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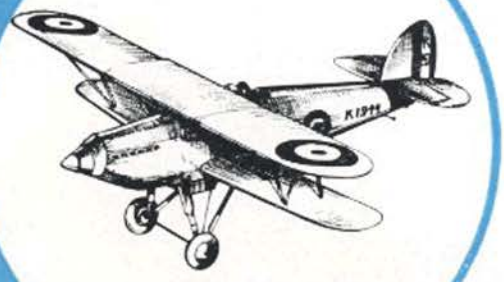

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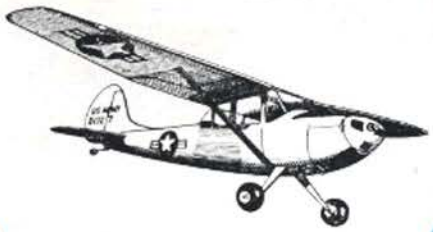

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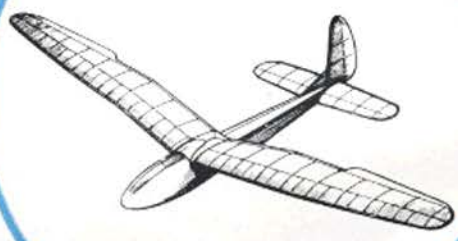

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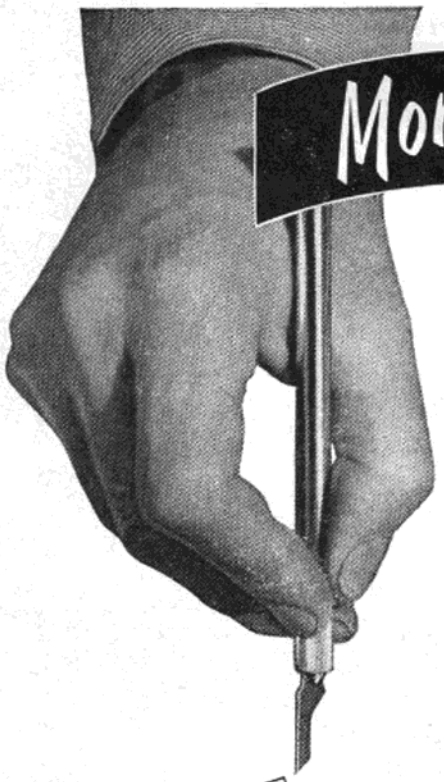

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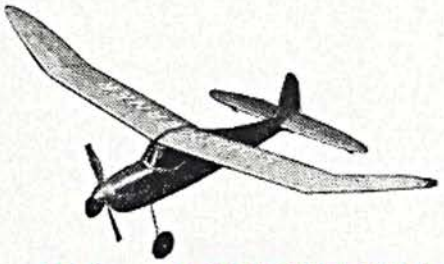
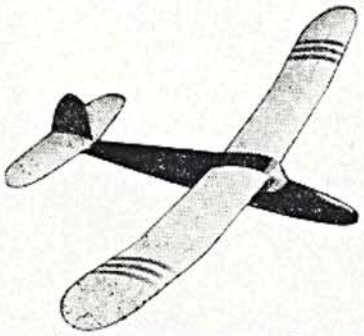


60" SPAN SOUTHERNER

This is without doubt the best looking cabin model ever kitted in Britain. The full size plan gives mounting details for no less than eleven engines, and drawings and parts are provided for building either a polyhedral or conventional "V" dihedral version. The Southerner kit is bound to please even the most fastidious builder. **46/8**



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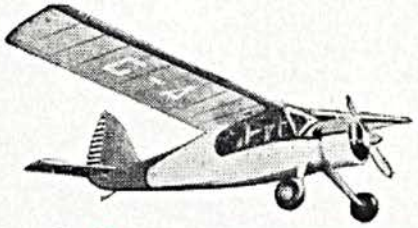
The most graceful A-2 glider available in kit form, the Chief features, built-in towline stability to ensure trouble-free launching. Exclusive KK features are the crash-proof plug-in wing panels, D/T tailplane and automatic rudder. Designed to comply with the International A-2 (Nordic) contest rules.

SPECIFICATION
Span 64½ in. Length 39 in. Total Area 515 sq. in. Weight 14½ oz. **21/7**

40" SPAN TOPPER

A contest glider of advanced design featuring butterfly tail, streamlined section fuselage, and tip dihedral for stable flight. The multi-spar wing with its under cambered airfoil section, is light in weight—yet strong and warp resistant. The kit contains full size plan, building and flying instructions, and ample high grade materials.
The Topper is capable of an outstanding performance. **9/11**



41" SPAN LADYBIRD

The semi-scale Ladybird features an attractive radial type cowl, knock-off wing panels, sheeted leading edges, and faired undercarriage. Tailplane is adjustable for incidence, and fuselage construction is quite unique. The fin is built integrally with the fuselage. In spite of its graceful appearance the model is straightforward to build, and rugged enough to take plenty of rough treatment. **21/7**

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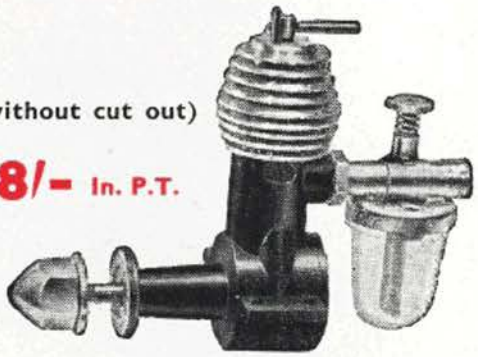

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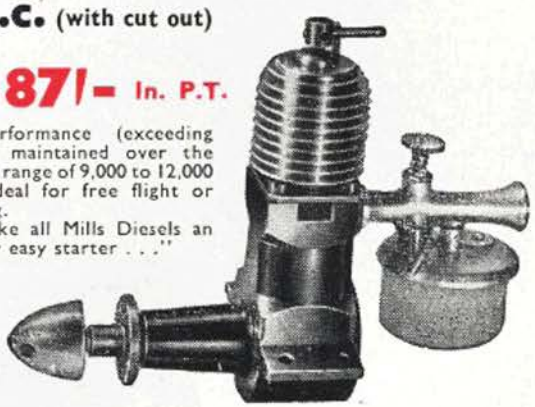

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NOVEMBER 1955 No. 173 VOL. 14

Contents

Cover Story

As this is the first issue of *Model Aircraft* to appear after the S.B.A.C. Show, it is rather appropriate that on our cover we should feature an aircraft which made its first public appearance at Farnborough, the Handley Page "Herald." It is a 36/44 seat medium range transport and so far 29 have been ordered by Queensland Airlines, A.N.A., and Lloyd Aero Colombiano. The first prototype, the machine on our cover, was completed in just over a year, and first flew on August 25th, 1955; a second prototype is now being built and delivery of production aircraft is expected to begin late in 1957.

THE JOURNAL OF THE SOCIETY OF MODEL AERONAUTICAL ENGINEERS

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Letters TO THE EDITOR

Seeing Red

DEAR SIR,—It is with regret that I have to complain about the article "Engines East and West," which appeared in the September issue of MODEL AIRCRAFT.

I have no objection to a straightforward comparison between engines of different countries, but the author uses such phrases as "Iron Curtain," "Communist bloc" and also refers to what he describes as "another of the mysteries of life in a People's Republik." Personally, I read MODEL AIRCRAFT as a model magazine and one does not expect a lecture on the socialogical problems of life in Communist countries. It is quite enough to read such reports in the papers and hear them on the radio, without having to pick up a model magazine and have the same thing slapped in one's face. Contact between countries "east and west" in the modelling sphere could do a lot to bring about a friendly feeling between countries of different political opinions.

In conclusion, Communist countries give a large amount of financial help to their various modelling organisations. Perhaps a country, such as ours, dependent on its technical ability and ingenuity for survival, would do well to follow their example. With state backing we would probably be able to produce an engine to beat current American designs, which would then entitle us to the right to criticise others.

Yours faithfully,
Leicester. K. J. MCREYNOLDS.

Fearnley Finds Out

DEAR SIR,—At last I have got near to unmasking my friend—and enemy—that dear old misery, Pylonius! His recent jibes in which I am named give me a strong clue.

Who, I ask myself, but a native of Grimsby would know of the local hazard of stepping over the latest kiddie cars, dodging by jig-saw puzzles, atomic guns, cowboy outfits, beach balls, fishing nets, model yachts, children's cut-out and painting sets, fighting one's way past model railway fiends, local radio aeromodellers buying model boat kits, competition fliers purchasing the latest three-in-one delta chuck glider set (ready in 30 sec.) to appear, out of breath in front of the proprietor, to find that the one thing, the only thing that is wanted, is out of stock?

When I have got his identity finalised,

(*Continued on page* 457)

'56 WORLD CHAMPS for G.B.?

THE situation regarding the venue/s for next year's World Championships is at present rather obscure and may remain so even after the meeting of the F.A.I. Model Commission at the end of this month.

As the rules stand at present the country winning the *Team* award in each of the four World Championship events has the first claim to run that event the following year. Thus in 1956 Italy could—and probably will—want to run the glider and control-line speed contests. Sweden should organise the Wakefield and Great Britain the Power contests.

Rumour has it, however, that Sweden will forgo her claim to run the Wakefield and as Great Britain has expressed willingness to run the Power Championship, and, in addition, any other contest for which a venue cannot be found, it is possible that we may also run the Wakefield.

All this means that it is very unlikely that there will be a combined World Championships meeting next year. Some will feel that this is a pity as there is no doubt that most of the competing countries would prefer a combined meeting. The main snag is that very few of them are either prepared to undertake the organisation of such a meeting, or would, in any case, be capable of doing so. We seem to be almost the sole exception at the moment and there is a strong feeling in S.M.A.E. circles that we should offer to undertake the organisation of the four-event World Championships at the first opportunity. Under the present rules this is not possible unless *all* of the countries winning the team awards agree to let one country run the meeting. On the other hand the F.A.I. appear to have already ignored the rules which they themselves framed by, so we understand, agreeing to Yugoslavia holding a combined World Championships meeting in 1957. This would seem to have added an additional complication to an already confused problem.

2-D Safety

IT has been said, with some justification, that the biggest boost for power boating has been the radio controlled model aeroplane. So many people have come to grief with radio controlled aeroplanes that they have decided that movement in two dimensions would be much safer than three—and what safer in two dimensions that a power boat.

Now we have nothing against power boating as such. It is a very fine hobby. But we do think that the freedom of movement in that third dimension is the outstanding *advantage* of radio controlled model aircraft. Of course it makes it more difficult, but it was difficult enough to get any sort of model aeroplane to fly consistently well thirty years ago. That means a lot of hard work to perfect suitable radio and control systems, and a lot of hard practice in order to be able to master it on the field. So don't write off the radio controlled model aeroplane after its first crash. It was probably your own fault, anyway.

JUST DANDY!

ALTHOUGH the British teams put up a good show in the World Championships at Finthen, they certainly compared very unfavourably with most of the other teams there for smart appearance on the field. The team members themselves were not to blame for this as they had not been provided by the S.M.A.E. with any form of contest wear or given any advice on the matter. At least we can thank our lucky stars that there were certainly no "Teddy boys" among our lads!

We have had occasion to raise this matter before and have been accused by some of trying to enforce regimentation and the wearing of uniforms by British teams. Anyone who has attended a World Championship Contest will know what nonsense this is. Let us make it quite clear then that we consider that international model flying is a *competitive sport*, like football, cricket and athletics. We also feel that there is a certain amount of national prestige and pride involved in ensuring that our teams look at least as smart as those from elsewhere. Could you imagine Denis Compton playing in a Test Match at Lord's wearing a knotted handkerchief on his head and a pair of very old flannel bags with the bottoms tucked into his socks? Nor could we! Neither could we imagine the Amateur Athletic Association allowing a member of one of our Olympics teams to appear abroad in similar garb. The Americans, Italians, Dutch, Yugo-slavs, Czechs, etc., at this year's Championships proved once again that it is *not* necessary to look "scruffy" in order to fly a model aeroplane.

Let us hope that before next year's teams have been selected the S.M.A.E. Council will give some serious thought to this matter and take steps to see that our future teams are equipped with smart, sensible contest wear. We would suggest a white shirt with a Great Britain crest on the left breast (similar to those worn by the G.B. soccer team) and flannel trousers. In addition a track suit should be provided—perhaps on loan. Some of our readers may have their own ideas on the subject; if so, we should be pleased to have them—and to pass them on to the S.M.A.E. This is a matter which need not, and should not, be left to the last moment as is so often the case.

All-Britain Rally

EACH All-Britain Rally seems to be more popular than its predecessor, and the 1955 meeting—held at Radlett Aerodrome on September 25th—was no exception. The car and coach parks were more full than ever, and certainly spectators and competitors alike were present in force. Even the weather, after a hesitant start in the morning, could hardly have been more kind.

Added interest to the meeting was given by the B.O.A.C. event for team racing, the *Junior Mirror* Championships for the under-16's, and the presence of Miss Carol Carr—although not necessarily in that order. Group Captain John Cunningham and Peter Bugge, the de Havilland test pilots, both gave their expert attention to the concours section—as usual, no easy task.

One notable incident (if it can be called such) occurred when Ray Gibbs broke the World Speed Record for Class II (5.0 c.c.) speed models, the engine being immediately impounded for inspection by the S.M.A.E.

A selection of photographs taken at the rally will appear next month.

ARE YOU SURE?

WHAT is the maximum engine run allowed for PAA-Load models? Fifteen seconds. Are you sure about that? You can confirm the answer on page 20 of the current S.M.A.E. Competition Rule Book. And suppose you cannot attend an important contest in person, due to illness, say. Can you employ a substitute or "proxy" to fly your model for you? That one you will find answered on page 7, rule 25.

With so many different contest model specifications, even the keenest competition types are not always sure about all the rules. A copy of the S.M.A.E. Rule Book, therefore, is as indispensable as your towline, fuel, or rubber motor. If you have not yet got a copy, make sure of getting one straight away while supplies last. Write direct to the Society of Model Aeronautical Engineers, Ltd., Londonderry House, Park Lane, London, W.1. The price is only 1s. (plus 1½d. postage).

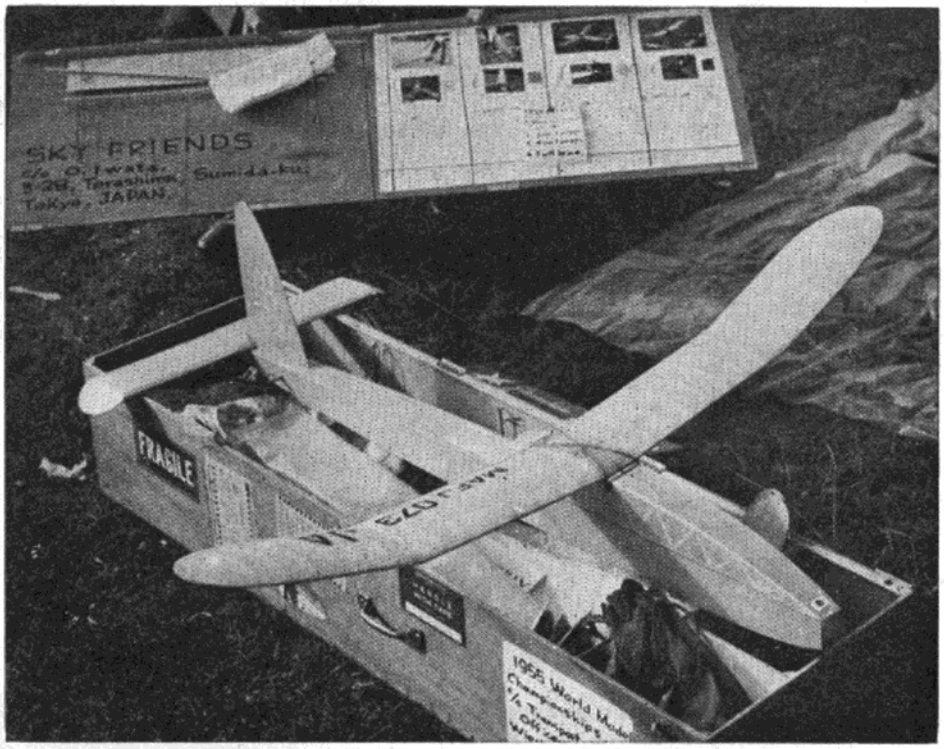
CUTTING IT FINE

EVER since contest specifications were introduced it appears to have been a point of honour amongst many designers to work right to the absolute limits allowed by the rules. Processing at every year's international events yields a proportion of models so "marginal" on certain dimensions, or weights, that we never cease to wonder why these people take such risks. Just what do they gain in saving that last fraction of a fraction of area or weight?

The answer is, of course, virtually nothing. Logic is against such practice. They run the risk of disqualification, or at least the necessity of "on the spot" modification, particularly if the processors are inclined to be severe; and any theoretical gain in performance is so small as to be ridiculous.

Many of these "down to the limit" designers, too, let themselves down over their building and provide a lesson for *all* contest entrants. Full size templates for checking are only accurate if they correspond *to the finished model*, and not necessarily to the plan from which it was built. There can be quite amazing differences—a $\frac{1}{16}$ on the wing chord, tip shape quite different after some judicious sanding, and so on. Why, we even remember a pre-war modeller of international repute who, just before leaving for America for a Wakefield finals, discovered that his 18 in. dia. propeller had one 9½ and one 8½ in. blade! He dared not do anything about it at that stage, and in any case the model was flying really well. But it does show how silly dimensional errors can creep in unnoticed.

In view of the fact that some of the British models at this year's World Championships were quite definitely 'borderline' would it not be a wise precaution to process the models before they leave the country in future?



PACKING 'EM IN!

THOSE international contest fliers who still make the transport of enormous model boxes a team manager's nightmare, should take note of the fact that the *four* Japanese Wakefield models were packed in *one* box somewhat smaller than the average model box. In addition, the models reached Germany undamaged.

Of course, the models were carefully packed—so much so that the directions displayed on the lid urged the unpacker to note how the models *had* been packed in if he wanted to get them all back again after the contest!

Enclosed with the Japanese models were the most complete instructions, photographs and sketches on the assembly, trimming and flying of the models. It has been left to the Japs, in fact, on their first entry into the World Championships, to show everyone exactly how models should be sent to an international event to be flown by proxy.

★

P. M. H. LEWIS contributes an attractive flying scale model of a German World War I fighter, powered by a half-c.c. diesel

★

Albatros D.V

SINGLE-SEATER *Albatros* fighters earned fame during the 1914-18 war in the hands of several of Germany's best pilots. With their finely streamlined fuselages, DV's were a notable advance in all-wooden design and formed the equipment of a number of the Western Front circuses during 1917.

It lost favour with the leading German *staffels* in the autumn of that year, when the Fokker Triplane made its appearance, but a number of D.V's. were still in service when the war ended.

An upright in-line Mercédès engine of 175 h.p. gave a top speed of 120 m.p.h. The span was 29 ft. 7 in. and the length 24 ft. 2 in.; armament was two Spandau guns. The original flying scale model was powered with the 0.5 c.c. Frog 50 engine.

Fuselage

3/32 in. sheet is used for the crutch outline, to which the $\frac{1}{4} \times \frac{3}{8}$ in. hardwood motor bearers are firmly cemented. The spacing of these should be adjusted according to the motor to be used. C1 is cut from $\frac{1}{16}$ in. plywood and pinned and glued to the front of the bearers. Using 3/32 in. sheet, make formers F1-F8 and cement them into their respective positions above and below the crutch.

Shape the undercarriage vees and also the centre-section struts from 18-g. wire and sew and cement them to their respective formers as indicated on the plan. The tail unit is cut to outline from 3/32 in. sheet and sanded to section before cementing to the fuselage. $\frac{3}{16} \times \frac{1}{16}$ in. strips are now used to plank the fuselage from F1 to the tail. Work upwards from the crutch edge, meeting at the top and bottom centre lines.

The engine bay between C1 and F1 is filled with soft block, hollowed out to $\frac{1}{4}$ in. walls. The upper section is removable, being kept in place with two press studs sewn and cemented in position. The 18-g. wire tailskid is fitted to the under fin and the entire fuselage filled with sanding sealer to close any gaps, and then sandpapered to a smooth finish, care being taken to avoid cutting through the skin. The undercarriage and centre-section struts are faired with $\frac{1}{16}$ in. sheet. The 18-g. wire axle is bound and soldered to the vees and faired with a strip of $\frac{1}{8}$ in. sheet of streamline section cemented in place.

Wings

These are built directly on the plan by first pinning down the $\frac{1}{8}$ in. sq. leading edge and lower spars and the trailing edge of $\frac{1}{16}$ in. sheet of the upper wing. $\frac{1}{16}$ in. sheet ribs are cut and cemented in place and the upper spar is added. $\frac{1}{16}$ in. sheet wingtips and centre-section complete the wings, with $\frac{1}{4} \times 3/32$ in. sheet braces to take the struts. The trailing edge between the ailerons is given a "feathered" effect by cutting with a razor blade and sanding. The lower wings are made in two halves in the same way as the upper. The root ribs are set at an angle to allow for $\frac{3}{8}$ in. dihedral at the tips.

Covering

Ensure that the model is as smooth as possible and cover with either heavyweight tissue or Jap silk. The latter, if available, is much more durable than paper. The fuselage is covered with several lengthwise strips doped on. Pin down the wings to prevent warping while they are drying from water spraying. Two coats of clear dope are given to the model followed by two of colour.

The D.III's (straight trailing edge to rudder) of the Richthofen circus were all-red, their leader's own aircraft bearing its black crosses with white outline above and below the wingtips and on each side of the rudder and the fuselage without any other distinctive insignia. D.III's and D.V's of other Jagdstaffeln flew with the wooden fuselages in natural finish and with flying surfaces camouflaged with hexagonal patches above in blue, green and fawn and below in pink, green and fawn.

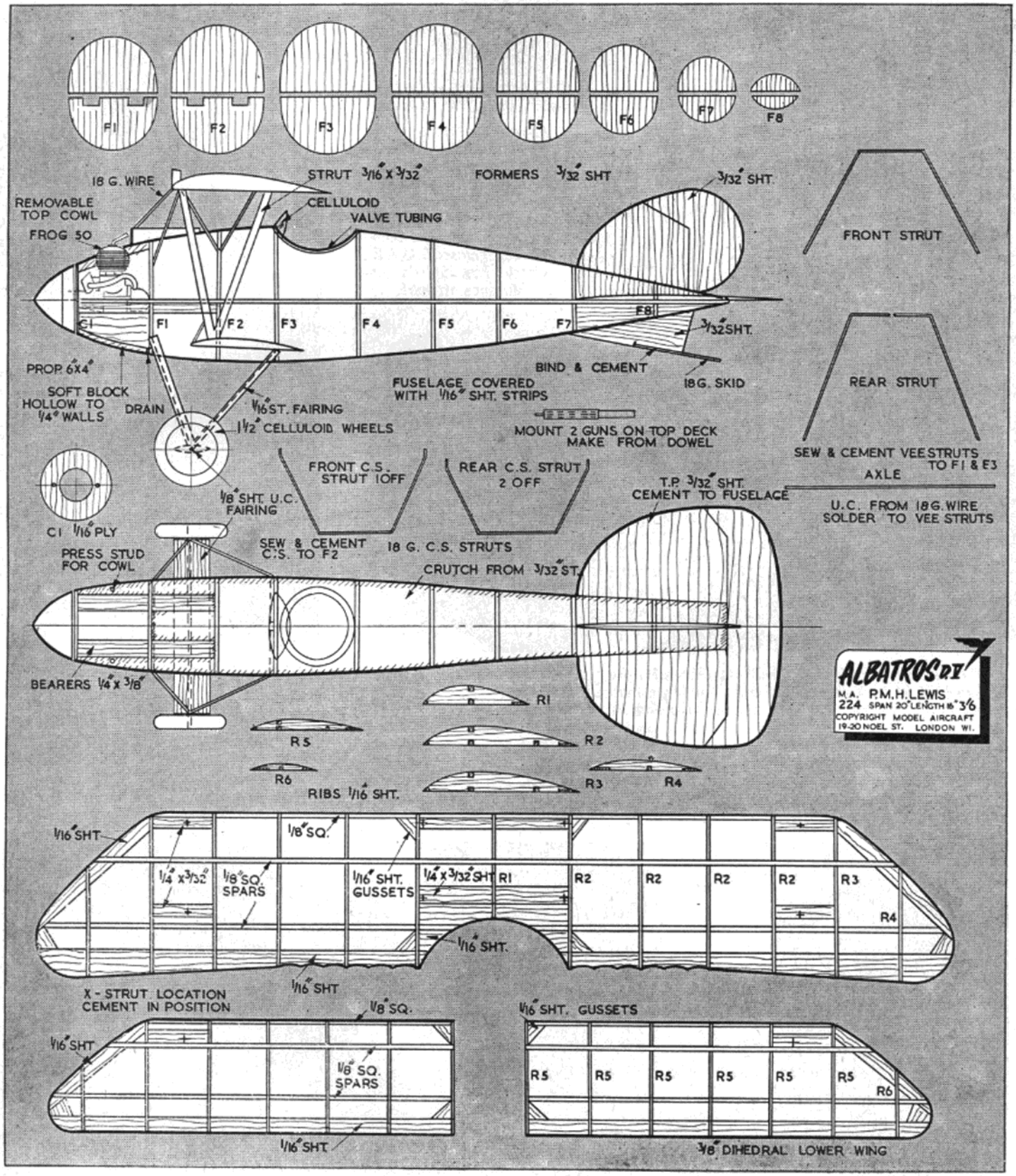
Assembly

The *Albatros* is now ready for completion and the lower wings are cemented to the fuselage sides followed by the upper wing on the centre-section struts. Interplane struts are cut from 3/32 in. hard balsa and cemented in place so that $\frac{3}{8}$ in. dihedral is set at the lower tips.

Details

1½ in. celluloid wheels are retained on the axle by soldered washers. The cockpit rim consists of split rubber valve tubing cemented to the edge, and twin Spandau guns of soft balsa are mounted on the top deck to fire on each side of the balsa dummy cylinder block. Rigging wires are simulated with grey cotton-covered shirring thread. The dummy exhaust is fitted on the starboard side leading past the centre-section struts, the radiator consisting of a panel of 1/32 in. sheet on the upper surface of the top wing.

Test glide the finished model over long grass until the correct balance is found by adding weight either to the nose or to the tail. Power flights are adjusted with side and down-thrust until a satisfactory power-on flight is obtained. A 6 × 4 in. airscrew being suitable.

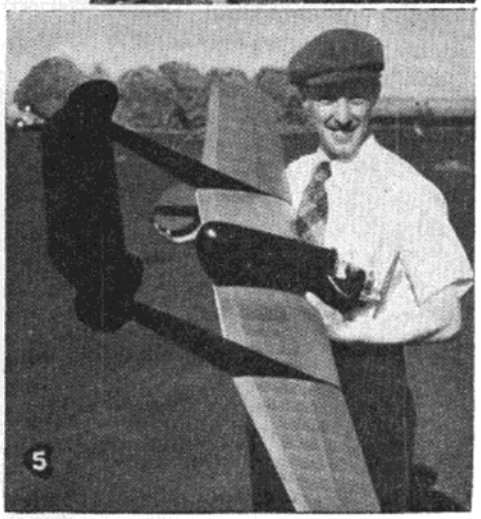


Scottish Festival of Model Aviation

Held at Preswick

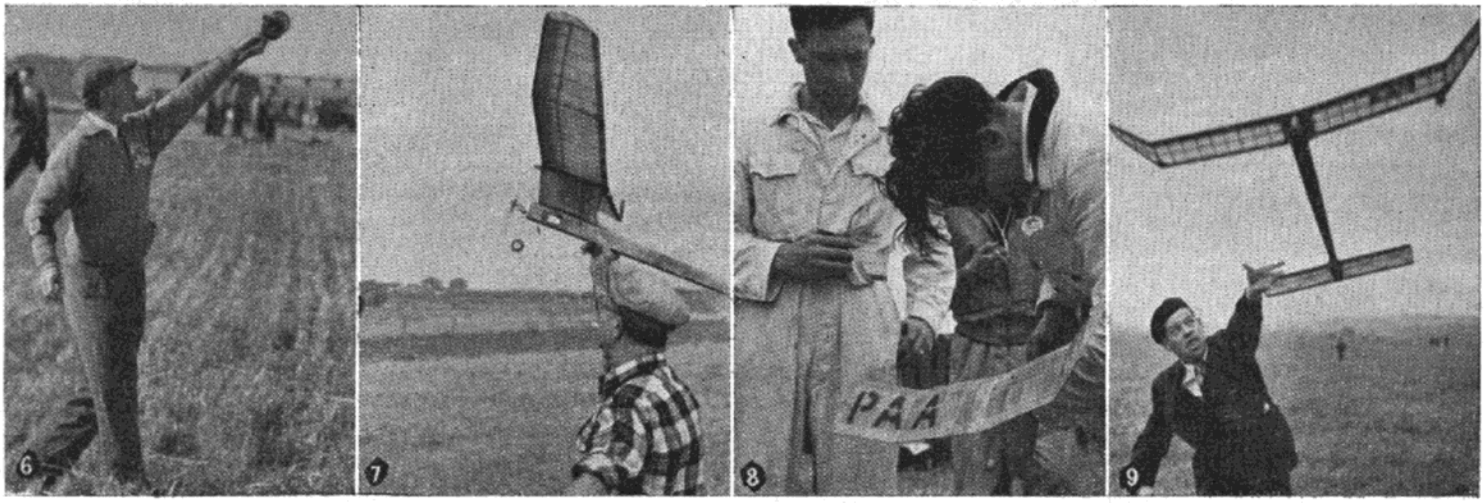
Above: The scene at the F/F and U.K. Challenge control.

2. L. to R.: Freda Shirt, festival manager, A. T. Doughton, P.A.A. Scottish sales manager, and Doug. Gordon, gen.sec.S.M.A.E., watch Ray Shirt's endurance attempt.



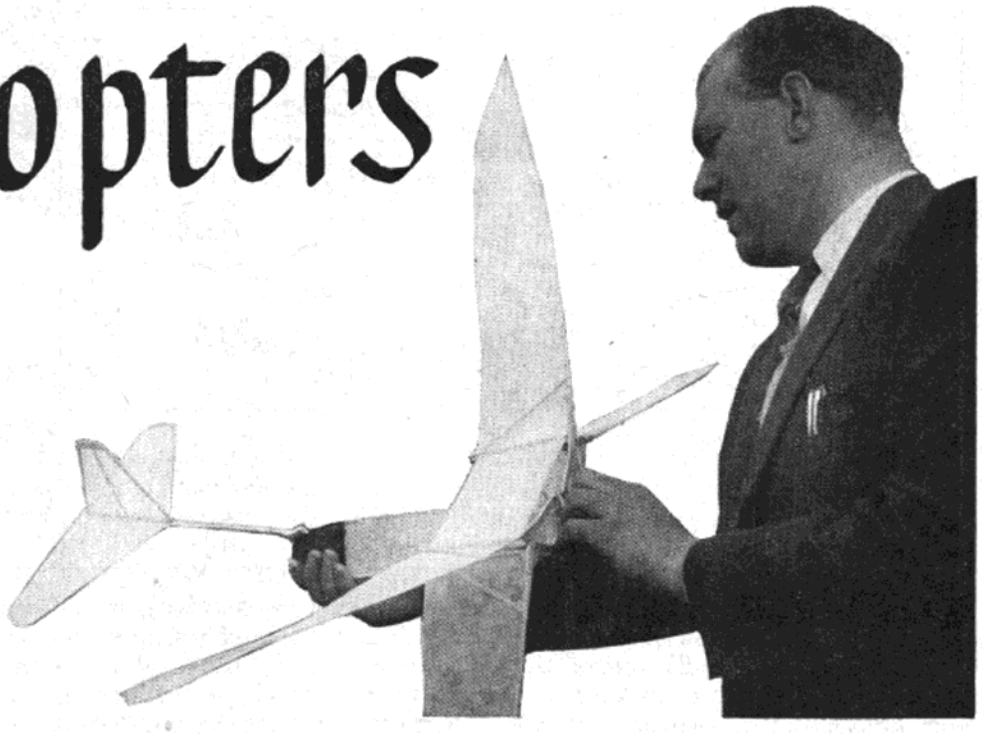
1. The winning English U.K. Challenge team with the cup.
3. Ron Firth of York flew in the U.K. Challenge match.
4. Receiving his prize for winning the America class PAA-Load from Lady Moore, is Pete Muller of London.
5. Raymond Shirt with his PAA-Load endurance model, the first of its kind in this country. He tried to break the American held record. Model carried 1½ lb. cargo, 8 oz. pilot and 1 pint of fuel. Power was Oliver Tiger converted to rotary disc valve—model used very little fuel in successive attempts totalling 105 minutes.

