for the grand entry.

Come charging in upon the scene with all the bustle and cavortings of a troop of cavalry. Start shouting in an urgent, imperious voice. Engage in a series of breathless conferences with your chiefs-of-staff, that is, the couple of wild-eyed oppos. Keep up the tension with a loud volley of "Right," "All-set," and similar terse epithets. Above all, don't relax, especially if there are any ten-foot glider and radio jobs in the vicinity ready to steal your thunder.

The grand finale comes in the chase. Quite a good dramatic effect can be achieved with a single high-revving motor-bike, but the larger the hunting pack the better. One skilled exhibitionist I know always manages to deploy two cars and three motor-bikes; not to mention the lighter reinforcements of cycle-squads and foot-men. And very impressive, too.

The general idea is to give the impression that the snarling, quivering model is all but impossible to hold in check; tension being built up by pointing it at different sections of the crowd. A process, which if maintained for a few minutes before finally releasing the model, will have the gallery swooning in admiration.

Got the idea? Good. Now quit dreaming about that ten-foot glider and go to it.

* * *

"Yes, the fuselage is completely resistant to any torsional stress, and you can't twist it either."

* * *

No Holds Bar-ed

Some festival visitors, not too conversant with our weird rural nomenclature and fearful of that perverse characteristic known as the British Sense of Humour, have tended to eye with the deepest suspicion an item in our Contest Calendar announcing a slope soaring meeting to be held at Sheepwash, Ommetberly.

That Sheepwash is an exaggeration must be admitted—there have to be thrown in. But, even so, let me hasten to assure our worthy visitors that there is no intention of pulling the wool over their eyes; Sheepwash does, in fact, exist.

Visitors to this sleepy little backwater would, perhaps, express only one grievance: the bleating noise the sheep make. However, the journey to Sheepwash is a most interesting one. Wending your way through the wild and woolly Ewe Valley, by way of Itchy Comms, you will eventually come to a notice which reads: "Netting and Gamboling Strictly Prohibited." Just beyond this point is to be found the actual site of the meeting: the famous Sheep Dip, which, as you may guess, is a shear slope.

Naturally, all the models flown there are of the Ram-jet type, and . . . Editor! W-what are y-you d-doing with that g-gun?

By D. Lonius

SURBITON GLIDER GALA

Right. One of the many casualties caused by the gusty wind. Entry by C. W. Hawkins of Apsley which crashed while being launched.

(Above). Brighton Club member H. Hollway, launching the model flown by Nicholas Neve.

(Left above). Glider belonging to R. A. L. Jones, of the Wayfarers Club getting away safely.

(Above). A St. Albans entry by M. Glynn being launched on its first flight attempt.

(Above). D. Bradford, of the Southern Cross A.C. prepares his model, assisted by P. Rose (left).

(Right). The Brighton Club launching crew having difficulty with R. J. Boxall's glider.

MODEL Talk

BY BILL DEAN

● WE START off this month's "Model Talk" with some news from Abyad—from Sqd. Ldr. Laurie Ellis, who is out there with the Middle East Air Force. The Abyad (R.A.F.) club is only a dozen strong, but members are very keen—all types of models being built, including speed and stunt C/L. Laurie has been nominated Model Aircraft Adviser to H.Q. 205 Group and has started action to get the Canal Zone clubs enrolled in the R.A.F. Model Association. In the near future, it is hoped to arrange a contest between the clubs in the Canal Zone and the Model Division of the Egyptian Royal Aero Club. The main headache of the Abyad club lies in the difficulty of obtaining model supplies—particularly balsa, cement and fuel. However, in the case of the latter, various mixtures have been tested and the most recent concoction of equal parts of Lockheed hydraulic oil, paraffin and ether seems to be as good as any branded diesel fuel. Flying conditions are of the type that British modellers dream about and de-thermalisers are essential for all free-flight models, except when flying in the early morning or late evening. Laurie goes on to give some details of his personal model activities. He writes. :

"My latest effort is a 54 in. span *Monocoupe*, powered with the Mills .75. It will be underpowered of course, but it is suprising what this little motor will do with the right airscrew combination. I used the Mills .75 for the initial testing of my big 7 ft. flying wing. The weight was 30 oz. (plus engine!), but with a 9 × 5 prop. turning over at about 6,000 revs, the model climbed sufficiently well to give me the answers on adjustments for higher power. This design is similar to A. J. Cockle's *Scylla*, but numerous alterations and modifications have been incorporated. Sweep-back is 22½ deg. : upturned tip fins are fitted and the elevons are vernier controlled for precision adjustment. A tricycle undercarriage is fitted and the engine nacelle is positioned above the centre section. The thrust line is 2½ in. above the wing and the engine is set at zero zero. The .75 was replaced by a Mills 1.3, then by an E.D. Comp. Special and finally by a Move D.2 for contest flying. The Move D.2 is not a fast motor, but it gives a good performance with an 11 × 8 prop. About 60 flights were needed to determine the best trim, which gives a 9 : 1 flight ratio. The best flight to date is 6 min. 10 sec. on a 22 sec. motor run and flights have been made in winds of up to 30 m.p.h."

"I have another smaller 'wing' of 5½ ft. span (weight 22 oz.). This one has a Republic *Seebee* type fuselage 30 deg. sweepback and was originally powered with the Mills .75. Now fitted with an E.D. Bee several flights of 4-5 min. on a 25 sec. run have been recorded. This is the most stable model I have ever built, as it will fly in tight vertical turns of about 30 in. diameter in either direction, without spiralling in. The design has recently been adapted as a club model."

"The favourite job in my stable at present, is an original cabin type of 70 in. span. This is powered with an inverted fully cowled E.D. 3.46 (13 × 6 prop.). American contest settings are used—that is, 3 deg. left thrust, left wing washed-out ¼ in., right wing washed-out ⅛ in. and the rudder offset ¼ in. to right. The climb is really something to see and I seldom use more than an 18 sec. run, which usually gives a 3 min. flight. I hope to have a flying boat or seaplane flying soon and my ultimate aim is to produce flying wing versions of these types."

Laurie's letter reminded us of our own enjoyable modelling days overseas, at R.A.F. stations in Southern Rhodesia in 1943-6. We too had our troubles in obtaining model supplies and in order to carry on, had often to use substitute materials and parts salvaged from old models. Instead of balsa, local softwoods were used, which although they lacked the strength (weight for weight) of the former, were suitable for even the largest power models. Cement was made by dissolving celluloid in clear dope and models were usually covered in silk. American free-flight designs were most popular with Service modellers—especially Goldberg's *Sailplane*, Struck's *New Ruler* and Taft's *Pace*. Flying from aerodromes as high as 5,000 ft. above sea level took a bit of the pep out of engine performance, but strong thermals more than made up for this. When we compare the flying conditions with those of this country, it makes us very, very sad.

★ ★ ★

● Some of the balsa sheet on sale nowadays is badly warped. Sheet affected in this way can be flattened by dampening both sides and pinning down to the building board for at least 24 hours. This usually does the trick with all except the very worst warps. Warped strip should be avoided at all costs when selecting wood for spars, leading and trailing edges or longerons—although slight twists are not

important in strip to be used for stringers or spacers . . . Chuck gliders and all-sheet Jetex models often develop twisted flying surfaces when flying in damp weather conditions. When this happens, the original circling trim can be regained by pushing a drawing pin (or pins) in one wing tip.

● BILL FORD, of Liverpool passes on the following method of improving the longitudinal stability of Wakefields. It appears that frogs, when confronted with a sloping surface, promptly start climbing—so that wonders can be worked simply by popping a small frog into the fuselage of your model just before launching. As soon as the nose starts to rise, off trots the frog towards the prop. assembly. When the re-disposition of ballast brings the nose down, the frog turns round and . . . but you probably get the idea from this point. Introvert frogs are not recommended as they may become hysterical and bale out through the nearest tissue covered panel!

★ ★ ★

● STILL ON [illegible] we have received the following communication from a well known American modeller:

"The Easter Bunny brought my young son some baby chickens. I'm going to try and teach them to fly so that I can enter them in this year's flying scale events. Of course, this type has high wing loading and a very low power loading, so in their natural (White Leghorn, Mk. I) condition have the drawback of extremely short range and low service ceiling. We are considering the addition of extra wing area and Jetex boosters to shorten the take off run. If you or your readers have any ideas that may prove useful, please rush them over."

★ ★ ★

● THE BELFAIRS CLUB, of Leigh-on-Sea, Essex, held their annual model exhibition recently and we were invited to go along and judge the models. Club secretary Dave Willmott told us that the Forces have claimed many of the older members and as a result, the average age of the remainder is about 16 years. The club was formed in 1945, the present membership being 50. After looking over the entries, we decided that the standard of building compares favourably with that of many larger and more mature clubs. Models were divided into Junior and Senior classes, the best entries being by Alan Longstaffe (last year's Junior Champion) and Dave Willmott who both tied for the Senior Champion award. In all, 68 models were on show (about half of them kit and magazine designs), varying from a 12 ft. span radio controlled glider to a midget Kemp .2 powered free-flight. Most of the models were well built, but about 20 per cent. fell short of exhibition standards when it came to covering—and in a few cases, sandpapering! It seems that covering is still the hardest part of aeromodelling for most builders.

● IN A recent article, Denny Davis—one of the top F/F men of the U.S.A.—passed on some useful tips on how to avoid crack-ups and win contests. He considers that it is attention to detail that is most important—such as making firm seatings for the flying surfaces, eliminating warps, building sturdy structures, choosing the correct combination of fuel and prop—and *not* brooding over such mumbo jumbo as gyroscopic effect and the Reynolds number. His formula for a successful model is: A well tried conventional pylon layout, easy-to-build construction, at least 1½ deg. difference between the wing and tailplane rigging, C.G. at about 85 per cent. of the wing chord, 46 per cent. (of wing) tailplane area, flat 10 per cent. wing section and flat 8 per cent. tailplane section.

● AS WE mentioned in the March issue, Frank Zaic is working on a new book—which deals, amongst other things, with stability and trimming problems. Frank says that he has come across quite a few new ideas and theories and in his latest letter he touches on a few of them. He writes:

"It seems that power models automatically shift to low angles of attack under power—meaning that if you have glide setting or trim for 6 deg., the model will shift to as low as 0 deg. while under power, the exact shift depending on the power, of course. The position of the c.g. will determine the size of circle

John Hume, youngest member of the Belfairs Club, poses with his stunt C/L model in front of a poster advertising his club's 1951 exhibition.

under power. A c.g. close to 35 per cent. of the wing chord gives rise to looping tendencies, while a c.g. towards the 100 per cent. position allows a gradual and fairly safe climb. However, a model with a 100 per cent. c.g. set up should not be allowed to glide in tight circles. C.G. position will determine the angular settings of the flying surfaces and the thrust line angles. Close to 35 per cent. calls for lots of downthrust, while 100 per cent. can get away with practically no thrust line adjustment. How does the model adjust itself to low angles? Well, it's all due to circular airflow. When the model circles, the airflow angle is decreased on wing and increased on tailplane. Which means that the tailplane has greater lift on the balance, which in turn tends to bring the wing to a lower angle of attack. At high speed the idea is to decrease lift to much less than the actual weight of the model as the thrust takes a load. I have the prop. blast at a high angle tailplane to achieve a low angle of attack under power."

"With regard to rubber, I have an idea that we are using too much power for the take-off. On checking the torque values, I find that we have as much as 70 oz., while a 0.09 cu. in. glow-plug motor only develops about 10 oz. Ellila's salvation in the 1949 Wakefield was probably his comparatively low power at take off—as he did not have to fight the torque and the wind at the same time. It seems a good idea to take off a few turns before launching—to get off the high peak of rubber power. Will not be a bit suprised if we eventually end up with a torque meter on the model!"

★ ★ ★

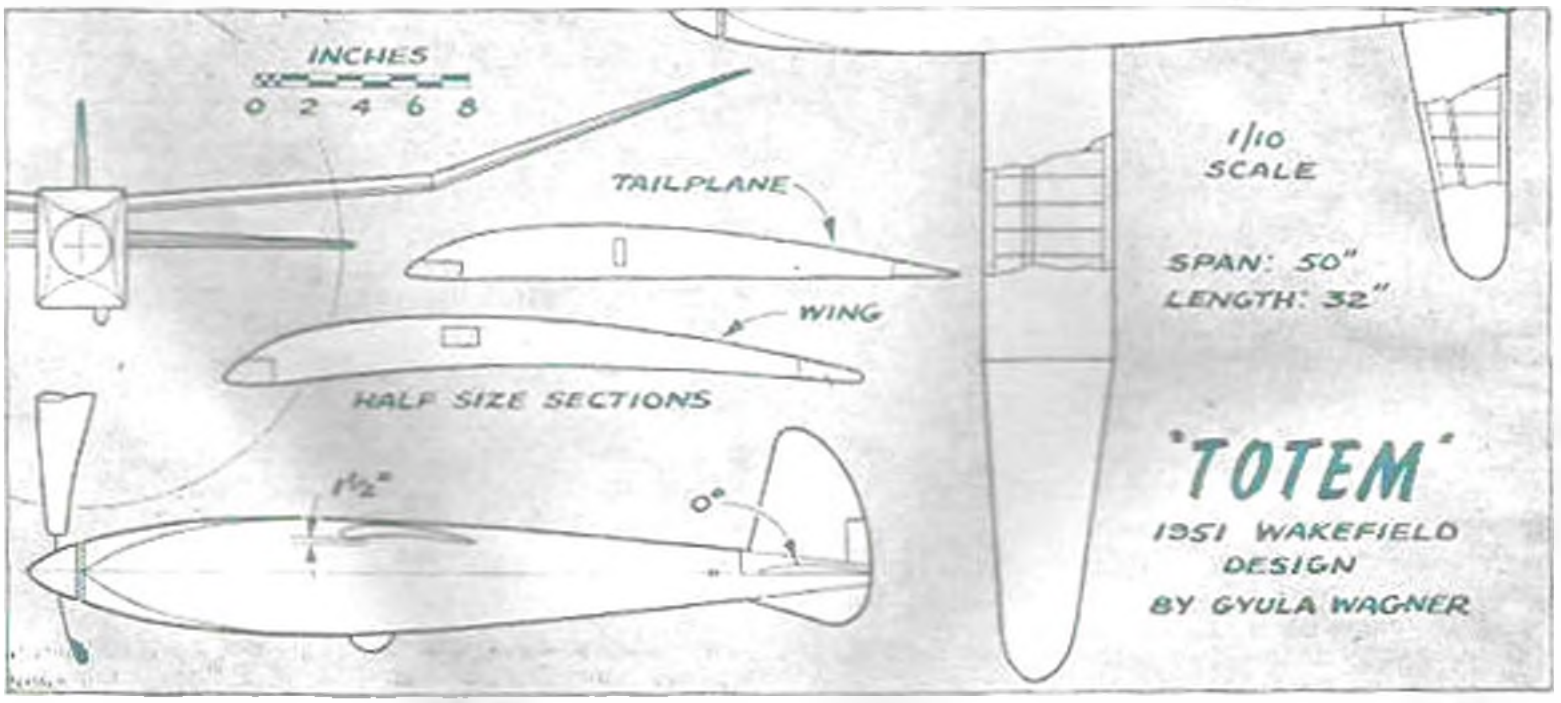
● IT WAS a pleasant suprise to receive a letter with a Hungarian postmark the other day—from Gyula Wagner, of Budapest, who is a keen model builder and holder of two National power records—for Duration (50 min. 16 sec.) and Distance (30 miles). Gyula is 20 years old and has been building models since 1940—his favourite types being Wakefield, free-flight power and indoor models. In 1949, he won the power event at the Hungarian Nationals and at this year's National Indoor Meet (March 18th), he took first place in the Flying Wing class (6 min. 32 sec.) with a microfilm model. Gyula enclosed some snaps of his latest free-flight pylon (McCoy "19" powered) and a three-view of his 1951 Wakefield design—the latter a very clean shoulder-wing slabsider, with a single leg retracting undercarriage. Gyula would like to exchange model news with British modellers and his address is: Budapest II, Alvinci ut 30, Hungary.