6. Brian Harris, West of Scotland Area P.R.O. and organiser of the U.K. Challenge match tows up his glider.
7. Representing England in the power was Silvio Lanfranchi of Bradford.
8. J. Taylor starts his power model assisted by Jim Hope. Both from Belfast, they represented N. Ireland in the U.K.
9. Alex Clark of the Glasgow Barnstormers flies his model in the F/F power event.



Ornithopters

by J. S. White



The author with one of his earlier ornithopter models which he flew at the British Nationals in 1954.

MY interest in ornithopters, or flapping wing machines, was aroused in 1949 by the plans of Parnell Schoenky's *Flap Happy*.* Rather limited success with this model led me to give considerable thought to the design principles involved, developing such ideas through numerous experimental models aimed throughout at improving performance.

The two main problems to be solved are—first, a method of transferring the power or energy stored in the rubber motor to the wings at a *uniform* rate ; and, second, the design of wings which are efficient propellers under power and also capable of sustaining the model in a glide when the motor has run out.

The wings of an ornithopter are its propeller, driven direct from the rubber motor. Thus the problem of coupling is quite different from that of orthodox rubber driven models. Power is transmitted from the motor to the wings by means of a crank and connecting rods, the wings being pivoted to flap up and down. The simple crank system used by Parnell and others—Fig. 1—is inefficient since only one half of the energy stored in the rubber is transmitted to the wings and the wasted power largely produces vibration.

The first step in improving the breed was to study the simple crank system carefully. In the horizontal position, going either up or down, the wings are moving with their greatest velocity and when the crank is moving at the top or bottom point of its revolution the wings have practically no movement. It is at these " dead " points that the crank tends to speed up, resulting in the jerky action and cracking sound characteristic of this type of design.

My first attempt to lessen vibration was to cement two carefully shaped pieces of soft rubber on the upper and lower faces of the noseblock so that the crank rubbed against them at the top and bottom of its circle. It certainly lessened the vibration, but it did not improve performance, simply because it provided only a case of wasting energy by absorbing it by friction. The next step was to consider using two pairs of wings arranged so that the " dead " points of one pair of wings coincided with the maximum speed or " active " points of the other pair.

Designing the crank system for my first multi-winged model was tricky—Figs. 2 and 3—since flapping wings are rather intangible things, confusing to analyse visually. Thus my first job was to plot the motions of each wing graphically. This was done by drawing the crank at various angles and measuring the corresponding angles assumed by the wings. Thus over a complete revolution it was possible to plot the change in angle of the wing with rotational movement of the crank.

Calling the angular displacement of the crank α and the angle assumed by the wings β, a graph of the change in angle of the wing through a complete revolution follows very much the same path as a sine curve—Fig. 4, wing A. Apart from showing the extent of the wing beat, such a curve also shows the angular velocity of the wing and the changing gradient of its slope.

* Parnell Schoenky, of the United States, is one of the world's leading authorities on unorthodox models, particularly ornithopters and helicopters. In addition to numerous past contest successes with such models he recently won the Hiller helicopter trophy at the 1955 American Nationals.—Ed. note.

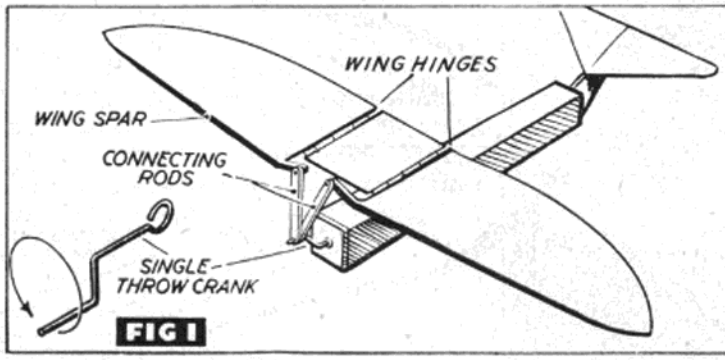


FIG 1

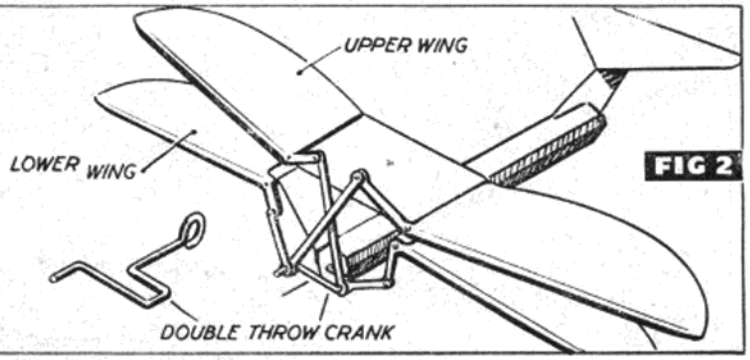


FIG 2

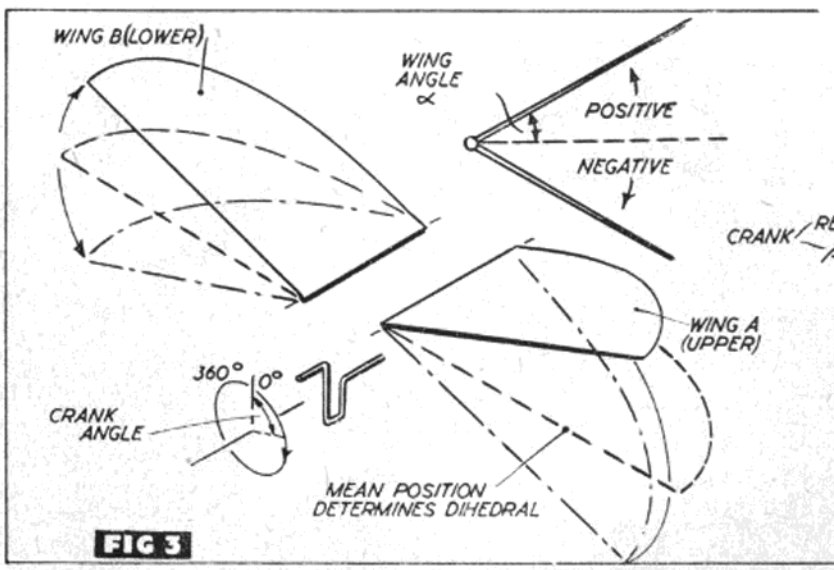


FIG 3

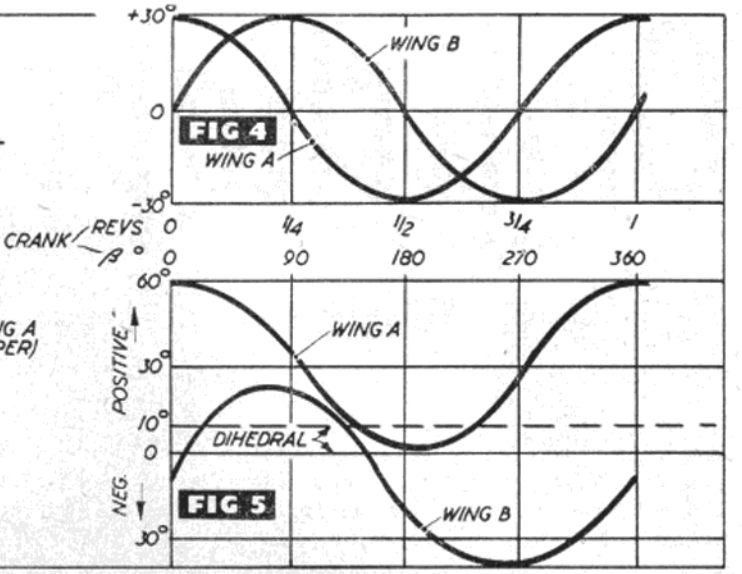


FIG 4

FIG 5

Adding a second wing pair one quarter of a revolution or 90 degrees out of phase (wing B) means that the point of maximum velocity of the first pair of wings coincides with the point of minimum velocity of the second pair, and vice versa. In other words, one pair of wings is "active" when the other pair reaches a "dead" point.

It is obvious that such a system of paired wings would overlap, so intending to mount one pair of wings above the other—Fig. 3—the curves were redrawn, raising the mean position of one pair of wings and lowering that of the other pair so that they would just meet, or nearly meet at the desired dihedral angle—Fig. 5.

A half-scale modified version of *Flap Happy* was then built, boasting two pairs of wings operated by a double-throw crank. The resulting model had a spectacular performance and was capable of resisting damage in a remarkable way. If it hit the wall instead of the ceiling on its passage across the dining room it was reckoned to be in poor trim. It was a scaled up version of this model that established the current British outdoor ornithopter record and made two consecutive flights of 1 min. 55 sec. and 1 min. 51 sec. at the Northern Heights Gala in 1954.

The fact that the wing beat curves approximate to sine waves can be assumed to be in its favour. Sine waves occur with uncanny frequency in nature—in the fins of fishes, along the wing of a manta ray when it is propelling itself through the water, and in countless other ways. I felt that I could not go far wrong if I copied nature and so redisigned the mechanism to enable the wings to beat with a true simple harmonic motion.

In order to produce this motion it is necessary to satisfy two conditions. The connecting rods must be the same length as the distance between the crank bearing and the wing bearing ; and the connecting rods must be parallel to a line joining the crank bearing and the wing bearing at all positions of the crank.

The first condition is easily satisfied by making the connecting rods the correct length and then adjusting the mean position of the wings by offsetting the little-end bearings—Fig. 6. The second condition cannot be satisfied, but a close approximation can be arrived at by pivoting all the wings at the same point and making the throw of the crank very small in proportion to the length of the connecting rods—Fig. 7. This re-

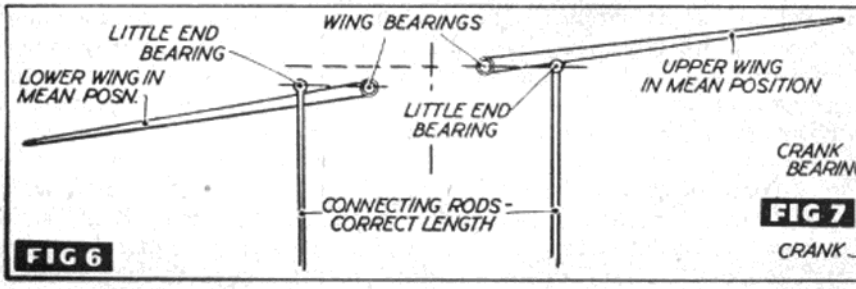


FIG 6

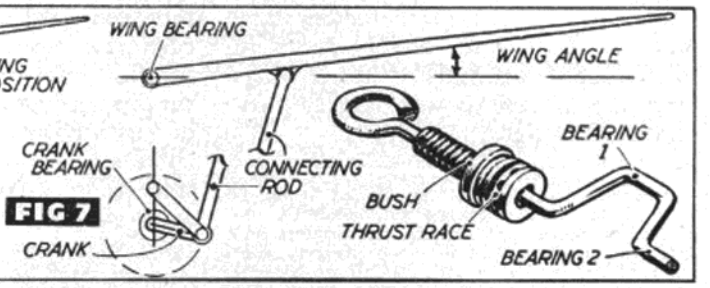


FIG 7

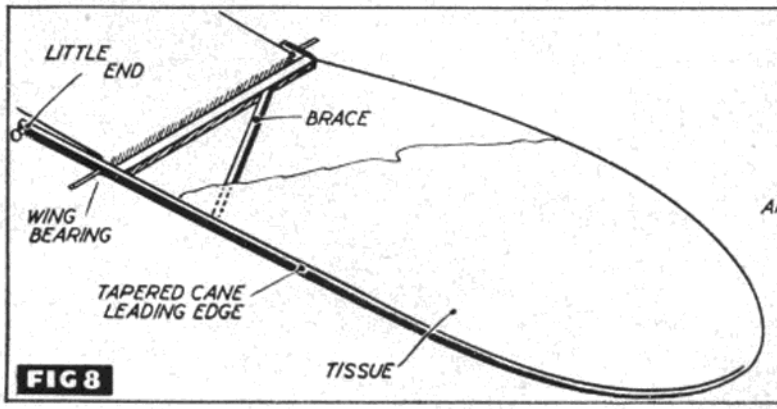


FIG 8

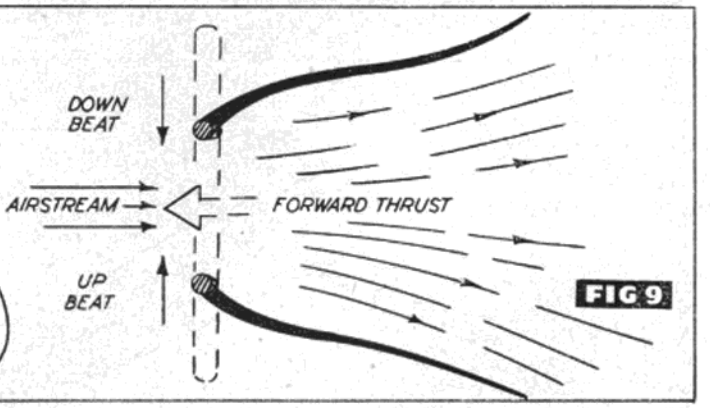


FIG 9

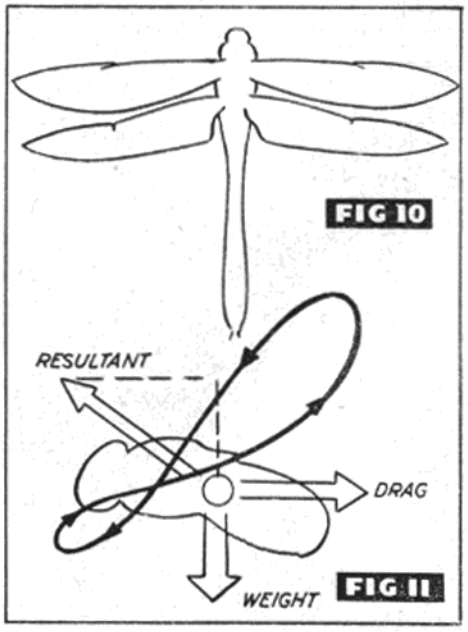


FIG 10

FIG 11

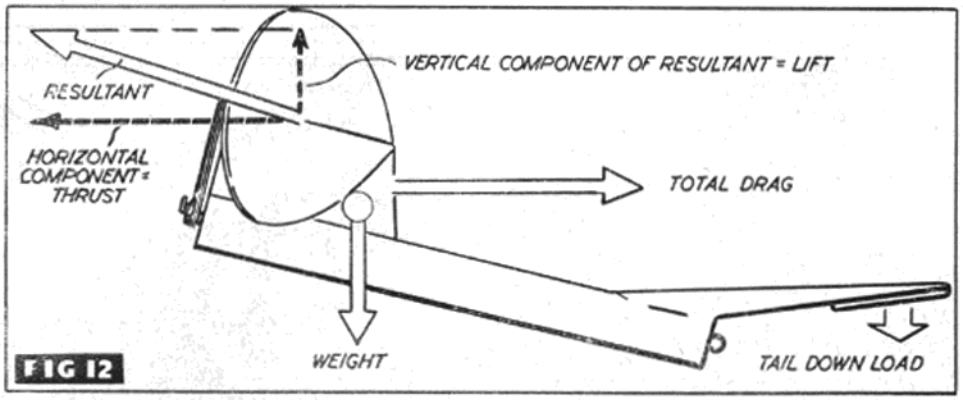


FIG 12

designed mechanism quickly proved, in practice, to be a great advance over the original. The type of linkage used is capable of transmitting energy from the rubber motor to the wing pairs at a uniform rate. The wings beat with remarkable smoothness and the crank unwinds at a regular rate without hesitation or vibration.

Two pairs of wings, then, one pair 90 degrees out of phase with the other pair, and both beating with simple harmonic motion solves the problem of *uniform* power transfer. The major disadvantage of the system mounting one pair above the other is that only one half the total wing area is presented on the glide. There is no reason why this should not be overcome by mounting the pairs of wings in tandem as in the dragonfly. With the mean position of *both* pairs of wings then arranged at about 10 degrees dihedral, full wing area and ample stability is provided for the glide.

This leaves the question of the most efficient design for the wings. Most wings at present in use consist of lightweight tissue with a stiffened leading edge and rigid root member —Fig. 8. In order to understand its action clearly, consider it as a blade of a propeller which instead of revolving continuously has an oscillating motion. On the upward beat the unsupported tissue behind the leading edge is forced downwards and, if it is fresh and taut, adopts a shape similar to the concave undersurface of a propeller—a change in pitch being evident from root to tip. At the end of the stroke when the wing changes direction, air pressure billows out the tissue in the opposite direction, changing the wing from a right-handed propeller to a left-handed one, and vice versa. The resultant thrust is in a forward direction, as one would expect from a propeller—Fig. 9. Any perpendicular component on the up beat is cancelled out by an equal and opposite component on the down beat.

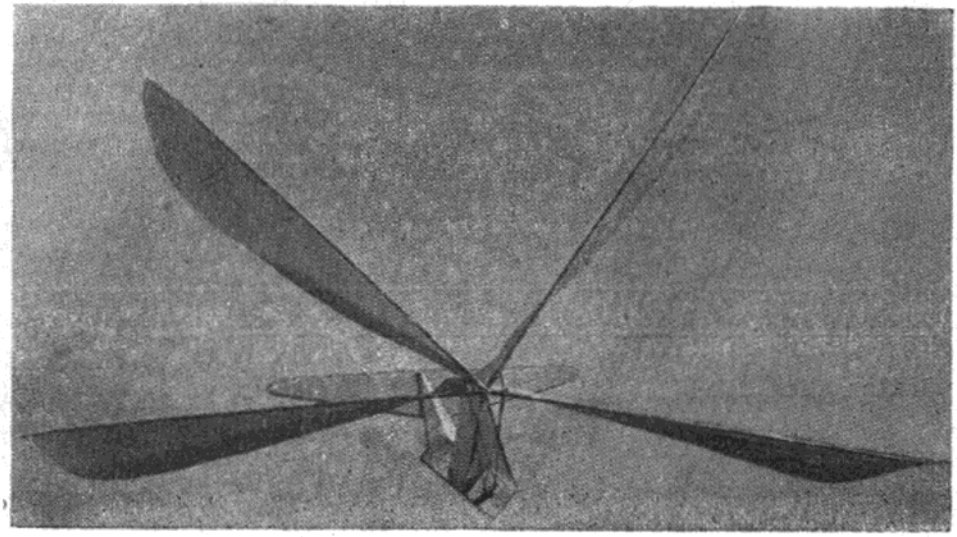
Ron Warring in an article published in this journal in 1953 suggested that if we wanted a successful model ornithopter we would have to start by forgetting about bird flight. I agree that the complicated action of a bird's wing and the function of its feathers would be difficult to duplicate, but I would suggest that a study of insect flight should not be neglected by those interested in the design of flapping wing models.

Contemporary model ornithopter wings are most like those of the dragonfly—Fig. 10. A dragonfly's wing muscles act directly on the wings as on levers, resulting in a simple up and down movement. The reversal of inclination is caused by the pressure of air acting on the wings, which are rigid in front and flexible behind. This change in inclination is not seen when a dragonfly's wing is vibrated in a vacuum.

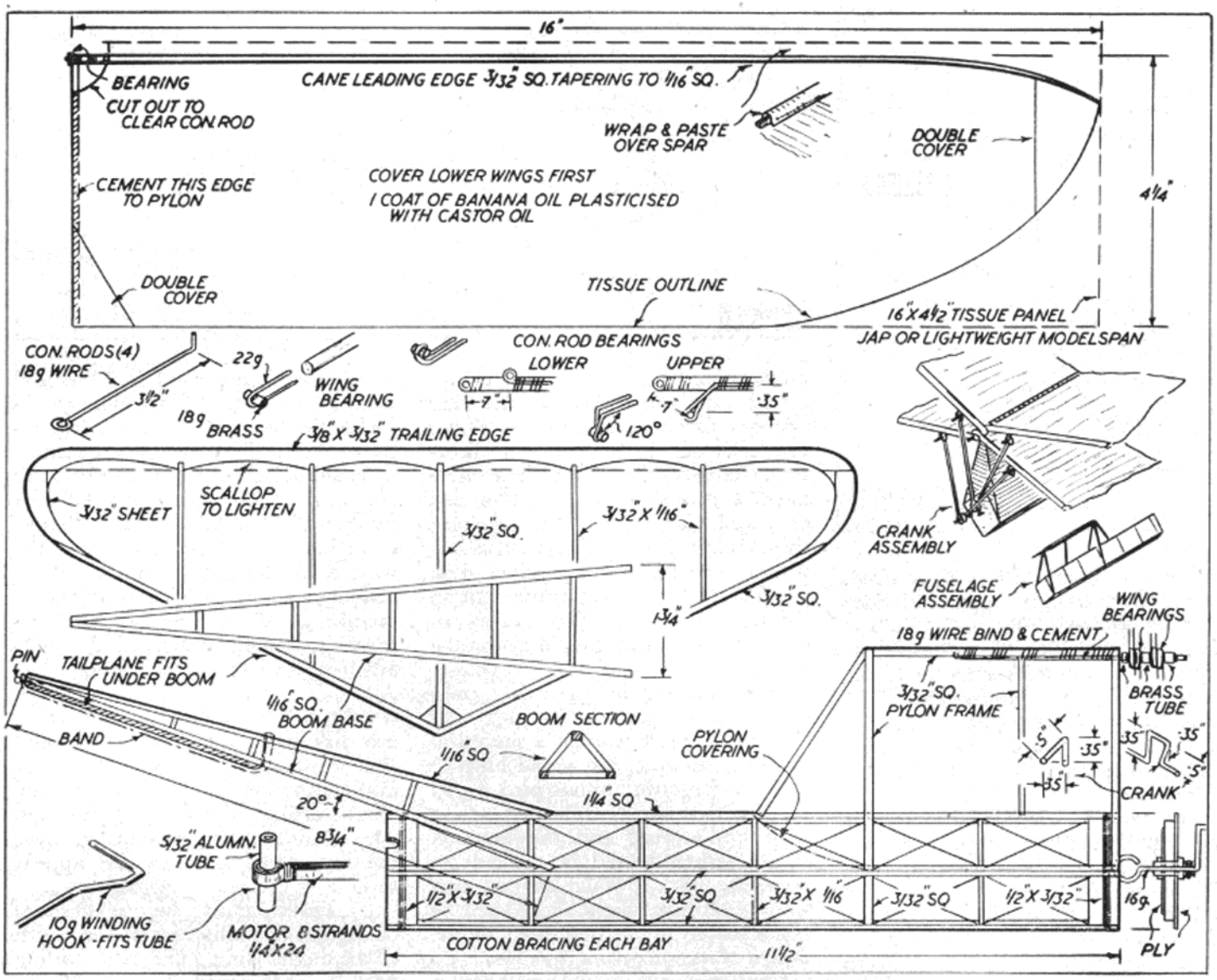
In less primitive types of insects this change in incidence is chiefly effected by muscular action, the same change in inclination taking place when the wing is cut down to a stump.

The usual insect wing consists of a membrane stiffened by tubular structures, its flexibility increasing gradually from leading edge to trailing edge. Although this description follows closely that of a model wing there are differences and I would suggest that improvements can be made by duplicating as far as possible the characteristics of a dragonfly's wing. The possible improvements over existing model wings would appear to be :—

(i) There must be a gradual change in flexibility across the width of the model wing. The cane leading edge is not so necessary if the driving mechanism is free from vibration and balsa could probably be used. I would suggest that the wing should have a thin symmetrical section with sufficient lateral flexibility to adopt the shape of an efficient aerofoil under power.



A head-on view of J. S. White's latest ornithopter. The plan is overleaf.



(ii) The longitudinal flexibility of the wing must be such that under power the air pressure forces it to adopt the correct pitch relative to the velocity of the wing through the air, so that with the lateral flexibility just mentioned the wings adopt the shape of an efficient propeller.

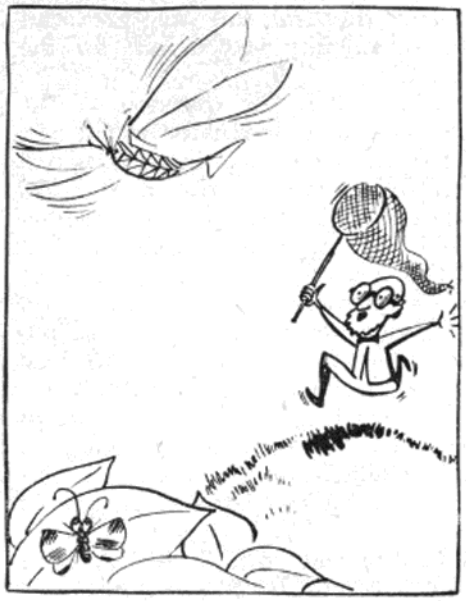
(iii) Whilst flexible enough to satisfy (i) and (ii) above, the wing must still be rigid enough to prevent undue flexing on the glide.

There is obviously a great deal of experimenting and development to be done on the design of model ornithopter wings. It is interesting to note, for instance, that the rear wings of the dragonfly beat just before the forward wings so that both wings meet undisturbed air. In other species of insects the trailing edge of the forward wings locks, by means of bristles, to the leading edge of the rear wings, presenting one complete area which solves the problem of the rear wings beating in disturbed air. In others the forward wings beat first and the rear wings follow.

Fig. 11 shows the forces acting on a fly in forward flight. The resultant force from the wings passes through the centre of gravity, giving it a helicopter-like stability. The high angle of attack—something like 50 degrees—must be due to its relatively low power : weight ratio—its flight muscles comprising only about 11 per cent. of its total weight.

Fig. 12 shows my estimate of the forces acting upon a model ornithopter in flight. The apparently unbalanced position of the thrust of the wings is balanced by the negative angle of the tailplane. This is a typical flying position, the tailplane being almost horizontal. The resultant force generated by the wings has a vertical component yielding lift and a horizontal component of thrust to balance the drag.

My latest model, plans of which are on this page, will be a test bed on which to experiment with various types of wings. It should be readily duplicated in the form shown and, in the hands of the average modeller, be capable of turning in flights of over one minute. In expert hands—who knows—a record flight ?



WORLD CHAMPS

Michael Gaster, Great Britain, Power Winner

HELD IN GERMANY

TEAMS from 24 nations gathered at the United States Air Force Headquarters at Weisbaden in Germany for the World Championships in the three F/F classes—Nordic A-2, Power and Wakefield—the biggest international event yet held.

The complex organisation needed to house, feed and transport the total of over three hundred competitors, team managers, officials and other interested parties was provided by the U.S. Air Force, while the contest organisation was the joint responsibility of the A.M.A. and the Deutscher Aeroclub.

Weisbaden Airbase is about three miles from the attractive spa town of Weisbaden, and Finthen Aerodrome, where all the model flying took place, was some 12 miles from the airbase. All the competitors lived at the airbase and transport was provided each day to the aerodrome at Finthen.

The organisation was on the whole good, although there were minor faults and perhaps the worst of these was the intention to check all the models on the Friday night, before flying commenced, by a totally inadequate number of processors. However, this was overcome by processing only the winning models after the events.

The competitions were all run in five two-hour rounds with one team member from each country flying each half-hour.

Rudolf Lindner, Germany, A2 Winner

Gustave Sämann, Germany, Wakefield Winner

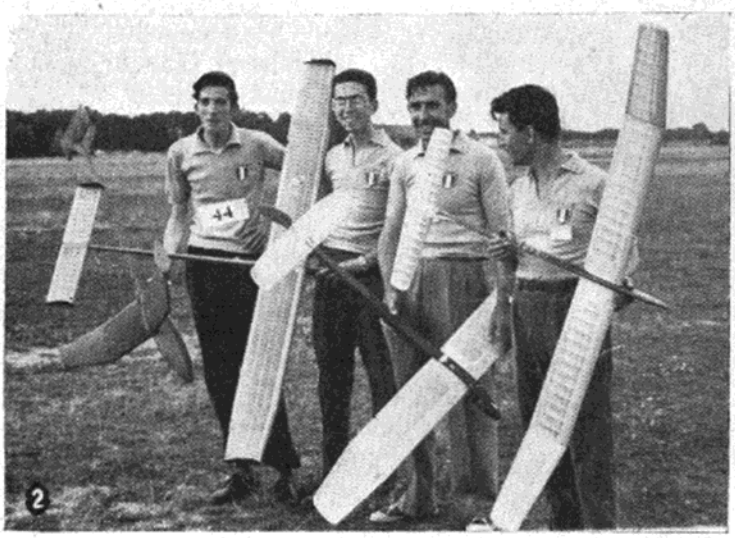
A2

THE weather, on the Saturday morning when the glider event was run, was overcast with a tendency to drizzle and in consequence the lack of thermal activity made this first round perhaps the most critical of the five. Of the 78 competitors, only six made a maximum score. In the British camp Bob Gilroy had a flight of 160 sec., and Des Yeabsley 134 ; John O'Donnell and Geoff Lefever both had less than 100.

The second round opened with improving weather, the flight times following suit, and above a third of the contestants scored max's. Gilroy and O'Donnell achieved three minutes each and at the end of the round three countries, Germany, Czechoslovakia and Denmark, each had one man with a double max.

During the third and fourth rounds the maximum flights—which had taken on an all-important aspect—were not quite so generously distributed as in round two, and the fortunes of the individuals concerned fluctuated considerably. As the fourth round ended it could be seen that last year's champion, R. Lindner, of Germany, was the only one with a perfect score. Thomann, of Switzerland, was next, 17 sec. behind, Gilroy (G.B.) and Hagel (Sweden) were 20 sec. behind the leader.

The team managers could decide in what order the team members could fly in each round, and as the fifth round opened under cooler, more cloudy conditions it was obvious that the choice of flying time could considerably affect the final results. Major Taylor, British team manager, allowed Bob Gilroy, our highest placed man, to choose his flying time and Bob went ahead and put up a max. As the round went on, the other highest placed men, with the exception of Lindner, flew and returned times that made it obvious that Lindner would have to exceed 160 sec. to beat Gilroy. In the last quarter of the round Lindner came out to fly. Another German model was flown nearby to test the air and Lindner in consequence moved further up the field where the process was repeated. This time Lindner flew and with 166 sec. won the World Championship for the second time running, Bob Gilroy, 6 sec. behind, took second place. Italy, by winning the team trophy, has the right to hold the A-2 contest next year.



1. Rudolf Lindner, the winner, with his model.
2. The winning team from Italy, E. Giusti, C. Boscarol, P. Nironi and C. Varetto.
3. The Swedish team who took second place in the Belgium Daumerie Trophy, L. Gustaffson, R. Hagel, G. Kalen and L. Olsson.
4. The three top place glider men, from L. to R., Bob Gilroy (G.B.), Rudolf Lindner (Germany) and Rolf Hagel (Sweden).
5. Herbert Kothe, the top U.S. glider man, took 7th place with his attractive model.
6. R. Lindner's model is launched on its final winning flight.
7. Hugh O'Donnell launches for brother John, who placed 19th.
8. A member of the Swiss team, Hans Ege, who placed 11th.
9. The wing of Hans Thomann's (Switzerland), who placed 6th, model was beautifully made from polished mm. ply and sported a turbulator.
10. Des Yeabsley, one of the British team members, launches Bob Gilroy's model.
11. Two of the G.B. team, J. O'Donnell and Geoff Lefever chat together.
12. A happy shot of the British glider team.

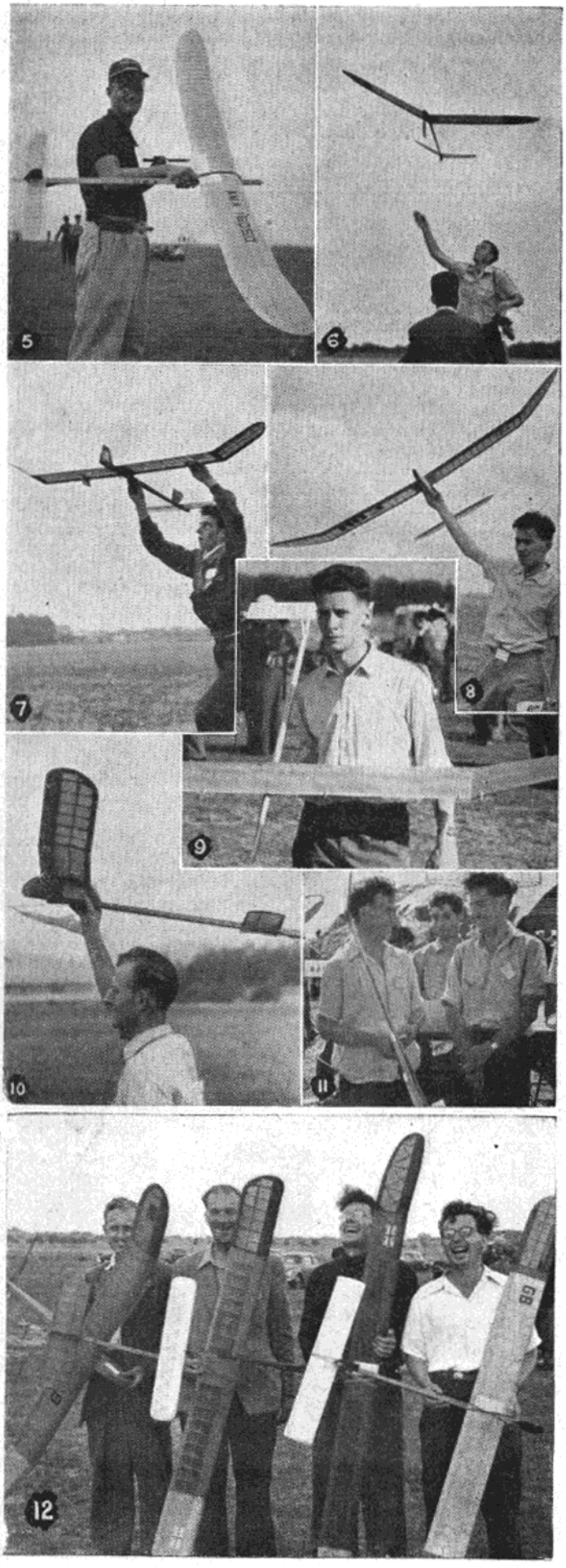
INDIVIDUAL RESULTS FOR THE SWEDISH CUP

			1	2	3	4	5	Total
1.	R. Lindner	Germany	180	180	180	180	166	886
2.	R. Gilroy	Gt. Britain	160	180	180	180	180	880
3.	R. Hagel	Sweden	176	180	180	164	177	877
4.	E. Giusti	Italy	156	180	180	180	180	876
5.	J. C. D. Esvelt	Netherlands	163	180	137	180	180	840
6.	H. W. Thomann	Switzerland	166	180	180	180	130	836
7.	H. Kothe	United States	143	180	145	180	180	828
8.	V. Horyna	Czechoslovakia	180	180	133	180	152	825
9.	H. Hansen	Denmark	180	180	158	106	180	804
9.	M. Vilchair	France	118	180	180	180	146	804
11.	H. Ege	Switzerland	174	116	180	144	180	794
12.	C. Varetto	Italy	130	180	180	180	114	784
13.	C. Goetz	France	135	100	180	180	180	775
13.	B. McElwain (P) Kurth	New Zealand	104	180	131	180	180	775
15.	G. Overlaet	Belgium	147	180	180	180	85	772
16.	L. Murtagh	Ireland	138	180	180	93	180	771
17.	A. Cavlevski	Yugoslavia	171	165	128	125	180	769
18.	L. Gustafsson	Sweden	141	180	180	90	168	759
19.	J. O'Donnell	Gt. Britain	96	180	180	180	114	750
20.	L. Feron	Belgium	150	139	180	180	97	746
21.	D. Mackenzie	Canada	130	99	180	156	180	745
22.	V. Spulák	Czechoslovakia	166	95	180	116	178	735
23	Eduardo Vich	Argentina	110	128	180	147	167	732
24.	F. Sussdorf	Saar	157	180	159	127	106	729
25.	S. Pedersen	Denmark	128	180	139	101	178	726
25.	L. Olsson	Sweden	114	180	72	180	180	726
27.	R. Berthe	France	108	144	180	180	110	722
28.	P. Petrovski	Yugoslavia	180	124	125	108	180	717
29.	C. Boscarol	Italy	140	146	158	178	122	716
30.	J. Lock	France	126	180	90	172	143	711
30.	A. C. LeBreton (P) Mussig	New Zealand	165	180	180	80	106	711
32.	J. Harápát	Czechoslovakia	143	180	180	87	114	704
33.	W. Etherington	Canada	180	151	72	180	115	698
34.	B. Jones	Canada	105	180	101	180	129	695
34.	H. Rau	Saar	133	180	180	127	75	695
36.	P. Nironi	Italy	180	84	180	70	176	690
37.	J. Fraquelli	Argentina	132	147	180	153	75	687
38.	M. Newnham (P) Barth	Australia	110	109	99	180	180	678
39.	M. Vuletic	Yugoslavia	150	180	78	100	167	675
40.	R. Knoll	Saar	92	180	128	180	83	663
41.	W. Woerle	Germany	121	180	69	145	143	658
42.	P. Smith	Ireland	87	180	112	71	180	630
43.	H. G. Wachter	Germany	116	180	83	96	152	627
44.	F. Menc	Czechoslovakia	125	103	180	109	108	625
45.	H. Nielsen	Denmark	80	180	178	98	88	624
46.	C. de Cosio	Mexico	124	180	179	86	54	623
47.	R. Melzer	Germany	113	95	180	47	180	615
48.	C. Aubertin	Monaco	104	176	76	74	180	610
48.	A. Klaver	Netherlands	139	172	82	180	37	610
50.	M. Zito	Argentina	94	87	62	180	180	603
51.	J. Turk	Austria	98	180	30	180	96	584
52.	O. Czepa	Austria	161	161	135	52	67	576
53.	J. Kolb	United States	95	128	180	56	116	575
54.	H. Glavitsch	Austria	131	123	176	20	118	568
55.	H. Cole	United States	121	175	113	93	63	565
56.	H. Sayar	Argentina	107	104	180	106	64	561
56.	H. Schnabel	Switzerland	138	180	40	82	121	561
58.	R. B. Lester	Canada	106	180	83	120	71	560
59.	D. Yeabsley	Gt. Britain	134	101	72	180	67	554
60.	H. Weintraut	Saar	102	173	66	101	47	549
61.	B. Hansen	Denmark	132	117	180	53	64	546
61.	G. Lefever	Gt. Britain	90	167	137	55	97	546
61.	F. Bachli	Switzerland	137	180	96	86	47	546
64.	J. Maes	Belgium	178	180	75	29	83	545
65.	G. Kalen	Sweden	115	117	133	75	77	516
66.	M. Walsh	Ireland	131	86	166	82	44	509
67.	J. Wastl	Austria	116	67	45	156	100	484
68.	R. Molinari	Monaco	47	70	180	90	86	473
69.	A. King	Australia	108	114	62	180	—	464
70.	L. R. G. Ackroyd (P) Denzin	New Zealand	119	119	56	68	96	458
71.	A. A Teunissen	Netherlands	114	86	91	64	89	444
72.	R. Aubertin	Monaco	90	133	84	81	49	437
73.	J. Harris	United States	122	90	77	77	56	422
73.	L. Pinter	Yugoslavia	63	76	99	61	123	422
75.	V. Adamski	Belgium	103	83	117	83	35	421
76.	J. Thompson	Ireland	87	114	92	54	53	400
77.	H. B. M. Luykx	Netherlands	126	35	60	58	63	342
78.	P. Carter (P) Boy	New Zealand	120	45	27	—	—	192
79.	W. Malcolm	Australia	—	180	—	—	—	180

(P) Indicates proxy flown.

TEAM AGGREGATES FOR THE BELGIUM DAUMERIE TEAM TROPHY

1. Italy	2376	8. Yugoslavia	2161	15. New Zealand	1944
2. Sweden	2362	9. Denmark	2154	16. Ireland	1910
3. France	2301	10. Canada	2138	17. Netherlands	1894
4. Czechoslovakia	2264	11. Saar	2087	18. Austria	1728
5. Switzerland	2191	12. Belgium	2063	19. Monaco	1520
6. Gt. Britain	2184	13. Argentina	2022	20. Australia	1322
7. Germany	2171	14. United States	1968	21. Mexico	623



WORLD CHAMPIONSHIPS

POWER

UNDER a sky of uniform grey with little thermal activity the first round of the power opened on the Sunday morning. The weather was ideal for the British team, their models—all well trimmed—in turn made convincing flights, gaining ample height on the power run and thus not needing thermal assistance on the glide. At the completion of the first round, the scoreboard showing the British team under the Union Jack looked very tidy, as Pete Buskell, Mike Gaster, Alan Mussell and John Parrott had each scored a max. The next best country was Yugoslavia with three max's, followed by the U.S., the Argentine and Italy with two apiece.

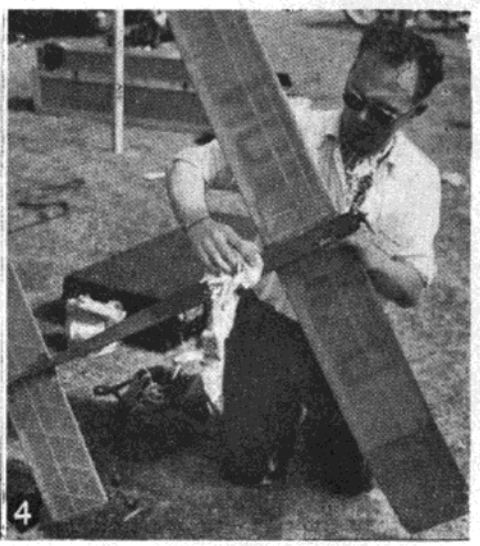
During the second round when thermal assistance was more in evidence, the British team had high hopes of keeping the scoreboard looking tidy, but unfortunately Alan Mussell turned in a short flight although the others succeeded. At the end of that round the fliers with a double maximum, besides the three British men, were Goss and Gould, of the U.S.A., Vidossich and Bacchi of Italy, Gunic and Zigic of Yugoslavia, Stacjer of the Argentine, Jones of Canada and Hajek of Czechoslovakia. Maria Rudolph of Germany, the only woman contestant, was but one second behind.

The third round saw John Parrott turn in a short flight and Alan Mussell, in trouble with his timer, make two attempts that were disqualified through over-long motor runs. The other G.B. men kept up the good work with two more max's. This round also dashed the hopes of the U.S. and Yugoslav fliers, while the rest of the double max. men went on to score a third.

Flown between two-thirty and four-thirty in the afternoon under sunny conditions, the fourth round provided a lot of lift and over half the competitors put up a max. The British team bagged a max. each and only one of the seven perfect score men, Bacchi of Italy, fell out of the running.

The fifth round was far more telling, as the weather conditions were changing rapidly. Pete Buskell, who, with Mike Gaster, had been flying with clockwork precision, now had a short motor run—only 7 sec.—and although he made a very creditable flight he was 29 sec. short of a max. Mike Gaster flew, making another perfect flight—now, what of the opposition? As the times came in it was found that only Francisco Stajcer of the Argentine and Bryant Jones of Canada had unblemished scores.

At about a quarter-to-seven in the gathering dusk, a fly-off took place between the three finalists—the Argentinian and Gaster off close to each other, and then some 15 sec. later Bryant Jones. Stajcer down first—about 3 min. and Jones's and Gaster's machines circling specks in the fading light. Jones down next and Mike Gaster, British team member, had won. When the watches were checked Jones had overrun on his power run by point-two of a second—the watches agreed exactly—and so he took third place.



1. Mike Gaster, individual power winner, is chaired by Bob Gilroy and Ron Martin.
2. Bryant Jones, who took third place, poses with a Canadian club mate.
3. Francisco Stajcer of the Argentine, walks out to compete in the fly-off.
4. Alan Mussell (G.B.), who missed a third round flight through timer trouble.

INDIVIDUAL RESULTS FOR THE F.N.A.F.O.M. CUP

			1	2	3	4	5	Total	Fly-off
1.	M. Gaster	Gt. Britain	180	180	180	180	180	900	313
2.	F. Stajcer	Argentina	180	180	180	180	180	900	175
3.	B. Jones	Canada	180	180	180	180	180	900	000
4.	V. Hájek	Czechoslovakia	180	180	180	180	166	886	
4.	L. Mangino	Mexico	166	180	180	180	180	886	
6.	P. Buskell	Gt. Britain	180	180	180	180	151	871	
7.	G. Vidossich	Italy	180	180	180	180	150	870	
8.	M. Rudolph	Germany	179	180	166	180	164	869	
9.	P. Goss	United States	180	180	148	180	178	866	
10.	L. F. L. M. Bausch	Netherlands	160	180	180	180	127	827	
10.	Antonio Podda	Italy	170	142	180	180	155	827	
12.	J. Partinen	Finland	132	180	158	180	167	817	
13.	H. Gould	United States	180	180	142	180	130	812	
14.	R. Bacchi	Italy	180	180	180	174	87	801	
14.	B. Gunic	Yugoslavia	180	180	81	180	180	801	
16.	J. Parrott	Gt. Britain	180	180	102	180	143	785	
17.	J. Heidemann	Germany	120	180	173	180	176	779	
18.	G. Hormann	Austria	180	169	133	180	102	764	
19.	O. Lucas	Argentina	162	180	60	180	180	762	
19.	J. Thompson	Ireland	150	127	125	180	180	762	
21.	M. Zito	Argentina	180	155	111	180	134	760	
22.	S. Davila	Mexico	180	125	129	166	157	757	
23.	F. Aiken	Ireland	180	154	180	165	74	753	
23.	E. Johansen	Denmark	157	132	104	180	180	753	
25.	G. Rupp	Germany	169	108	109	180	180	746	
26.	E. Fresl	Yugoslavia	180	130	95	151	180	736	
27.	H. Fries	Sweden	144	180	160	180	69	733	
28.	L. Nesic	Yugoslavia	147	76	147	180	180	730	
29.	G. Lippens	Belgium	136	152	180	180	81	729	
30.	P. Schmitter	Switzerland	154	180	123	180	91	728	
31.	W. Hartill	United States	135	100	180	180	113	708	
32.	B. Baker	Australia	180	153	101	114	158	706	
33.	H. Buhr	Switzerland	118	90	180	180	137	705	
34.	A. Mussell	Gt. Britain	180	156	—	180	180	696	
35.	R. Cerny	Czechoslovakia	159	99	143	110	180	691	
36.	J. McMillan (P) Benkert	Canada	79	180	136	153	139	687	
37.	A. Lundin	Sweden	102	132	180	180	90	684	
38.	T. Morelli	Ireland	115	137	180	142	109	683	
39.	H. Entzeroth	Switzerland	148	119	180	103	104	654	
40.	W. Etherington	Canada	173	49	143	156	131	652	
41.	R. Schenker	Switzerland	137	133	67	117	174	628	
42.	J. S'Jongers	Belgium	172	180	103	71	95	621	
43.	G. Guidici	France	180	97	117	119	92	605	
44.	H. Loser	Germany	15	180	120	180	109	604	
45.	R. Hagel	Sweden	7	138	180	180	96	601	
46.	G. Navarro	France	100	130	91	142	121	584	
47.	C. Bergamaschi	Italy	117	167	95	108	76	563	
47.	E. Shailor	United States	—	124	79	180	180	563	
49.	R. Das	Netherlands	172	79	89	101	115	556	
50.	M. Vondruska	Czechoslovakia	137	180	69	86	67	539	
51.	H. Nielsen	Denmark	78	115	83	142	113	531	
52.	J. C. Guyot	France	—	152	180	44	151	527	
53.	J Pouliquen	France	88	60	180	37	152	517	
54.	A. A. Tennissen	Netherlands	171	85	—	127	123	506	
55.	G. Woodworth	Ireland	137	56	112	67	88	460	
56.	F. Sussdorf	Saar	107	—	180	80	83	540	
57.	E. Balasse	Belgium	95	79	180	—	88	442	
58.	R. Molinari	Monaco	141	—	95	107	30	373	
59.	O. Czepa	Austria	58	164	42	68	34	366	
60.	G. Zigic	Yugoslavia	180	180	—	—	—	360	
61.	H. Waldhauser	Saar	—	76	—	180	94	350	
62.	G. M. Cornelissen	Netherlands	—	72	74	79	115	340	
63	C. de Cosio	Mexico	150	—	—	79	105	334	
64.	M. Libert	Belgium	45	75	41	71	68	300	
65.	J. Verges	Mexico	—	180	34	42	9	265	
66.	J. Graves (P) Beck	Canada	108	—	—	51	57	216	
67.	E. Blasche	Austria	—	92	—	110	—	202	
68.	C. Aubertin	Monaco	137	10	—	—	—	147	
69.	A. King	Australia	69	—	—	—	—	69	
70.	F. Hillcoat	Argentina	43	2	—	—	—	45	
71.	G. Skalla	Austria	9	—	—	—	—	9	
72.	R. Aubertin	Monaco	8	—	—	—	—	8	
	P. Hakansson	Sweden	—	—	—	—	—	—	
	J. Gerny	Czechoslovakia	—	—	—	—	—	—	

(P) Indicates proxy flown.

TEAM AGGREGATES FOR THE FRANJO KLUZ TROPHY

1.	Great Britain	2556	8.	Ireland	2198	15.	France 1716
2.	Italy	2498	9.	Czechoslovakia	2116	16.	Austria 1332
3.	Argentina	2422	10.	Switzerland	2087	17.	Denmark 1284
4.	Germany	2394	11.	Sweden	2018	18.	Finland 817
5.	United States	2386	12.	Mexico	1977	19.	Saar 800
6.	Yugoslavia	2267	13.	Netherlands	1889	20.	Australia 777
7.	Canada	2239	14.	Belgium	1792	21.	Monaco 520

5. John Parrott, who placed 16th, prepares to fly in the third round.
6. Flying a Super Tigre powered model, G. Vidossich was the top Italian man with 7th place.
7. Pete Buskell (G.B.) flew well and consistently but a short motor run robbed him of a place in the fly-off.
8. The only woman entrant in the power, Maria Rudolph of Germany, took 8th place.
9. The best of the Czech power team, Vladimir Hajek, who tied for 4th place.

WORLD CHAMPIONSHIPS

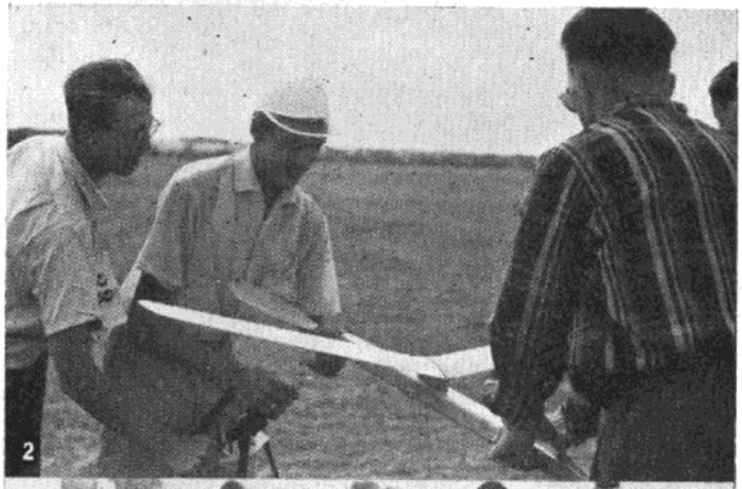
WAKEFIELD

MONDAY morning at eight o'clock brought the competitors for the Wakefield to the processing tent. The morning was fine and warm even at that hour and last minute trimming activity indicated there was lift about. The models looked longer and leaner this year—the combined effect of the abolition of the fuselage cross-section rule, with the long fuselage trends of recent years.

When flying started it became obvious that models to the present Wakefield formula flying in that kind of weather could easily exceed the 3-min. maximum, and they did, every round, all day. More than half the competitors, on an average, scored max's every round. After the more orderly scoring of the preceding two days the scoreboard presented an astonishing and bewildering sight. The British team on this occasion was headed by Frank Holland, flying a very old design, John and Hughie O'Donnell and Phil Read.

The first round flown, the British team with the exception of Phil Read, had max's on the board together with 35 other competitors. The second round flown and the British team, with the exception of Phil Read, had double max's on the board—so had 20 other competitors. The third round and—John and Hughie were without max's—Frank Holland was still there—with 18 other contestants with perfect scores. The whole U.S. team had three max's at this time. The fourth round over and all the British team had collected max's. Frank Holland was still in the running with nine other contestants with four full 3-min. to their credit. The fifth and last round, and, as on previous days, a change in the weather as the evening drew nigh. Frank, the last British hope for the fly-off, did not quite make the time and the watches clicked off 20 sec. short. Hughie, John and Phil flew to record a max. each by no fly-off places.

In the dusk, seven men from six countries assembled at the take-off boards with their models, helpers and timers. Seven men wound ; seven models took-off and the 14 pairs of eyes behind the watches strained to keep the models in sight in the gathering gloom. A test of flying ability or the timer's eye sight? A debatable point. But by the rules of the Wakefield all seven men won the event and the fly-off was to see who would hold the cup. Gustave Samann of Germany was accorded the best time and is to be congratulated as the winner. Sweden, with the best team performance, has the option of running the Wakefield next year.

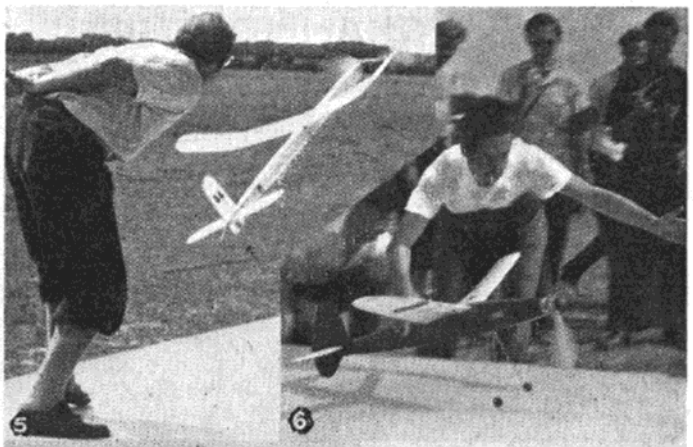


1. The fly-off takes place in the dusk—Samann is about to launch and Fea's model is airborne.
2. Samann, the winner, fits the noseblock in position before flying in the 5th round.
3. The Swedish team member Anders Hakansson launches in the 5th round to score another max.
4. Grim expressions on the faces of the Italian team members I. Pietralunga (holding) and V. Scardicchio (winding).
5. German national champion Altmann makes a clean launch in the 3rd round. He placed 4th in the fly-off.
6. Frank Holland, top British member, launches to miss a place in the fly-off by 20 sec. and place 11th.
7. The other Italian chance in the fly-off, Guido Fea, winds while Prandini holds.
8. Yugoslav top man Emil Fresl shows his model. He placed 5th in the fly-off.
9. The O'Donnell brothers, John holding while Hughie winds. Hughie dropped 24 sec. short of a max. in the 3rd round.
10. John O'Donnell's model gets away well in the 2nd round to score his 2nd max.

INDIVIDUAL RESULTS FOR THE WAKEFIELD CUP

			1	2	3	4	5	Total	Fly-off
1.	G. Samann	Germany	180	180	180	180	180	900	315
2.	A. I. Hakanssen	Sweden	180	180	180	180	180	900	289
3.	C. Scardicchio	Italy	180	180	180	180	180	900	286
4.	J. Altmann	Germany	180	180	180	180	180	900	284
5.	E. Fresl	Yugoslavia	180	180	180	180	180	900	270
6.	Guido Fea	Italy	180	180	180	180	180	900	213
7.	L. Muzny	Czechoslovakia	180	180	180	180	180	900	169
8.	M. U. Blomquist	Sweden	180	180	180	172	180	892	
9.	K. E. Widell	Denmark	180	180	180	180	170	890	
9.	R. G. Ahman	Sweden	180	170	180	180	180	890	
11.	F. Holland	Gt. Britain	180	180	180	180	160	880	
11.	R. A. Champine	United States	180	180	180	179	161	880	
13.	H. H. Kothe	United States	180	180	180	158	180	878	
14.	F. Mursep	Argentina	164	180	180	173	180	877	
15.	H. O'Donnell	Gt. Britain	180	180	156	180	180	876	
16.	E. Balasse	Belgium	180	180	180	149	180	869	
16.	C. R. de Vries	Netherlands	180	180	180	159	170	869	
18.	M. D. Andrade	United States	180	180	180	148	180	868	
19.	G. Maibaum	Germany	180	180	147	180	180	867	
20.	G. J. Schaap	United States	180	180	180	180	146	866	
21.	A. S. P. Balogh van Galantha	Netherlands	180	143	180	180	180	863	
21.	O. de Bare	Belgium	180	180	180	143	180	863	
23.	V. Kmoh	Yugoslavia	141	180	180	180	180	861	
24.	R. Cizek	Czechoslovakia	178	180	132	180	180	850	
25.	H. J. v.d. Geer	Netherlands	148	180	180	177	158	843	
25.	H. Toersen	Netherlands	180	125	180	179	179	843	
27.	E. Knudsen	Denmark	180	174	136	168	180	838	
28.	R. K. E. Johansson	Sweden	180	180	117	180	180	837	
29.	D. Prandini	Italy	180	180	180	114	180	834	
29.	J. O'Donnell	Gt. Britain	180	180	114	180	180	834	
31.	D. R. Mackenzie	Canada	180	158	133	180	180	831	
32.	R. McGlashan (P) Etherington	Canada	175	172	180	172	180	829	
33.	M. Bodmer	Switzerland	162	180	160	160	165	827	
34.	E. Gerlaud	France	105	180	180	180	180	825	
35.	I. Pietralunga	Italy	180	115	180	148	180	803	
35.	R. Miyahara (P) Schulz	Japan	156	164	173	180	180	803	
37.	P. W. Read	Gt. Britain	138	165	136	180	180	800	
38.	L. F. Murtagh	Ireland	125	180	180	180	129	794	
39.	B. R. S. Baker	Australia	180	154	114	180	165	793	
40.	L. Nesic	Yugoslavia	103	180	157	167	180	787	
41.	E. Nienstedt	Denmark	180	144	180	98	180	782	
42.	N. Corwell	Ireland	108	180	180	180	133	781	
43.	M. Chevrlot	France	180	180	180	123	113	776	
44.	R. E. Conzalez	Argentina	180	173	121	144	153	771	
45.	J. C. Parnisari	Argentina	180	151	125	180	127	763	
46.	J. Hemola	Czechoslovakia	149	180	70	180	180	759	
47.	J. Morisset	France	180	172	145	134	127	758	
48.	O. Hyttrek	Germany	173	156	110	122	176	737	
49.	A. Leong (P) Hertsch	New Zealand	118	180	131	115	180	724	
50.	J. Upton (P) Hartrill	New Zealand	180	151	70	156	163	720	
51.	Y. Mikami (P) Tonn	Japan	180	145	180	104	110	719	
52.	C. Goetz	France	78	180	122	180	155	715	
53.	V. H. Ure (P) Strattner	Canada	180	113	127	180	114	714	
54.	N. W. Sorensen	Denmark	155	131	180	104	143	713	
55.	J. A. Djorde	Yugoslavia	171	144	180	114	89	698	
56.	M. Kimura (P) Sabel	Japan	110	180	137	140	108	675	
57.	G. Lippens	Belgium	109	180	121	125	121	656	
58.	Z. Mach	Czechoslovakia	147	180	—	155	172	654	
59.	R. E. Bird (P) Ehmann	Australia	170	180	48	60	180	638	
60.	V. J. Rizzi	Argentina	27	109	106	180	180	602	
61.	K. Miyoshi (P) Bathel	Japan	180	98	103	48	158	587	
62.	L. J. Walter (P) Naegele	Canada	125	47	180	128	105	505	
63.	A. D. King	Australia	180	151	170	69	—	576	
64.	L. R. G. Ackroyd (P) Heidmuller	New Zealand	—	180	114	180	—	474	
65.	A. Gordon	Ireland	—	103	99	64	145	411	
66.	B. R. McElwain (P) Ruedle	New Zealand	—	133	113	89	—	337	
67.	D. R. Boughton (P) Lichte	Australia	—	—	—	180	137	317	
68.	H. Houtrelle	Belgium	92	—	64	68	91	315	
69.	J. D. Thompson	Ireland	—	38	104	47	57	246	
70.	R. M. Aubertin	Monaco	—	10	—	—	—	10	

(P) Indicates proxy flown.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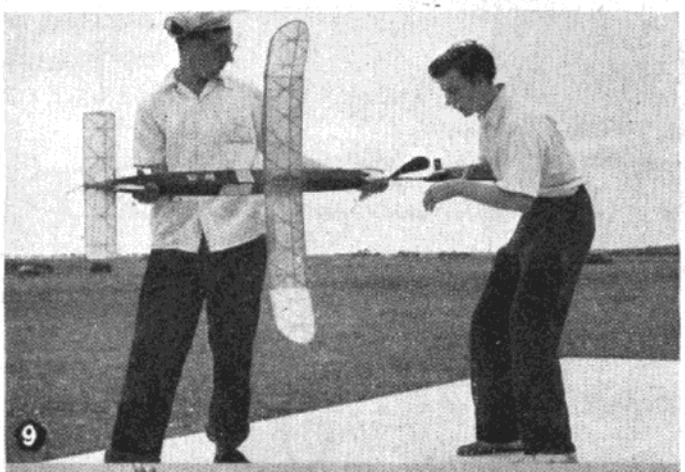
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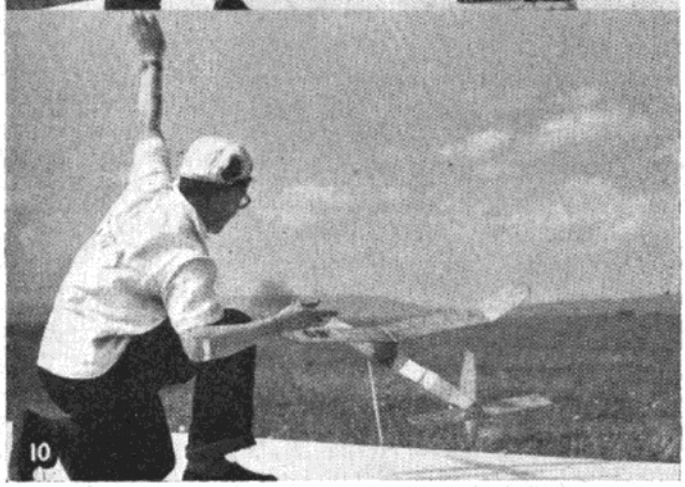
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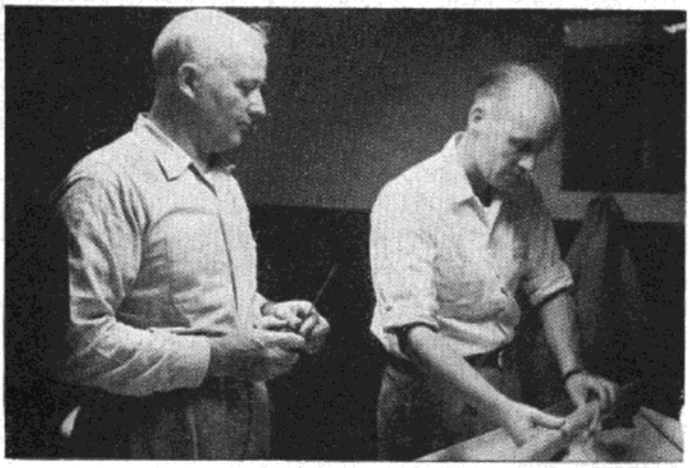
TEAM AGGREGATES FOR F.M.A. CUP

1.	Sweden	2682	7. Yugoslavia	2548	13. France 2359
2.	Germany	2667	8. Denmark	2510	14. Japan 2197
3.	United States	2646	9. Czechoslovakia	2509	15. Australia 2007
4.	Italy	2634	10. Argentina	2411	16. Ireland 1986
5.	Great Britain	2590	11. Belgium	2388	17. New Zealand 1918
6.	Netherlands	2575	12. Canada	2374	18. Switzerland 827

WORLD CHAMPIONSHIPS

In the evening, after the Wakefield contest, a banquet and prize-giving were held in the airmen's mess at Weisbaden Airbase. Some 300 visitors sat down to dinner—the main course was a large grilled T-bone steak in the best American tradition—with the addition of local wines to add the Continental flavour. Following the dinner, H. J. Nicholls, one of the guests, "took the chair" and in turn mentioned the many U.S.A.F. officers who were responsible for accommodating the meeting at the airbase. The president of the Deutscher Aeroclub then replied.