★ ★ ★

In Brief

● THE NEW Car-Plate and Autobrite liquid car polishes are ideal for protecting the finish of colour doped model surfaces. These polishes are applied by spreading on with a soft cloth, allowing to dry (about 20 min.) and then wiping off to leave a hard glossy surface . . . P. E. Norman has built a free-flight version of that famous fighter of the 'thirties—the Hawker *Fury Mk. II*. Scale dihedral, scale tail-surfaces and a completely cowled Ameo 3.5 are featured. The lower wings plug into the fuselage and the one-piece upper wing is seated on a parasol type mounting. The undercarriage is internally sprung and the cowling formed from thin Alclad. The model r.o.g.'s beautifully and when conditions are fairly calm, P.E. lets the motor run for 7 min.

We hear that Dave Long, well known Piper aircraft designer and model builder, was killed in his second *Long Midget* on a cross-country flight. . . . . Johnny Nunn sends in some details of the 10 c.c. team racers that he and his Barking clubmates are building nowadays. Having tried wing areas of 250, 275 and 300 sq. in., they eventually settled on the middle figure as ideal for 10 c.c. racing motors. The models are flown on 70 ft. lines and at the time of writing, only two-a-circle flying has been tried. Mercury pressure tanks are being used, but slightly larger 2 fluid oz. tanks would be better. Johnny's own model laps at about the 100 m.p.h. mark and is fitted with a McCoy Series 20.



ACCENT ON POWER

John Chinn with his Bill Dean designed "Cessna 170." Model has side-mounted Allbon Dart diesel.

By P. G. F. Chinn

PITY the hard-working contest flier! With screaming pylons, hurtling speed models, jumping stunters and whirling team-races seldom can he stand back, relax and enjoy his flying. The passing of those more happy days when competition flying was a little less intense and possibly had more of the sporting element, has oft-times been deplored by older modellers. How fortunate it is that there are model aeroplanes, now appearing in greater numbers, for those who like a more leisured pace.

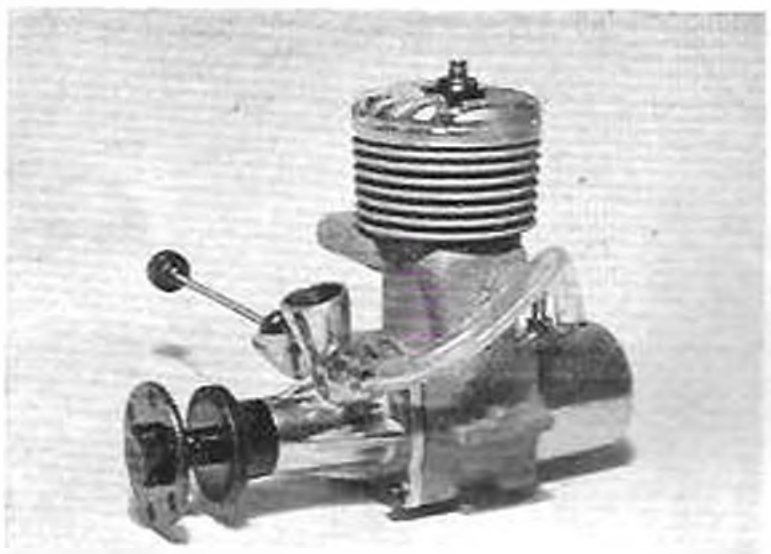
We are not decrying C/L or power/duration—far from it, having mostly favoured these types during the past five years—nor is any criticism of contest flying in general intended. In any case, the vast majority of models built from kits and published plans, which have been designed for competition work, are constructed by modellers who never enter them in big contests: possibly because, even if they make a reasonably good model, are under the erroneous impression that they "wouldn't stand an earthly" (visits to some comps. should soon dispel such notions!) or, in a few cases, live in out-of-the-way places from which the big events are difficult to reach. Probably by far the greatest number, however, build and fly simply for the fun of it and are not inclined to enter the fray. If they build strictly competition types, this may be because they wish to achieve a certain standard of performance for their own satisfaction or, equally probably, because the majority of available designs have hitherto been of these types.

The "Cessna 170" with cowling removed. Note dural undercarriage legs.

Because of all this, the apparent revival of interest in free-flight scale models and such like "pleasure" types, seems to be most timely. For those who fly only for pleasure, an occasional scale model adds a little more spice to the fun of model flying: for the inveterate "spindizzy" or power/duration addict a good scale or semi-scale type can provide the sort of brother's holiday that may serve to show him how much he may be missing.

A couple of months ago an interesting small scale job was described in these columns: Bill Dean's Dart-powered *Cessna* 170 a replica of which was also then being completed by the writer's brother. Bill has now produced two more models of the same type: a Luscombe *Silvaire* and a Piper *Super Cruiser* and since all three will shortly be available in kit form, some gen on experiences with the *Cessna* may be of interest.

The model was built exactly to plan except for the addition of 1/32 in. sheet balsa to the upper leading-edge surface of the wing and two stringers to each corner of the fuselage. Despite these minor "extras" the finished weight came out at 8½ oz.—½ oz. less than the original. The upper cowling section behind the engine calls for stiff paper covering and three-sheet Bristol-board was therefore used here. However it is felt that the sheet balsa filling-in between stringers, which is used to cowl the engine could profitably be, extended back to this section at the expense of slight extra effort. The c.g. location was found to be almost exactly in the specified position and no ballast was



The 3.2 c.c. McCoy 19, an American "sport" type engine.

needed to obtain a satisfactory longitudinal trim.

Since the Allbon Dart motor provides far more power than is required, or is even desirable for a model of this type, it was decided that this power should be used in the most *inefficient* possible manner without this appearing too obvious. A 7 in. scale type propeller with narrow but very thick section symmetrical section blades was, therefore, made and painted black and a metal sheathed leading-edge was simulated by means of metal foil doped on. With this prop. the Dart can be run steadily on a rich needle setting without recourse to excessively low compression (and the resultant misfire which this gives) to obtain low thrust for a shallow climb. The only disadvantage is that torque, of course, remains relatively high and thus induces a fairly steep left banking turn, but this was counteracted by the use of extra sidethrust.

From the first flight the model flew very satisfactorily and the only adjustments made were to give a total of 4 deg. right thrust to the engine in order to produce the flight pattern now used. This is a wide left turn under power, with straight glide. Due to the generous fin area, the model has a natural tendency to rudder into wind in the glide and a straight approach is usually obtained.

Perhaps the most convincing argument of the *Cessna's* "flyability" is that, despite the accepted sensitiveness to trim (particularly in such small sizes) and vulnerability, of scale types, the model remains quite unmarked, after a score or more flights, including a number made under moderately windy conditions. The dural undercarriage seems to be quite as serviceable as a normal wire type, with the advantage that it will not bend back easily in a heavy landing or collision. The need here is to glue and brace the whole unit really firmly to the interior of the fuselage in order that shocks are transmitted through the airframe.

In addition to the Dart, one or two other small diesels will shortly be making an appearance, suitable for similar models. These include the Elfin .49 and Frog "50" each of 0.49 c.c. capacity. Both these, like the Dart are annular port shaft rotary valve engines. Other suitable units can be found in the popular American "½A" glow-plug motors. These are of up to 0.8 c.c. displacement (0.049 cu. in.) but do not deliver any more power—rather less in fact—than the Dart, so that the difficulty of reducing power with the glow-plug type should not arise.

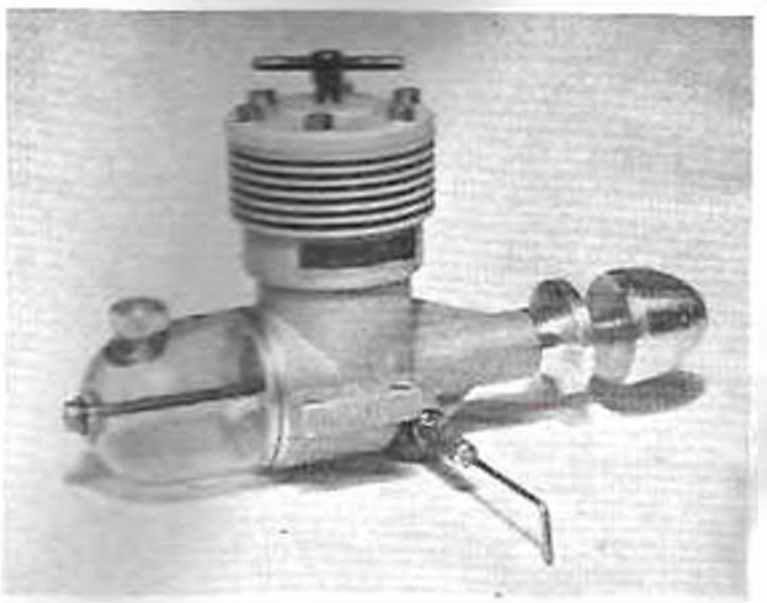
One of these latter engines was, a short time ago, received by the writer from a friend in the U.S. This was the Atwood Wasp .049 which is probably the most powerful and certainly one of the best "½A" class engines so far turned out in the U.S. Like the Anderson .045, described a few months ago, the Wasp is sold complete with all the necessary oddments, including fuel tank, an excellent moulded prop., glow-plug connector and combination spanner. It is a very neat and compact little engine as the photograph shows and the finish of all the component parts, including the polished die-cast crankcase and tank, is excellent.

In these baby g.p. engines, a nitroparaffin content alcohol fuel is generally a necessity and it is most essential to avoid overloading with a large prop. By "large" is meant anything over 6 × 3. The Wasp was tried out on the 5½ in. "Kaysun" prop. supplied and, after a short running-in period, was checked at 11,500 r.p.m. The engine needs to be primed but not made too wet and one need have no fears for one's fingers. The exhaust note can best be described as sounding just like a miniature Yulon.

In addition to the new .49 c.c. Elfin, the 1.49 and 2.49 Elfin models show detail improvements for 1951. These include cleaner die-casting and a new type compression-lever. This latter is in a shallow "V" formation which is much easier to grip and thus facilitates adjustment.

Another interesting high-performance diesel which we have recently tried out is the latest version of the 3.42 c.c. D.C.350 produced by Messrs. Davies-Charlton & Co., of Barnoldswick, Lancs. who, of course, also built the well-known "Wildcat" 5 c.c. diesel.

This is a purposeful looking engine, the crankcase and cylinder barrel which is produced en bloc, being



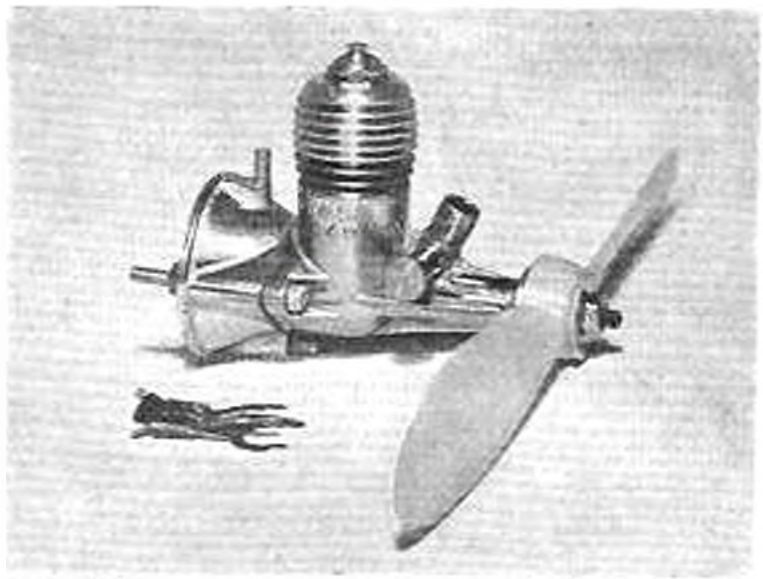
The D.C. 350 diesel, a well made addition to the ranks of high-performance 3.5 c.c. class diesels.

very cleanly die-cast with the fins machined and then finished in the attractive matt grey treatment now featured by many leading makes, including Eta, Dooling and McCoy. The cylinder head is similarly finished and is now attached with six machine screws, while the compression lever is now of the "T" type.

The D.C. 350 is a shaft-valve engine with induction below the main bearing and drawing fuel from a detachable plastic tank mounted on the rear crankcase cover. The engine is of the annular port type. The cylinder casting, however, includes an exhaust belt, expended gases being ejected through ducts on either side.

The D.C.350 has the power at high revs which we have now become accustomed to expecting of high performance competition diesels and the makers state that the port design has been adopted to combine high power with moderate fuel consumption, giving, as examples of this, performance figures obtained with a D.C. gen fitted to a Mercury Mk. I team racer. On a pint of fuel, 77 laps were obtained at a speed of [illegible], an extremely good performance indeed. At a distinctly reduced speed (69 m.p.h.), laps were increased to [illegible], which, with the desirable avoidance of overheat runs, gives a handy safety margin, except that such a model should cover a 10-mile race with only one pit stop.

The D.C. 350 falls into the S.M.A.E. "B" and "III" classes and another engine of this group which the writer recently sampled was the American McCoy "19" front rotary valve model. This engine, although not to be confused with the McCoy "Red Head 19" disc-valve ball-bearing racing model, emphasises the marked differences between contemporary British and American model engine design. Both engines are designed mainly for the same types of installations: general purpose C/L and free-flight. Of only slightly less capacity (3.2 c.c.) the McCoy is also a shaft-valve engine like the D.C. 350 (and, for that matter, the Amco 3.5 which is of identical bore and stroke), but here the similarity ends.