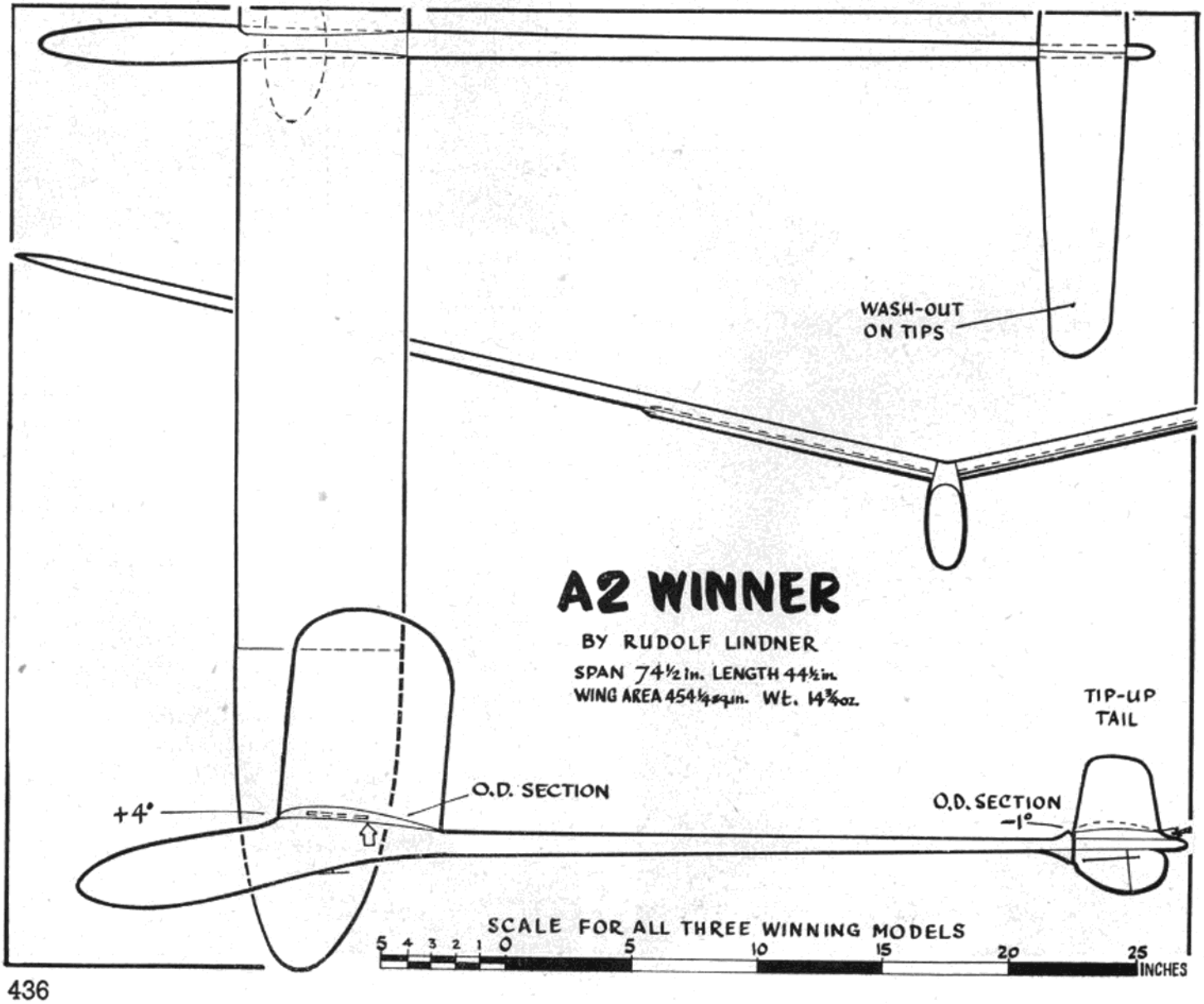
The prizes and souvenirs were presented to the winning teams by Keith Storey, A.M.A. president, and finally a huge iced cake was given to Miss Marjorie Miller, chief of the Recreation Branch, for her very considerable assistance in organising the meeting.

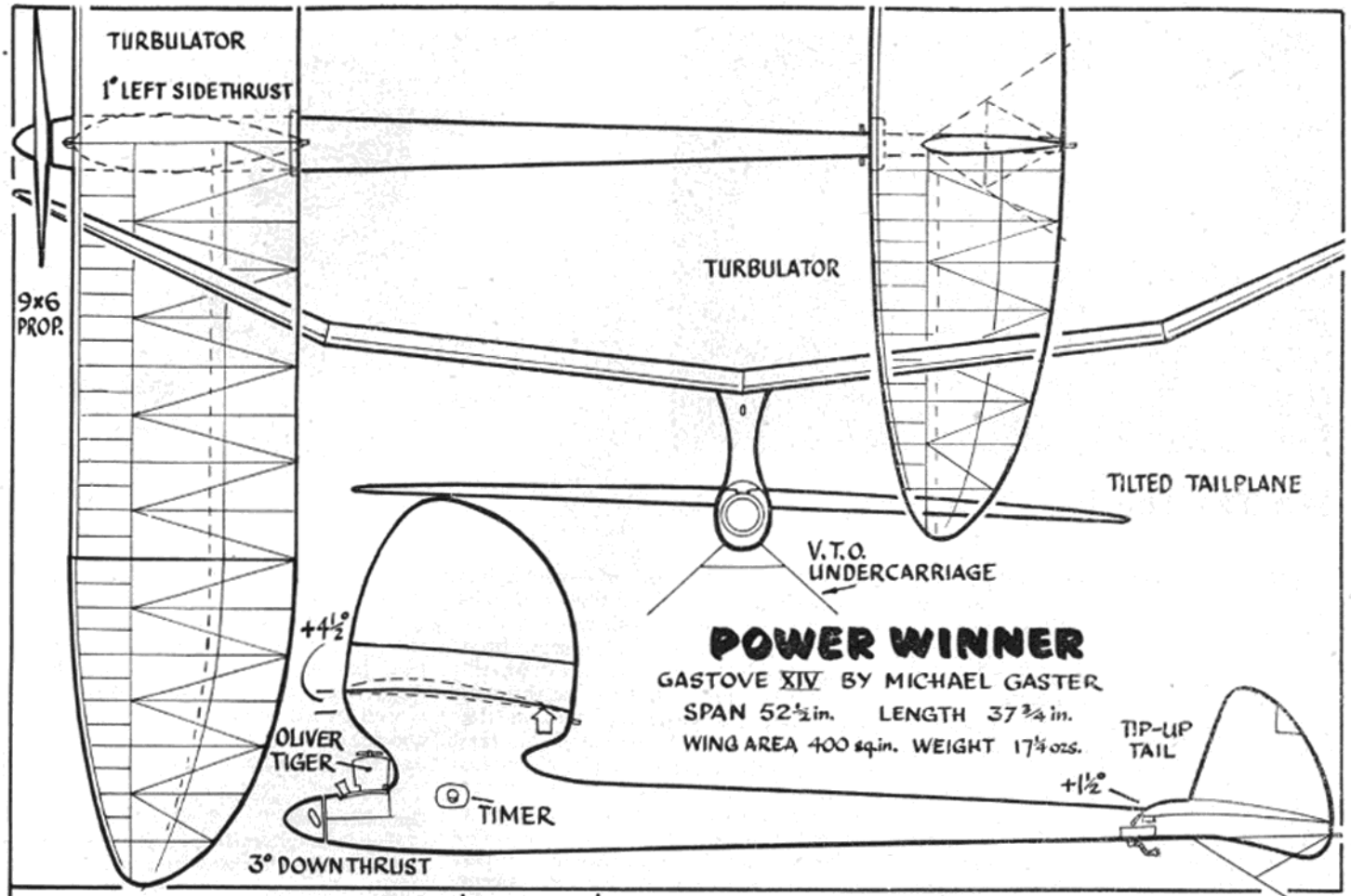


Above : Peter Buskell receives the Franjo Kluz trophy on behalf of the British power team from Keith Storey, president of the A.M.A.

Left : Frank Ziac and Joe Bilgri process some of the A2 models.

THE WINNING MODELS



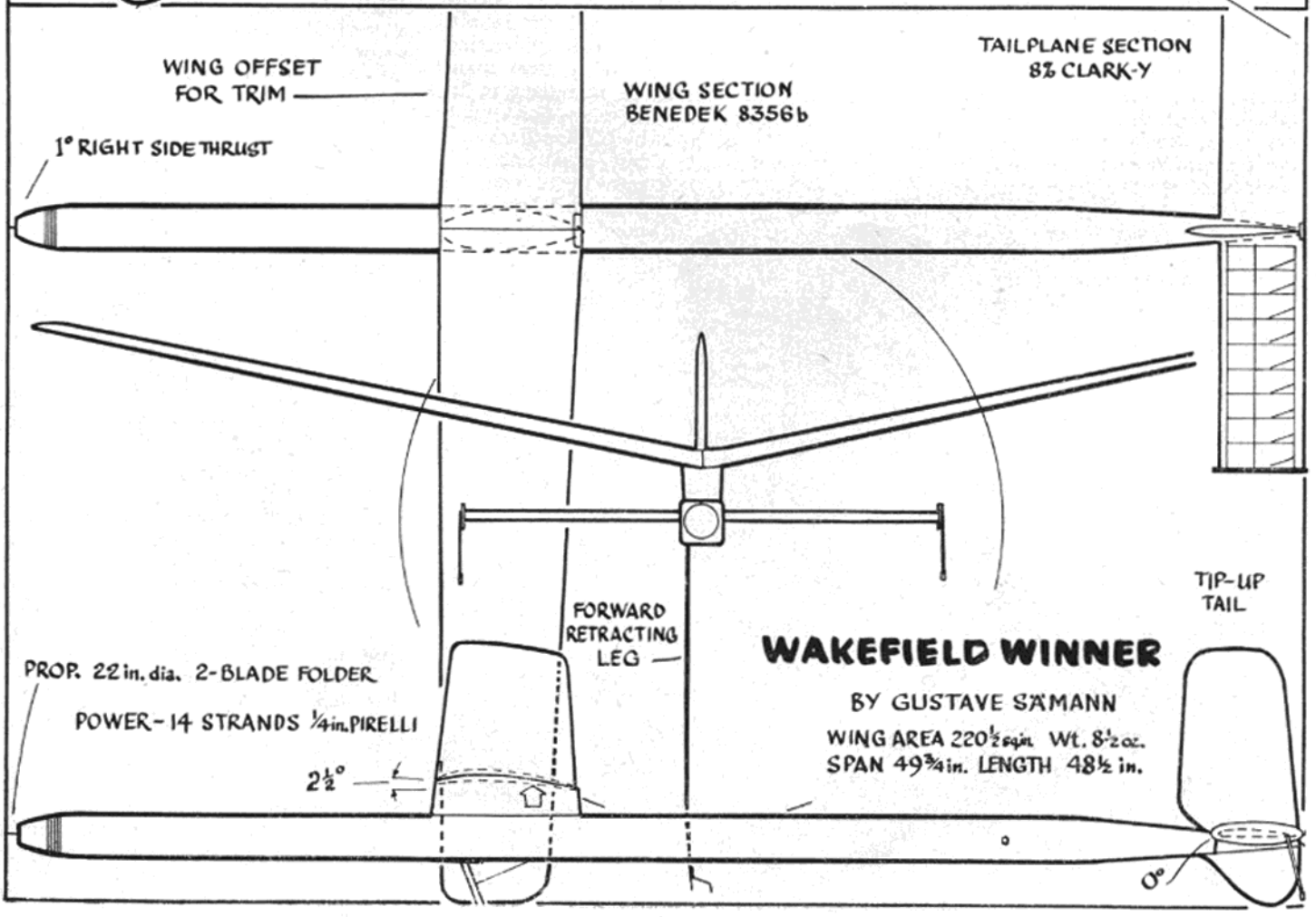


POWER WINNER

GASTOVE XIV BY MICHAEL GASTER

SPAN 52½ in. LENGTH 37¾ in.

WING AREA 400 sq.in. WEIGHT 17¼ ozs.



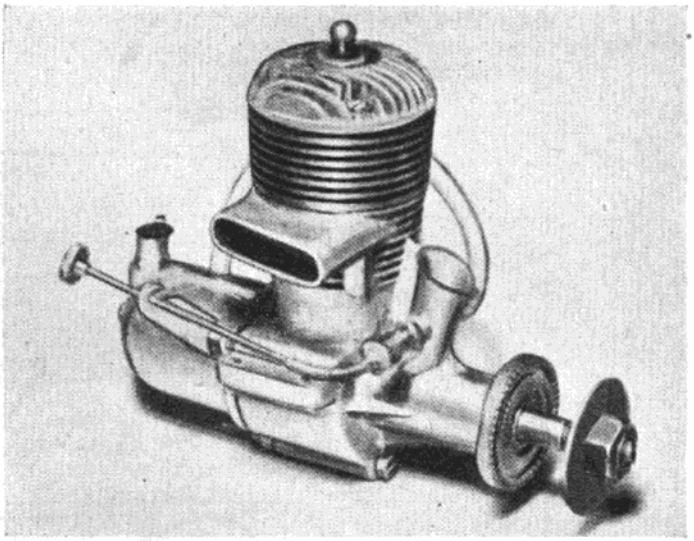
WAKEFIELD WINNER

BY GUSTAVE SÄMANN

WING AREA 220½ sq.in. Wt. 8½ oz.

SPAN 49¾ in. LENGTH 48½ in.

M.A. Engine Tests



No 79. The Frog 500 5 c.c.

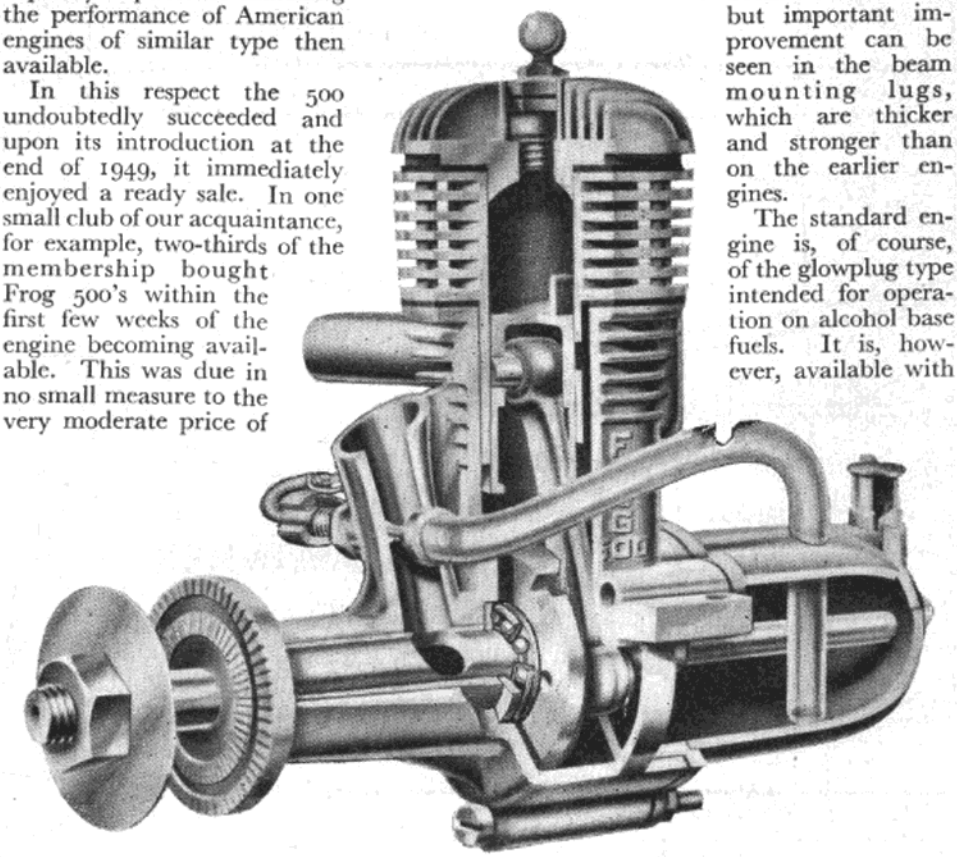
ONE of the most popular of the larger engines, not only in its native Britain, but overseas as well, is the Frog 500. Designed and built by International Model Aircraft Ltd., a subsidiary of the vast Line Bros. organisation, the Frog 500 first appeared six years ago, about two years after the advent of glowplug ignition had swept the United States. At this time, engines of 3 to 5 c.c. were still considered quite a "normal" size and anything of much less capacity was a "small" engine. The majority of C/L aerobatics enthusiasts (at that time stunt flying was at the very height of its popularity) were using 5 c.c. or larger engines and the Frog 500 undoubtedly filled a long-felt need for a reliable general purpose engine of this capacity capable of matching the performance of American engines of similar type then available.

In this respect the 500 undoubtedly succeeded and upon its introduction at the end of 1949, it immediately enjoyed a ready sale. In one small club of our acquaintance, for example, two-thirds of the membership bought Frog 500's within the first few weeks of the engine becoming available. This was due in no small measure to the very moderate price of the unit—only £3 15s. 0d.—which has remained unchanged. The 500 still represents exceptional value.

The Frog 500 has, of course, been previously dealt with in the "M.A." Engine Tests series. However, as this was more than five years ago and as the present model embodies one or two improvements on the original, it was considered that a new report on the engine would be of interest to both new and old readers.

The principal modifications to the current model, both of which are recent innovations and concern the crankshaft, are the addition of a ball thrust bearing and the substitution of a new main bearing of Vandervell manufacture in place of the original phosphor-bronze bush. Another small but important improvement can be seen in the beam mounting lugs, which are thicker and stronger than on the earlier engines.

The standard engine is, of course, of the glowplug type intended for operation on alcohol base fuels. It is, however, available with a contact-breaker (costing a further 10s.) to permit operation as a normal spark-ignition petrol engine. A test report on the spark-ignition 500 was contained in the January, 1952 issue of MODEL AIRCRAFT. The standard glowplug unit is well suited to stunt models of around 400 sq. in. wing area, to C/L scale types and to F/F models of 5 to 6 ft. span.



Specification

Type: Single cylinder, air-cooled, two-stroke cycle, glowplug or spark ignition. Shaft type rotary valve induction. Cross-scavenged, two-port cylinder with baffle piston.

Swept volume: 4.92 c.c. (0.3005 cu. in.).

Bore: 0.750 in. Stroke: 0.680 in.

Compression ratio: 7 : 1 approx.

Stroke/bore ratio: 0.907 : 1.

Weight: 7.75 oz. (complete with F/F tank).

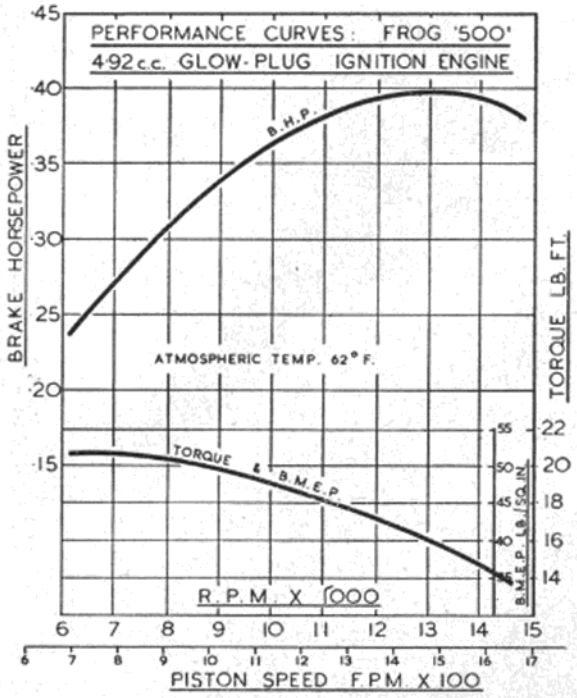
General Structural Data

Die-cast aluminium alloy crankcase with integral main bearing housing, carburettor intake, transfer and exhaust ducts. Die-cast alloy detachable rear cover. Hardened steel cylinder with integral cooling fins. Cast-iron piston, ground and lapped. Hardened steel crankshaft, ground and lapped and running in Vandervell main bearing, with ball thrust race. Forged Hiduminium RR.56 alloy connecting rod. Silver steel fully-floating gudgeon pin. Die-cast aluminium alloy cylinder head. Cylinder assembly retained by four machine screws passing through from cylinder-head and screwing into crankcase lugs. Detachable die-cast alloy fuel tank, with spring-loaded filler cap, attached to crankcase rear cover. Spraybar type needle-valve. Beam or three-point radial mounting.

Test Engine Data

Running time prior to test: two hours.

Fuel used: 44 per cent. Power Blending Methanol, 28 per cent. 2-Nitropropane, 28 per cent. Castor-oil B.P.



Ignition equipment used: K.L.G. "Miniglow" short-reach glow plug. 1.5 volts to start.

Performance

Frog 500's are generally remarkably consistent. That is, one seldom finds any substantial variation in performance between one example and another; unlike some makes in which wide variations in power output and even in handling characteristics, exist between individual samples of the same model. The intending purchaser need have no qualms about buying an off-the-shelf 500. There will be no question of Joe Smith's 500 being "a thousand revs better than anyone else's."

The average diesel user has no difficulty when graduating to a 500. The first difference he will notice is that, despite its greater capacity, the engine is quite docile. Admittedly it makes more noise, but it is quite easy to start, has no unpleasant tricks to play on its owner (such as the knuckle-rapping habits of some diesels) and runs with less vibration than many of its smaller diesel brothers.

In starting the 500, the procedure laid down in the maker's leaflet can be relied upon. Priming the engine through the exhaust port will normally be required for a start from cold, but restarts can be obtained quickly merely after choking the intake for a single flick. Any good methanol/castor-oil base fuel can be used and the maker's own "Red Glow" mixture is entirely satisfactory. Where higher performance is desired, a nitroparaffin content blend, such as the nitromethane formula given in the instruction leaflet, or the blend used in our test and mentioned above, can be used to advantage. Incidentally, we should here mention that the two castor base oils recommended in the manufacturer's leaflet, namely, Castrol R and Shell Super Heavy are *not*, in fact, suitable for methanol base fuels. We would suggest Castrol M or Pratts or Duckhams Racing Castor-oil, or Castor-oil B.P. obtainable from any chemist.

The Frog 500 has an extended needle-valve control on a flexible connection and, with this, there is no risk of getting one's fingers too close to the propeller. The needle-valve stem is provided with a spring ratchet device and if the spring is properly tensioned, this gives smooth and positive control of mixture strength. The engine responds particularly well to mixture strength adjustment and can be "throttled down" satisfactorily by enriching the mixture to produce "four-stroking."

The performance of the engine on test is indicated by the accompanying performance graph giving torque/b.m.e.p. and b.h.p. curves. The maximum output of approximately 0.40 b.h.p. obtained with a 2-nitropropane content fuel developed for stunt work, is, of course, a very good figure. Similarly, the performance at 7,000/8,000 r.p.m. where 0.27/0.30 b.h.p. is available, is very useful for installations calling for larger propellers and lower shaft speeds, such as R/C models. This, of course, is due to the useful torque figure which reaches a maximum value equivalent to a b.m.e.p. of 52 lb./sq. in.

To summarise, the Frog 500 is a robust, hard wearing unit, easy to handle and of good performance. It represents exceptional value in the larger engine groups.

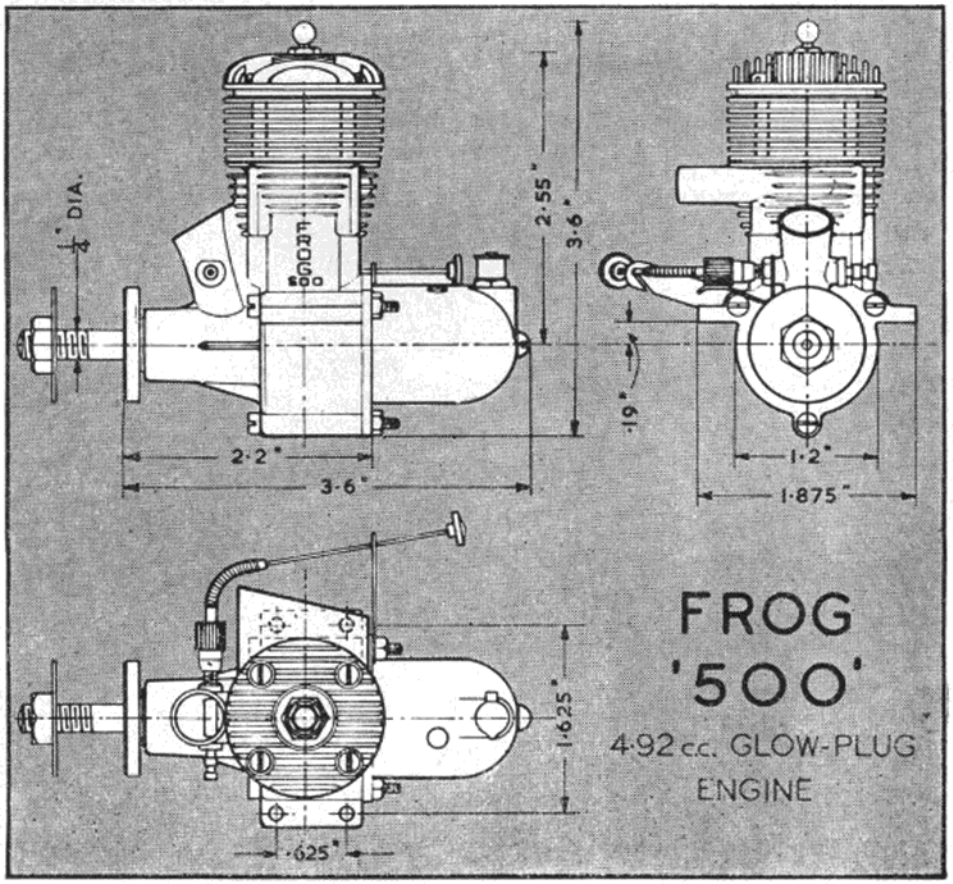
Power/weight ratio (as tested) : 0.82 b.h.p./lb.

Specific output (as tested) : 81 b.h.p/litre.

Engine Materials—4

Deep Drawing. A process, allied to the drawing of seamless tubes, sometimes used in the production of aluminium fuel tanks, also engine cowlings, from light gauge aluminium sheet, as an alternative to spinning.

Die Casting. Light alloy diecasting is widely used in the production of crankcases, also cover plates, bearing housings, cylinder heads and, occasionally, light alloy pistons, connecting-rods and cylinder barrels. The low cost of the modern mass produced model engine can be largely attributed to this method of production, by which components can be turned out quickly and require a minimum of machining and finishing. Specifications may refer to *gravity diecasting*, *pressure diecasting*, or *permanent mould casting*. Gravity and pressure casting are distinctly different processes. Permanent-mould is American usage and refers to gravity diecasting. Gravity diecasting consists, essentially, of casting low melting point alloys in metal dies instead of sand, the dies usually being of iron or steel and, of course, re-usable. In pressure casting, the molten metal is injected into the mould under pressure. The latter process produces intricate castings more accurately and with better surface finishes than gravity casting, but is less favourably regarded structurally due to a tendency towards porosity in the finished product.



Aviation NEWSPAGE

by J. W. R. Taylor

This Westland " Widgeon " provided a splash of colour and put on an entertaining flying show at Farnborough.

NASAL SURGERY and other changes have converted G-ALIK, one of Westland's early S-51 helicopters, into the smartly turned-out blue and white prototype *Widgeon*. The widened nose permits an extra passenger to be carried, with two seats in front and three at the rear Blistered side windows improve downward vision, and the general cockpit layout and furnishing set new standards for 'copters.

An S-55 *Whirlwind* rotor head gives improved mechanical qualities and removes the need to carry ballast to compensate for variations in load. For ambulance duties, the port side of the nose hinges sideways. *Freighter*-fashion, so that two standard military stretchers can be loaded inside, one above the other—a great improvement over the *S*-51's external litters.

Loaded weight of the *Widgeon* is 5,900 lb. and maximum permissible speed 96 m.p.h. Range at a cruising speed of 80 m.p.h., with 15 minutes allowance for take-off and landing, varies from 23 miles with full 1,108 lb. payload to 275 miles with a 608 lb. payload.

* * *

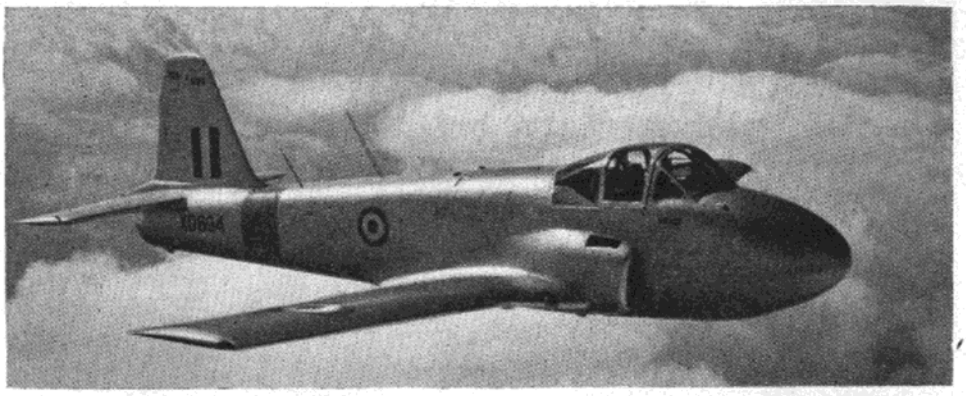
Much modded **ANTI-SUB TUB,** first seen at Farnborough in September, is the Avro *Shackleton M.R. Mk.* 3. Identified by its new wing-tip fuel tanks, it is the first version of this standard Coastal Command long-range maritime patrol-bomber with a nosewheel undercarriage. Other features include deletion of the dorsal gun-turret, introduction of a clear-view cockpit canopy, and internal changes to improve crew comfort. New exhaust pipes on the 2,490 h.p. Griffon 67 engines make the *Mk.* 3. much quieter than earlier marks, and it looks very workmanlike in its all-over coat of glossy dark grey.

* * *

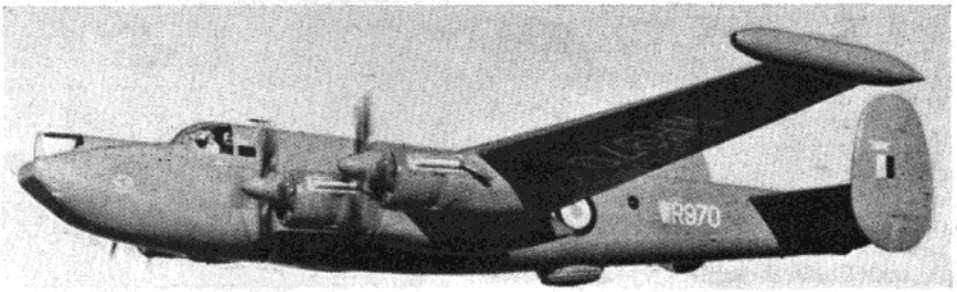
TENTH JET-PROVOST (XD-694) of the pre-production batch ordered for R.A.F. evaluation introduces several changes and may become the *Mark* 2. Its Dowty undercarriage is 22 in. shorter than before and all three units are actuated by a single jack in the fuselage. The tailpipe for its 1,640 lb. thrust Viper 101 turbojet has a diameter 2 in. greater and the " kink " in the fuselage underside has disappeared.