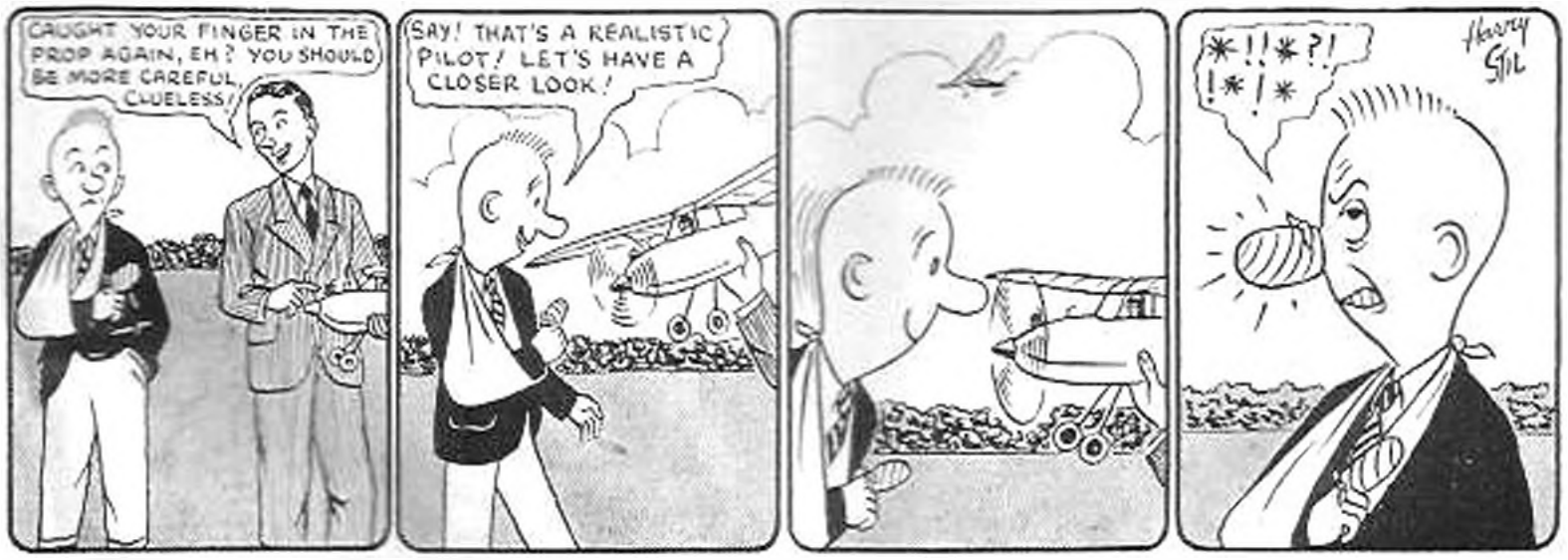


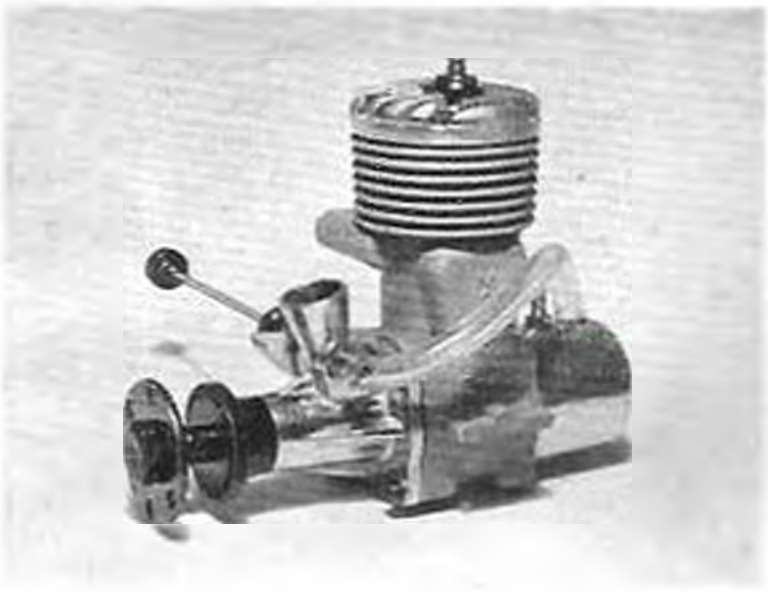
A particularly good example of the "2A" class engine which is now so popular in the U.S.A. The Atwood "Wasp" of 0.8 c.c.

The McCoy is a glow-plug engine. It uses a lightweight piston with two rings and has 180-deg. exhaust porting with a large volume transfer passage. Although it has a one-piece crankcase/cylinder casting like the D.C. 350 (an uncommon feature in a British engine) the front bearing housing is separate while no detachable rear cover is used.

The McCoy peaks at quite high r.p.m. and shows a similar level of performance to the Amco "Glo. 3.5" but in the case of the example tested was considerably more difficult to start than the Glo. 3.5 which is particularly easy in this respect. This was due to relatively poor piston seal and would improve somewhat as the engine was run in and the piston rings became bedded-in. The only method of guaranteeing a reasonably quick start with the new engine however was to liberally prime the cylinder through the plug hole with castor oil turning the engine over so that a fairly thick film was distributed over the cylinder walls and piston surfaces and in the ring grooves. With compression thus improved, and a generous prime of fuel, the engine started readily.

POKING HIS NOSE IN **By Harry Stil**





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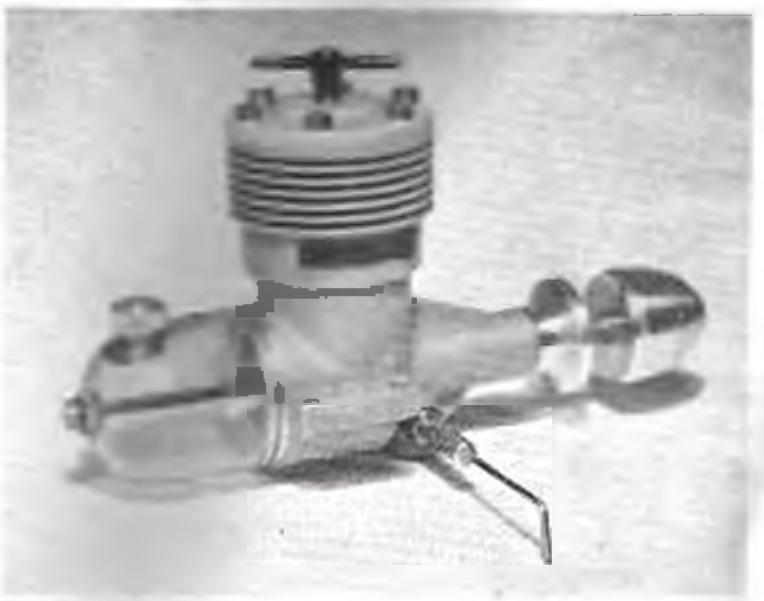

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Correspondence

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

BOWDEN TROPHY CONTEST

DEAR SIR,—Past supporters of the Bowden International Power Trophy may feel that this year's rules have deserted their interests in favour of "duration," which has become universal in all free-flight competitions. I feel it is therefore necessary to say that through an oversight the original intentions behind the trophy were lost sight of for this year, and that those who have found an outlet for their activities in the "Bowden" may take comfort for the future years from 1952 onwards, when the originally stipulated intentions behind the trophy will be considered.

Duration of all types is very well catered for in the major competitions. Therefore, when I originally gave the trophy to the S.M.A.E. I made certain stipulations which would encourage a wide range of engine types and capacities, and also flying other than just pure duration.

These stipulations covered the following points:—

(1) To encourage all types of internal combustion engine (except jets) of any capacity up to 10 c.c., the S.M.A.E. limit. (Even jets were not ruled out if they became safe for free-flight as advance progressed.)

(2) Realistic type of flight, as opposed to duration climb only.

(3) Precision control of flight.

(4) The encouragement of variety in design of the aircraft.

(5) To hold the competition yearly in the London area in order to encourage foreign entries to come in this country.

In conclusion, I would say that I strongly feel there are a number of people who still like realistic flight and experimental variety, and it is these people I wish to encourage, for I consider they are somewhat neglected by the clubs who have very adequately catered for the duration enthusiast. It is therefore up to those who support the "Bowden" in interest and in active competition, to let us have their views on how we can best frame rules to comply with the stated intentions.

Yours faithfully,

Poole, Dorset. C. E. BOWDEN.

TO THE "POWER AND GLORY" BOYS

DEAR SIR,—The "power and glory" boys of the anti-Wakefield movement come very near to clinching the argument in favour of a merciful end to the anachronistic reign of King Rubber. They plausibly condemn the diehard attitude which clings to the use of such an archaic method of propulsion in the premier international event, and convincingly suggest that the popular miniature engine has all but eclipsed the old fashioned and inefficient rubber motor.

Yet with all their potent arguments they cannot overcome the incontrovertible fact that the rubber model remains the only form of competition model which can be fully extended within the limits of the type of power prescribed. The power model outranges its suitability for duration competition by reason of its all too efficient propulsion unit, and some arbitrary means of reducing its range potential must be imposed to bring it within the scope of competitive activities. The energy available to the rubber model, on the other hand, is in no way proscribed by such arbitrary limitations. A Wakefield, for instance, could carry more than twice its weight in rubber strip, if that were practicable; and such energy could be freely arranged, in terms of power run, to suit the flying characteristics of the particular design.

This latter factor is, I think, a very important one, as it gives rise to that great diversity of design and variety of flying techniques which open up a field of debate, controversy and speculation without parallel in any other form of competition flying. In the world of power only team racing enjoys any similar freedom of individual choice in the conversion of energy into terms of range. Free-flight competition merely limits the range by restricting the motor run and engine capacity; thereby giving no scope for the possible development of a slower climbing model with a more economical, and thus more efficient, utilisation of energy.

The prime objective in free-flight power competition is always to achieve the greatest possible height in the shortest possible time. This, admittedly, calls for a high degree of trimming skill and technical ability, but performance of this nature ultimately depends more upon the science of the engine manufacturer than upon the skill of the individual modeller.

Above all, with a Wakefield model the competitor can really "have a bash." As he piles on the last few turns it is with the exhilarating feeling that he will be flying his model to the utmost limits of its capabilities.

Yours faithfully,

Romford, Essex. L. RANSON.

CAPACITY AND POWER

DEAR SIR,—In your March "Here and There" a paragraph entitled "Capacity and Power" asked readers for their views on engine classification.

May I suggest the following system, which is primarily based on the MODEL AIRCRAFT "Engine Test" reports.

The performance of the engine in b.h.p./litre should be multiplied by the power/weight ratio in h.p./lb. The resulting figure should then be divided by those for a very well-known engine (e.g., Mills, Rec, etc.), the result being then expressed as a number.

I have prepared a chart, using a glow-plugged Arden 099 as datum, and using your published test figures. It was noticeable that, in general, the modern engines gradually crept up the scale, and that two engines of different sizes could be compared in a general way in terms of the "performance number."

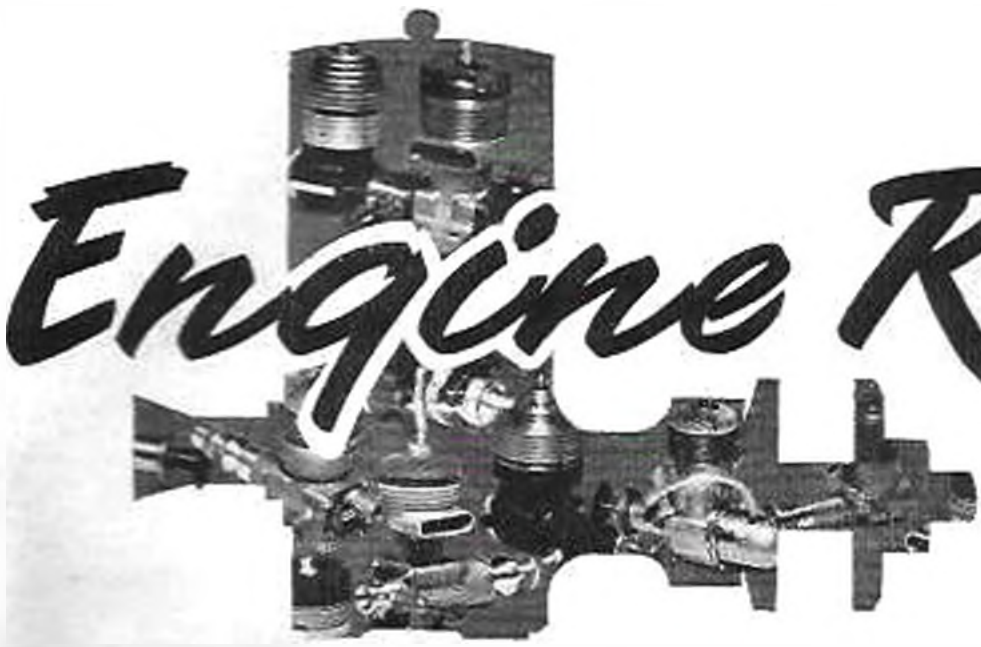
Such a method, of course, depends essentially on the availability of accurate test data, and perhaps the manufacturers could co-operate in this respect, with curves obtained as the average of a number of tests, to eliminate the odd "super" and "dud" cases.

Perhaps I am sticking my neck out, writing this, but the results would, I think, be interesting.

Yours faithfully,

Hayes End, Middlesex. JAMES F. MURRISON

Engine Review



PART TWO

GLOW-PLUG AND SPARK IGNITION ENGINES

RATHER more numerous than the compression-ignition types dealt with in Part 1, the spark-ignition and glow-plug engines listed in this review include a number of popular American units many of which are frequently seen in Britain.

Smallest of these engines are the now popular "¼A" class g.p. types, which comprise nine different models from five manufacturers. The first of these, introduced towards the end of 1948, and, incidentally, the smallest capacity so far manufactured, is the K. & B. "Infant-Terrible" of 0.02 cu. in.—approximately the same capacity as the British Kalper diesel. Like all the ¼A types, this is a shaft rotary-valve engine. A 5 in. × 2 in. prop. is recommended for the "Infant," which may be used for free-flight models as small as 24 in. span. Two other K. & B. ¼A engines have since appeared, of 0.035 and 0.049 cu. in. respectively, suitable for the ¼A class free-flight contest models now popular in the U.S.

Quickly following the small K. & B. engine, were designs from the Mel Anderson and Herkimer-"O.K." concerns. The well-known Anderson "Baby-Spitfire" of 0.045 cu. in. was, last year, supplemented by a new low-priced version known as the "Spitzy." For 1951, an improved "Spitzy" with a larger integral fuel-tank, heavier crank-shaft and higher compression-ratio, is available. The latest Anderson product is just outside the ¼A group and is a 0.065 cu. in. engine (i.e., just over 1 c.c.) known as the "Royal-Spitfire." This engine retains the 360 deg. port layout but features an exhaust duct with outlet on the left-hand side. The engine is of attractive appearance and has the same good finish displayed by other Anderson engines.

The Herkimer "Cub" range comprises four models: two in the half-A group, the 0.039 and 0.049, and two A class engines of 0.074 cu. in. and 0.099 cu. in. All four engines are of similar design and feature a patented porting system designed by Charles Herkimer, president of the Herkimer Tool and Model Works in New York.

A recently introduced ¼A engine which has already gained a number of contest distinctions is the Atwood "Wasp." This is a very neat radial mount 0.049 cu. in. engine of rather similar layout to the popular British Class I radial port diesels. A low stroke/bore ratio is employed and the engine reveals the same clean, polished die-casting as found on many other leading American types. Latest addition to the ¼A ranks is from the Duro-Matic company, makers of the highly successful McCoy engines, and is known as the "Baby Mac." Full details of this model have not yet been received.

In general, these small glow-plug engines do not show such high specific output figures as are obtainable with the latest small British diesels. They are essentially high speed engines and must be allowed to run at speeds of 12,000 r.p.m. or more to achieve maximum power, but on a power/displacement basis, the small g.p. types do not equal the performance of such engines as the Mills "75" and Allbon Dart which, at 0.45 cu. in. and 0.33 cu. in. respectively, are well within the ¼A class limits.

Within the S.M.A.E. Class I classification is a new British glow-plug engine, shortly due to reach the model shops: the 1.48 c.c. Frog "150" "Red-Glow." This will replace the "160" model and is to be accompanied by a diesel version of the same engine and, also, by a new 0.49 c.c. diesel known as the Frog "50." Information on these latter were received too late for inclusion in last month's article. All these engines differ from previous Frog designs and follow the now popular small high-performance engine layout of shaft rotary-valve, short stroke and annular porting with cylinder screwing into the crankcase and the cylinder head threaded on to the cylinder. The diesel "150" has the same bore and stroke dimensions as the glow-plug version for which data is listed. The "50" model has a bore of 0.515 in. and stroke of 0.330 in.

All the smaller types of g.p. engines are, of course, lapped piston units. The smallest engine having piston rings (in this case one ring) is the McCoy "9" of 1.6 c.c. This is the smallest of the three "sport-type" McCoy engines now built. The other two are the "19" and "29." Each of these is a shaft rotary-valve engine and the two latter types are, of course, rather cheaper than the McCoy "Red Head" disc-valve racing series. The shaft-valve "19" and "29" have aluminium pistons with two

The American Dooling "29."

compression rings. They are primarily intended for free flight and general-purpose C.L. use.

Within the British Class A and C.L. Class II categories will be the new E.D. 2.46 which, first appearing as a diesel, will later become available both as a glow-plug and spark ignition engine, the latter type with two-speed contact-breaker if required. As described last month, this engine features two ball-bearings and a disc admission valve.

Other small engines to use ball-bearings are the popular Arden 0.099 and 0.199. These engines pioneered the now widely used 360-d-g. porting system in which the normal transfer passage is replaced by a grooved lower cylinder section. Designer Ray Arden also originated the model glow-plug in 1947 and the two Arden engines, originally designed for spark-ignition, were the first units to be offered with glow-plug ignition. These engines have always been noted for the exceptionally high degree of accuracy and finish which their component parts display, standards which have seldom been equalled in miniature engine construction.

In the .19 cu. in. and 3.5 c.c. groups are a number of both glow-plug and spark-ignition units suitable for different types of models. For control-line speed there are the two leading racing 19's, the American McCoy Red Head (which has returned speeds of up to 128 m.p.h. in the U.S.) and the British Eta. Of similar general design, these are disc-valve engines, having twin ball-bearings and aluminium pistons with two rings, and are capable of delivering outputs exceeding .35 b.h.p. on suitable nitrated fuels. An output of .40 b.h.p. is, in fact, now claimed for the American unit. The Eta has a collett type prop drive as fitted on most racing engines, while the McCoy has a normal serrated disc driver. The current McCoy Red Head 19 is an improved version of the original .19 model introduced in the autumn of 1948, which had a single ball-bearing with cast-iron outer bearing. A small, yet useful, feature of the new model is the right-angle elbow jet, a standard fitting, which is of considerable assistance in accommodating the fuel pipe within the severely limited space of a speed model fuselage. This engine, like the Eta, is primarily a g.p. type, but is also available with spark ignition. The Eta design is to the same high constructional standards as this company's well-known "29" model.

One of the earliest "19's" was the original three-port Ohlsson spark ignition model. Rotary valve and glow-plug conversions of this model and of the slightly bigger Ohlsson 23 later became available. The three-port Ohlsson is now no longer manufactured, but the current shaft-valve 19 and 23 may be purchased either as spark or g.p. units. The Ohlsson models are unique in the form of crankcase, cylinder and cylinder head construction used. These are welded into an integral unit with only the front bearing housing detachable.

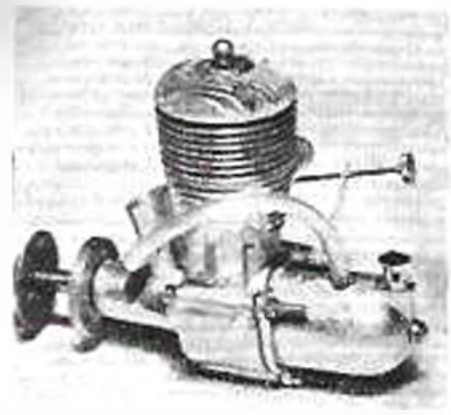
Also dating back to pre-war days is the well-proved disc-valve Bantam "19" engine which, originally designed by Ben Shereshaw, has, since 1947, been produced by the Herkimer company. This compact, lightweight engine has been widely used for all kinds of competition models, including speed and power duration types.

A new 0.19 which is due to be released by the time these words appear, is the latest K. & B. model, a shaft valve engine which, incidentally, has the same bore and stroke dimensions as the Eta "19."

A possible rival to the McCoy "19" in the shape of Hornet Motors' new 0.199 model was suggested by reports of this engine's impending appearance some time ago, but the Hornet does not now appear to have been put into quantity production.

Outside the American Class A group, but still within the S.M.A.E. Class III category, there remains the Amco "Glo. 3.5" which was recently featured in the MODEL AIRCRAFT "Engine Test" series. Of light weight and high performance, this engine, with its good compression seal, obtained by the use of a lapped piston, is easy to start and is suitable for most model designs for which 0.19 cu. in. types are specified.

By far the largest group of g.p. and spark ignition engines is found in the 5 c.c. and 0.30 cu. in. types. These include such well-known British examples as the Eta "29," Yulon "29" and "30" and Frog "500." Of these, the Eta "29" and Yulon "30," appearing in the winter of 1948/49, were the first. The Eta "29" is essentially a racing unit and has undergone a number of detail modifications since its introduction. From the outset, this engine established a standard of performance considerably higher than any other British 5 c.c. engine and, in its 1950 Series III version, for which outputs of up to 0.65 b.h.p. have been achieved at speeds approaching 16,000 r.p.m., the Eta is comparable with its American counterpart, the McCoy "Red Head 29," for which similar figures are claimed. Originally rated at .54 b.h.p. at 13,400 r.p.m., the porting was later modified to give a flatter power curve with the peak occurring at 14,000 to 14,500 r.p.m. The Series II and III models have further amended porting with larger choke tube area and, in the Series III, a larger transfer passage and exhaust duct. The Yulon has attracted considerable attention among stunt enthusiasts and gained the distinction of winning both the 1949 and 1950 Gold Trophy events. Three 5 c.c. models have so far been produced, the 1949



The popular British Frog "500."

" 30." and 1950 " 29 " and the 1951 " Eagle." Of somewhat unusual design, the 1949/50 Yulons featured 360-deg. porting of original pattern in which complete rings of small circular ports were used for both transfer and exhaust. The latest. " Eagle," model uses an entirely different 360-deg. arrangement which has been developed as a means of overcoming certain of the inherent disadvantages of the normal annular port layout.

The Frog " 500," which gained wide popularity during 1950 is comparable in design and performance to the American general purpose units of similar capacity. Up to 0.45 b.h.p. at 13,000 r.p.m. has been obtained with one of these engines on test and using a heavily nitrated fuel, while 0.37 b.h.p. was recorded with the same engine using standard fuel. The spark-ignition version of this engine, long awaited by R/C enthusiasts, should be available very shortly.

Among the older American " 29's " are the K. & B. Torpedo, Forster, Herkimer-" O.K.", De Long " 30 " and Ohlsson " 29." All these are lapped piston shaft valve engines with the exception of the Forster and De Long which have disc valves. These two engines have also been produced in racing versions with aluminium pistons and two rings.

Both Forster and Torpedo date back to 1940. The Forster was one of the very first commercially built disc-valve engines. The output of the standard Forster petrol engine is given as 0.32 b.h.p. at 11,600 r.p.m. On methanol fuel this is raised to 0.38 at 12,300 while on g.p. ignition and a nitro-methane mixture the b.h.p. is further boosted to 0.42 at 13,400 r.p.m. The entirely new G.29 model which was introduced last year, is estimated to give better than 0.5 b.h.p. at 14/15,000 r.p.m. Both these Forster models are also produced in American " C " class versions, the bore of the cylinders in each case being increased by 0.010 in. to push the displacement up to 0.304 cu. in. At 4.98 c.c., however, these engines are still just within the British Class B and Class IV groups. The G.29 and G.31 models are distinguishable from the standard " 29 " and " 305 " by an inclined carburettor intake. No contact-breakers are fitted to the racing models as these are designed expressly for g.p. operation.

The K. & B. Torpedo is also produced in a larger bore, Class C, version, known as the Torpedo-33 and the Ohlsson " 29 " also has its Class C counterpart in the " 33 " model, the increase in capacity in this instance, however, being obtained by " stroking " the engine from 0.663 in. to 0.729 in. Similarly, the Fox " 35 " has appeared as a " 29 " with bore reduced from 0.800 to 0.738 in. Yet another example of " two-class " design is found in the new Veco " 29 " and " 31 " in which a 0.025 in. increase in bore is used to bring the 0.29 cu. in. engines up to 0.319 cu. in.

An outstanding "49"—The Yulon

The British Nordic R.C.10

Alone among the non-racing-type " 29's," the McCoy " 29 " front rotary engine is the only unit having an aluminium piston with rings. This engine replaces the same company's earlier " Sportsman 29 " engine which had a disc admission valve. Also now discontinued are the Sportsman Junior and Senior models. No less than 11 different McCoy models have been marketed during the past three years, excluding improved or modified versions of existing designs.

The outstanding American 0.29 at the present time is undoubtedly the Dooling. This engine differs considerably from its nearest rival, the Red Head McCoy " 29 " already mentioned, and features the very low stroke/bore ratio successfully used on the 10 c.c. Dooling. The engine is exceptionally well made and an unusual departure from standard practice is the non-metallic valve-rotor employed. The engine has a very light aluminium piston and transfer of the crankcase charge is effected via large skirt ports in the piston and corresponding ports in the cylinder wall. An output of 0.75 b.h.p. is claimed and independent tests would seem to indicate that this claim can be substantiated.

Sole British example of the 0.49 cu. in. group is the Yulon " 49," which is basically similar to the 0.29 engine but with greatly increased bore and a slightly longer crankshaft. This engine is remarkable for its very light weight and thus good power/weight ratio. The American Class C speed group is represented by the McCoy " 49." The only other high performance " 49 " is the Atwood Triumph and this is, in fact, the only engine to offer any competition to the McCoy in the U.S. A disc-valve version of the Triumph " 49 " was actually used by speed expert Don Newberger to record his winning speed of over 136 m.p.h. at the 1948 American Nationals. The Triumph has an aluminium piston with two compression rings and is available either as a spark-ignition or glow-plug type. Here again a 10 thou. oversize cylinder is used to increase capacity from 0.491 cu. in. to 0.503 cu. in. in the Class D Triumph " 51 " model. This latter engine, at 8.24 c.c. is, of course, still within the S.M.A.E. Class V (8.5 c.c.) group.

The 0.60 cu. in., or 10 c.c., engine has not achieved very great popularity in Great Britain since the war and in the U.S., too, the " sixties " have lately suffered a decline in all except C/L speed. British 10 c.c. engines have yet to equal the performance of the leading American types, namely, the Dooling and

Series "20" McCoy, although a Series II model Nordec-Special engine tested for MODEL AIRCRAFT has produced some 1.23 b.h.p., a very good figure and one which could doubtless be further improved. This engine is very similar in design and construction to the Series "20" model McCoy

Both Dooling and McCoy have returned speeds of 150-160 m.p.h. in American contests and the latter currently holds the A.M.A. Class D record at 162.54 m.p.h. as well as the British record of 132.6 m.p.h. Other racing type engines are the American Hornet, Ball and Fox "Hi-Speed" and the British Rowell, Conqueror and Pioneer. All these are disc-valve ball-bearing engines with lightweight ringed pistons, with the exception of the Ball which has crankshaft induction. The Fox, alone, differs from standard racing practice in having a relatively low compression ratio and in being much lighter in weight. This engine is also available with a lapped steel piston for general competition work.

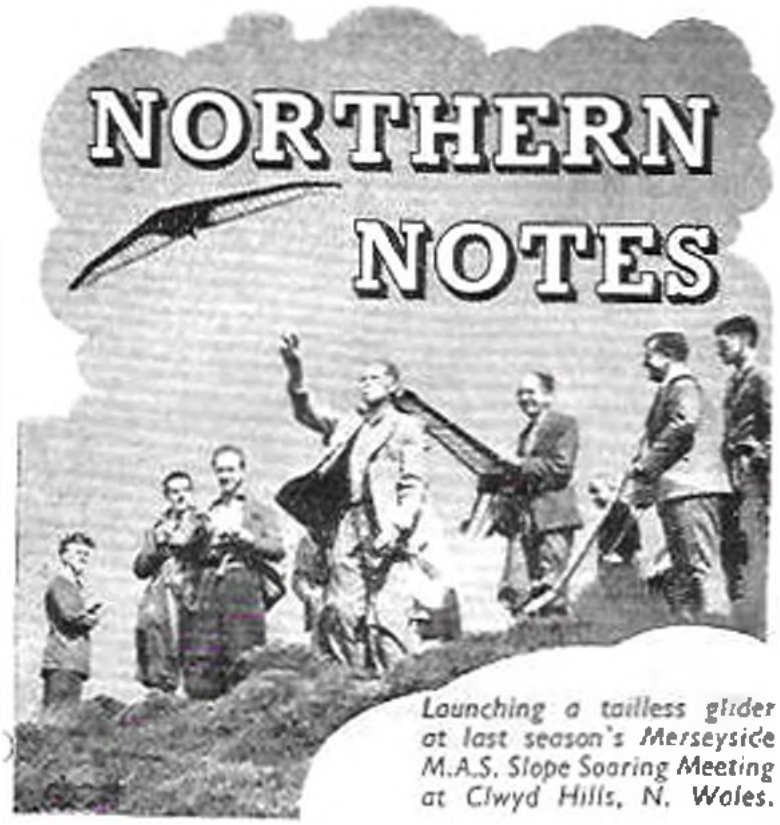
GLOW-PLUG AND SPARK IGNITION ENGINES 1948-51