* * *

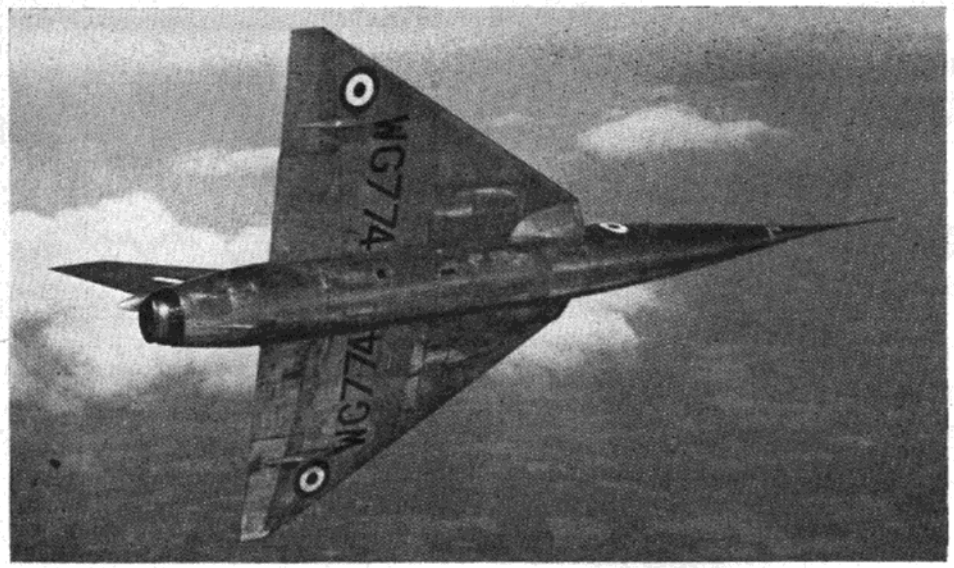
New facts on the needle-nosed, razor-winged **FAIREY DELTA 2** research aircraft leave little doubt that, although non-operational, it points the way to the next generation of super-fighters. It has the large control surfaces needed for manoeuvring at well above Mach 1 at extreme



Above: As a result of development tests, the tenth " Jet Provost " incorporates a number of modifications giving it improved handling qualities.



Right: Presenting much cleaner lines than earlier marks of " Shackleton," the new Mk. III has been designed for long range patrols in tropical and temperate climates. In addition to its offensive role, the " Shackleton " can also carry a motor-driven lifeboat—which is dropped by parachute—for air-sea rescue work.



One of the most interesting aircraft on show at Farnborough was the Fairey F.D.2, drawing large crowds to its "pen" in the static display. Its sleek lines are well matched by a superb natural aluminium finish.

altitudes, and the power potential essential to overtake supersonic atom-bombers.

The *Delta* 2 has an Avon turbojet with reheat. Any fighter development would probably have mixed jet and rocket power. An ideal formula would be a 15,000 lb. thrust Gyron turbojet for economical climb to height and cruising, and a Spectre or Screamer rocket-motor for rapid take-off and supersonic combat.

* * *

HUNTER VARIANTS at Farnborough indicate that this Hawker fighter may become as versatile as its illustrious forebear, the *Hurricane*. Latest fighter version is the Mk. 6 (WW593), with the 10,500 lb. thrust RA.29 Avon turbojet and enlarged tail-pipe, but no reheat. Speed is supersonic in a shallow dive, complete with two finless 100-gal. underwing plastic fuel tanks, made by Bristol.

A *Hunter* 4 (WV385) aerobatted with a tank and 12 air-to-ground rockets under its starboard wing, and a tank and 1,000 lb. streamlined bomb under its port wing. No less spectacular was the duck-egg blue *Hunter* side-by-side two-seater (XJ-615), with broader, lengthened nose. It looked every bit as fast as the single-seaters and, although nominally a trainer, is strongly tipped as an all weather fighter with radar nose and underwing missiles. At present, it has two 30 mm. cannon in external blisters under the cockpit, which contains two Martin-Baker Mk. 4 lightweight ejection seats.

Big surprise was a *Hunter F.R. Mk.* 4 (WT780) with a detachable nose cap containing windows for six cameras. Two of them face sideways, two obliquely down, one obliquely forward and one straight forward. Normal armament of four 30 mm. cannon is fitted ; but the plastic nose-cap for radar-ranging gunsight and the gun camera have had to go.

* * *

Boeing's *Model* 707 prototype is flight testing **FLYING BOOM** refuelling equipment projected for the developed *KC*-135 *Stratotanker*, which has been ordered in very large numbers for the U.S.A.F. More streamlined than the Flying Boom fitted to the *Stratofreighter*, it will enable the *KC*-135 to accompany formations of 600 m.p.h. *B*-52 heavy bombers and new U.S.A.F. jet-fighters, and refuel them during long-range attack missions.

* * *

SUPERIOR SABRE illustrated below is the Canadair-built *Sabre* 6, now serving with R.C.A.F. wings in Europe. Powered by a 7,000 lb. thrust Orenda 14 turbojet, 30 per cent. more powerful than the J47 of the original *F*-86 *Sabre*, it has a redesigned fuselage, larger air intake and much improved performance, with a max. level speed of about 690 m.p.h. Its underwing fuel tanks are fitted with fins, and there are small fences on the wing leading edges.

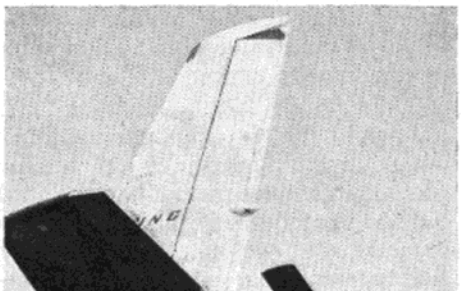
Altogether, Canadair have built around 1,350 *Sabres*, of which the last 250 have been *Mk.* 6*s*. The rate of production was cut back from two to one a day this summer, and there are about 150 more to be built.

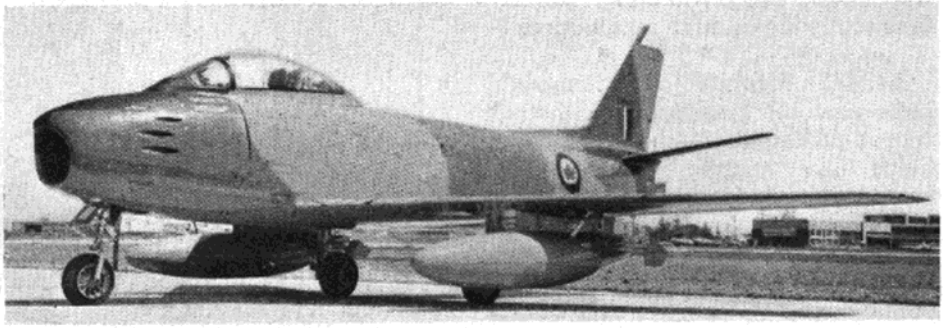
* * *

A refuelling vehicle for high test peroxide rocket fuel, exhibited by Saunders-Roe at Farnborough, seems to prove that U.S. reports of forthcoming British mixed power plant rocket fighters may be more than rumours.

* * *

The British Commonwealth's **AWARD FOR AIR SAFETY**, the Cumberbatch Trophy, has gone this year to Silver City Airways for eight years of accident-free operations on the cross-Channel vehicle ferry. In that time, the company's Freighters and Superfreighters have flown well over 60,000 services.





Right: The "business end" of Boeing's Model 707 prototype now testing this flying boom equipment. Below: The Canadiar-built "Sabre" Mk.6, now serving with the R.C.A.F. in Europe.

OVER THE COUNTER

The Sopwith *Camel* is a new addition to the Keilkraft 3/6 flying scale range. It is planned, incidentally, that all the existing models in this Junior range will be duplicated in a Senior range in the not too distant future—working out at something like 30 in. span and suitable for rubber or half c.c. engine power.

* * *

Another new Keilkraft model which should be appearing in the model shops soon is the *Rapier*, a swept wing design with prefabricated pre-printed parts in similar style to the *Sportser* and *Sedan*. Ship modellers will also be interested to learn that the double-size Keilkraft "galleon" kit of the *Golden Hind* is to be followed by all five of the other ships in the smaller range.

* * *

Watch for a new cabin-rubber design from Skyleada with a true duration performance. We chanced on two prototypes on flight test trials recently and we can truthfully say that performance was most impressive. Size is large enough for consistent performance (36 in. span) and stability is of an exceptionally high order. Construction very straightforward. Kits should be ready before Christmas.

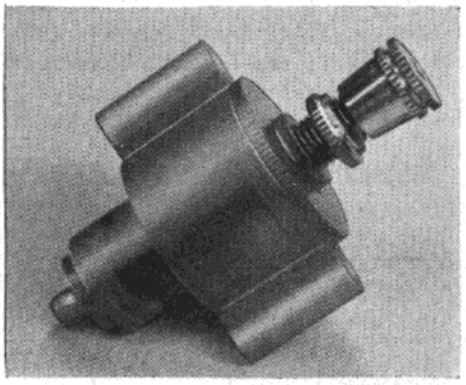
* * *

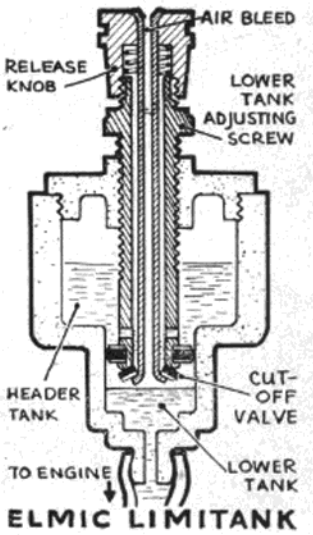
Christmas, or the New Year, will also see a new range of scale kits on the market, which will make "solids" fans really sit up and take notice.

* * *

Model Aircraft (Bournemouth) have gone all "nautical" with their recent productions—the latest being a 27 in. "sharpie" racing yacht retailing at 58s. 11d. We have heard rumours, however, that some "junior rubber" designs are in the offing in the "Truflite" series. These to include plastic propellers and wheels.

The new Elmic Limitank which is illustrated below is of interest to all power modellers. As its name suggests it works on the principle of limiting the motor run by allowing only a measured amount of fuel to the engine when the timer has been tripped. Ingenious in design, it allows the motor to be run and adjusted while using fuel from a header tank, which keeps the lower tank full, until the measured run is started by turning the knob. The engine run is thereafter limited to the amount of fuel contained in the lower tank.





ELMIC LIMITANK

The capacity of the lower tank can be altered by turning the lower milled screw. Air to replace the fuel used in the lower tank enters through the centre of the spindle. The tank is well made from polythene and metal parts, and weighs only one-third of an ounce.

* * *

The demand for Wolf Cub power equipment has multiplied to an extent that the manufacturers have built a new factory equipped with the latest machinery to cope with the demand. This has resulted in lower production costs which give Wolf the opportunity to pass on to their customers a ten-shilling reduction in the price of the Wolf Cub drill. Also Wolf Tools have recently introduced an attractive easy payments scheme under which equipment upwards of £8 10s. 0d. may be obtained for a first payment of 30s., and the balance paid in small weekly instalments.

* * *

At a carnival held recently at Southend, Contest Kits entered a float (illustrated below) publicising their XC4 kit. Four thousand leaflets were distributed which resulted in considerable extra business for the local model shop, The Hobby Stores. Contest Kits inform us that the float is available for other events; model shops interested are invited to get into touch.

* * *

A new kit, a low-wing monoplane design called the *Cresta*, is now in production. The first look in the box gives a favourable impression and is in keeping with the high standard set by Contest Kits.

The Contest Kits publicity float at the Southend Carnival.

OVER THE COUNTER

KIT REVIEW

THE DAVIS CHARLTON

BALLERINA

IT is rather unusual to find an established engine manufacturer turning his hand to kit production. Majesco Miniature Motors did it just after the war with a " matching " model for their 4.5 c.c. engine ; E-D's did it with the *Radio Queen* : K & B in America produced a duration design for their motors (although subsequently turning this over to another firm) ; and International Model Aircraft started the other way round with kits and then went in for motors.

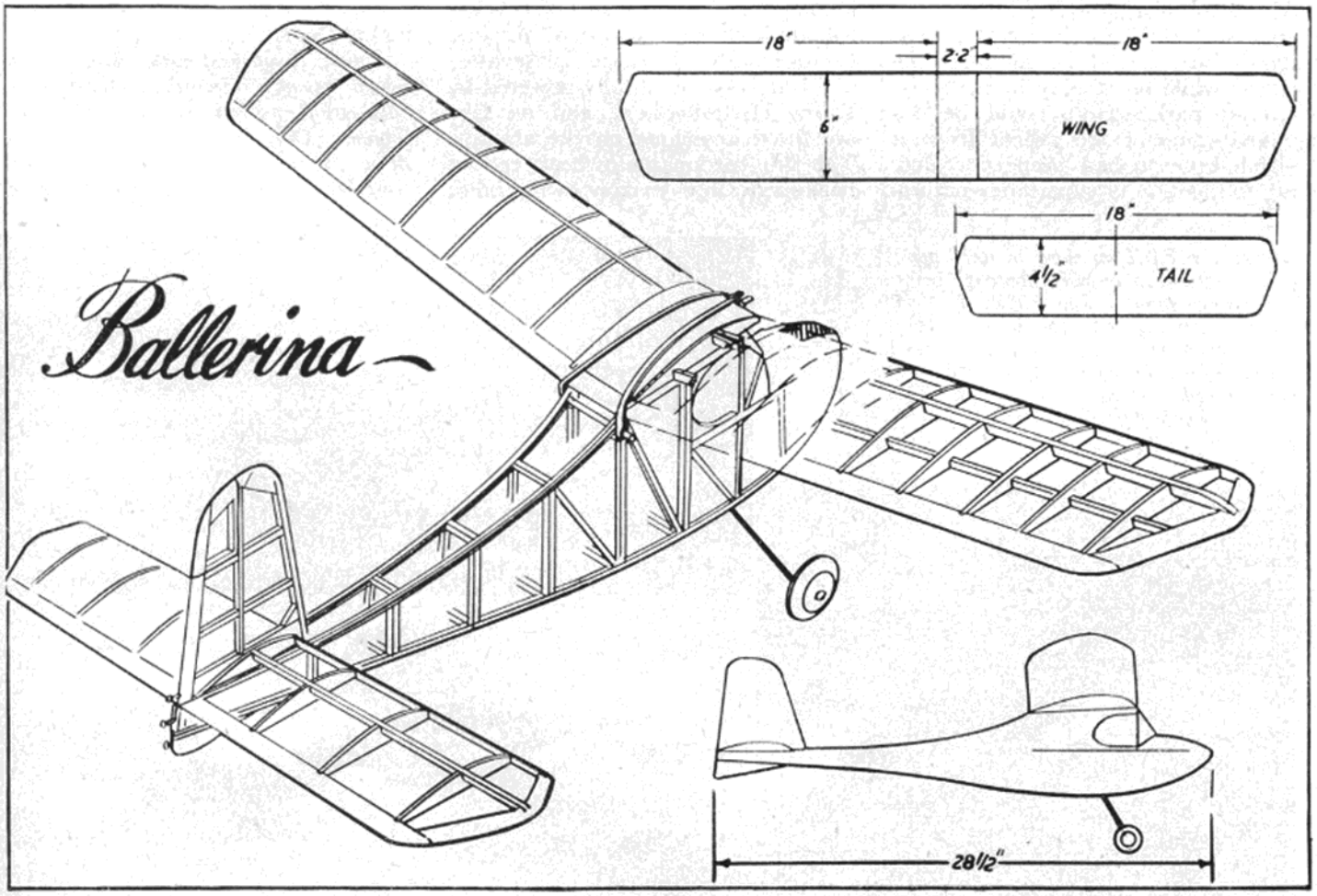
Quite obviously this first Davies Charlton kit is intended as the forerunner of several more. It is naturally enough designed around the most popular selling sizes of their motors—the 0.5 c.c. Dart and 0.8 c.c. Merlin—but will equally well take other engines in this size range. It is a very good kit and a very good design, the latter by Vic Smeed.

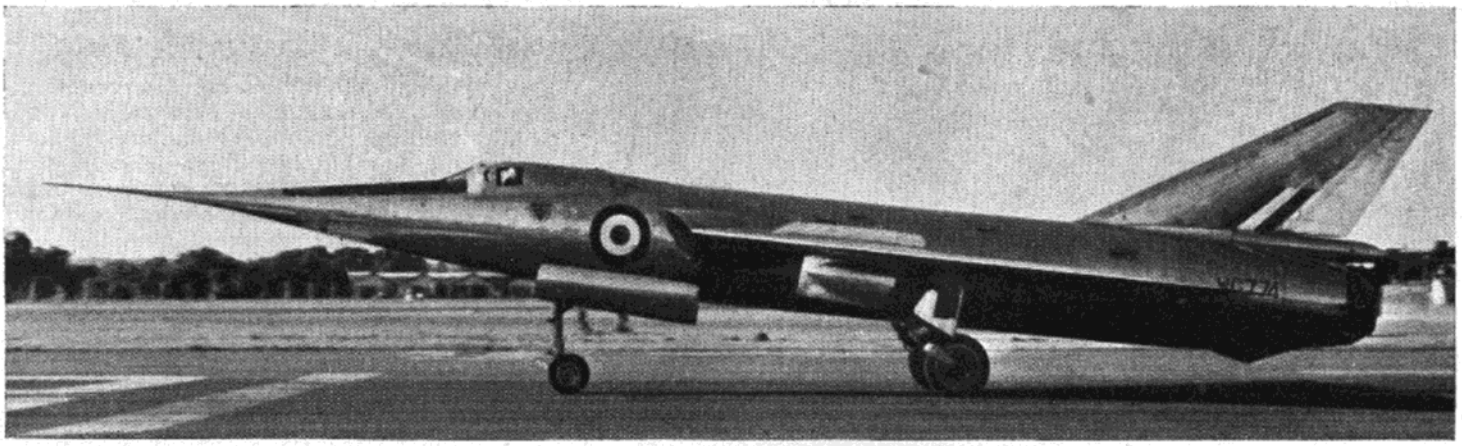
Layout and construction are straightforward and follow Smeed's favourite method of using short straight lengths for wing tips—simple, effective and stronger than printed sheet. It also saves the rather troublesome task of having to cut curved tips out from relatively thick sheet. Although a cabin model, the wing is virtually pylon mounted and the fuselage has plenty of side area. Proportions look absolutely right and it should be a very easy model to trim and fly. It is also robust enough to take a lot of rough handling.

The kit contents are of a high standard, the wood nicely hard and cleanly cut. Shaped trailing edges are included, the other strip lengths being standard size sections. Upper longerons are laminated from two pieces of $\frac{3}{16} \times 3/32$ so that this rather deep curve can be laid out without fear of splitting the wood, although the front bend is still rather severe.

Printed sheets include one panel of aircraft quality ply printed out with the two main formers, to the larger one of which the undercarriage is bound. It would have been a nice thought to mark out the position of the undercarriage here as a full size pattern both for bending the wire and positioning it accurately and also the cabin cut-out. The remaining four printed sheets cover the wing and tailplane ribs, cabin sides, cowling sides and underfin. There are no difficult parts to cut out and all pieces are widely spaced on the sheet. Tissue provided is in two colours (red and

(*Continued on page* 451)





FAIREY DELTA F.D.2

THE S.B.A.C. Show at Farnborough can usually be relied upon to provide something unusual, and this year our nomination would be the Fairey F.D.2. Originally designed as a subsonic test bed, it is still in the test bed category but is now very much supersonic, and in level flight too. In fact, it is easily one of the fastest aircraft produced by this country.

Having previously had our appetites whetted by two unrevealing side view photographs, it was not surprising that the F.D.2 was constantly surrounded by an admiring crowd while on display in the static aircraft park. Here could be observed some of the salient features which hitherto had been concealed, not to mention its superlative natural aluminium finish, which we overheard one foreign observer attribute to the F.D.2's faster-than-sound flights—the swift flow of air over the body having a polishing effect! (Car owners please note.)

One of its most novel features is, of course, the hinged nose section of the fuselage, the hydraulically operated hinge being immediately behind the cockpit.

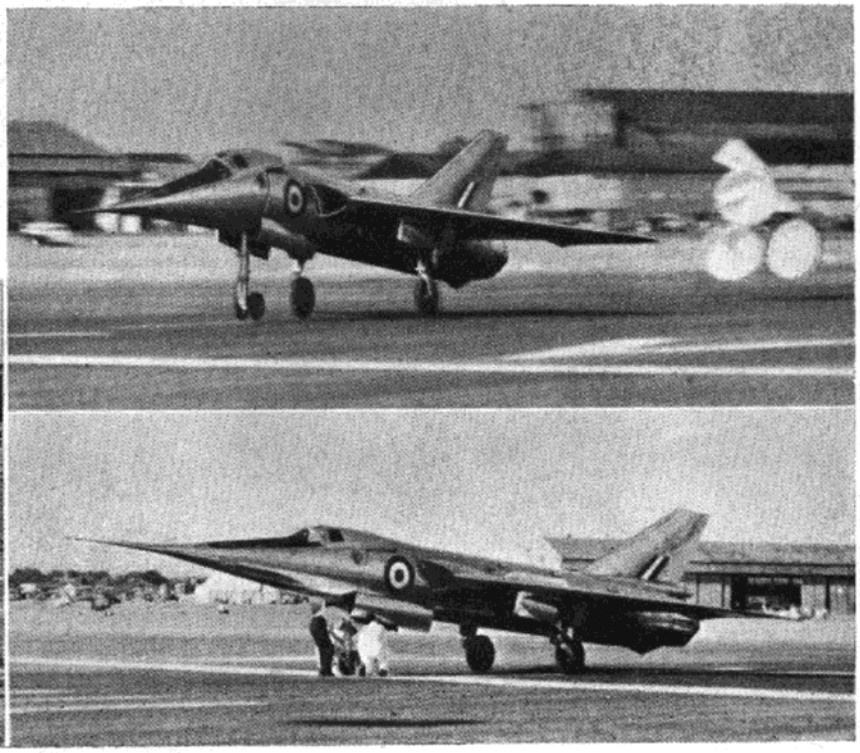
Power comes from an afterburning Rolls-Royce Avon housed in the rear fuselage, air for the turbojet being fed through the wing-root intakes. Control surfaces—ailerons, elevators and rudder—are all fully powered by Fairey Hydroboosters, and no tabs are fitted anywhere on the aircraft. The thin-section mainwheels retract backwards into narrow wing bays, the nosewheel also retracting backwards.

Fuel is carried in fuselage and wing tanks, the wing, incidentally, having a thickness/chord ratio of approximately five per cent. Four large petal dive brakes are located at the rear end of the fuselage, which also houses three small braking parachutes. The latter are released on a very long line just before touch down and have a considerable retarding effect.

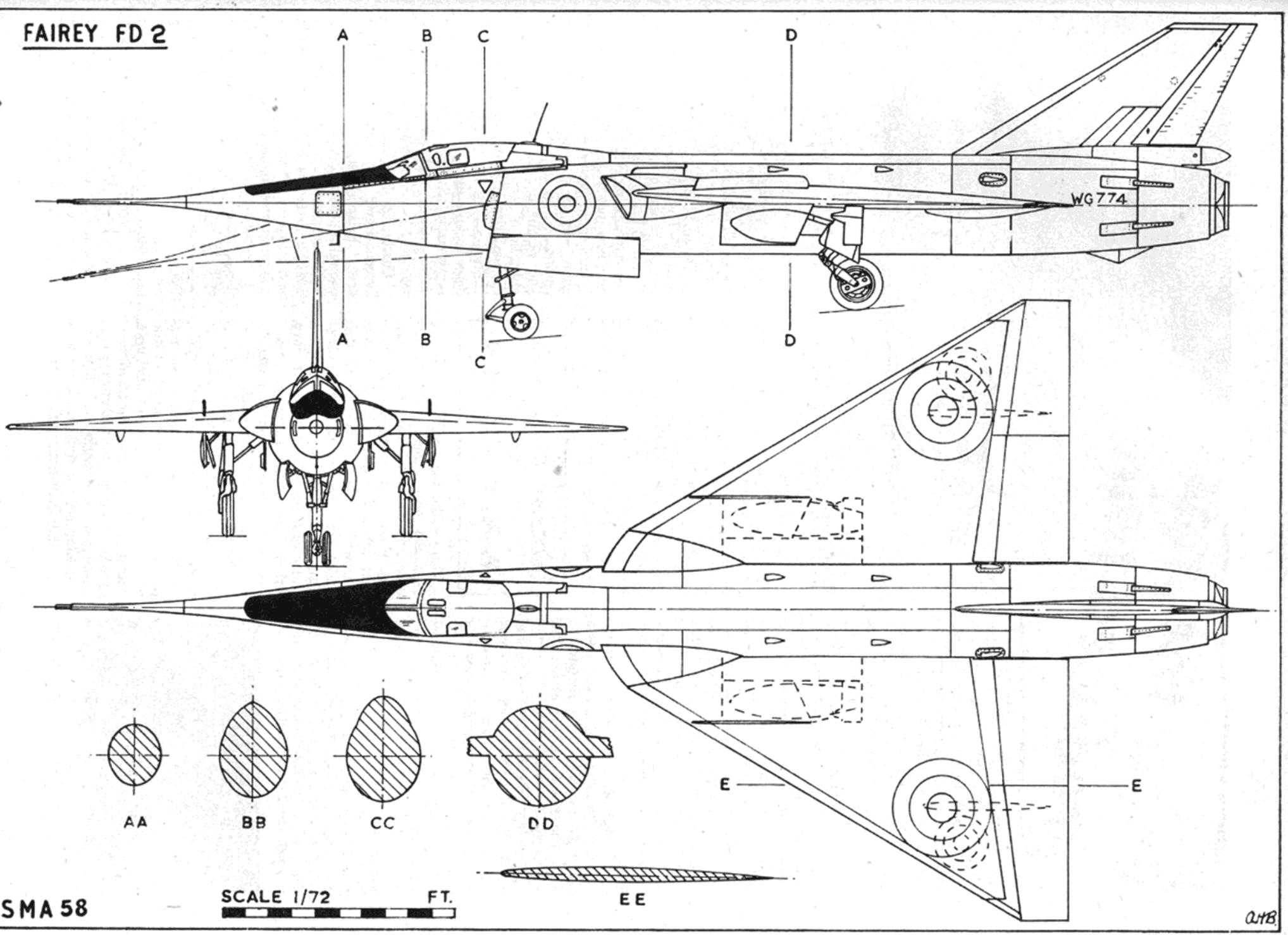
F.D.2 Data

Type : *Single-seat delta wing experimental research aircraft. Dimensions* : *Span*, 26 *ft.* 10 *in.*; *length*, 51 *ft.* 7½ *in. Engine* : *One afterburning Rolls-Royce Avon. First flew* : *October* 6*th*, 1954. *No other details available for publication.*

Below: The F.D.2 on show in its "pen" in the static display at Farnborough before the flying show. Top right: A "full blown" landing with the braking parachutes open and the nose section lowered. Lower right : Mechanics performed some unexplained ministrations to the F.D.2 before each take-off.

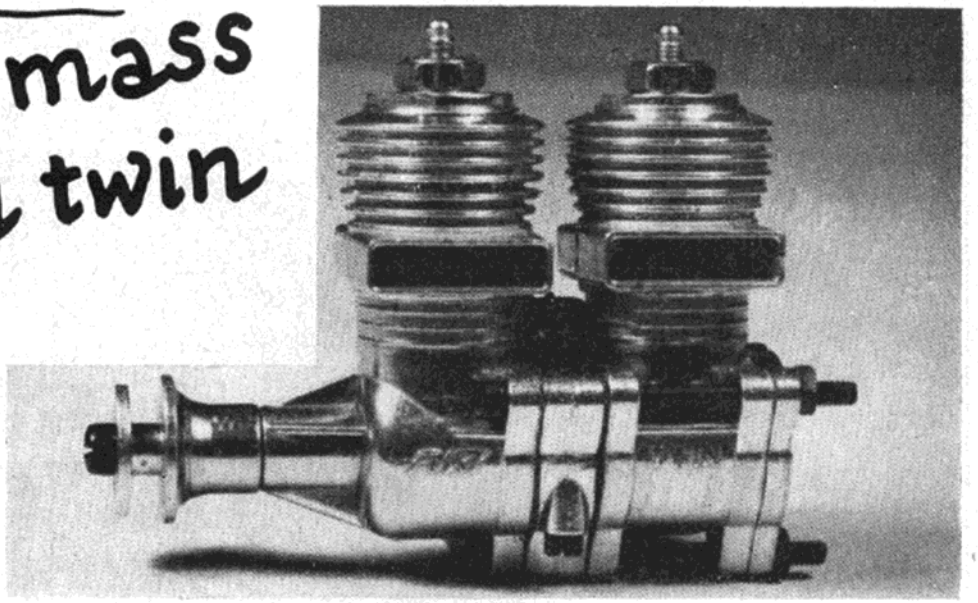


FAIREY FD 2



SMA 58

Enter the mass produced twin



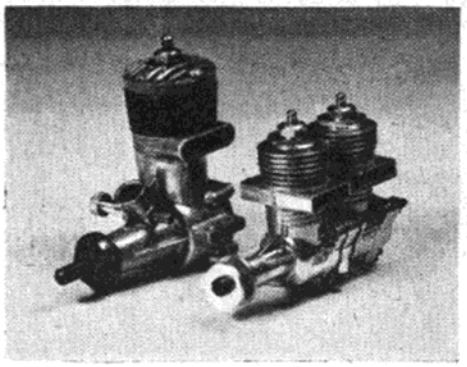
The new K. & B.-Allyn Sky Fury Twin .15 has a total capacity of 2.45 c.c. Its performance does not equal that of 2.5 c.c. single cylinder units, although being smaller and lighter, its power/weight ratio is very good.

CONSIDERABLE interest was aroused on both sides of the Atlantic when, earlier this year, it was announced that the K. & B. and Allyn companies had amalgamated and that, among the products that the new company would be marketing, would be a range of low priced twin-cylinder model engines.

Twin cylinder engines are not, of course, by any means new to the model world. Various firms in the United States and, in fact, one or two in this country, have previously manufactured twins. However, all of these have been types which, for various reasons, have been produced in relatively small numbers. Most of them were, of course, of fairly large total capacity and were generally of the horizontally opposed type. All of them were relatively expensive and prices ranged from about £9 to £25. In consequence, there was not a very great demand for them.

The big interest item with the K. & B.-Allyn announcement was that the new twins were to be of a size in line with the popular capacity classes and that they would be priced accordingly. Three distinct capacities were to be offered: 0.099 cu. in., 0.12 cu. in. and 0.15 cu. in. The 0.12 cu. in. (2 c.c.) model was to be basically a marine unit with flywheel, while the 0.099 (1.6 c.c.) and 0.15 (2.5 c.c.) models were to be offered as aircraft units. Additionally, it was disclosed that the 0.12 and 0.15 cu. in. models would also be used as twin-cylinder power heads for the already well established Allyn outboard and vertical bevel-drive inboard marine motors.

The extremely compact dimensions of the Allyn Twin .15 can be judged by comparing it with the well-known Torpedo .15—itself one of the smallest engines in the 2.5 c.c. class. The Allyn Twin should be particularly well suited to ducted fan installations.



ACCENT ON POWER
by
P. G. F. CHINN

During the past few weeks, initial examples of the first of these new twin cylinder Allyn units, the 2.5 c.c. Sky Fury Twin 0.15 model, have been appearing in the United States and we have been fortunate enough to obtain one of these from New York. Incidentally, this engine is not a factory supplied unit, but is a strictly off-the shelf example.

Although these American engines are not available through normal retail channels in the United Kingdom, the interest of British enthusiasts is understandable and, in this article, we will endeavour to give our impressions and an assessment of the worth and capabilities of the unit. There has been some speculation as to whether other manufacturers will follow suit and market an engine of a similar type and it has been suggested that British manufacturers may also be persuaded into producing small twins. This, no doubt, will largely depend on the model world's reaction to the Allyn Twins.

The inevitable question : " What's it like?" has already been shot at us several times in regard to the Allyn Twin. This simple enquiry sums up the average modeller's approach to any new product. He is primarily interested in how it performs and in what way it differs from previous engines. The finer points of design and technical interest must, inevitably, be of secondary importance to the majority of model builders.