Type	Class S.M.A.E. F/F	Class S.M.A.E. C/L	Class A.M.A. F/F	Class A.M.A. C/L	Swept Volume cu. in.	Swept Volume c.c.	Bore in.	Stroke in.	Weight oz.	Compression Ratio	B.H.P.	at	R.P.M.	Induction System	Mounting
K. & B. 'Infant-Torpedo'	A	1	¼A	A	.020	.33	.281	.331	1.0	8 : 1	...	...	...	Shaft R.V.	Radial
K. & B. 'Torpedo-Jr.'	A	1	¼A	A	.035	.57	.343	.380	1.2	8 : 1	...	...	...	Shaft R.V.	Radial
Herkimer-'O.K.' Cub .039	A	1	¼A	A	.039	.64	.390	.334	1.5	9 : 1	...	...	...	Shaft R.V.	Radial
Anderson 'Baby-Spitfire'	A	1	¼A	A	.045	.74	.375	.406	1.0	10 : 1	...	...	...	Shaft R.V.	Radial
Anderson 'Spitzy'	A	1	¼A	A	.045	.74	.379	.405	1.4	—	.025	at	12000	Shaft R.V.	Radial
K. & B. 'Torpedo-.049'	A	1	¼A	A	.049	.80	.406	.380	1.5	—	...	...	...	Shaft R.V.	Radial
McCoy 'Baby-Mac'	A	1	¼A	A	.049	.80			1.4	—	...	...	...	Shaft R.V.	Radial
Atwood 'Wasp'	A	1	¼A	A	.049	.80	.421	.356	1.3	8 : 1	...	...	...	Shaft R.V.	Radial
Herkimer-'O.K.' Cub 049	A	1	¼A	A	.049	.80	.390	.415	1.5	—	...	...	...	Shaft R.V.	Radial/Beam
Anderson 'Royal-Spitfire'	A	1	A	A	.065	1.06	.436	.437	1.9	6.5 : 1	...	...	...	Shaft R.V.	Beam
Herkimer-'O.K.' Cub 074	A	1	A	A	.074	1.21	.478	.415	1.7	—	...	...	...	Shaft R.V.	Radial/Beam
Frog '150' 'Red-Glow'	A	1	A	A	.091	1.48	.500	.460	2.9	8 : 1	...	...	...	Shaft R.V.	Radial
Allbon 'Arrow'	A	1	A	A	.091	1.49	.525	.420	2.2	10 : 1	.08	at	11000	Shaft R.V.	Beam
Elf 'Single'	A	II	A	A	.097	1.60	.468	.564	3.0	7 : 1	.08	at	10000	3-port	Radial/Beam
'Glo-Mite'	A	II	A	A	.098	1.61	.500	.500	2.7	—	...	...	...	Shaft R.V.	Beam
McCoy '9'	A	II	A	A	.098	1.61	.500	.500	2.6	8 : 1	...	...	...	Shaft R.V.	Beam
Herkimer-'O.K.' Cub 099	A	II	A	A	.099	1.62	.515	.480	2.0	9.5 : 1	...	...	...	Shaft R.V.	Beam
Arden 099	A	II	A	A	.099	1.62	.495	.516	2.6	9 : 1	.12	at	12-13000	Shaft R.V.	Radial
Frog '160' 'Red Glow'	A	II	A	A	.101	1.66	.485	.550	3.2	—	.09	at	10000	Shaft R.V.	Radial
'K' Tornado	A	II	A	A	.119	1.96	.520	.562	4.2	—	...	...	...	Shaft R.V.	Radial/Beam
E.D. 2.46	A	II	A	A	.150	2.46	.590	.550	5.0	—	2+	at	12000	Disc R.V.	Beam
Elf 'Twin' (2-cyl.)	B	III	A	A	.195	3.20	.468	.564	5.0	7 : 1	.16	at	10000	3-port	Radial
McCoy '19' (1948/49)	B	III	A	A	.195	3.20	.625	.630	4.9	9 : 1	.3	at	14000	Disc R.V.	Beam
McCoy '19' (Shaft valve)	B	III	A	A	.195	3.20	.625	.630	4.5	—	.28	at	14000	Shaft R.V.	Beam
McCoy 'Red-Head 19'	B	III	A	A	.195	3.20	.625	.630	5.0	—	.25	at	14000	Disc R.V.	Beam
Ohlsson & Rice 19 (1951)	B	III	A	A	.196	3.21	.684	.536	4.8	7 : 1	...	...	...	Shaft R.V.	Radial/Beam
Ohlsson & Rice 19 (3-port)	B	III	A	A	.197	3.23	.6875	.531	4.0	6 : 1	.14	at	7000	3-port	Radial/Beam
Arden 199	B	III	A	A	.198	3.25	.635	.625	4.2	9 : 1	.22	at	13000	Shaft R.V.	Radial
Herkimer-'O.K.' 'Bantam'	B	III	A	A	.199	3.26	.654	.590	3.5	7 : 1	.28	at	12000	Disc R.V.	Beam
Eta '19' G.P. Series I	B	III	A	A	.199	3.27	.640	.620	4.7	8.5 : 1	.35	at	15000	Disc R.V.	Beam
K. & B. '19' ...	B	III	A	A	.199	3.27	.640	.620	6.0	—	...	...	...	Shaft R.V.	Beam
Amco 'Glo .35'	B	III	B	B	.209	3.42	.6875	.5625	4.2	8.5 : 1	.28	at	13000	Shaft R.V.	Radial/Beam
Ohlsson & Rice 23 (1951)	B	IV	B	B	.230	3.77	.684	.625	5.0	7 : 1	...	...	...	Shaft R.V.	Radial/Beam
Ohlsson & Rice 23 (3-port)	B	IV	B	B	.232	3.80	.6875	.625	4.5	6 : 1	.17	at	7500	3-port	Radial/Beam
K. & B. 'Torpedo-24'	B	IV	B	B	.249	4.08	.662	.724	7.0	7 : 1	...	...	...	Shaft R.V.	Radial/Beam
Campus '29' ...	B	IV	B	B	.278	4.56	.803	.550	—	4 : 1	...	...	...	Shaft R.V.	Beam
McCoy 'Sportsman-29'	B	IV	B	B	.293	4.80	.746	.670	6.5	—	.46	at	13/14000	Disc R.V.	Beam
McCoy '29' (Shaft valve) ...	B	IV	B	B	.296	4.85	.750	.670	6.5	—	.4+	at	13/14000	Shaft R.V.	Beam
McCoy 'Red Head 29' (1950) ...	B	IV	B	B	.296	4.85	.750	.670	7.0	8.5 : 1	.6	at	15000	Disc R.V.	Beam
Forster '29'	B	IV	B	B	.297	4.87	.750	.672	6.5	9 : 1	.40	at	13400	Disc R.V.	Beam/Radial
Forster 'G.29' ...	B	IV	B	B	.297	4.87	.750	.672	6.6	10 : 1	.5	at	14/15000	Disc R.V.	Beam/Radial
Eta 29 Series I (1948/9)	B	IV	B	B	.297	4.87	.750	.672	7.0	10 : 1	.54	at	13400	Disc R.V.	Beam

Type	Class S.M.A.E. F.F	Class S.M.A.E. C.L	Class A.M.A. F.F	Class A.M.A. C.L	Swept Volume cu. in.	Swept Volume c.c.	Bore in.	Stroke in.	Weight oz.	Compression Ratio	B.H.P. at R.P.M.	Induction System	Mounting
Eta 29 Series I (1949)	B	IV	B	B	.297	4.87	.750	.672	7.0	9 : 1	.54 at 14500	Disc R.V.	Beam
Eta 29 Series II and III	B	IV	B	B	.297	4.87	.750	.672	7.0	8.5 : 1	6 - at 15 16000	Disc R.V.	Beam
Dooling '29'	B	IV	B	B	.298	4.88	.800	.594	6.8	8.5 : 1	.75 at 17500	Disc R.V.	Beam
Yulon '29'	B	IV	B	B	.298	4.89	.743	.687	5.6	—	.38 at 13000	Shaft R.V.	Beam Radial
Yulon 'Eagle'	B	IV	B	B	.298	4.89	.743	.687	6.0	—	.4 + at 14000	Shaft R.V.	Beam
K. & B. Torpedo-29	B	IV	B	B	.299	4.90	.725	.724	7.5	6.9 : 1	—	Shaft R.V.	Beam Radial
Vaco '29'	B	IV	B	B	.299	4.90	.725	.724	7.0	8.5 : 1	.35 .40 at 11 12000	Shaft R.V.	Beam
Merkimer 'O.K.' 29	B	IV	B	B	.299	4.90	.760	.660	7.5	7 : 1	—	Shaft R.V.	Beam Radial
Merkimer 'O.K.' Mechand													
Ohlsson & Rice '29'	B	IV	B	B	.299	4.91	.759	.663	5.4	—	.40 at 10500	Shaft R.V.	Beam Radial
Fox '29'	B	IV	B	B	.299	4.90	.738	.700	5.5	7 : 1	.40 at 13000	Shaft R.V.	Beam
De Iong '30'	B	IV	B	B	.300	4.92	.748	.680	8.0	10 : 1	—	Disc R.V.	Beam
De Iong '30-Special'	B	IV	B	B	.300	4.92	.748	.680	8.5	9 : 1	.50 at 15000	Disc R.V.	Beam
Frog '500'	B	IV	C	C	.3005	4.92	.750	.680	7.5	8 : 1	.40 at 12500	Shaft R.V.	Beam Radial
Yulon '30'	B	IV	C	C	.302	4.95	.746	.691	5.5	—	.37 at 12000	Shaft R.V.	Beam Radial
Electra 'Pioneer-5'	B	IV	C	C	.303	4.97	.750	.6875	9.0	6 or 10:1	.42 at 12000	Disc R.V.	Beam
1066 'Hawk'	B	IV	C	C	.303	4.97	.750	.6875	9.0	—	—	Disc R.V.	Beam
'K' Vulcure G.P.	B	IV	C	C	.303	4.97	.750	.6875	7.5	—	.25 at 9000	Shaft R.V.	Beam
Forster '305'	B	IV	C	C	.304	4.98	.760	.672	6.5	9 : 1	.40 at 12400	Disc R.V.	Beam Radial
Forster 'G.31'	B	IV	C	C	.304	4.98	.760	.672	6.6	10 : 1	.5 at 14 15000	Disc R.V.	Beam Radial
Vaco '31'	C	V	C	C	.319	5.23	.750	.724	7.0	8.5 : 1	.35 .40 at 11 12000	Shaft R.V.	Beam
K. & B. 'Torpedo 32'	C	V	C	C	.321	5.26	.750	.725	7.5	8.5 : 1	—	Shaft R.V.	Beam Radial
Ohlsson & Rice '33'	C	V	C	C	.330	5.41	.759	.729	5.5	7.8 : 1	.40 at 11000	Shaft R.V.	Beam Radial
Fox '35'	C	V	C	C	.345	5.65	.800	.700	5.7	7 : 1	.5 + at 14000	Shaft R.V.	Beam
McCoy 'Sportsman Jr.'	C	V	C	C	.349	5.72	.809	.670	7.0	8.5 : 1	.41 at 13000	Disc R.V.	Beam
Reeves 6 c.c.	C	V	C	C	.359	5.88	.781	.750	7.9	6 : 1	.17 at 6,500	Shaft R.V.	Beam
Mechanair 'S.9'	C	V	C	C	.359	5.88	.781	.750	8.0	—	—	3-port	Beam
[M 'Four' (4-cyl.)	C	V	C	C	.389	6.38	.448	.564	9.0	7 : 1	—	3-port	Beam
Air-O 'Mighty Midget'	C	V	C	C	.451	7.39	.875	.750	7.5	8 : 1	.60 at 12400	3-port	Beam
Madewell '49'	C	V	C	C	.488	8.00	.891	.783	9.0	5.5 : 1	—	Shaft R.V.	Beam
Atwood 'Triumph-49'	C	V	C	C	.491	8.06	.890	.790	8.5	7.5 : 1	.75 at 14000	Shaft R.V.	Beam Radial
McCoy 'Red Head 49'	C	V	C	C	.491	8.05	.890	.790	11.5	9 : 1	.90 - at 15500	Disc R.V.	Beam
Yulon '49'	C	V	C	C	.498	8.16	.960	.688	6.7	—	.55 - at 12000	Shaft R.V.	Beam
Atwood 'Triumph 51'	C	V	C	D	.503	8.24	.900	.790	8.5	7.5 : 1	.75 at 14000	Shaft R.V.	Beam
McCoy 'Sportsman Sr.'	C	VI	C	D	.548	8.98	.940	.790	11.0	9 : 1	.69 at 13800	Disc R.V.	Beam
Fox 59 'Hi-Torque'	C	VI	C	D	.593	9.72	.937	.860	9.5	6 : 1	.80 at 10000	Disc R.V.	Beam
Fox 59 'Hi-Speed'	C	VI	C	D	.593	9.72	.937	.860	9.5	6 : 1	1.12 at 16000	Disc R.V.	Beam
Contestor D.60R	C	VI	C	D	.596	9.77	.945	.850	13.8	6.8 : 1	.61 at 10500	Drum R.V.	Beam
Ball BC	C	VI	C	D	.603	9.88	.924	.900	16.0	10 : 1	1.00 at 16000	Shaft R.V.	Beam
Wasp-Twin (2-cyl.)	C	VI	C	D	.604	9.90	.740	.702	12.0	7 : 1	.50 at 9000	Shaft R.V.	Beam
Merkimer 'O.K.' 60	C	VI	C	D	.604	9.90	.900	.950	12.0	6 or 8 : 1	.33 at 8500 9000	Shaft R.V.	Beam
Electra 'Pioneer-10'	C	VI	C	D	.604	9.90	.937	.875	14.0	12 : 1	.62 at 12000	Disc R.V.	Beam
Ohlsson & Rice '60'	C	VI	C	D	.604	9.90	.937	.875	10.0	6 : 1	.5 at 9000	3-port or Shaft	Beam Radial
1066 Conqueror	C	VI	C	D	.604	9.90	.937	.875	15.0	13 : 1	—	Disc R.V.	Beam
Hornet	C	VI	C	D	.604	9.90	.937	.875	16.0	10 : 1	1.2 at 14000	Disc R.V.	Beam
Rowell '60'	C	VI	C	D	.604	9.90	.937	.875	19.0	12 : 1	1.0 at 15000	Disc R.V.	Beam
Anderson Spitfire (1948)	C	VI	C	D	.604	9.90	.937	.875	12.0	6 : 1	.5 at 10000	Shaft R.V.	Beam
Jensen C.L. Special (4-stroke)	C	VI	C	D	.604	9.90	.937	.875	19.5	6.5 : 1	.52 at 10000	O.H.V.	Beam
Super Cyclone	C	VI	C	D	.604	9.90	.906	.937	10.0	5.5 : 1	.55 at 10500	Shaft R.V.	Beam
Nordec R.G.10	C	VI	C	D	.607	9.95	.940	.875	16.3	10 : 1	.63 at 12200	Disc R.V.	Beam
Nordec R.10	C	VI	C	D	.607	9.95	.940	.875	17.0	10 : 1	.74 at 13000	Disc R.V.	Beam
Nordec-Special Series I	C	VI	C	D	.607	9.95	.940	.875	16.5	10 : 1	.75 at 13000	Disc R.V.	Beam
Nordec-Special Series II	C	VI	C	D	.607	9.95	.940	.875	16.0	—	1.23 at 15200	Disc R.V.	Beam
McCoy Series 20	C	VI	C	D	.607	9.95	.940	.875	16.0	9.5 : 1	1.4 at 16000	Disc R.V.	Beam
Dooling 61	C	VI	C	D	.607	9.95	1.813	.750	16.0	9.5 : 1	1.5 at 16000	Disc R.V.	Beam
Craftsman-Twin (2-cyl.)	C	VI	C	D	.607	9.95	.750	.6875	15.5	7 : 1	.2 - at 6700	Disc R.V.	Beam
Atwood Champion Type D.R.	C	VI	C	D	.624	10.23	.940	.900	11.5	8 : 1	.90 at 12500	Dual R.V.	Beam
Super-Wasp (2-cyl.)	C	VI	C	D	.645	10.57	.740	.750	12.0	6.5 : 1	.75 at 10000	Shaft R.V.	Radial
Anderson-Spitfire (1949 SC)	C	VI	C	D	.647	10.60	.937	.937	12.0	6 : 1	.5 - at 10000	Shaft R.V.	Beam
Ohs Tornado-65	C	VI	C	D	.647	10.60	.937	.937	—	12.5 : 1	—	Disc R.V.	Beam
Hazard 'Blue-streak'	C	VI	C	D	.648	10.62	.940	.934	—	11 : 1	1.0 at 15000	Shaft R.V.	Beam
Burgess M.5 (5-cyl. radial)	—	—	—	—	.920	15.08	.625	.600	22.0	5.5 : 1	.3 at 3500	O.H.V.	Radial
Forster '99'	—	—	—	—	.997	16.34	1.062	1.125	15.0	8 : 1	.62 at 7000	3-port	Beam
Merkimer-O.K.' Twin (2-cyl.)	—	—	—	—	1.208	19.80	.900	.950	23.0	6 : 1	.50 at 6000	3-port	Radial

The above data are prepared as at April 1st, 1951. Weights quoted are actual checked weights wherever possible. Capacities (swept volume) are calculated from makers' bore and stroke measurements. Performance figures are prepared either from manufacturers' information, or from independent test data, or from estimates based thereon. Wherever possible these indicate, in round figures, average production model performance, rather than figures obtained with any one example.

NORTHERN NOTES



Launching a tailless glider at last season's Merseyside M.A.S. Slope Soaring Meeting at Clwyd Hills, N. Wales.

★ ON THE third stroke of the gong it will be somewhere round thereabouts and your local station announcer will be giving you the usual garbled version of events and happenings in the North. Stand by for a very important announcement from the Northern Area, one which should lead to rejoicing in all parts. At long last, and after a great deal of effort, sponsors have been found who are willing to assist with a real Northern Area Meeting. The help mentioned has come from the *Yorkshire Evening News*, who, in their desire to assist modellers in the county, are willing to stage a meeting of meetings. It has been suggested that this meeting be held at Sherburn (between York and Leeds) and that it take the place of the usual Northern Area Rally, due to be held at Baildon, on September 9th. Further details will be given as soon as available, but from what your writer has already heard, several imposing trophies have been assured, apart from a tremendous individual prize list. Make a note of the date.

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★ I UNDERSTAND too that the arrangements are well under way for an All C/L Rally sponsored by the Scarborough Corporation, to be held at Scarborough sometime in August. Here again I am informed that the Corporation are presenting imposing trophies with supporting prizes, a good blow out for the competitors after the event and also, if possible, provision of accommodation at a nominal figure for stoppers-over-night. It should be noted that both the events already mentioned are not confined to the North, or, in fact, to any particular area, but we hope to see a large entry of competition fliers from anywhere in the country. Again, full and finalised details will be given in these columns as soon as available.

★ AND HOW did you do on Gamage Day, Daddy? Did you manage to find your way through the blizzard, blinding snow storm, howling gale, typhoon (cross out inappropriate words, if inappropriate.) So far as I can gather there were only about two people brave or crazy enough to turn out in the North, since during the early part of the day, rain was proceeding at about 40 miles per hour horizontally from one horizon to the other and during the afternoon the only change in the conditions was that snow and hail was substituted for rain. Your correspondent made careful examination of the weather at intervals throughout the day and each time decided that discretion was the better part of valour and got back into bed. N.E. Area report that models were out of sight in 20 sec., but Leeds report that Henry Tubbs managed to pile up 315 sec. in the Gamage. Also I hear that York managed to beat Creswell in the Area Knockout. Creswell having the bad luck to smack up every model that attempted flight.

And so we draw a veil over this dull and dismal day, remembering that Gamage Day has never been a success yet and placing it to coincide with Easter Sunday this year was absolutely tempting providence. What we asked for, we certainly got.

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★ A NOTE to club secretaries of all the three Areas in the North, please, please do NOT send affiliation fees to your Area Secretary, they must be sent direct to the Society's Secretary at Londonderry House, and do NOT send to Londonderry House for a ha'porth of transfers or a penn'orth of handbooks, they should be sent to your own Area official. Compliance with these two simple rules will save your Area officials a great deal of worry and the Society's officials a lot of unnecessary work.

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★ FROM THE North West comes news that they have had some success in arranging a venue for Area competitions, namely at Tilstock, near Whitchurch (Salop). I may add that this arrangement was not made without a great deal of difficulty and I hope that competitors from the Area and visitors will not forget the Ghost of Sealand and model their behaviour accordingly. As far as I can make out, if anything happens at Tilstock the only other place left open to them will be that aero-modellers' "paradise" on the outskirts of the great metropolis, where they can thoroughly enjoy themselves mucking in with the footballers, picnicking parties and other odds and ends who flock there over the weekend.

➢ ➢ ➢

★ FROM THE LAND of the frozen North I hear that the arrangements are well on the way for what is hoped will be a very successful season, the N.E. Area has taken a leaf out of the book of the Northern Area

and laid on an Area knock-out competition. The rules have been kept to the absolute minimum—in fact, the news sheet hardly mentions any rules at all. After seeing some of the happenings in the Northern Area Knock-out Trophy, may I advise the N.E. committee to be well prepared for the inevitable arguments. They are bound to come.

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★ GOING BACK to the Northern Area, fliers were looking forward to a really good day at Rufforth, on April 15th, but the only man who met with any success was that well-known Yorkshire Chinaman, How Ling Gale. The R/C competitors were wise enough to keep their models in their boxes, 24 competitors met with mediocre success in the Astral Trophy. 45 entries snacked up about 40 models in the A-2 contest and nobody at all ventured forth for the Area rubber contest. It's a great pity that the weather was so bad because there really was a good turn out, in fact, I should say it was one of the best attended meetings that the Area has held. One surprising fact emerged, and that was, the number of people who were caught out by the demand for templates at the check point. 15 min. after the opening of the meeting all the coaches on the drome were full of hods hastily carving out templates from any entertaining literature suitable for the purpose.

S.M.A.E. CONTEST RESULTS

GAMAGE CUP

1.	E. Harwood	Ipswich	11 min.	37 sec.
2.	J. Gorham	Ipswich	10 min.	50 sec.
3.	M. Gilbert	Flying Saddlers	10 min.	37 sec.
4.	E. Smith	Icarian	9 min.	35 sec.
5.	W. Smith / W. Rockall	Upton / Gainsborough	9 min.	27 sec.

Juniors

1.	D. Berriman	Wolverhampton	7 min.	
2.	C. Marsh	Ilford	6 min.	44 sec.
3.	H. O'Donnell	Whitefield	5 min.	24 sec.

156 entries. 141 Seniors, 15 Juniors from 74 clubs.

PILCHER CUP

1.	G. Gates	Southern Cross	13 min.	3 sec.
2.	T. Noel	Wayfarers	12 min.	28 sec.
3.	D. Kemp	Chelmsford	12 min.	23 sec.
4.	B. Gardner	Surbiton	12 min.	17 sec.
5.	M. Simpson	P.M.A.L.	11 min.	20 sec.
6.	N. French	Central Essex	11 min.	15 sec.

Juniors

1.	A. Hinks	Luton	7 min.	36 sec.
2.	J. Mace	Luton	7 min.	9 sec.
3.	G. Evans	Cheadle	6 min.	28 sec.

272 entries, 243 Seniors, 29 Juniors from 93 clubs.

ASTRAL TROPHY

1.	W. Trow	Dudley	10 min.	13 sec.
2.	J. Hudman	Birmingham	8 min.	51 sec.
3.	N. Marcus	Croydon	8 min.	6 sec.
4.	B. Venville	Solihull	7 min.	47 sec.
5.	Bickerstaff	Accrington	7 min.	43 sec.
6.	R. Lewis	Eastbourne	7 min.	42 sec.

307 entries.

S.M.A.E. CUP

1.	C. Aitkenhead	Loughboro' Coll.	11 min.	32 sec.
2.	T. Geesing	Croydon	9 min.	44 sec.
3.	P. Gilbert	Pharos	9 min.	39 sec.
4.	D. Smith 1	Loughboro' Coll.	9 min.	30 sec.
5.	M. Wood	Blackheath	9 min.	0 sec.
6.	C. Whitworth	Kettering	8 min.	59 sec.

507 entries

N.W. Area reports that conditions at Tilstock were extremely bad—even the Area experts being well and truly confounded. There were two people brave enough to fly in the Ripmax. Clemmett, of Bolton, and Inkestor, of Wallasey—scoring 50 and 25 points respectively. Faulkner, of Whitefield, led the A-2 list with an aggregate of 6 min. 3 sec., followed by Targett, of Prestwich, and Wrigley, of the same club. Bickerstaffe, of Accrington, topped the poll in the Astral with over 7 min., Lawton, of Fylde Coast and Rec, of Wallasey, second and third. I understand the C.O. at Tilstock was very helpful and co-operative and welcomes the use of the drome for future Area contests. The Area Committee must feel very pleased! The conditions on Newcastle Town Moor must have been much worse than either Tilstock or Rufforth, since reports state that the only models left in one piece were those that didn't come out of the boxes! Again there were no Ripmax contenders and none of the top three in the A-2 completed three flights (what, no reserve models!). Laing, of N. Shields, clocked 103 sec. for two flights, second was Smailes, of Braydon, third, Short, of Sunderland. Times were not given by my informant for the Astral, but top three were Cairns, Newcastle, Stephenson, of Newcastle and Hymers, of Bishop Auckland. What a disappointing week-end for all concerned!

Engine Tests

(Continued from page 283)

seconds running and as it approached its normal running temperature. While it is still possible that some extra hours running might improve performance slightly, it was obvious, from the first, that the engine would not require a long and tedious running-in process and a nominal time of 30 min. only was therefore given. Subsequently, the engine was run up to 17,000 r.p.m. with not the slightest tendency towards overheating.

For torque and b.h.p. tests, the Eagle was run at speeds ranging from 7,500 to 17,000 r.p.m. There is little object in operating an engine of this type at lower speeds and five figure r.p.m. should always be aimed at. B.H.P. and torque curves, therefore are shown for speeds between 8,000 and 16,000 r.p.m. The makers, in their leaflet, emphasise their recommendation of a nitroparaffin content fuel for optimum performance and at the more moderate revs, in particular, a fuel of this type is desirable. The Eagle was tried on a standard methanol/castor fuel but at the lower speeds a certain amount of fluctuation and sensitiveness to needle-valve adjustment was evident. A nitroparaffin content fuel was, therefore, used exclusively for the tests.

The actual power shown by the b.h.p. curve reaches a maximum of 0.42 b.h.p. This is remarkable for the fact that it is achieved at over 14,000 r.p.m.—the highest peak speed recorded by a "non-racing" type unit in this series. It is, in fact, the high peak r.p.m. which are responsible for the Eagle showing a greater specific output than any previous Yulon model tested as, although torque recorded was slightly better than for the "30" and "29," higher maximum torque figures have, in fact, been recorded with one or two other 5 c.c. glow-plug units, yet seldom with such a high b.h.p.—except in the case of specialised racing units, of course.

No trouble whatsoever was experienced with the Eagle during tests. No excessive vibration was detected at any speed. Like all Yulons, the Eagle ran with a sharp, penetrating exhaust note, but remained smooth running and showed not the slightest sign of stress even at the seemingly excessive speed of 17,000 r.p.m.

Props. recommended by the manufacturers are: Free-flight, 10 × 4; C/L stunt, 9 × 6; Speed, 7 × 10; Team-racing, 8 × 8, and commercial examples in these nominal sizes should allow the engine to utilise an appreciable proportion of its available power in the air. Checked on a 10 × 5 "Stant" prop. (tips rounded off) the test engine achieved 11,600 r.p.m. 12,000 r.p.m. were exceeded with home-made 9 × 6 stunt props.

Power/weight Ratio (as tested) 1.12 b.h.p./lb.

Power/displacement Ratio 85.9 b.h.p./ litre.

Topsy

(Continued from page 289)

paste this on to metal sheet. Cut out with tin-snips, including all the necessary slots. Drive a pin through each end and the template is now ready for use. The two centre ribs are cut separately. Select a good piece of $\frac{3}{16}$ in. × $\frac{3}{4}$ in. trailing edge and, after cutting slots and cementing dihedral brace, pin one half to plan (prop. the other tip up to a height of $5\frac{1}{4}$ in. The main spar is next pinned down after cementing dihedral brace. Now cement ribs in position and then the leading edge, which should be of $\frac{3}{16}$ in. sq. medium hard straight balsa. The leading edge assumes a curve towards the next chord and to produce this it is necessary to cut two pieces of $\frac{1}{8}$ in. sheet to shape required, laminate them and cut the diamond section to conform with the leading edge.

Tips are made from soft block hollowed out to $\frac{1}{8}$ in. thick walls.

Tailplane

The tailplane is simply constructed. Rib blanks are sanded to shape after cementing in position. The leading and trailing edges are tapered towards the tips to conform to the section.

Fin

Construction needs no explanation. It is made in four parts (top, bottom, leading and trailing edges). Use $\frac{1}{8}$ in. medium sheet throughout.

Covering and Finish

The whole of the model is covered with lightweight Modelspan (including cowling inside and out). There is no need to water spray. Give the tissue one coat of "217" dope and then lightly brush on yellow Aerolac. The undersurface is painted with ordinary black dope plus 50 per cent. thinners.

The cowling should be given a coat of fuel proofer inside and F2 should be covered with linen gauze soaked in cement. This is to cover up the holes where the undercarriage is bound on, preventing fuel seeping through into the fuselage.

Flying

Before attempting to fly check to see that the c.g. is in the correct position (the model should balance on the mainspar), that the flying surfaces are not warped or out of alignment.

A few hand glides should be made before attempting power flights. If you are using a Mills "75," a 7 × 4 Stant will be ideal for preliminary test. Do not use less than half power with this propeller or the plane will not fly. Make sure the motor is running evenly before launching, a gentle push is needed for launching with low power. Trim the model to climb dead into wind: when the motor cuts it should turn in a fairly tight circle and unless the ground is exceptionally rough will make a three point landing without nosing over.