Such a solid and realistic approach deserves an equally solid and realistic reply and, of the Allyn Sky Fury Twin 0.15, we would therefore say this :

Firstly, it has no place in the International 2.5 c.c. competition class, being not nearly powerful enough. Secondly, it is extremely light and compact for its capacity. Thirdly, it is not difficult to handle and runs very smoothly. Fourthly, it is an interesting and clever novelty but is unlikely to have any effect on the popularity of the 2.5 c.c. single-cylinder engine.

It is natural to compare the performance of any new engine with that of other units of the same capacity. In this respect, as we have hinted, the Fury Twin does not show up particularly favourably. However, if we pause for a moment, we may ask ourselves whether, in fact, this is so very important. The performance of

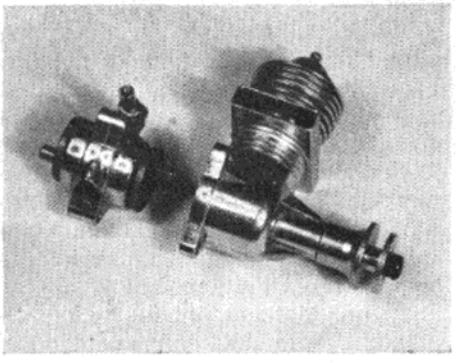
any model engine must be assessed against at least two factors : capacity and weight. For the majority of competition purposes (i.e., F/F power-duration, C/L speed, team racing, etc.), there are rules enforcing certain limits to total cylinder capacity and, in consequence, there has been, of recent years, a great deal of emphasis on the development of engines having high specific outputs. However, with almost all other types of models, it is the size and weight of the unit—always assuming performance is adequate—which really decide the type of power unit to be used.

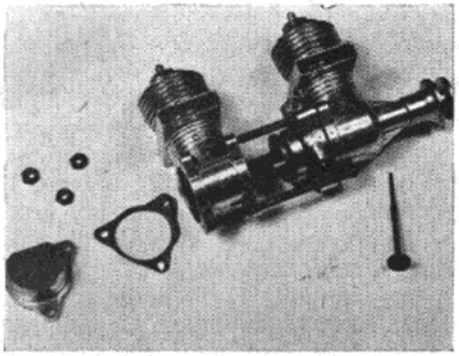
The weight of the Allyn Sky Fury Twin 0.15 is fractionally under 3 oz. It is therefore no heavier than the average popular diesel in the 1-1.5 c.c. group. The frontal area is considerably less than any diesel in this group, for the Allyn is both shorter and narrower and its actual dimensions in these respects—only $1\frac{7}{8}$ in. high and 1 in. wide—are, in fact, the same as for the half-A class (0.8 c.c.) Allyn single cylinder engines.

Therefore, if we ignore any claims to competition performance, it is practicable to consider the Allyn 0.15 Twin as a possible replacement for engines in the 1.5 c.c. classes.

The actual performance of the Fury 0.15 does, in fact, fit it for such a role, for its capabilities on various props are roughly equalled by the average 1.5 c.c. capacity diesel. On an 8 × 4 Stant propeller, our test example recorded 9,000 r.p.m., using a 28/72 mixture of castor-oil and methanol, and on a 7 × 4 prop this was increased to 11,000 r.p.m., both of which are not greater than figures obtainable under similar loads with engines of the Frog 150 and Allbon Javelin class. As might be expected,

The heart of the Allyn Twin is the centre bearing and two-throw crankshaft unit which embodies the rotary induction valve and forms the link between the two cylinders.





The cylinder and centre bearing units are quickly taken apart by withdrawing the three long screws which pass through the crankcase lugs.

the peak r.p.m. of the Allyn are somewhat higher than for the average diesel and, by using a well thinned, narrow blade 7 × 3 prop, the speed was pushed up to 14,200 r.p.m. These figures would be increased by up to 1,000 r.p.m. by using an adequate nitromethane content in the fuel.

We believe that these r.p.m. figures can be accepted as representative of the performance of an average example of the Allyn Twin 0.15. Up to the time of writing, no independent reports on the engine have appeared, but an American source reports 12,000 r.p.m. as being recorded with a wide-blade 7 × 3 prop and 18,000 r.p.m. on a 6 × 3, neither of which suggests that our test example is by any means below par.

We suspect that some people are going to say that this engine is tricky to start. We were almost ready to believe this following our first attempts on bench tests. Familiarity breeds contempt and it is all too easy for the experienced operator to treat this unit as just another glowplug motor and to casually apply his usual techniques with scant regard to manufacturer's recommendations. In fact, however, it is best to forget any pet theories one may have about starting glowplug engines. The Allyn Twin needs two things : (a) reasonably accurate and balanced priming direct into the cylinders and (b) a good, hot glow to both plugs. This may sound elementary but if strict attention is paid to these two points, there is nothing else to worry about.

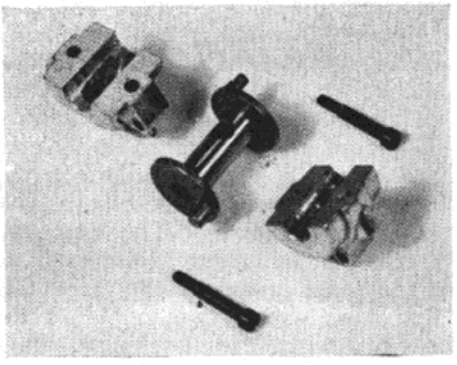
The manufacturers warn users against priming through the carburettor intake. The reason for this is obvious since the single carburettor supplies both cylinders, and priming in the normal manner will merely cause all, or most, of the charge to be drawn into one crankcase chamber only—i.e. via the crankshaft port that has opened first. It is possible to carefully meter the prime by repeating the dose after turning the shaft through 180 degrees, but since the engine, in any case, prefers a fairly rich mixture in the combustion chambers for starting, it is certainly better to direct the prime straight into the cylinders.

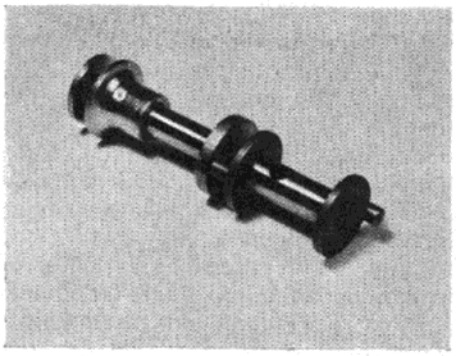
The most positive method of obtaining an initial start, we found, was to remove the glowplugs, inject three or four drops of fuel through each plug hole, turning the engine over in order to lubricate and loosen up the pistons and shafts, then to inject a prime of a further 7 or 8 drops of fuel through each plug hole before replacing the plugs and connecting the battery. The engine would then start within three or four flicks of the prop. Injecting in the normal manner through the exhaust ports can, of course be employed. It is then helpful to have a very small syringe by which the prime can be accurately distributed between the two cylinders.

Obtaining a start with most single cylinder glowplug engines, is usually possible with the plug glowing only a medium red colour and many of us are persuaded to use only the minimum voltage required to start the motor, in order to prolong glowplug life. On the Twin, however, it is definitely a better policy to have the glowing a bright red or orange colour since this appears to partly compensate for any difference in initial mixture strength between the two cylinders and gives more positive starting.

The glowplugs used are of the Allyn "W" element pattern and are of the long reach type with large cavities. As is usual, they are nominally rated at 1.5 volts and, of

The centre bearing is split horizontally and is held together with two screws. The crankshaft has separate valve ports for each individual cylinder which are fed from the single carburettor intake formed in the upper half of the bearing.





The two-section Allyn crankshaft. The extended front crankpin engages a slot in the forward shaft web to convey the drive to the prop.

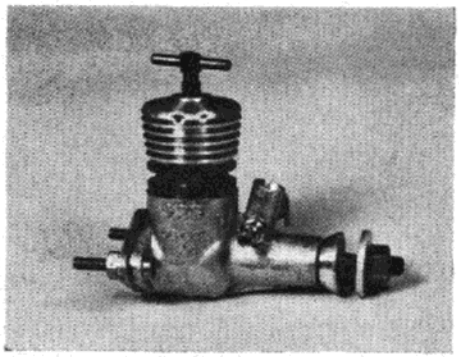
course, it is necessary that the two should be connected to the battery in parallel. If dry batteries are used (e.g. bell cells) it would appear advisable to use two cells and to connect them in parallel to equalise the available current to each plug. Incidentally, it is *not* advisable to use a 3 or 4 volt battery with the plugs connected in series as, should one plug be accidentally shorted to earth, the full voltage will be immediately put through the other plug which, needless to say, will burn it out.

The most noticeable point about the Allyn Twin when it is running is, of course, the exhaust note which, due to the fact that there are two power strokes per revolution, results in an extremely high frequency note at all normal speeds. On an 8 × 4 prop, this is not so evident, and there is an impression of smoothness, the volume of noise is more subdued than one might expect, but at 16,000 r.p.m., the Allyn has a 32,000 pops-per-min. beat which is something quite outside the experience of most of us. Needle-valve control, we found was not critical and the engine would start and run on a common setting of four turns open. Actually a needle from a single cylinder Allyn was used, the original having been broken in transit.

A rather surprising feature is the fact that a simple bulkhead method of mounting is employed. The considerable overhang that this produces is certainly a good advertisement for the reduced vibration of the alternate-firing twin layout. If desired, the engine can be adapted to beam mount installations by means of a special bracket available as an accessory. The standard method of mounting, however, is to remove the nuts from the three long crankcase screws and to mount the engine with the backplate flush against the front bulkhead or a suitable adaptor plate. Unfortunately, by the time one has added locknuts (or, as we did, replaced the existing nuts with fibre stopnuts) one is allowed a bare 3/32 in. for the thickness of the mounting bulkhead, so that a separate plate, or brackets, will, in most cases, be required. For bench mounting, we used a strip of 3/32 in. steel plate. With this screwed to the edge of the bench, it was quite possible to "spring" the nose of the crankshaft up and down, but, when the engine was running, there was no sign of any oscillation at any speed and the Twin contrasts strikingly in this respect with single cylinder diesels of similar capacity.

In general, the design of the Fury Twin follows previous Allyn-Fury practice. Each cylinder barrel and its respective crankcase section is in a single unit diecast from aluminium alloy. In fact, this casting is the same size, and much the same shape, as that employed in the single cylinder half-A class engine, which, of course, accounts for the relatively small dimensions of the 0.15 Twin. The 0.099 Twin has the same bore and stroke as the single-cylinder Sky-Fury (although the stroke appears to have been increased by a few thou. over the 0.400 in. of the original) while the extra capacity of the 0.15 is obtained by merely increasing the bore from 0.390 in. to 0.483 in. The design of the cylinder liner, however, has been modified and the former Arden type transfer grooves have now given way to two larger grooves, re-located to give a longer transfer period.

The original announcement of the Allyn Twins resulted in some conjecture as to the method used for coupling the cylinders. Examination now reveals that this is similar to that employed on the Taplin Twin diesel (see "Accent on Power," May 1955 issue of MODEL AIRCRAFT) in which a two section shaft is used, the crankshaft proper being supported in a short bearing between the cylinders while the front shaft, for power take-off (prop or flywheel) is driven by an extended front crankpin. Unlike the Taplin, however, the Allyn is of the rotary-valve induction type and the crankshaft therefore incorporates twin intake passages to the individual crankcase compression chambers. The crankshaft ports are, of course, at 180 degrees to each other and the carburettor intake chamber is funnel shaped in order to feed each port in turn.



The new Super-Tigre model G.29.

The main crankshaft bearing has to be split, of course, and this, together with the carburettor body, forms a separate two-part casting which is clamped between the two cylinder/crankcase units. Thus, the front unit, centre bearing, rear unit and back cover are clamped together, sandwich fashion, by three long machine screws and nuts. Paper gaskets are used between all three pairs of joint faces. The general layout of the engine will be apparent from a glance at the photographs

In Brief . . .

We now have a prototype of one of the new Aerotrol three-valve R/C outfits (receiver and transmitter) mentioned in last month's "A on P." This new equipment, designed by Walter Good and Joe Dale, is expected to be in production by the time these words appear in print and will be known as the "Tone Aerotrol." We hope to give our impressions of it in next month's article.

Latest arrival from Italy is the Super Tigre G.29. Similar to the 0.5 c.c. G.28 model described in the August issue, the G.29 is a half-A class unit (0.799 c.c.—0.0488 cu. in.). It has the same stroke as the G.28 but is *not* merely a bored out version of the ½ c.c. model. Virtually the only interchangeable parts are the backplate and needle-valve. Working parts, including crankshaft and con-rod, are of much heavier construction to deal with the heavier loads imposed by the greater capacity.

Some months ago we were permitted to examine proofs of the new Tri-ang R/C booklets. Copies of these are now being printed ready for when distribution of the new Tri-ang R/C units begins. These booklets comprise three "Owner's Handbooks" and a "Technical Manual" and are certainly an immense improvement on the standard of makers' literature that has previously accompanied British R/C equipment.

Topical Twists

Getting the Works

We English are not quite so green as our landscape is painted. We like to be fair minded of course, even to outsiders, but we have had our suspicions all along, and now, at last, the apalling truth has emerged. These foreign chappies don't go to international meetings for a nice, friendly spot of mutual flag waving and parley-vooing, but with the ungentlemanly intention of winning. And if this isn't a jolly, unsporting attitude to adopt, we don't know what is. Moreover, for some unaccountable reason, they have the audacity to regard model flying as a *bona fide* sport, like athletics (but, not we hope, cricket!). This we can only regard as a gross presumption, quite at variance with the modest principles of our traditional " boys with toys " approach.

To clinch our loss of faith in the un-English human animal, came the unholy success of a state sponsored works team at a recent international speed meeting. These dungaree clad heroes of the people's republic were unsporting enough to use special engines to advance the national prestige. An action which has aroused widespread indignation among our own patriots, who firmly adhere to the belief that a re-worked Dooling is a good enough toy for any boy, whatever his nationality.

Another appalling aspect of this fly-to-win element is that anyone should take advantage of the carefully avoided fact that the speed at which a model engine can be whirled around on the end of a piece of wire depends on the power of the engine. This not only destroys the sacred illusion that a speed model is a scientific work of art, in which the speed is mystically attained through ingenuity of aerodynamic layout, but is a breach of gentlemanly agreement.

When all the wailing and gnashing of teeth, and other forms of lamenting acoustics have subsided, it appears that our speed experts will be left with two possible courses to pursue; either to withdraw in humble defeat from the international field, and continue to enjoy sporty little games of rounders upon the very playing fields upon which Waterloo was reputed to have been won, or to throw themselves on the mercy of our manufacturers.

The latter course is the bolder one—and likely to yield results. A get together of manufacturers on this issue would be welcome. From it might emerge a decision to pool resources. In which case we can confidently look forward to the grandiose offer of a beginner's glider kit to the modeller making the highest time in an international event.

What's My Line

A sticky one for any B.B.C. parlour game panel would be to guess the occupation of the chap whose workaday life is spent flogging balsa wood to schools. An even stickier poser would be to fathom the educational purpose for which it is purchased.

The first answer that springs to mind is the building of model aircraft, but having had some experience of the younger generation's revulsion towards this form of sweated labour, we can dismiss this idea as wildly improbable. And, anyway, it would be unthinkable, in these enlightened times, that any modern Mr. Squeers would be allowed to inflict such inhuman practices upon his innocent charges.

One other, more feasible, use to which balsa wood might be put in the classroom is as an absorbent agent to the ravages of the posteriorly applied cane: a soft quarter grain $\frac{3}{16}$ in. stock could well prove a superior alternative to the customary exercise book. But even this possible solution must be discarded, since the cane is, now, like the speed model, a relic of a savage past; and the child, when asked to spell the name of that instrument, cannot truthfully answer, as I do towards this schoolboy puzzler: " beats me ! "

Getting A-Head

I have been asked by well-wishers (and you should see the depth of that well!) if, in view of my recent achievement of placing 3rd in a chuck glider comp, I intend to apply for membership to the Size 8 Club.

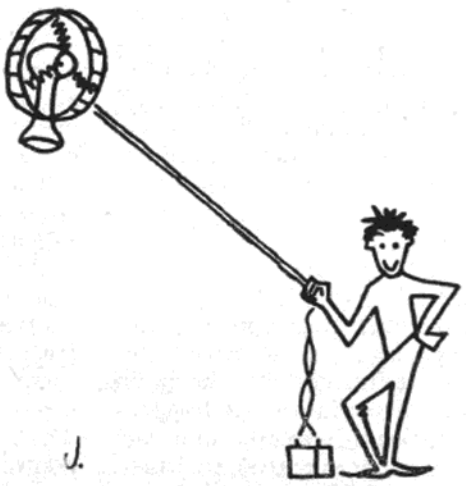
The answer is, of course, no. Field achievement, even of such distinguished merit as a chuck glider third, can no longer be accepted as a qualification for membership. This decision followed a meeting of the select pub-committee, called to check the alarming inflation both of members and their cerebral attachments. Already V.I.P.'s greatly outnumber entrants in the contest areas, this being particularly noticeable in the Radio events where V.I.P.'s now congregate.

In order, therefore, to relieve congestion, it is now proposed that only Fellows of the Size 8 Society be allowed to visit the radio areas, although ordinary members will continue to enjoy certain obstructive privileges at the main control centres.

The question of the parking of members' cars also came under discussion. Cars entering areas where they would constitute a definite nuisance to competitors and officials, must in future conform to a specification now in course of preparation. Whilst little is yet known of the specification, it is expected that it will include for sports cars of not less than 3,000 c.c. capacity.

Motor cycles, on the other hand, must now be considered infra dig, and relegated to the Rubber Comp. and other less fashionable centres.

All members are asked to note that tele-lens attachments are now standard to all V.I.P. cameras.



Fly-Paper

Some people believe in giving the petulant child a toy trumpet in order to keep it quiet, but I find a paper model aeroplane—folded in the traditional style—an ideal means of keeping the infant threat at bay,

Turning out a flight of these from my stock of foolscap (paper not headgear) I meditated on the brilliance of the unknown genius whose primitive form of chuck glider has introduced countless generations of urchins to the noble art of model flying. That he never achieved fame was undoubtedly due to his scholastic pursuits being more concerned with folding the exam. papers than to answering them; a tradition to which we ourselves can attribute much of our blatant ignorance. He did, however, achieve something with a few cunning creases that eludes all our advanced wrinkles: a model that would fly straight off—or out of—the drawing paper, without any trimming or adjustment. But, then, he lived in an age that was blissfully unaware of the impending threat of c.g., moment arms and all the other depressing factors which keep our litter bins full.

Pylonius

How it all started

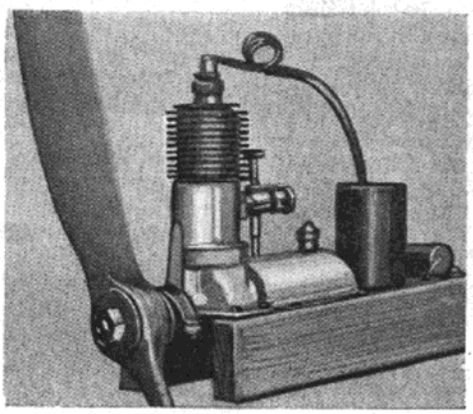
THE R/C model aeroplane was initiated in the United States. Admittedly in the very early days of radio a remotely controlled airship model was demonstrated in this country, using a coherer type receiver, and was in fact for some time a novel music hall turn. Also experiments with coherer-type receivers proceeded for some years on both sides of the Atlantic, with a massive induction coil as the primary part of the transmitter, but almost entirely confined to boats and similar models. In any case the engine-powered model aeroplane did not become a worthwhile proposition until about the middle of the 1930's, the majority of flying models up to that time being rubber driven with a definite limit to flight duration and the amount of "payload" which could be carried. There were, however, some noteworthy developments in radio control of full size aircraft during this period, aimed principally at evolving a "drone" target for anti-aircraft gunnery practice, etc.

Radio control development consists, inevitably, of scattered individual experiments with the main history recorded via known happenings at national contests and the appearance of commercial equipment on the market. The latter followed long after radio control contests were an established fact, all early equipment being home built and, in a majority of cases, own-design. Also contest achievements represent (or should represent) the peak of performance achieved during any particular period. Contemporary free-lance claims are often impossible to check and every hobby invariably produces its "cranks" ready to claim that they have done better, sooner than anyone else, although never able to justify such claims by practical demonstration.

The Americans were in the fortunate position of being the first country to have commercial model engines available in reasonable quantity—and quite consistently good at that. The "grandfather" of all these was the Brown Junior, appearing in 1934. As far as we can judge, radio flying really started about 1935, with suitable radio circuits beginning to appear in the "Radio Amateur's Handbook" and similar publications in 1936-7. Certainly an early experimenter, Ross Hull, was actively concerned with one of these radio magazines and wrote about the problem, including a description of a three-valve receiver and rubber powered actuator unit which he had employed in a 16 ft. model sailplane in 1937. Transmission appears to have been concerned with the 5, 80 and 160-meter band, all operators requiring a licence to work their sets. This Government regulation remained as a handicap until long after the war, discouraging many would-be enthusiasts from getting going and leading to numerous anomalies, such as a licensed "ham" operator resting his hand on the control button and an unlicensed, but skilled model flier, operating the control by pressing the other's hand instead of the button!

By 1937 radio control was sufficiently well advanced for a radio control event to be held at the Nationals, attracting six entries. Of these, three actually got off the ground, but two crashed immediately. The only model to demonstrate controlled flight was a 9-ft. span, 6 lb. model by Chester Lanzo, powered by a Baby Cyclone engine and fitted with a 30 oz. receiver giving rudder-only control.

The Brown Junior engine was one of the first successful commercially-produced units. First made in 1934, it popularised power models, which in turn led to R/C flying.



Technically, for rudder-only control, the radio system was relatively complex. The receiver was a three valve unit, one a detector and the other two audio amplifier valves, the sensitive relay being operated on receipt of unmodulated pulses from the transmitter. It was operated on the 3.5 Mc. band (80-meter), was extremely critical on tuning, but was reported to respond to other amateur signals on the same band hundreds of miles away on occasions!

The rudder was driven by a rubber motor, via reduction gearing, normally working through a right-centre-left-centre sequence all the time. It could be stopped at centre and intermediate rudder positions and although this form of control left much to be desired the model flew well, demonstrated that it was controlled from the ground, and walked away with the event.

During the same year a group from the American Radio Relay League got down to experimenting with the 56 Mc. band (a near equivalent of which subsequently became the "standard" American 50-54 Mc. band for radio control workers) and came up with two particular developments which have influenced radio modelling ever since. The first was the magnetic escapement and the second, although this came a little latter, the single-valve lightweight receiver.

By the time the 1938 American Nationals came along the first commercial radio equipment was being manufactured by Clinton DeSoto, another pioneer enthusiast, but a name to enter the lists was Walter Good, who won the main event with a model which he had had ready the previous year, but did not fly. Good's model was the only radio model to fly at the 1938 Nationals—and even he only managed a short duration before crashing. None of the other models got off the ground—it was too windy! DeSoto's model at this event, incidentally, spanned 14 ft., weighed 28 lb. and had four separate receivers—one each for right and left rudder and one each for up and down elevator! He was granted second place, although he never

flew, on the fact that he demonstrated that the equipment would work on the ground.

Walter Good flew the same model again in 1939 (with rebuilt tail surfaces) and this year was joined by his brother, William. Weather was fine this year and the Good brothers more or less walked away with the National's event, performing turns, figure eights and spot landings with re ularity and precision. They repeated their success in the following year with the same model again, notwithstanding the fact that their transmitter was stolen the day before the event and they had to build a new one hurriedly overnight. But competition was growing stronger and although the total entry was still only a dozen, each one flew.

The last of the pre-war National events was held at Chicago in 1941 and this time Jim Walker, a man already well known for his mark on the control line field—he started it all! —topped a record entry of 26 with a most complex multi-control system which performed admirably with proportional rudder control operated via a fluid clutch and two-speed motor control. Transmitter control was a stick, the degree of control movement selected by the stick being reproduced by the rudder and the two-speed motor timer being controlled by a separate radio channel. It is also noteworthy that in spite of the elaborate control system the model was smaller than the average of that time being of 7 ft. span and fitted with a tricycle undercarriage. The Good brothers' model (they did not fly in 1941 and did not appear again on the contest field until 1947, when they again won with the same old reliable machine!) was of 8 ft. span whilst 9 to 10 ft. machines were the rule rather than the exception.

This was the first time that a complex control system had bettered simple rudder control in the competition field. Although multi-control systems were in the majority at each of the events 1937 to 1941, none had achieved the degree of reliability necessary for consistent operation under flying conditions. Over-complexity of the system, in fact, started right with the beginnings of radio control and is still with us. Rudder-only continued to hold its own right up into the 1950's in America and is still the best bet for competition entry in this country under present rules. Post-war development of radio flying, both in this country and America is, however, another story. But it can be pointed out that pre-war American development reached a level which has still to be realised by the majority of radio modellers in this country.

Typical of the early radio controlled models is this 12 ft. span job by Earl Vivell, which weighed 26 lb. Using selective single channel control working rudder and elevators, it flew well with a ½ h.p. motor in America in 1940.

OVER THE COUNTER

KIT REVIEW

THE DAVIS CHARLTON

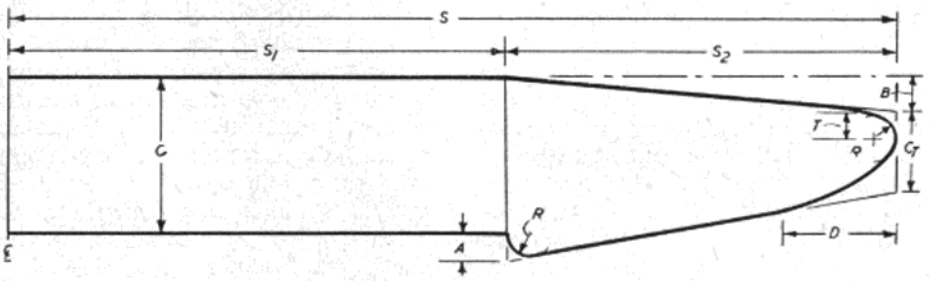
BALLERINA

(*Continued from page 443*)

white); motor bearers are true, smooth, hard stock; and the undercarriage wire is plated. Cabin celluloid is a really sensible thickness, but slightly too small; no wheels, cement, tissue cement or dope are included, this being almost standard practice these days.

The label announces this model as a Davies Charlton Super Kit. As regards quality of materials we agree that the superlative is justified. But basically it is just a plain, straightforward kit in the orthodox British tradition.

Comments on building the *Ballerina*: front bend of bottom longerons requires wood to be dampened or steamed, for safety. We suggest fitting sheet fill-in and cabin sheeting at this stage as a precaution against the sides "springing" when removed from the plain. The tailplane ribs (printed sheet) make no allowance for slotting into the trailing edge. Allow for this when cutting out. There are similar small errors on the wing ribs, relative to the plan. Cut-outs for bearers on former 2 (ply) are too low. Check carefully before asembly, otherwise the bearers will be mounted with upthrust. One large tube of cement and one tube of tissue paste will complete this model.



The WOLF WING

This is a characteristic German glider wing planform, originated by Wolf Hirth, which has been much copied, both for full size gliders and models. Although no actual data is available showing the relative efficiency of the Wolf wing, compared with more conventional designs, any advantages to be gained lie in a close approximation to the original layout.

The diagram splits the wing outline into two basic shapes—a parallel inboard section with a sweptback, tapered outer panel. Layout proportions are given in the table as factors of the semi-span dimension (S). Such a wing can be used with straight dihedral, gull or polyhedral. The former is generally to be preferred. Gull-type polyhedral (i.e. less dihedral on the outboard sections) improves the appearance of the wing but is less effective aerodynamically.

AREA OF 'WOLF' WING = $2(S_1 \times C) + (S_2 - R)(C + Ct + A)$ (Approx.)

Layout Dimension	S_1	S_2	A	B	C	Ct	D	R	T
Factor	.55	.45	.03	.04	.175	.09	.125	.025	.03

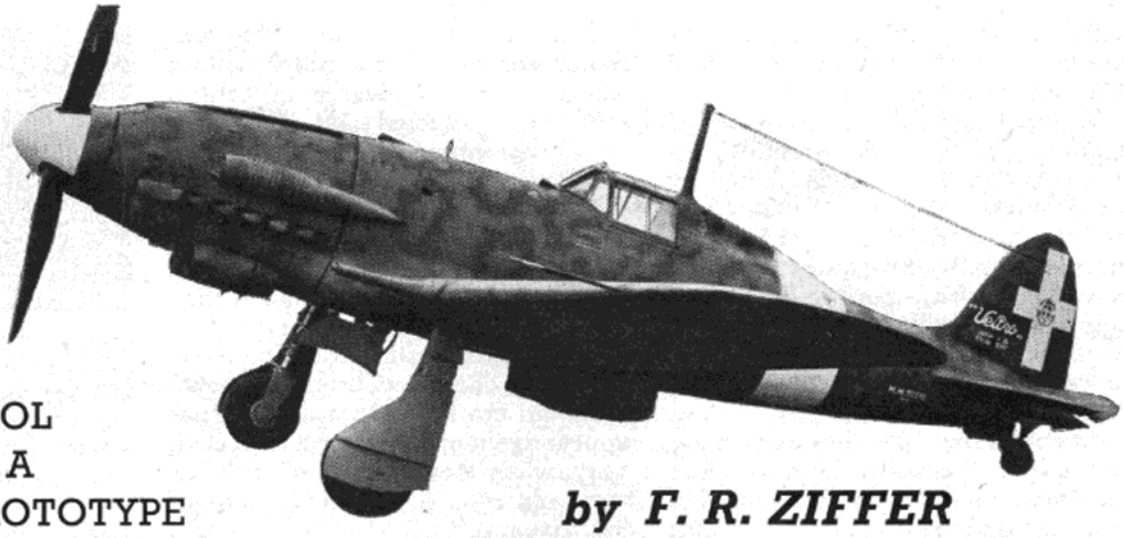
EXAMPLE :—

Suppose design calls for a 40" span wing. Semi-span (S) = 20" .·.

$S_1 = .55 \times 20 = 11$ in.
$S_2 = .45 \times 20 = 9$ in.
A = .03 x 20 = 0.6 in.
B = .04 x 20 = 0.8 in.
C = .175 x 20 = 3.5 in.
Ct = .09 x 20 = 1.8 in.
D = .125 x 20 = 2.5 in.

R = .025 x 20 = 0.5 in.
T = .03 x 20 = 0.6 in.
Area = 2(11 x 3.5) + (9 − 0.5)(3.5 + 1.8 + 0.6)
= 2 x 38.5 + 8.5 x 4.7
= 77 + 39.95
= 117 sq. in. (approx.).

THE MACCHI C.205V.



★

A SCALE CONTROL LINE MODEL OF A FASCINATING PROTOTYPE

by F. R. ZIFFER

LIKE Great Britain, Italy owed much to the experience gained in the Schneider Trophy races when in later years she came to develop combat aircraft. Italy twice won the trophy with Macchi aircraft designed by Mario Castoldi, chief designer of Aeronautica Macchi.

The C.205V was a development of the C.200 Saetta series of radial engine fighters, the in-line engine types being introduced when, in 1940, a Daimler-Benz DB 601 engine was installed in a modified Saetta airframe and designated C.202 Folgore.

The C.205V Veltro prototype first flew on April 19th, 1942, with a 1,250 h.p. DB 605A engine installed and an armament of two 12.7 mm. and two 7.7 mm. guns. In the production Veltro, which entered service in 1943, the 7.7 mm. guns were replaced by two 20 mm. cannon as shown in our heading photograph and plan. Provision was also made for an external bomb load, and in fact the type was mainly used as a fighter-bomber.

Construction

The first step is to cement together the engine bearers and formers 1, 2 and 3 (precementing makes a good job here). Next, solder the engine attachment nuts to two strips of brass or tinplate and bind these, in position, to the bearers with fuse wire ; afterwards cementing liberally. The engine is mounted on the centre line without any offset. Then fit the tank between the bearers between formers 2 and 3, and the bellcrank aft of former 3.

The next stage in the fuselage construction is to join the main side stringers to the formers—1 to 3 and then add formers 4 to 7. Afterwards the top and bottom stringers can be cemented in place. Then assemble the tailplane and cement it in position adding the push rod. The tailwheel wire is stitched and cemented to former 8 before it is cemented to the ends of the fuselage stringers. Then add the fin.