For best performance with a Mills "75" use an 8 × 4 Tru-Flo or 8 × 4 Truflex.

From the S.M.A.E. and the CLUBS

REPORT OF THE S.M.A.E. COUNCIL MEETING HELD AT LONDONDERRY HOUSE, PARK LANE, LONDON, W.1. ON MARCH 31st, 1951, at 2.30 p.m.

The following were present : Messrs. A. F. Houlberg (Chairman), R. F. L. Gosling, D. A. Gordon, H. W. Barker, S. D. Taylor, C. S. Rushbrooke, M. A. L. Coote, K. J. A. Brookes, E. F. H. Cosh (London), G. S. Foden (East Anglia), H. J. Towner (South Eastern), B. V. Hansman (North Western), G. S. Bishop (Western), W. W. Lowery (South Wales), R. C. F. Day (Southern), D. S. Scoffham (Royal Aero Club).

Wakefield Sub-Committee

This Committee consisting of E. W. Evans (Northampton), F. Holland (Swansea), J. B. Knight (Kentish Nomads) and R. H. Warring (Zombies), had met under the chairmanship of the Competition Secretary, Captain S. D. Taylor, to discuss the method to be adopted in running the Wakefield Trials.

The Committee were agreed that flying should take place in as near non-thermal conditions as possible and submitted two alternative schemes.

Scheme A

First Round 8 p.m.-9.30 p.m. Saturday, June 9th
Second Round 6 a.m.-7.30 a.m. Sunday, June 10th
Third Round 7.30 a.m.-9 a.m. Sunday, June 10th

Scheme B

First Round 7 p.m.-8.30 p.m. Saturday, June 9th
Second Round 8.30 p.m.-10 p.m. Saturday, June 9th
Third Round 6 a.m.-7.30 a.m. Sunday, June 10th

The voting on the two schemes being equally divided between the members of the Committee the Chairman gave his casting vote for Scheme A and the Council confirmed its recommendation.

" Model Aircraft " Club Copies

Only three Area Committees having informed the Council of their decision concerning this matter, it was decided to refer the matter back to the Area Committees requesting them to send details of their voting for and against the supply of free copies to the clubs.

Secretarial Position

Mr. D. A. Gordon informed the Council that Miss Cottingham had resigned from her Secretarial appointment and Miss C. Philpott had been appointed in her place. The Secretary drew attention to the volume of work which both he and the Secretarial Assistant now had to deal with and suggested the appointment of an additional clerk. This was agreed to. The amount of Secretarial work involved in conducting the Society's affairs was discussed, the Council generally agreeing that the problem could only be solved by the appointment of a salaried secretary. It was pointed out that at present the Society's finances would not permit this and an increase in the affiliation fees would probably be necessary. The Chairman suggested that Area Delegates should present the facts to the clubs in their areas and inform the Council as soon as possible of their views.

Area Resolutions

South Midland Area. " That for 1952, the F.A.I. Rules and S.M.A.E. Contest Rules be printed separate from the Handbook in the form of a Rule Book. This to be issued for that and subsequent years and an ' Amendment and Addition Sheet ' to be issued for future years."

This proposition was not carried.

London Area. (a) " That in view of the formation of sub-committees for specific branches of modelling that a Free Flight Power sub-committee be appointed immediately."

The Council were in sympathy with this proposition but felt that it would be unnecessary to appoint such a committee until next year's Power Competition Rules were being considered.

(*b*) " That entrants in the ' Astral Trophy ' contest be allowed to enter models conforming to the new F.A.I. Regulations but with motors exceeding 2.5 c.c. and not have any power loading, but that these entries be disregarded from the point of view of the International Eliminator."

This proposition was not carried.

(*c*) " That the Council approach the Ministry of Town and Country Planning and discuss with the Ministry the provision of suitable facilities for model power flying in the new satellite and other towns. It is suggested that the National Association for Power Boats and Cars be asked to co-operate."

This proposition was carried.

(*d*) " That prizes for the 1951 Nationals shall be supplied from S.M.A.E. funds in preference to obtaining kits or engines, etc., from the model aircraft trade."

The Council agreed to institute a prize fund for the 1952 season in order to purchase prizes other than kits, engines, etc.

Other Resolutions

" That should a competitor be unable to compete in one of the qualifying Contests for the Wakefield or A/2 Glider Trials owing to Military Service under the ' Z ' scheme his model may be flown by proxy."

This proposal was carried unanimously.

Proxy Flying

The question of proxy flying in the Society's contests by entrants who were disabled was discussed and the following proposal carried : " That proxy flying will be permitted in S.M.A.E. Contests *only if special sanction is obtained from the S.M.A.E. Competition Secretary prior to the Contest concerned.*"

Finance

The Treasurer presented his Statement of Accounts which showed a balance in hand of £529 6s. 7d. Outstanding accounts amounted to £284 16s. 10d., leaving a net balance in hand of £244 10s. 9d.

Records

The following records were ratified : Lightweight Rubber-Driven Flatplane, J. O'Donnell (Whitefield M.A.C.) 1 min. 43.5 sec., 14/1/1951. Lightweight Power-Tailless, M. M. Gates (Non-member), 2 min. 47.0 sec., 28/1/1951.

The following Record applications were accepted : Lightweight Tailless Glider H.L. N. Osbourne (Belfast M.F.C.) 1 min. 15 sec., 25/2/1951. Lightweight Tailless Glider H.L. R. A. Faulkner (Whitefield M.A.C.) 1 min. 19.1 sec., 10/3/1951. Lightweight Tailless Glider T.L. A. R. Lucas (Bridgend M.A.C.), 12 min. 00 sec., 25/3/1951. Lightweight Rubber-Driven Monoplane, C. J. Davey (Blackpool & Fylde), 9 min. 33.5 sec., 11/3/1951.

Merit Certificates

These were awarded to the following : Class B No. 249 Wade, S. A. (Loughborough College), 381 Faulkner, B. T. (Cheadle), 450 Chinn, J. I. (Norwich), 457 Shanks, W. A. (Lanark), 485 Linford, G. W. (Loughborough College), 486 Sugden, D. C. (Loughborough College).

Class A, No. 485 Linford, G. W. (Loughborough College), 486 Sugden, D. C. (Loughborough College), 487 Martin, G. S. (Blackpool), 488 Tasker, R. (Blackpool), 489 Lee, H. (Blackpool), 490 Morrell, R. J. (Blackpool), 491 Newton, S. (Blackpool), 492 Rae, G. J. (Malvern), 493 Ford, D. (Huddersfield), 494 Jones, A. (Blackburn), 495 James, D. (Saddlers), 496 Cooke, A. W. M. (Henley), 497 Sprason, F. C. T. (Small Heath), 498 Wheldon, C. P. G. (Blackheath & H.), 499 Sandy, R. F. (Henley), 500 Gaster, M. (Manor House), 501 Waldron, J. G. (Henley), 502 Lloyd, K. H. (Solihull), 503 Taylor, E. R. (Cheadle), 504 Anderton, A. F. (Cheadle), 505 Scott, A. (St. Helens), 506 Peek, G. (Chelmsford), 507 Shaw, J. (Oldham), 508 Nash, W. S. (Cheadle), 509 North, E. (Halifax), 510 Hudson, F. J. R. (West Bromwich), 511 Baker, P. (West Bromwich) 512 Taylor, R. (Bolton), 513 Cartwright, J. K. (Bridlington).

Applications for Affiliation

Applications from the following new clubs were accepted : Sunbury Meteors (London), S.3, J. 7, Fee £1 5s. Leamington & D. M. Eng. Society, S.12, J. 14, Fee £2 14s. 6d. Wellingborough School M.A.C., S. 6, J. 6, Fee £1 11s. 6d. (Midland). Stapleford & D.M.A.C. (Mid-

land) S. 9, J. 5, Fee £1 18s. Oundle & D.M.A.C. (Midland), S. 8, J. 5, Fee £1 5s. (10s. 6d. o/s). Lambeth M.F.C. (London), S. 12, Fee £1 10s. Shirebrook & D.M.A.C. (Midland), S. 10, J. 2, Fee £1 17s. 6d. Hemsworth & D.M.A.C. (Northern), Bridgend M.A.C. (S. Wales), S. 8, J. 6, Fee £1 16s. 6d. Godalming & D.M.F.C. (Southern), S. 22, J. 4, Fee £2 19s. Central Essex Aeromodellers (East Anglian), S. 1, J. 10, Fee £1 11s. 6d. Edmonton M.A.C. (London), S. 17, J. 7, Fee £3. Cottingham M.A.C. (Northern), S. 2, J. 17, Fee £1 12s. 6d. Society of Bedford Aeromodellers, S. 14, J. 7, Fee £2 12s. 6d. Penarth M.A.C., S. 10, J. 10, Fee £1 17s. 6d. Cheltenham M.A.C. (South Midland), Fee £1 19s. 6d. Teham Model F.C. (London), Fee £3 0s. 6d. Phoenix (Mansfield) M.F.C., S. 8, J. 4, Fee £1 4s. 0d.

Registration of Timekeepers

The Competition Secretary stated that he considered the position regarding the Society's official timekeepers should be regularised; the present list being out of date. Mr. Rushbrooke proposed the certification of timekeepers but this was not agreed upon. It was decided to circularise to all clubs in order to bring the Society's list of timekeepers up to date.

The meeting terminated with a vote of thanks to the Chair at 7 p.m.

NORTH WESTERN AREA

Indoor Nationals, August 18th, 1951. Corn Exchange, Manchester

Free-flight—any type of indoor model. Chuck glider—maximum weight is ½ oz. R.T.P. Speed—no r.t.p. class A or B—but facilities will be laid on if anyone wishes to attempt a record flight. In the F.F events the best of two flights will count. Contest flying will start at 1 p.m. and continue until 9-10 p.m. Normal S.M.A.E. entry fees for all contests.

" Daily Dispatch " Woodford Rally, August 19th, 1951

The contests will be—F/F Rubber—Glider—Power Duration—F/F Scale for the E. J. Riding Memorial Trophy—Women's Trophy Event—R/C and Jetex.

C/L flying will be on an exhibition basis; also Team racing—details as soon as possible. Important—R/C event will be by invitation based on the results of the Ripmax Trophy to be held on April 15th.

Pre-entry forms for the Indoor Nationals and the *Daily Dispatch* Rally will be sent to all clubs in June.

SOUTH EASTERN AREA

Report of Extraordinary General Meeting held at Sevenoaks on March 11th, 1951.

Present. A. F. Houlberg, H. W. Barker and representatives of the following clubs: Brighton, Eastbourne, Men of Kent, Sevenoaks, Southern Cross, Worthing, and Mid-Sussex.

Minutes. The meeting commenced with Mr. Houlberg in the chair and the minutes of the last meeting were read and confirmed.

Matters arising from the minutes. Mr. Houlberg had effected a reduction in the printing bill for the C/L Championship programmes. A loan of £160 had been made by the Society to meet this account. Mr. Barker had been unable to obtain any information from Messrs. Torch Publicity Ltd., regarding unpaid advertising accounts.

Finance. Mr. Barker presented the balance sheet for the C/L Championships and the area's accounts, which, after lengthy discussion were accepted as being a true statement of the area's affairs. The General Reserve Fund showed a debit balance of £53 6s. 4d. A vote of thanks was accorded to Mr. Barker.

Election of Treasurer. Mr. Towner agreed to act as Treasurer, under the guidance of Mr. Barker, until the a.g.m. He stated that cash must be enclosed with all orders for badges, transfers, handbooks, etc., no credit will be given.

Letter from the Brighton D.M.F.C. It was agreed to refund £6 in respect of a loan made by the Brighton club to the 1950 C/L Championships. Other clubs will be paid by order of ballot.

Area Raffle. Mr. Donald, joint P.R.O., reported that the raffle had yielded £9 18s., the Chairman increased this to £10 and the draw was made by Mrs. Houlberg. D. Marchant of Sevenoaks won the Frog " 500."

SLOUGH M.A.C.

We have just completed a successful Winter programme, which included a trip to see the London show " Knights of Madness," an exhibition and a social and prize-giving, and now they have opened up the 1951 Contest Season with a successful meeting at the Edham Club rally on Chobham Common on April 8th. Mr. Langley and Mr. Buckland gained first and second place respectively, in the Power Duration Contest, Mr. Langley was flying an Elfin 2.49 powered, *Mallard* and Mr. Buckland an Allbon Javelin powered original design.

SUNDERLAND & D.M.A.C.

" Gamage " morning dawned bright in the North East, raising hopes of members who had arranged to fly that afternoon at Warden Law with the Seaham M.F.C. However, just as the serious flying started the snow began to fall, and in spite of snow-clearing gangs working on wings and bodies times dropped to the 30 sec. mark. Seen through the murk, these gangs plus odd assistants all feverishly brushing snow off models gave one the impression of an Eskimo octopus playing the bagpipes—or vice versa! Some gliders got up and vanished in the snow, but with conditions as they were we would have been better off with St. Bernards than " retrievers."

YORK M.A.S.

York M.A.S. achieved its first away win on March 25th last, against Creswell at Dore Village (Sheffield) in the Area Knockout. In winds reaching 40 m.p.h. it was typical " Gamage " weather. York was credited with three flights, while the damage sustained by Creswell forced them to defeat. On the home range conditions were a little better and the top Pilcher times were K. H. Buckham 6 min. 18 sec.; K. Brown 6 min. 11 sec.; R. Hodgson 5 min. 00 sec.; T. Heselwood 4 min. 57 sec.; D. Dickinson 4 min. 28 sec.; H. Johnson 3 min. 57 sec.; A. Finucane 3 min. 37 sec.; J. E. Sykes 3 min. 14 sec.; L. B. Cross 2 min. 25 sec. Cross and Hodgson had only one flight, the latter losing his model for a maximum. It turned up a day later at Bishop Wilton 12 miles away. In conclusion, just a word to the Sheffield Club in appreciation for all they did to help the York boys at Sheffield the other day. They were rapidly transported from the station to Dore Village, were given a hot supper, and even a suit of clothes was lent to the York team leader who got bogged up to his waist. Many thanks Sheffield, we hope to be able to reciprocate some day. P.S. That does not mean we have a bog all round the aerodrome!

HALIFAX M.A.C.

On Gamage Day four members went to fly with the Burnley club. Their ground turned out to be a vast stretch of open moorland. In dry weather this should be an almost perfect flying ground due to the absence of any buildings, but on the day was very boggy. Weather was very windy with many showers, visibility getting worse as the day progressed. The times were as follows: Gamage Cup E. North, aggregate 192 sec. flying a modified *Bazooka*.

Pilcher Cup. M. Regan, 42 sec. (one flight) flying a *Nord* Nordic A/2 glider. J. Magson, aggregate 220 sec., flying his own design *Gêmeau* Nordic A/2 glider. E. North, aggregate 666 sec. flying his own design Cranwellian III A/2 glider.

Magson and Regan were dogged by bad luck on the line. E. North's Nordic glider travelled 2½ miles on the first flight, then 1½ miles and finally just over a mile on the last flight. Other members co-operated in retrieving.