Carve and sand the wings to the section shown on the plan. Cut the openings for the undercarriage, for formers 3-4, and for the lower stringer of the fuselage. Insert the two blocks for the lines-guides. Bend the undercarriage to the pattern shown on the plan, bind and cement to the 1.5 mm. ply brace. Cement together the two half wings by means of the undercarriage brace and insert the completed wing into the slot cut in the fuselage.

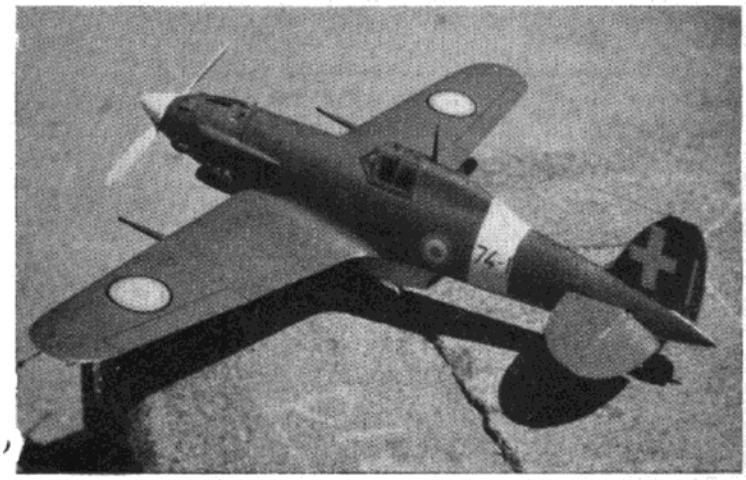
Plank the fuselage with $\frac{1}{16} \times \frac{3}{16}$ in. stringers. Sand-paper the entire fuselage smooth and add the engine cowl, streamlined rear cockpit, radiator, and tail wheel cowl blocks, and also fair in the wing root with soft block balsa.

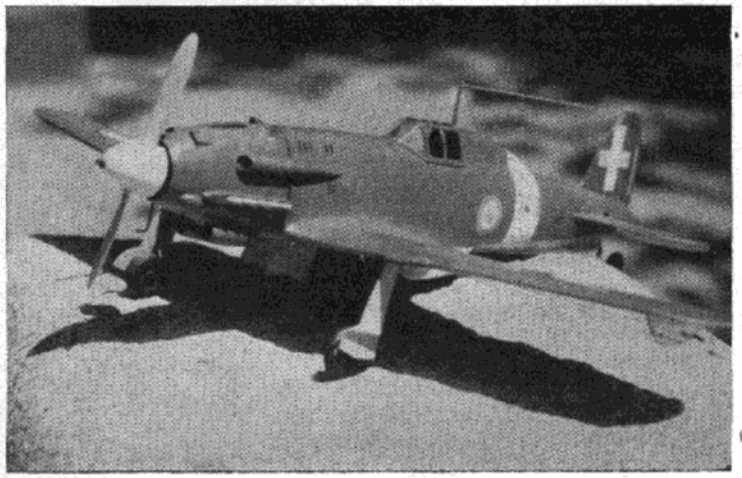
Sand the complete model smooth, and, finally, fix the celluloid cockpit cover, and the small detail fittings.

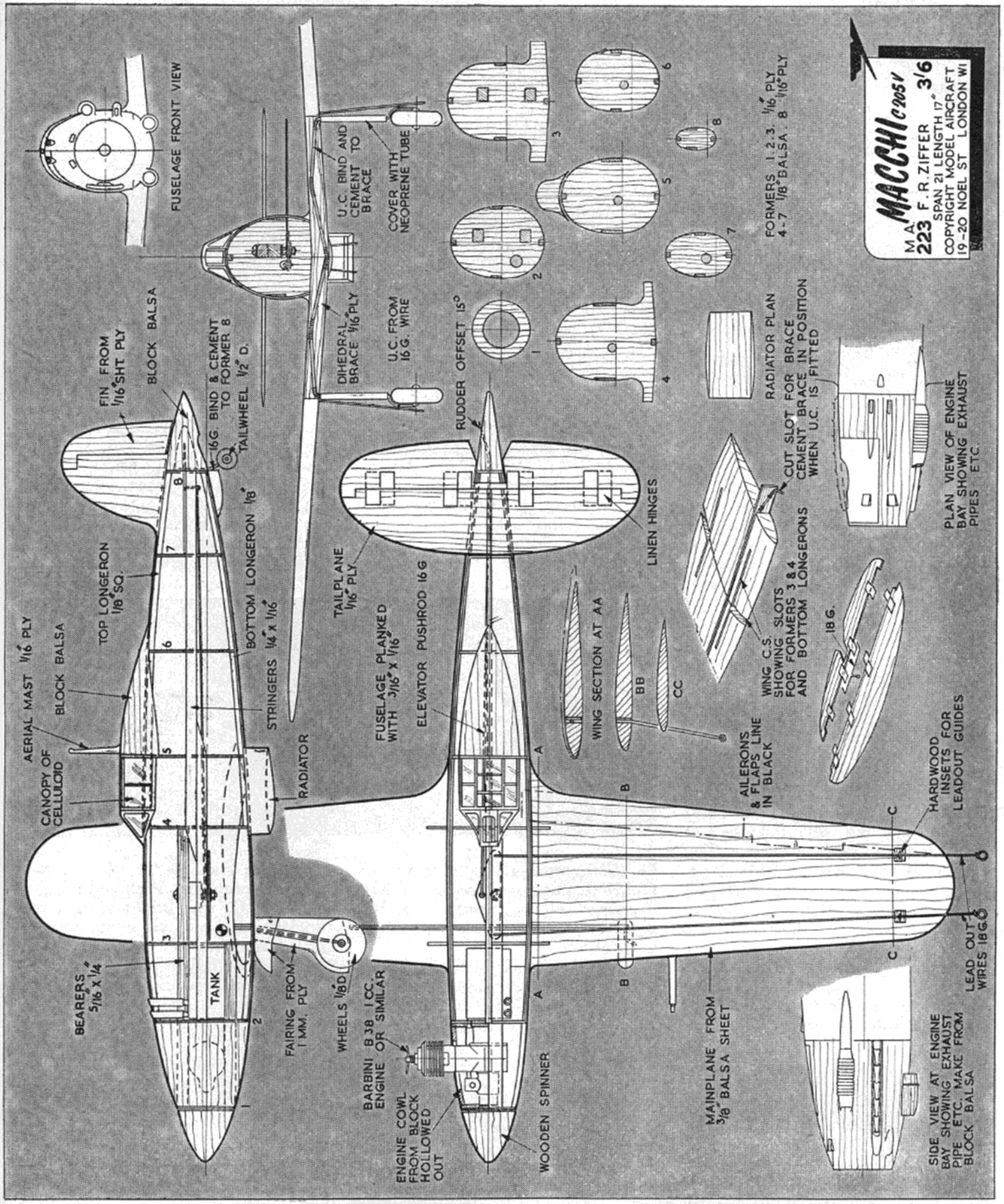
Cover the finished model with lightweight tissue doped on and give several coats of grain filler or thinned-down dope ; apply two coats of paste obtained by mixing some talcum powder with clear dope, sanding between coats. The model is then ready for colour doping.

The colour scheme is : upper surfaces drab olive ; lower surfaces sky blue ; spinner and vertical band on the fuselage (see plan) white ; white cross on the fin.

These two photographs show well the amount of detail that can be incorporated in a model Macchi C.205V.







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Civil Markings

Part Two by P. M. H. LEWIS

IN this concluding article, the remaining British registrations are dealt with, together with notes on foreign aircraft and some of the major civil airlines. With regard to the latter, company colour schemes are, generally speaking, the same for all aircraft in their respective fleets, but it is again emphasised that reference to photographs is essential for correct positioning of the various colour trims. For illustrations of airline symbols, study of "Civil Aircraft Markings" by J. W. R. Taylor is recommended.

The attractive Miles family is now reached, the selection consisting of low-wing machines, except for the M57 *Aerovan* G-AGOZ in cream and red. *Flight* magazine's M65 *Gemini* G-AKHC is colourful with royal blue fuselage and white top, the rest grey and outlined in red. The earliest of the low-wing Miles types is represented by the M2 *Hawk*, all cream with red G-ACRB. The racing M2L *Hawk Speed-Six* G-ADOD was similarly finished.

The M14A *Hawk Trainer* 3 G-AITS owned by the makers and based at Shoreham is silver overall with red flash and lettering. Also Shoreham-based is M38 *Messenger* G-AJOM in silver/green, also operated by F. G. Miles Ltd. Colonel Lindbergh's M12 *Mohawk* sported a bright scheme of black fuselage with orange wings and tail and outline registration G-AEKW. Both the M17 *Monarch* G-AFCR, and the M5 *Sparrowhawk* G-ADNL were originally cream/red. G-ADNL has now become the M77 *Sparrowjet*, all white with royal blue registration and black 92 on the vertical tail.

Percival aircraft include the *Gull* G-ACFY, blue fuselage, remainder silver, P6 *Mew Gull* G-AEXF, white/blue trim 97 flown by Nat Somers, P44 *Proctor* G-AGSW, turquoise fuselage, silver wings and tail, and the silver P10 *Vega Gull* G-AEYC.

G-AJVO, silver/green, was one of the Republic RC-3 *Seabees* flown in the U.K., while Stinson 105 *Voyager* G-AGZW was also here in silver/black. G-AISU, silver/black, was for a while a civil *Spitfire* 5*B*. A rare parasol aeroplane, Westland *Widgeon* 3 G-EBRO, was bright with a red fuselage, and the rest silver, and the little Zaunkönig flew as G-ALUA in dark blue with light blue trim.

As an alternative to the single-engined aircraft, quite a few modellers turn to the twin- and four-engined types.

The Vickers *Viking* helped to restore the airlines of Britain after the war and G-AMGG of B.E.A., silver with white top deck and red

Above: This Aer Lingus photo of their Viscount EI-AFV "St. Patrick" shows well the company's attractive styling for the colour scheme.

Left: This Miles "Hawk Trainer" (in light blue with dark blue trim) is typical of the many in service with flying clubs all over the country.

Top: A Swissair photo showing Convair 240 HB-IRS, which has the badge of "Glarus" on its nose. Lower photo shows P.A.A. "Stratocruiser" "Clipper Southern Cross," in natural aluminium finish, white top decking with blue trim.

markings, was one of these. It was named "Sir Robert Calder." The *Dakota* is still in service as the *Pionair* with B.E.A., whose colour scheme is silver/red. One example is G-AHCZ. A foreign airline twin is the Swissair *Convair* 240 HB-IRS, which is in silver with white top deck and red trim and which carries the name "Glarus."

There are plenty of four-engined aircraft from which to choose: B.E.A.'s de H. Heron G-ANXA, Vickers *Viscount* 701 G-AMOA "George Vancouver"—both in the usual silver/red—B.O.A.C.'s Bristol *Britannia* G-ALBO, Boeing *Stratocruiser* G-AKGH "Caledonia," and Canadair *Argonaut* G-ALHX are all left in their natural metal finish with white top decks and blue trim. Aer Lingus *Viscounts* include the silver/green "St. Patrick" EI-AFV: one of those operated by Air France in silver with blue trim is F-BGNM. Pakistan International Airlines fly their *Super Constellation* AP-AFR in silver with white decking and green trim.

Possible jet air liners include the D.H. *Comet* 2 G-AMXA, and the *Comet* 3 G-ANLO. Boeing's 707 is registered N70700 and received a striking colour scheme of canary yellow, chocolate brown and silver.

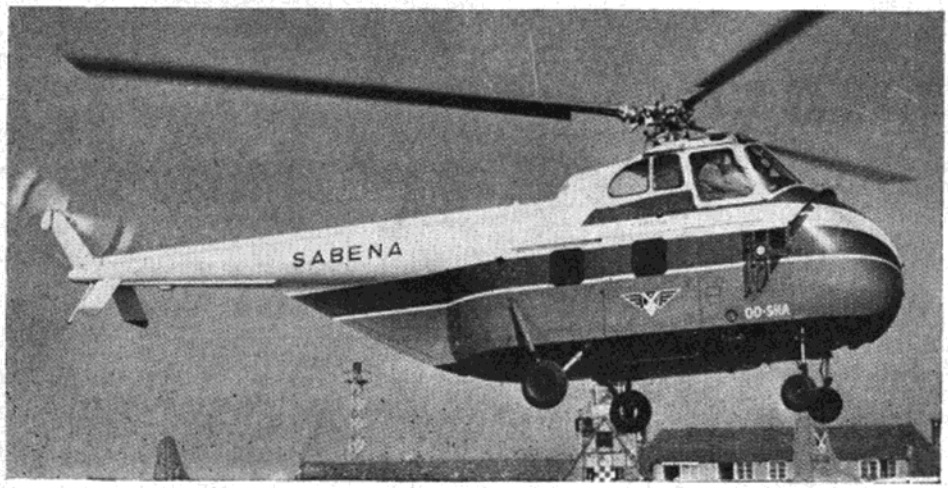
Small Foreign Aircraft

An example of the Aeronca *Chief* is the silver/black NX21300, and the Italian Ambrosini S-7 looks well in the same colouring, as I-BOZI. OO-TIT, Avion Fairey's *Tipsy Junior*, appeared with yellow fuselage, leading edge of wings and fin, and with silver wings, tail and rudder.

The staggered wing Beechcraft D17 biplane, would make an intriguing model and could be completed in white with red trim as NC12584. Additional Americans are the civilianised Bell P63 *Kingcobra* "Kismet" NX52113, all black, white lettering, Cessna C-34 *Airmaster* NC19464 and Cessna 170 NX41691, both silver. Fairchild 24W NC25181 was smartly finished with red fuselage and tail unit and white wings. An ideal design for a pusher amphibian model is the Goodyear GA-2 *Duck* NC36281 in silver/black.

Colourful subjects indeed are the Granville Brothers *Gee-Bee* racers, among them being the *Super Sportster* R-1 NR2100, *Super Sportster* 2 NR77V "City of Springfield, Mass.," *Sportster E* NC11041 and *Sportster D* NR49V. All were white with red trim and with black flash on the spats. The Howard "Mr. Mulligan" NR273Y "40" raced in all white/black trim. Another of the Mac-Robertson Race aircraft was the Lambert Monocoupé NR501W "Baby Ruth" of Wright and Polando, all red, white trim, blue fin and race No. 33. A famous Lockheed *Vega* was that of Wiley Post, NR105W "Winnie Mae," all white, blue trim, black lettering. An Italian design which has found favour is the Macchi MB308, I-MACK, cream and black.

A Swiss-owned N.A. *Navion* 205, HB-ESE, flies in white with red trim, while Piper J-3 Cub NX33527 is cream/black. M. Mignet's original "Le Pou du Ciel, H.M. 14, L'Autre Aviation," was all white, black trim and carried the foregoing inscription on the rudder. One of the Czech Praga E114/106 Babys was the silver OK-PGB and an American-owned Republic RC-3 *Seabee* the silver/black NX87451. A recent newcomer was the Danish S.A.I.KZ-7 Lark, OY-DHY being silver/black. Stinson's SR10C *Reliant* NC17147 has a good appearance in white overall with red trim, their 105 *Voyager* NC26200 having the reverse colour scheme. The final aircraft covered is the WACO "S" biplane NC20955, which is also all red with white trim.



Sabena took the lead in operating helicopters for internal services. This S-55 has white top decking with a blue band, and the company crest and registration number on a light grey background.

MODEL AERODYNAMICS No. 11

When a perfectly true wing approaches its stalling angle, the whole of the wing does not stall at the same time. If the wing planform is rectangular, the centre of the wing will stall before the tips. In the case of a tapered wing, then the tips will stall first—Fig. 1. This fact is important for it governs how the model will behave should it be accidentally stalled in flight.

On a wing where the tips stall first, one tip is very likely to stall before the other. As a result that tip will drop and the model will start a roll into the beginning of a spiral dive. On the other hand, if the centre of the wing stalls first, then the tips will still be supporting the model between, as it were, two suspension points and the probable reaction will be a straight stall with the nose dropping.

Provided we can guarantee that the centre of the wing *will* stall first we can use this as a stabilising device by sweeping back the wing. As the wing centre loses lift by its premature stall, the effective centre of the lift of the whole wing moves back applying a correction to the stall. A parallel chord sweptback wing will have this natural characteristic.

Swept wings, however, are normally tapered—Fig. 2. To get the same stability effect we must make sure that the normal stall effect in this case is reversed, when tip lift with the centre stalled will provide the same righting effect as with the rectangular wing.

This can be done quite simply by applying a geometric "twist" to the wing so that the tips have a reduced effective angle, shown exaggerated in Fig. 3. This is known as washout and is normally regarded as an essential stability feature with tapered wings, whether sweptback or not. The amount of washout required is quite small—about 1 to 2 degrees to make all the wing stall together, and 2-3 degrees to ensure that the tips will stall last. Using more washout will make more sure of this, but reduces the effective flying attitude of the tip portions of the wing, with loss of lift. This would be acceptable on a sports design, but not on a duration layout.

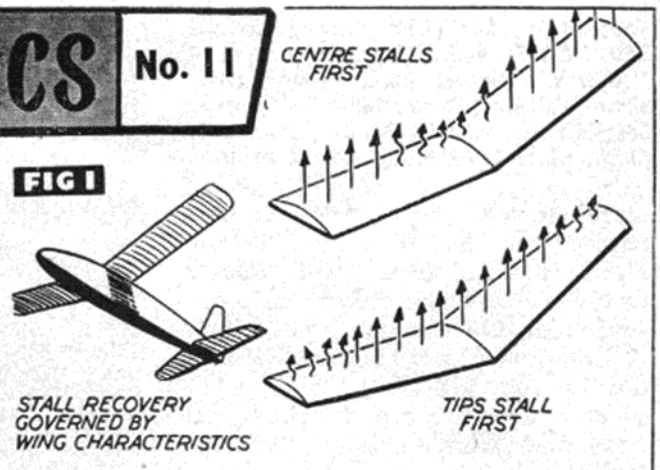
Using a swept-forward, tapered wing, it is desirable that the tips *do* stall first, when a small amount of wash-in may be employed. Such a wing planform, however, is not generally recommended as it leads to spiral stability troubles.

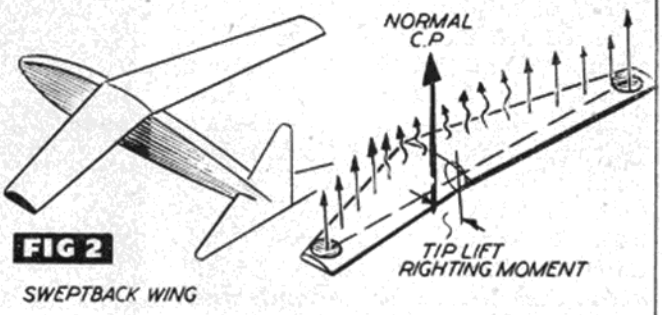
Actually quite a number of supposedly "straight" wings are, in effect, swept in one direction or another. A purely rectangular wing, with dihedral, assumes a slight sweepback when rigged at a positive incidence, and slightly more in actual flight when the angle of attack may approach 8 degrees or so. Many tapered wing planforms, ostensibly unswept, incorporate a few degrees of effective sweepback or sweep-forward.

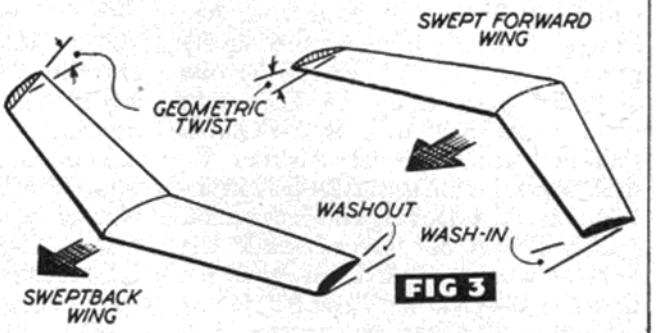
The "sweep" angle is correctly measured from the quarter chord line—an imaginary line joining the quarter chord points of the root and tip rib. Thus the typical wing planform shown in Fig. 4 has effective sweepforward. In flight, for the reason mentioned above, it is probably effectively "straight." Small sweep angles have very little effect and so are generally ignored.

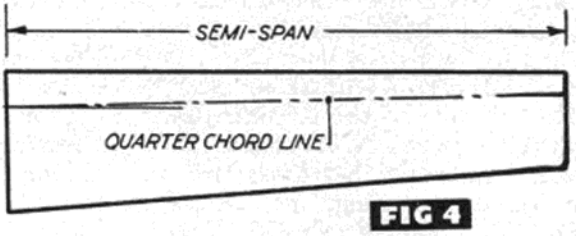
Stability measures adopted apart from actual wing geometry include the use of washout on the tips of parallel chord, as well as tapered wings, and special devices to increase the differential between tip and wing centre stalling point. Spoilers over the inner wing have been used effectively by de Bolt on an R/C designed intended for inverted flight manoeuvres. The wing used would normally incorporate tip washout as a stability measure, which would become wash-in (and an unstabilising device) in inverted flight. He therefore uses spoiler plates on the leading edge to promote an early centre section stall, whichever way the wing is operating. Fig. 5.

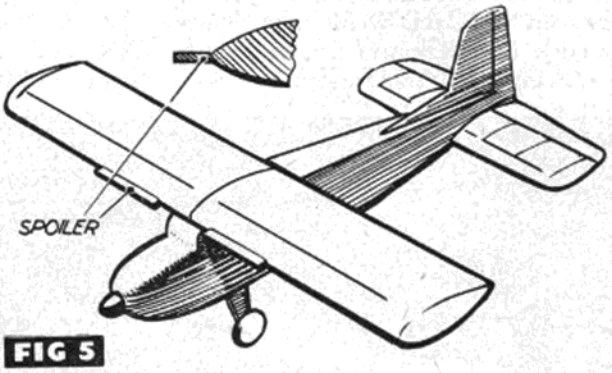
Of more general application for sports type models are stall-delaying fixtures added to the outer wings, such as the fixed slat (or letterbox slot), or turbulators—Fig. 6. The latter have been relatively unexploited in this field to date, but would appear to have considerable possibilities. There is some evidence, too, that a primary cause of instability on tow with many glider designs is premature tip stalling, so that tip stall-delaying devices may have application even on duration models.

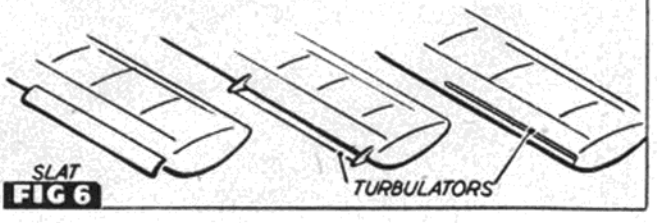












Letters

Continued from page 419

Pylonius will have to buy his chuck gliders somewhere else—for the proprietor is waiting for him with a block of 4 × 3 for daring to make such a statement in "M.A." that he runs a toy shop.

Everyone knows that the toys are there for the amusement of local modellers. Without them they would not have an excuse to take their kids in on Saturday.

Yours faithfully,

Grimsby. E. FEARNLEY.

Faces and Places

DEAR SIR,—We read with dismay the article on the Northern Gala in the September issue of the MODEL AIRCRAFT. We note "that due credit goes to the North-Eastern area and in particular to the Darlington Club," but do not get the implication contained therein.

The officials of the N/E area, from January to August, 1955, did the "solid" graft necessary to bring about the organisation and smooth running of the gala. The Darlington club was represented in a very minor capacity by Mr. Swinden, and their efforts were of a very small nature compared with the overall organisation.

We of the North Eastern area have in the past run quite a number of "home" rallies; also we have been with "busloads" to all the Sherburn Rallies, the Trials, Nationals, and to last year's Northern Gala. From observations of what was right or wrong at these events we formed our programme—the only common sense thing an organising committee should do.

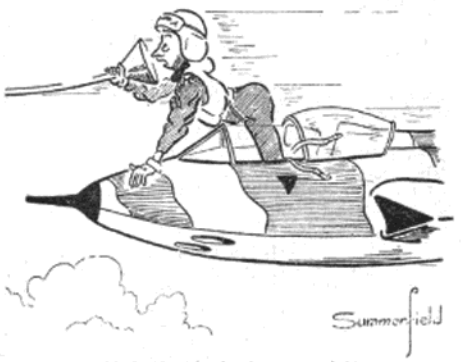
As we note already that the North-Eastern area was rather a minor part in the organisation, we are affronted with the insult "that many of the Northern clubs were more active with tongues and pens than flying." We would like to state that the N/E area, with the exception of the C/L events, did control, marshal and timekeep all events, including the services of a judge at the I.R.C.M.S. events. Further to the organisation, everyone knew their task before arriving at the field, and all reported and accepted their duties—the great number carrying these out all day, forfeiting flying (and food!). In regard to the remark about keeping the big event in one place, the area chairman consulted Major Taylor and Mr. Gosling, also the contest fliers, and from their remarks decided to leave things as they were.

We were honoured by the attendance of Mr. Houlberg, S.M.A.E. chairman at the Northern Gala, a fact which we appreciate. May we also say how much we appreciated the way in which Mr. Gosling (vice-chairman) and Major Taylor gave their services and kind advice, which were a great asset to the event. We would close by saying that we have applied for next year's event and would, if it had been asked, have taken the Nationals this year, and will do so next year if given the opportunity.

Yours faithfully,

R. F. SANDERSON,
North Eastern Area Chairman,
R. SPARKES,
North Eastern Area Secretary,
G. L. ROBINSON,
for North Eastern Area Committee.

At the last council meeting—attended by all northern area representatives—no delegate was able to suggest a better venue for the Nationals than Waterbeach, so the 1956 Nats are at Cambridge.—Ed.



"O.K., let's have it!"

DEAR SIR,—I should like to correct the secretary of the S.M.A.E. on two points arising from his letter headed "Reply to Seaham" in the October issue.

First, the Seaham club is not in the Northern, but the North Eastern Area. Secondly, the Northern Area is not a co-organiser of the Northern Gala. We had no part in the organisation of that event this year.

I should not normally have taken the secretary to task over these points. But it seems to me that the letter you had from Seaham, grossly ill-informed as it was, is to some extent a poor commentary on the area concerned. I hope and trust there is no club in the Northern Area as ignorant of S.M.A.E. arrangements as the Seaham crowd appear to be. Moreover as an area we should take a very poor view of a club which aired its grievances—and its lack of information—in the Model Press without coming to the area committee first.

Yours faithfully,

Leeds. K. F. P. RUTTER,
(P.R.O. Northern Area.)

Mr. Hume Replies

DEAR SIR,—I must confess I am surprised at Major Taylor's letter. If the North *v.* South antagonism is non-existent as he says, then he gives a very good imitation of taking part in it.

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.

He seems to suggest that as we have the Northern Gala we should have no desire to have the Nats. He gives a list of figures attempting to prove that one is as good as the other. This is, of course, nonsense. I, for one, am willing to swap comps.

He then goes on to ruthlessly slaughter the Northern Gala (though what the poor organisation has to do with my arguments evades me). I am a team race flier and at any meeting see little but the C/L side of the event. I must say that I have no complaints whatsoever about any N.G. at which I have flown.

I still maintain that the clubs have no *direct* say in the organisation of the S.M.A.E. They could easily vote on large number of matters that affect the members by post.

The major's last two paragraphs were so rude that I would have preferred to ignore them but his statements are simply not true. We have attended *every* meeting that was within reach of us at all. We have attended every Northern Gala and every *Y.E. News* Rally held and have always entered at least one camp. If you cannot find any record of Seaham, Major, I suggest that you look again. As a point of interest, Major Taylor was *actually discussing my letter with T. L. Robinson at Croft. This member of our club was helping in the organisation of the glider event.* We also find no less than six club entries in the Gamage & Pilcher Trophies alone this year. We do not think this is so bad for a club of 15 or so members, most of whom fly C/L.

Though I have less quarrel with Bob Gosling's answer I still cannot agree that the S.M.A.E. is democratic enough.

I said that the area rallies were shambles because of lack of entries, not because of poor organisation. My choice of words is at fault. In fact I appreciate fully the amount of work put into the organisation of an area "do."

I suggest that everyone interested takes a look at this year's contest calendar. The North has a fair share of contests forsooth!

As a last word I would like to point out that the aeromodelling record—in all forms—of Seaham D.M.C. is not so bad. We have a winner of the Gamage Cup in our ranks, a second place winner of the Model Aircraft Trophy, a fair amount of success with team-racers, etc. Handy as I may be with my pen, the club is handy enough with models. Furthermore, not only is any distance not too far, but we are holding regular *friendly* meetings with our good friends Thornaby Pathfinders M.F.C. a club whose headquarters are no mean distance away.

Yours faithfully,

Seaham. WILLIAM E. HUME.

This correspondence is now closed—Ed.

Club News

AND NEWS FROM THE S.M.A.E.

WEST MIDDLESEX M.F.C.

It is hoped the club will be, within a few months, as prominently in the news as of yesteryear.

At our recent A.G.M. it was generally accepted that either we sink or swim as a model flying club. Some very frank discussions took place and, sensibly, recriminations were put in the background. Out of it emerged the decision that we must get back to our old footing ; to the era when we were accepted as formidable opponents on the field. A fairly clean sweep has been made in the committee formation and several ideas with a view to instilling enthusiasm; one in particular: that each non-flying weekly meeting be devoted to a discussion on any one aspect of aeromodelling; a recognised " expert " to take the chair and to toss the apple of argument to those present.

To quote a radio type—" We shall see ! "

Our semi-final against Northwick Park for the L.D.I.C.C. Cup proved the usual heartache for the glider lads. (The landscape of Chobham Common gives one no choice but to fly from the top of one of its many hills; with the usual trouble: the slightest breeze follows the downhill contour.) Only one glider was lucky enough to strike an immediate thermal and exceed 2 min. duration. As expected the onus rested on rubber models and Northwick Park were unlucky enough to have a D/T failure during a pre-contest trimming flight. This left us in a position to coast along and win with three flights in hand. The result would otherwise have been a matter of seconds either way. One point became obvious. If we are to have a 50-50 chance in the final against Hayes, an efficient recovery service will be as important as good models.

CROYDON & DISTRICT M.A.C.

First of all this month we offer our heartiest congratulations to Bob Gilroy for his second place in the A/2 Glider Championships at Finthen.

A report on the Croydon gala, held at Chobham, appears elsewhere in this issue.

Cranfield was the scene of much fustration on the part of the F/F contingent when they found that the flying site was halfway down the airfield towards a cornfield, wherein repose many models. The combat boys hadn't got enough sixpences to win their event, although out of 25 heats or so, only about three were won with actual cuts.

A fortnight later, at the London Area C/L meeting at Heston, the full Croydon combat strength of four, re-equipped with A-M and Amco 3.5s, was in action. However, due to several mishaps, their efforts were of no avail. Thanks to the gentleman who insisted on aiming for Dick Standing's model instead of his streamer, and the other character who wound " Daffy " Dilly's lines round his feet and hauled his model into the centre of the circle, with a capstan action, only Max Wood and Paul Anderson reached the semi-finals. While Ed Bennett and Norman Butcher processed several very skinny team racers, " Daffy " resurrected his Elfin 149 speed model to place second in handicap speed with 77.9 m.p.h.

SOUTHAMPTON M.A.C.

This month all members of the club are very pleased with themselves because at R.A.F. Thorney Island we managed to beat the Portsmouth M.A.C. to the tune of 18 points to 6 in the Hobart Trophy.

This annual F/F competition was started by Lt.-Cmdr. Hobart, R.N., who presented a very fine cup to be awarded yearly to the winners.

Very prominent in the flying activity was our newly acquired lady member who joined the club last month.

BRADFORD & LEEDS M.A.C.

The club's " general " competition, held recently, faced a crisis due to a misunderstanding of the rules, but after a happy suggestion that every intending flier should donate 6d. and the kitty be divided into three prizes, an enjoyable day was had by all except the local farmers and Ken Rutter, who made a 4-min. flight before the maximum was reduced to 2 min. and lost his best model (it was recovered six days later from a tree). Thanks to Bill Lakeland's enthusiastic organising—he even entered his dog—the kitty finally realised £1, and the eventual winner (after a fly-off between six with treble maxs., despite wind and low cloud) was Brian Eggleston's Mk. 17 *Creep* with 6.00 + 3.24. Second was Bill Bickerdyke's Wakefield with 6.00 + 2.45, and junior John Creak (6.00 + 1.48) placed fifth.