The club is keen to regain some of its pre-war prestige and enthusiasm is very high.

GLASGOW M.A.C.

The K.L.M. Trophy Contest for power models will be held at Abbotsinch, Paisley on Sunday, June 17th, at 12 noon.

First prize, silver trophy to be held for one year and free trip to Holland with an opportunity to meet Dutch modellers.

Entry forms from R. Todd, 273, New Edinburgh Road, Fallside, Uddingston, Glasgow.

Contest open to Scottish modellers only.

A small charge will be made for entry to the drome of spectators.

N.A.A.F.I. will supply tea and cakes.

Part proceeds of all monies received will go to naval charities.

CONTEST CALENDAR

May	27th	*K. & M.A.A. CUP. A2 Glider Eliminator. Area.
"	27th.	GUTTERIDGE TROPHY. Wakefield Eliminator. Area.
June	3rd	SOUTH WILTS RALLY. R.A.F., Old Sarum, Salisbury.
"	10th	PREMIER SHIELD. Wakefield Eliminator.
"	10th	A2 CHALLENGE CUP. A2 Glider Eliminator Centralised. Cranwell Aerodrome, Lincs
"	17th	WEST ESSEX GALA. Fairlop Aerodrome.
"	17th	WALSALL M.A.C. RALLY.
"	17th	SWINDON M.A.C. SLOPE SOARING MEETING. Wiltshire Downs.
"	17th	S.W AREA RALLY. Chudleigh, Knighton Heath, Devon.
"	24th	NORTHERN HEIGHTS GALA DAY. Langley, Bucks.
"	24th	MERSEYSIDE SLOPE SOARING MEETING. Clwyd Hills, N. Wales
July	1st	*" MODEL ENGINEER " CUP. U/R Team Glider. Area.
"	1st	WOMEN'S CUP. U/R Rubber/Glider. Area.
"	1st	POWER CONTEST. U/R Power/Duration (0.01-1.5 c.c.) Area.
"	14th	FESTIVAL OF BRITAIN National Model Flying Championships, Empire Stadium, Wembley. Control Line Stunt, Speed, and Team Race.
July	15th	KEIL TROPHY. U/R Power/Ratio. Area.
"	15th	LADY SHELLEY CUP. Tailless. Area.
		THE BRITISH NATIONALS Fairwood Common Aerodrome, Swansea.

* Plugge Cup events.

S.M.A.E. CONTESTS IN BOLD TYPE

SURBITON DIST. M.F.C.

We held our annual glider gala on Epsom Downs on April 1st, the event being cursed by the worst weather possible.

A sharp thunderstorm with a downpour of hailstones delayed the start slightly, and made the launching area extremely muddy. Things eventually got under way at 11.15 a.m., D. Butler (taking a day off from tank polishing) being the first man away. Conditions by this time were sunny with plenty of thermals, but very windy.

The strong wind and slippery conditions underfoot made towing very difficult, with the result that few contestants got their models to the top of the line. An exception was Roy Yeabsley whose model disappeared on a 4 min. flight quite early on.

The first maximum was recorded by F. H. Boxall of the Brighton club, but his model travelled about 5 miles doing it, and he did not get it back.

The wind got even stronger during the afternoon and very few contestants managed anything like a reasonable flight.

By 4 o'clock, Yeabsley had built up a comfortable lead with a three flight aggregate of 530.8 sec., his nearest rival being G. Fuller, of St. Albans, with an aggregate of 497.4 sec. Rain came on again shortly afterwards and lasted until nearly 5 o'clock, by which time the wind had dropped and most of the competitors had gone home !

The stalwarts remaining included the Croydon and St. Albans boys who were hard at it trying to beat each other in the team event.

E. Bennett, of Surbiton, club took advantage of the improved conditions by towing up his *Fugitive* for a flight of 4 min. 30 sec., which put him into third place. At 3 min. to go, however, Geesing, of Croydon managed a flight of 3 min. 35 sec., which just gave him third place, and Croydon the lead in the team event.

Final results were : 1st, Roy Yeabsley, Croydon, 530.8 sec. ; 2nd, George Guller, St. Albans, 497.4 sec. ; 3rd, T. Geesing, Croydon, [illegible] sec. Junior, J. Marshall, Brighton, 186.0 sec. Team Event : 1st, Croydon, 2nd, St. Albans, 3rd, Surbiton, 4th Brighton.

CROYDON AND DISTRICT M.A.C.

The Croydon Gala went off as well as the Easter Monday weather would allow.

The attendance was good. So were the items put up by the entrants, the results are as follows :—

First place and Gala Champion, thus winning the Thurston Trophy for one year was C. Bennett, of Ipswich, with 12 min. 44 sec.

			min.	sec.
2nd.	G. Lefevre	West Essex	11	46.3
3rd.	M. Wood	Blackheath	11	42.4
4th	G. Fuller	St. Albans	10	34
5th.	J. Rumbly	Kent Nomads	10	13.5
6th	P. Bushell	Surbiton	10	11.9
7th.	J. Gorham	Ipswich	9	59.7
8th	Mr. Ellabank	P.M.A.L.	9	49.8
9th	Mr. Grassmeden	W. Essex	9	25.1
10th	Mr. Penny	P.M.A.L.	8	38.6
11th	J. Gorham	Ipswich	8	28.4
12th	Mr. Dennis	W. Middlesex	8	16

Junior Winner

Mitten		Sutton By-Pass	5	43

The lads were back on form when visiting the Surbiton Glider Gala at Epsom on April 1st. Roy Yeabsley taking the 1st prize and T. Geesing the 3rd, thus making sure of the Team Cup as well.

HOGSTHORPE (SKEGNESS) & DIST. M.A.C.

This newly formed club started its activities with a successful exhibition, at which the standard of construction demonstrated the general abilities of the 15 members. Their flying [illegible] were thoroughly tested during a recent club rally, in competition for the *Griffith* Cup, which will be presented to the best all rounder during the year. The open glider contest was confined to a fleet of A/2 entries all of which show great promise.

Results (150 ft. lines, two flights) : 1st, K. Horry, 200 sec., 2nd T. J. Hammond 166 sec., 3rd M. Stow 135 sec., 4th, R. Dunkley 121.5 sec.

Owing to the constant rain which followed this event, all other contests were abandoned. The club hopes to make its debut this season, in the E. Midland Area Eliminators.

STOCKTON & DISTRICT M.F.C.

The weather on the morning of Gamage cup day was fine and sunny and Ernie Harrison, raised our hopes when he caught a thermal with his Amco 0.87 power job which was recovered about 2 miles away.

Our hopes did not least long, however. By the time the boys had finished their initial trimming flights the sky was beginning to darken but this did not prevent Tom Chambers clocking a near maximum with his own designed rubber model. When Tom returned after retrieving his job it was raining steadily and it was unanimously decided to evacuate to a tin hut at the side of the field to see if the weather would improve (some hope !). It was shortly after this that a member literally flattened our " Gamage " hopes by sitting on Tom's wing (he was pleased !). Despite this obvious handicap he recorded a moderate second flight but had the misfortune of having his model stall in after 13 sec. on his last attempt. Matt Robson did quite well with his ultra lightweight considering the conditions but Ben Spurr's *Raff V* was right off form

PRESTWICH M.A.S.

Plenty of thermals, accompanied by a high wind, were in evidence for the Gamage and Pilcher. S. R. Targett timed his own 66 in. span sailplane for 10 min., the model being found 8 miles away. With 600 sq. in. of wing area, this sailplane only weighs 8 oz.

A. D. Bennett obtained the highest total from the club in the Pilcher, with 320 sec. His model is 9 ft. in span, 10 in. chord, having a circular fuselage with a pylon wing mount. This *Miolnir* sailplane features an N.A.C.A.6412 wing section.

Many Nordic's are being built, most of the members having at least two or three. A. D. Bennett's A/2 clocked a 6 min. flight from a very short line. This model which resembles a *Revenge* crossed with a *Chief*, was assembled from bits and pieces in a few nights !

CHESTER M.F.C.

Ted Martin could hardly believe it when we timed his new McCoy team racer over a mile at 90 m.p.h. So he joined the timekeeper while F. Wilde flew it, result was 1 mile at 97 m.p.h. The engine is tuned exactly as per his article in MODEL AIRCRAFT and is mounted inverted. Movable trim tab is connected to a sliding bell crank, so that tension on the lines pulls the trim tab straight.

WHITEFIELD M.A.C.

Several models were entered in the Northern Models Exhibition, and three prizes were won. The Junior Glider section was won by R. A. Faulkner with a Nordic Tailless of " flying plank " layout—this model is a development of his smaller lightweight model which holds the British Tailless Glider (Lightweight) H.L. Record, with a time of 79.1 sec. Third in the Junior Glider and second in the Junior Rubber was H. O'Donnell with a Nordic *Miolnir* and a Veron *Rascal*. The former has a I.D.C.2 wing which is quite effective.

The Gamage and Pilcher contests were held on the Prestwich club's field. The weather which started very well, with sun and only about 10 m.p.h. wind, rapidly deteriorated and ended with rain and strong wind. In the Gamage, top club time was J. O'Donnell's 557.6 aggregate flyer a last year's Wakefield—the model being lost on its third flight of 3 min. plus in pouring rain. Next was H. O'Donnell who did 323.8 sec. aggregate, despite a slipping clutch. Times in the Pilcher were not as good, top being R. A. Faulkner with 225.4 sec. aggregate.

Four flyaways have been experienced with Nordics all due to D.T. failure. H. O' Donnell lost his Nordic *Miolnir* for 21 : 10 and had it returned undamaged whilst A. Croppers model lost same day for 11 : 30 has not been heard of since. J. O'Donnell has lost two, for times of 7 : 30 and 6 : 14 and has heard of the latter, the model having been seen to land 26 miles from launch.

CHINGFORD M.F.C.

Most of the C/L hods in the Chingford M.F.C. have been pressing on regardless of the rough weather, at Fairlop. Note I said C/L hods, for no free flight boys, namely Wakefield and Glider, have been seen for the last couple of months or more. We hope this will change when the comps. come along. No remarks about the bod who fell down the drain-hole with his jet job, or the bloke that does 85-90 with an Eta " 19 " speed job—not bad for a junior. Full marks to Ray Ferguson (½-pint) for the most stable Class B team racer of the month. Anybody who has flown this thing will know what I mean.

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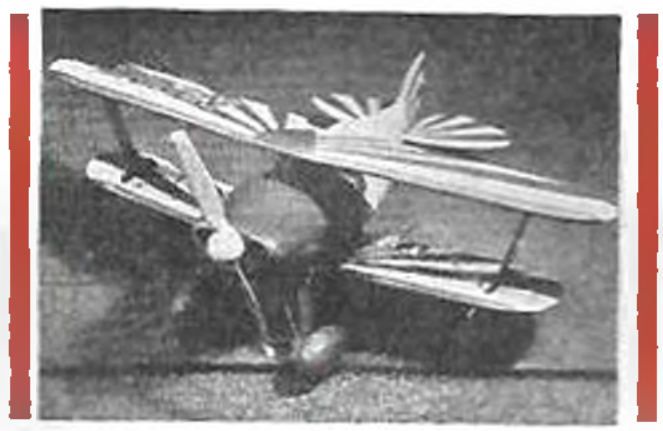

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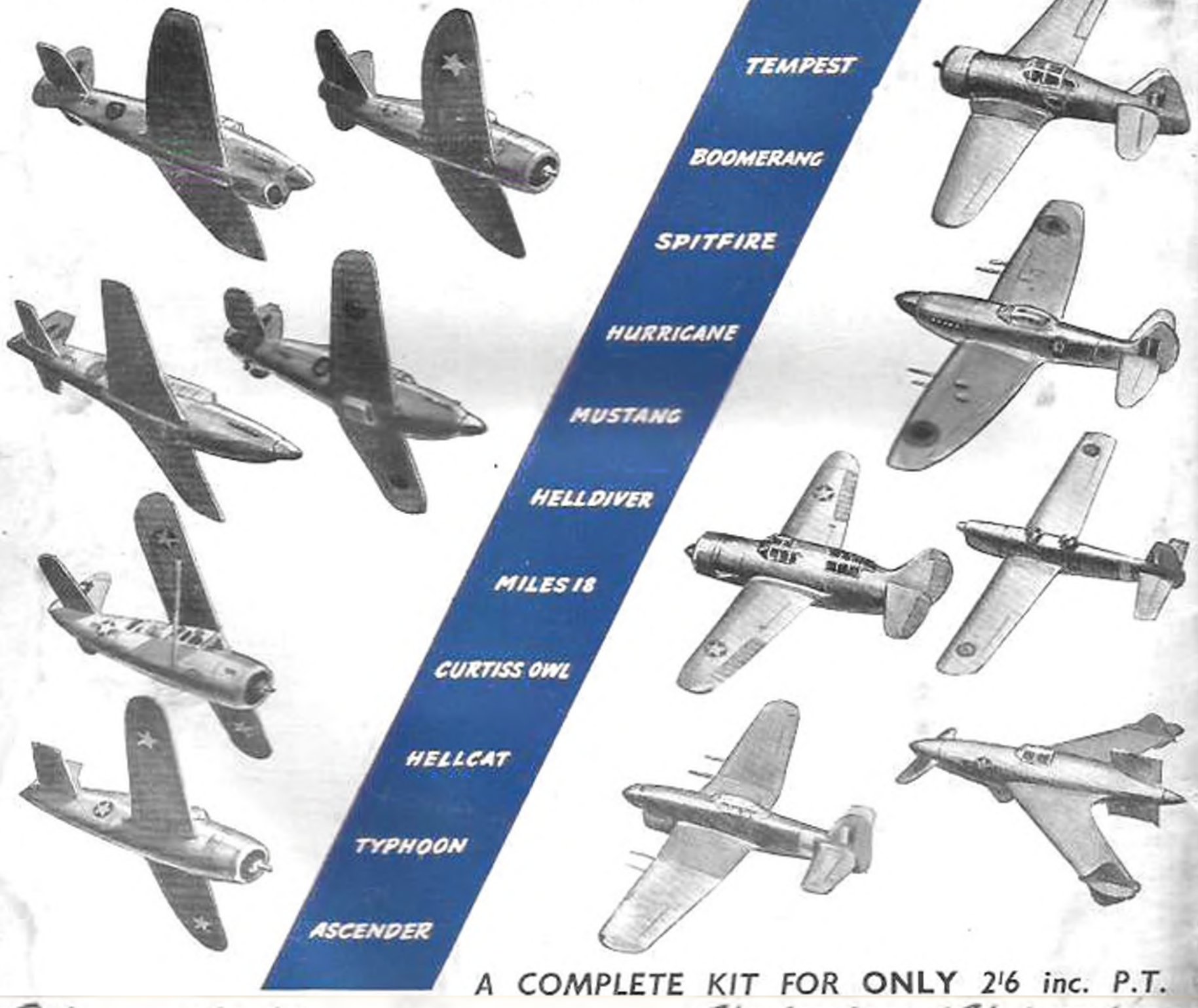

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