In the second leg of the Area knock-out, Bradford annihilated N. Sheffield in only two rounds; Messrs. Collinson, Miller and Eckersley totalled 15-37 against a pathetic 4-17 from the opposition, and so go to the final against Hull Pegasus. On the same day, a rally organised by Leeds as a stop-gap for Sherburn was held, and here our members placed high in all classes. J. Godden won in power with 8-28, junior P. Lawson was top in rubber with 7-54, and F. McNulty second in glider with 5-04.

MILL HILL & D. M.A.C.

The club was asked to appear again this year at the Hendon Show to give a static display and a flying exhibition in the arena. Both events were a great success, although one or two expensive scale models bit the dust. While the club appreciates this annual opportunity to show its paces provided by the Hendon council, one year we hope to appear as an arena event, and stated as such, in the official programme. This appeal, we feel, is merited, since our C/L shows have been getting better and better over the last five years.

Recently, we exhibited at Hendon R.A.F. Station an assembly of about 50 models of all types, including Bob T's model of the 1911 Bristol *Racer* with which he won two pots at the " M.E." Exhibition this year. Many thanks are due to F/O Bentley and his helpers for providing an enormous coach which went all round the neighbourhood collecting and afterwards delivering models and modellers. When we reached the hangar, we found a beautiful double row of tables decked with coloured crepe paper and with a rope barrier all ready. The boys are not used to such organisation !

At Cranfield there were quite a few dicey do's among the C/L blokes, a fellow, name of Lane, is now known as the " Wrecker." Practising for combat, Lane pranged Alan Blunt's job, whereupon Blunt promptly flew and pranged Lane's, albeit with little damage. Lane then proceeded to bend Chas. Crawley's model and went on to crash his own. He was once regarded as a safe pilot !

CAMBRIDGE M.A.C.

New secretary of the club is 18-year old Gordon Parker, of Bishop's Farm, Fulbourn. Gordon, who works on the land by day and spends all his spare time in the evenings building models, has been a member of the club for severa years. His main interest is in R/C aircraft and he has just finished building his own radio set for the latest plane.

" I have plenty of spare time during the winter months and feel I would like to help the club," says Gordon.

Former secretary was Mr. John King, who is leaving Cambridge shortly to live at Bedford, where he works at the aircraft test establishment.

MEN OF KENT AEROMODELLERS

Three members of the club went to the Croydon Gala and found almost perfect flying weather, despite the overcast. Dennis Latter came fourth in glider and Norman Elliot did well in rubber after a generally enjoyable day. Elliot is now stationed well away from Maidstone, but his wanderings do not appear to affect his flying, as witness his win in open rubber at the R.A.F. Championships.

Recently, the club held a competition for A.1 gliders, and this attracted a grand total of six entries, although by some devious method seven entry fees were collected ! Although intended as a still air comp. there was a remarkable number of thermals around and two models were lost. The winner was Dennis Latter with a total of 4 : 44 out of a possible 6 min.

THE BRISTOL & WEST M.A.C.

Now that the loss of Lulsgate Aerodrome is imminent, the accent is on sport flying on Durdham Downs, until such time that a more suitable and central flying ground is found.

It is hoped that the proposed contests stressing the control of models, rather than on their sheer duration, will be successful.

G. Woolls' tailless " got away " while trimming for the All Britain Rally, and disappeared after just over 9 min. The fact that only one timekeeper was " on " prevents a new record claim.

Good turnouts of models are becoming more regular, and it is hoped that the club will soon regain its former strength.

The secretary is now G. Woolls, 9, Backstoke Lane, Westbury on Trym, Bristol 9, to whom all enquiries should be sent.

NORTHWICK PARK M.A.C.

Our small contest group continues to place well in most events entered. Four members made the 250 mile journey to Croft for the Northern Gala—a long way by motor-cycle. George Upson collected the Frog Senior Cup and Ian Simcock took a rather unlucky second place in the C.M.A. Cup. His fly-off time was actually greater than that of the winner's, but his low aspect-ratio glider disappeared o.o.s. upwards from the timekeepers after 10 : 26.

Two weeks later Brian Hutton collected a second place in slope-soaring and Dave Leech a second in glider at the Croydon Gala, which was flown over a rather damp Chobham Common.

We flew our second round draw of the L.D.I.C.C. against Mill Hill at Cranfield and managed to obtain the creditable score of 33 : 05 against our opponent's 15 : 08. The next round, flown two weeks later at Chobham, brought about our downfall, however, West Middlesex being the cause. We do consider ourselves a little unfortunate though, as one of our rubber fliers lost his only model on a test flight just before the comp. with a d.t. failure.

Due to the small size of our local flying field, stunt C/L has quite a large following, and although the boys may not be able to do " the book " they certainly seem to get a lot of fun out of their flying.

The most outstanding of the " sports " F/F models seen recently have been Pete Babb's modified *Cardinal* complete with wing struts and wheel spats, and the same flier's impressive scale Hawker *Cygnet*, the latter making some very realistic flights.

A club contest held recently in dull, windy conditions, was open to all types of F/F models. The object was to score as near as possible to 3 min. with three flights. Ian Simcock, flying a glider, made a perfect score of 3 : 00, to win.

WIGAN M.A.C.

The club has had a very successful year, being represented at every competition held so far, and can chalk up a four figure mileage.

Our prize winners so far are B. Tabbat, 2nd in Junior Power at Woodford, and B. Picken, 2nd in Power at the Hyde Rally. He also placed 4th in rubber. D. Yates was 3rd in rubber at

1955 IRISH NATIONALS

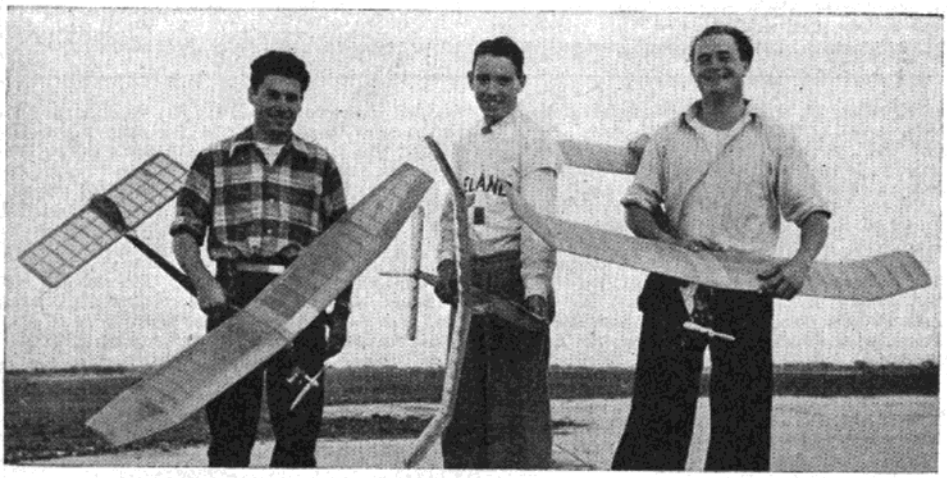
Control line events in the 1955 Irish Nationals were confined to class A and B team races, as there was such a small stunt entry; total entries were, in fact, down on previous years.

The glider event started in gale-force winds and near rain. Many models folded their wings on the line and only one max. was recorded—this by Tony Morelli, the eventual winner, flying a *Seraph*.

Brighter conditions greeted the rubber fliers the next day, although the strong winds had abated but little. The Wakefield models were all fully trimmed and easily outflew the few lightweight models entered.

The power event was started in the afternoon in slightly calmer air. Eventual winner was Bill Redmond, of Phoenix D.C., who only completed his model in the early hours of the same day.

A very pleasant dinner at which the prizes were presented by Mrs. Woods was held on the Sunday night.



Top: Bill Redmond releases his model for the 3rd round to win the power. Below: L. to R. Tony Morelli, class "A" and "B" T/R and glider winner. Liam Murtagh, rubber winner, and Bill Redmond, top power man.

Bill Redmond's "last straw" is launched by Ray Meehan in the glider event.

RESULTS

Class "A" T/R
1st. T. Morelli, Dublin M.F.C.
2nd. N. Barrett, Cork A.C.
3rd & 4th, Collided.

Class "B" T/R
1st. T. Morelli, Dublin M.F.C.
2nd. N. Barrett, Cork A.C.
3rd. A. McWilliam, Dublin M.F.C.

Glider
1st. T. Morelli, Dublin M.F.C. 387.2 sec.
2nd. M. Walshe, D.S.M.E.E. 358.3 sec.
3rd. B. Ridge, Drimnagh A.M. 324.7 sec.

Rubber
1st. Liam Murtagh, Phoenix A.C. 329 sec.
2nd. Wm. Redmond, Phoenix A.C. 320 sec.
3rd. A. Gordon, Phoenix A.C. 233 sec.

Power
(Aer Rianta Trophy & Replica.)
1st. Wm. Redmond, Phoenix A.C. 382 sec.
2nd. P. Mulville, D.S.M.E.E. 212.6 sec.
3rd. T. Morelli, Dublin M.F.C. 200.5 sec.

The Inter Club Trophy was won by The Dublin Model Flying Club, 22 points. The Phoenix Aeromodelling Club had 18 points.

Hyde. D. Morgan placed 3rd in power and 5th in rubber and glider. The same member also had success at Croft, placing 3rd in PAA-Load.

WHITEFIELD M.A.C.

The club has recently attended a number of contests and intends to continue doing so in the future.

At Croft, Darlington, little success was recorded, since everybody seemed to place 4th even in such superb weather.

While at Finthen, Germany, the three team members had only average success. The O'Donnell brothers had only four maximums and J. Parrott even worse with three !

These three were supported and encouraged by John Trainer and Bob Christie, who hitch-hiked all the way from Manchester. They arrived looking rather long-bearded, but proceeded to enjoy the excellent flying provided by the various countries and then set off home.

COVENTRY & DISTRICT M.A.C.

A group of our boys attended the South Midland Area Rally at Cranfield and managed to get a few of the prizes again. A. J. Barr, flying a *Seraph*, won the glider event for the second year running, with three max's.

Ron Draper, third last year, placed second in the power, flying his *Criterion* own design F.A.I. power job with a Super Tigre G20 (ringed version). This is the job which almost won him a place in the British power team. Reg Abbey, who took first last year, took fourth this year. Even one of our very junior members, Colin Ford, took a prize in the Junior chuck glider event.

The club membership has greatly increased in the past 12 months: from about a dozen to the 40 mark, with an average of about one new member a week. Negotiations are under way to obtain a suitable hall for indoor flying during the winter, and a programme is being drawn up to include lectures, talks, an auction sale and visits to the local aircraft factory.

HEANOR & DISTRICT M.A.C.

Several members have reached the semi-finals in team race contests, and our No. 1 combat pilot reached the semi-finals at Chester. Not bad for a start, so watch out for us next year.

We are planning a winter contest, to be held on January 8th, 1956, on a local ground, which will be mainly C/L. Any clubs interested are asked to contact our club secretary: M. BOOTH, 21, Dalton Close, Aldercar, Derbys. Food and drinks will be laid on, and everyone will be welcome. Let's have a good response, as we should like to make this a yearly event.

WALLASEY M.A.C.

We recently held our 3rd annual open day—the first without a gale force wind ! To suit our field size it was agreed to have a 2 min. max., with the result that treble max's occurred in all three events, and the results of the fly-offs were :—

Open Power		
1. J. O'Donnell	Whitefield	2 : 14
2. C. Bryan	Wallasey	0 : 42
Open Glider		
1. J. Hannay	Wallasey	2 : 00
2. R. Hotchkiss	Wallasey	1 : 48
Open Rubber		
1. J. O'Donnell	Whitefield	2 : 29
2. J. Hannay	Wallasey	1 : 37

We are grateful to our chairman, Roy Alexander of Birkenhead Model Supplies, for helping us out with the prizes.

WORCESTER SKY PALS M.A.C.
ex FREEMASONS ARMS M.A.C.

The club's last display at a local fete was very much appreciated by the crowd and apparently balloon bursting seems to hold their attention more than anything.

Owing to rough ground, Trevor Baddeley could not get his twin engined model to take-off, even after laying 20 tables for a runway.

At a local cinema, in support of the film "Escapade," a display was put on inside the foyer which must be regarded as the best seen for some time in the locality. Thanks to all our members who contributed

EDINBURGH M.F.C.

While the Scottish Festival is the highlight of this Scottish season, the previous events of the year have a sound lesson for all in the Edinburgh M.F.C. Models flown in contests must be well trimmed and safely flown, otherwise their entry is foolish and unsatisfactory. Both the juniors in the club must learn that it is patience, practice and determination that makes a competent aeromodeller.

The season's flying has been moderate. G. Blair's 15th place in the Power Trials at Odiham has been the best result, and his four-day round trip was the first to the trials by a club member in six years.

At home, in Scotland, R. Turner placed third at the Nationals in glider, while B. Smith cost himself victory in power through the carelessness of an overrun and no D/T. But certainly the most remarkable local performance was the raising of the Scottish chuck glider record to 2 : 18, a figure which has daunted further attempts.

We hope that in the coming winter the club will accept the season's lessons, and that if next year we have a summer of flat calm—we shall have some models to trim and fly, to enjoy the weather and the contests.

SIDCUP AERONAUTICAL SOCIETY

We have attended most of the C/L contests so far, with reasonable success. The Enfield C/L Rally, being blessed with good weather, was enjoyed by 23 of our members, resulting in a 1-2 win in class B, T.R., class A and combat entries being eliminated.

The London area C/L rally was also attended by us, but with little success. Class A entries of H. Templeman and J. Harding took 3rd and 4th places. Class B entries were eliminated. P. R. Denyer's engine was run in after bearing trouble after his win at Enfield, and H. Templeman's standard E.T.A. burned out plugs one a minute, after taking second place a Enfield. Combat entries were eliminated except A. Greenland's model, which took second place.

MINCHENDEN M.A.C.

During the past few months the club has been almost totally inactive as regards flying. Only lately has it started again, with R. Nichols, D. Bagot and the old faithfuls tottering into the air.

Bad luck was experienced at the Heston Comp. where Bagot's racer was clocking a good 80 m.p.h. with nice snappy pit-stops. When he came to fly in the heat, the engine would not start. Afterwards he was also lapping the Olivers with his re-worked Allen Mercury showing its paces. He is now looking for a suitable dust-bin in which to put his scorched and blackened E.D. Racer.

HAYES M.A.C.

An enjoyable day was spent by club members at the South Midland Area Rally. We were surprised, however, at the relatively low attendance and entries. Josh Marshall stayed up till 12 o'clock every night of the previous week finishing a 1 c.c. payload model (based on *Paageboy*), and when he entered, he found that Ray Monks was the only other would-be competitor. Needless to say, the comp. was scrapped. Our one and only junior Pete Robinson went to Cranfield in high hopes for the glider comp. with his new *Shorty*, which all agreed was beautifully built by any standards, not just " not bad for a junior." Spirits hit rock-bottom, however, when the model disappeared from 60 ft. of line, without a D/T. A letter was received, with the address label, and two pieces of the wing sheeting saying that the model was slightly the worse for wear after going through the works of a combine harvester ! A replacement is expected soon. E. Welbourne was pleasantly surprised later in the week when six pots of coloured dope and two brushes arrived for the 4th place in glider on only 7 : 45.

Every year the club is invited to display models at Fairey Aviation Company Horticultural Society's Exhibition. Eighteen models were shown including three C/L models. J. Baguely won the prize for " the most outstanding model on show " with his V.T.O. power model, shown in take-off position (with the aid of drawing pins). Next year, without a doubt, all power models will stand on their tails for this show. Lying on a table is just not good enough !

The club was represented for the first time ever in a C/L competition at the London Area C/L championships by Frank Blows and team in Class A racing. Their efforts were not attended by any great success, but Frank is not discouraged and has a glo-plug 2.46 speed model due for test shortly.

The club also obtained a bye into the final of the L.D.I.C.C.C., and will fly off against West Middlesex some time in the next two months.

SECRETARIAL CHANGE

Worcester Sky Pals M.A.C. ex **Freemasons Arms M.A.C.** S. Hames, 230, Bransford Road, Worcester.

Blackburn M.A.C. O. Atkinson, " Sunnyhurst," 38a, Livsey Branch Road, Blackburn, Lancs.

Huddersfield D.M.A.C. S. Woodhead, 53, Royds Avenue, Linthwaite, Nr. Huddersfield.

The Croydon Gala

August 14th at Chobham dawned with a strongish wind and slight rain; it had rained continuously the day before, and it looked for a time as if the gala would be washed out three times in two years, surely a record. However, the wind calmed and the sun came out, and during the afternoon the sky cleared and the wind dropped completely.

The F/F contests were almost all over by 4 p.m. and only the odd flight was made after 5, so interest centred round the slope soaring contest run by John Blount and Miss Dawn Rumbold. The customers gave their money to Miss Rumbold with some enthusiasm and a roaring trade was done.

The slope soarers were being launched from the back of the clump, which is about 100 ft. above the surrounding gorse bushes, and some models were reaching the telegraph wires about half a mile away. Luckily the wind was light enough for the models not to be blown back into the hill, but it enabled them to soar to advantage.

Dave Posner won the power event with one of his *Dream Weavers*, and Mike Gaster placed second with his Fox-powered model after an over-run and other troubles.

In open rubber, Cyril West of Godalming, placed first with a Wakefield which returned a score of three fours.

Winner of the glider event was Miss M. Pepper of Southampton, aided and abetted by Pete Giggle.

Tony Brookes of Grange won chuck glider with 142 sec. for his best three of five flights. Pete Muller distinguished himself by doing about 20 min. with his entry, but unfortunately 19 of these didn't count due to the 1 min. maximum.

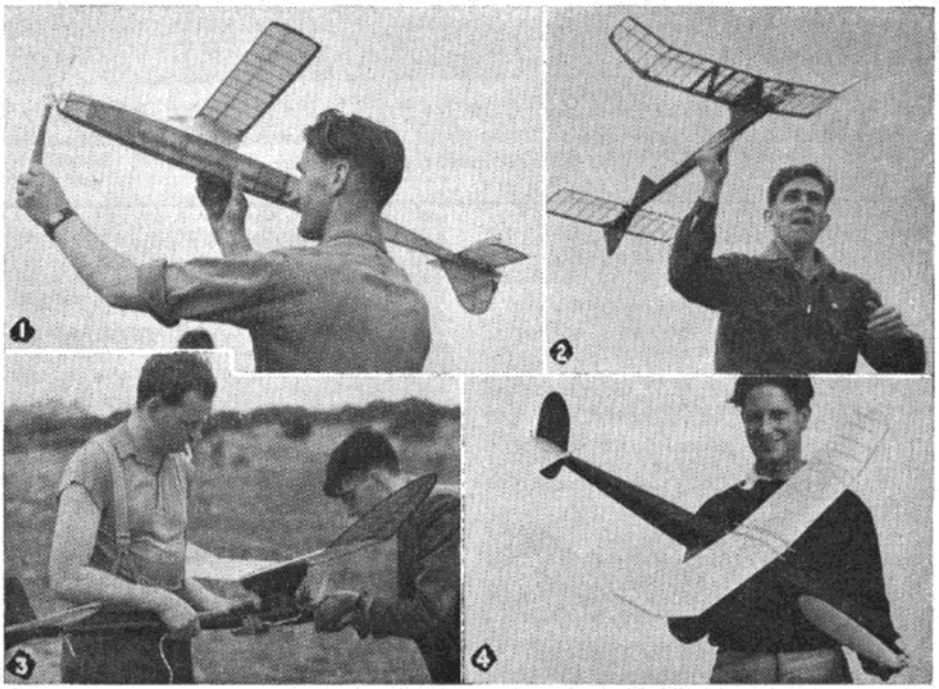
Gala champion was E. R. Wellbourne of Hayes who totalled 21 : 41 for nine flights in rubber, glider and power, and took home the Thurston Trophy.

All entry fees were returned as prize money plus £2 added. Double expenses of gala notices and postage (the first gala was drowned on May 1st) were also borne by the club. Croydon members did not fly and were thus free to concentrate on timekeeping and recording. No queues, no cornfield, no farmers : also fortunately no bush fires due to the previous day's heavy rain, but D/T snuffers should be used when flying at Chobham.

Results

Open Rubber		
1. C. West	Godalming	12 : 00
2. B. Rowe	St. Albans	11 : 20
3. P. Crossley	Blackheath	10 : 42
Open Glider		
1. Miss M. Pepper	Southampton	8 : 17
2. D. Leach	Northwick Park	8 : 07
3. G. Hancock	Surbiton	7 : 39
Open Power		
1. D. Posner	N.W. Middlesex	11 : 00
2. M. Gaster	C.M.	10 : 37
3. C. Barker	Surbiton	10 : 29
Slope Soaring		
1. R. Boxall	Brighton	2 : 29
2. B. Hutton	Northwick Park	1 : 56
3. —Dumble	R.A.F. Debden	1 : 52
Chuck Glider		
1. A. Brookes	Grange	2 : 22.5
2. C. Barker	Surbiton	2 : 10
3. P. Muller	C.M.	2 : 9.3

Gala Champion
E. R. Welbourne, Hayes

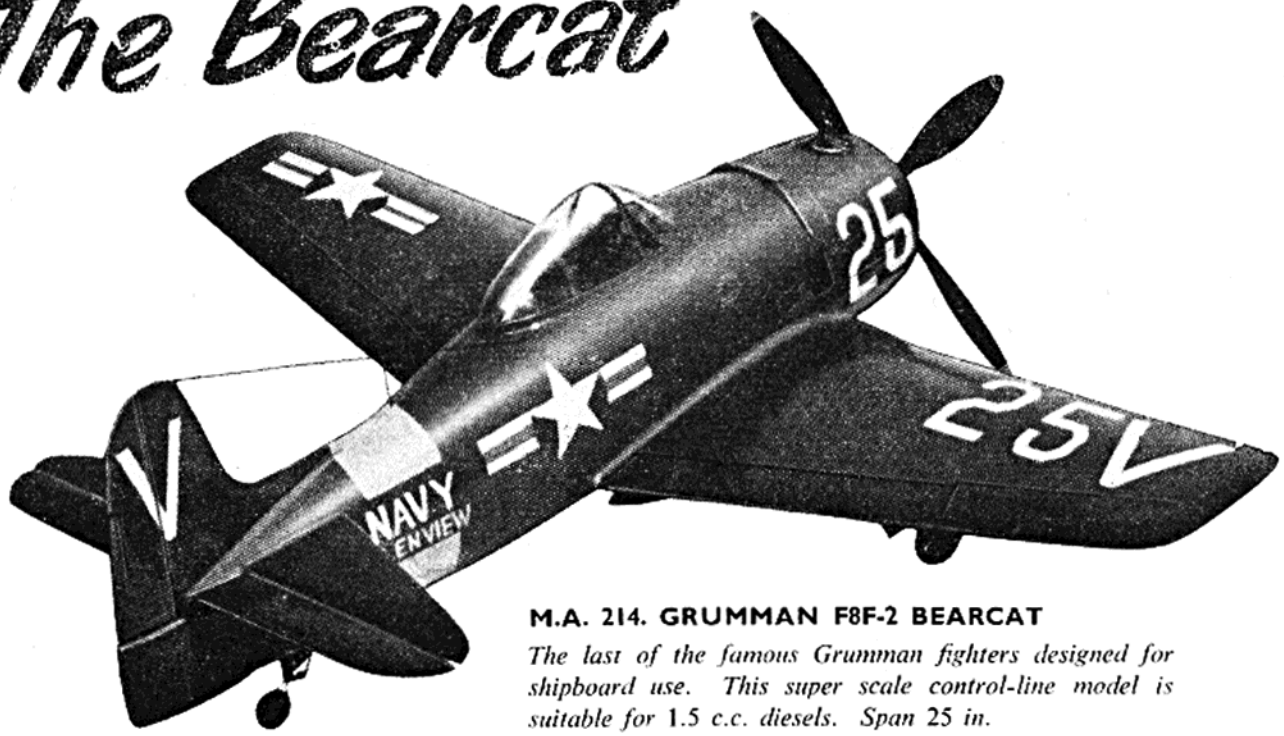


1. Boxall of Brighton had no luck in the Rubber but was 1st. in the Slope Soaring. 2. Leach of Northwick Park also had no luck in the Power but was second in the Open Glider.

3. Mike Gaster (2nd in Power) makes an adjustment while P. Muller holds.

4. Top man of the Rubber, C. West of Godalming.

The Bearcat



M.A. 214. GRUMMAN F8F-2 BEARCAT

The last of the famous Grumman fighters designed for shipboard use. This super scale control-line model is suitable for 1.5 c.c. diesels. Span 25 in.

by P. M. H. LEWIS Price 4s. 0d.

more plans for CONTROL-LINE MODELS

M.A. 69. TYCOON. *By Cyril Mayes* **Price 5s. 0d.**
Stunt control-line model which has won many contests. Detachable wing and straightforward construction. For 2-3.5 c.c. engines. Span 37 in. Weight 14 oz.

M.A. 77. THE TWISTER. *By C. A. Bates* **Price 3s. 0d.**
Stunt control-line model. 28 in. span. Suitable for 1-2 c.c. engines.

M.A. 84. GEE MAC. *By B. M. Evans* **Price 3s. 3d.**
A sleek-looking class B team racer with a good contest record.

M.A. 89. TINIFLYTE. *By R. Scott* **Price 2s. 0d.**
A control-line speed model that has held the Class I record.

M.A. 95. CARDINAL PUFF. *By C. A. Taylor* **Price 3s. 3d.**
Class " B " Team Racer which has won a number of contests.

M.A. 99. JAMBON. *By N. J. Butcher* **Price 3s. 0d.**
A class " A " team racer that has proved a popular design.

M.A. 106. WYVERN. *By M. W. Payne* **Price 4s. 6d.**
Scale control-line model for 2.5-3.5 c.c. engines. Span 31½ in.

M.A. 139. TYRO GYRO. *By D. Longman* **Price 3s. 0d.**
An interesting and unusual control-line autogiro powered by a 1 c.c. engine. Rotor diameter 19½ in.

M.A. 141. VOUGHT F4U-2 CORSAIR. *By P. M. H. Lewis* **Price 3s. 6d.**
A fine C/L scale model of the famous U.S. fighter which has been designed around the 1.5 c.c. Allbon Javelin. Span 26 in.

M.A. 151. MIGHTY MOUSE. *By M. Kelly* **Price 2s. 6d.**
A fast sensitive little C/L stunter, 16 in. span, .5 c.c. powered. it will do all the tricks on 30 ft. thread lines.

M.A. 155. CREAM PUFF. *By C. M. Milford* **Price 2s. 6d.**
A 16 in. span " half A " team racer for .5 to .75 c.c. engines, 60/70 laps at 27/30 m.p.h.

M.A. 169. DINGBAT. *By J. W. Pickford* **Price 3s. 6d.**
An unorthodox looking C/L stunt model of 38 in. span, powered by a 2.5 c.c. engine.

M.A. 174. D.H. 9A. *By E. Fearnley* **Price 3s. 6d.**
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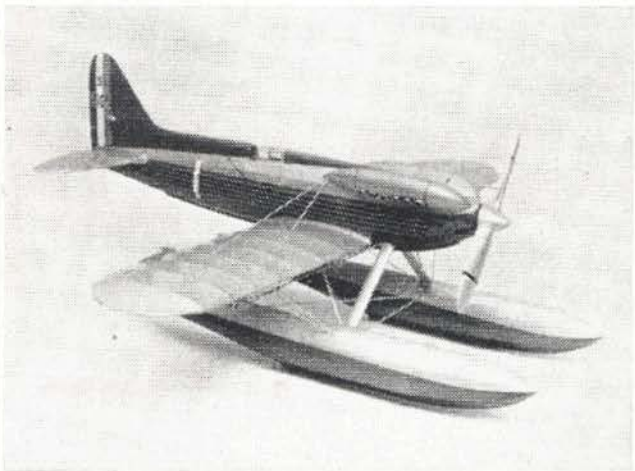

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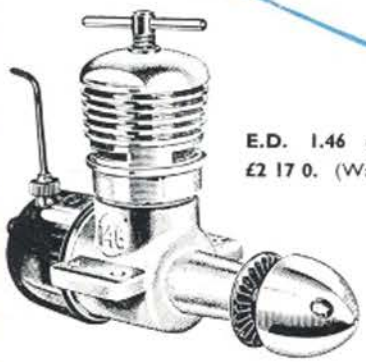

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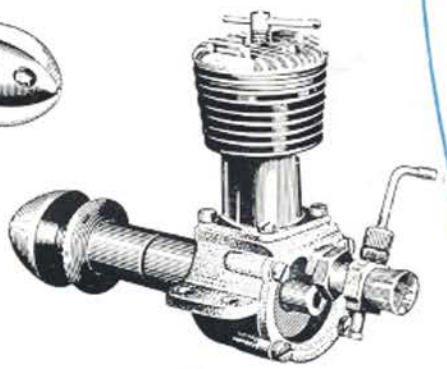

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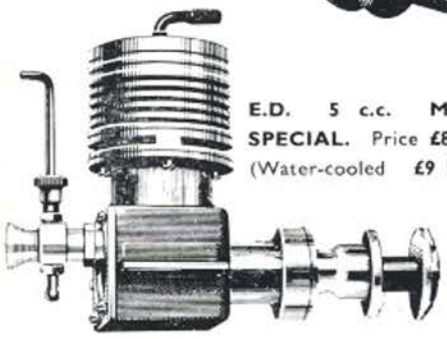

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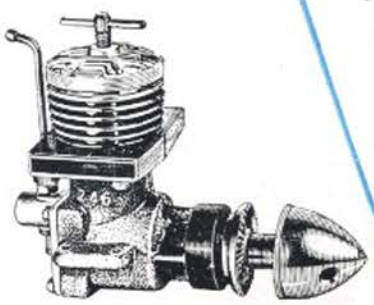

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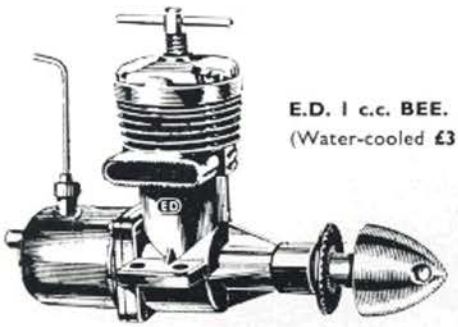

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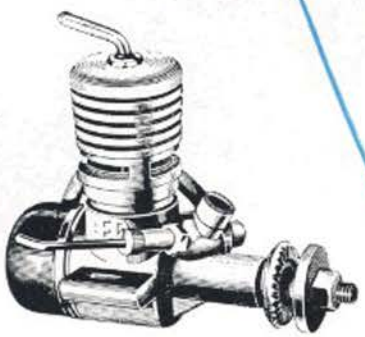

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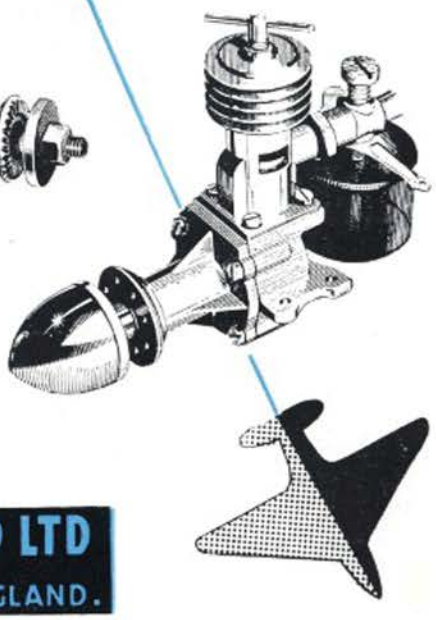

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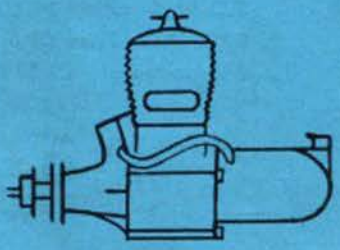

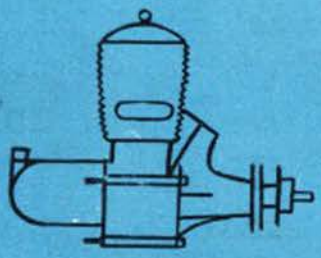

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