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THE JOURNAL OF THE S.M.A.E.

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MODEL AIRCRAFT

The Journal of the Society of Model Aeronautical Engineers

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Edited by
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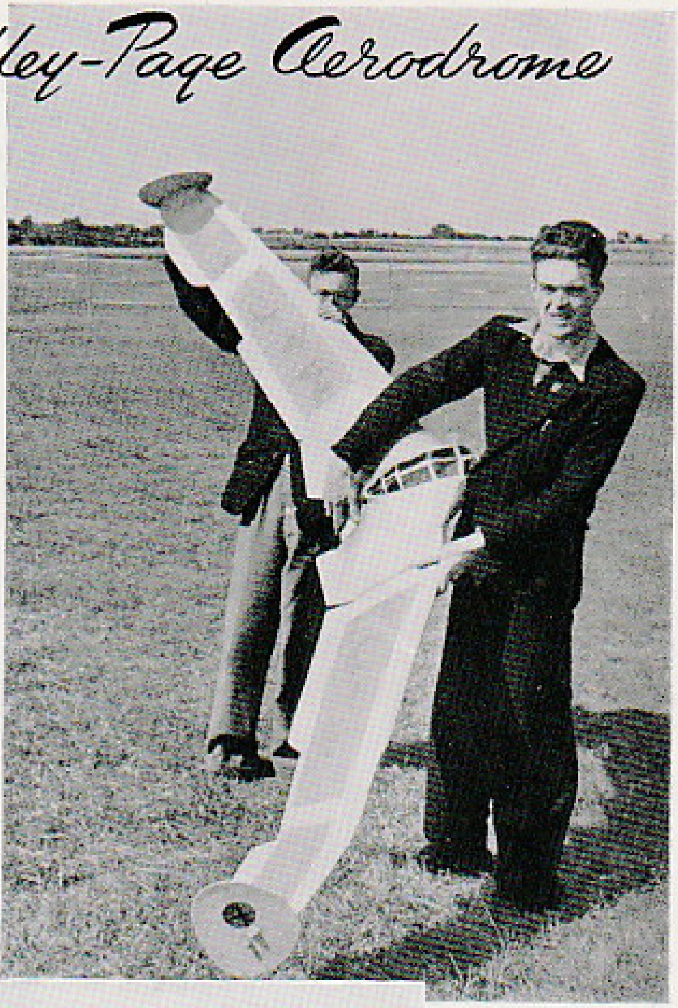
The Editor presents

A PERCIVAL MARSHALL PUBLICATION

Seen at the Handley-Page Aerodrome



Mr. G. Paul, of Twickenham, entered the attractive tailless model shown in the right-hand illustration in the Handley-Page Tailless contest.

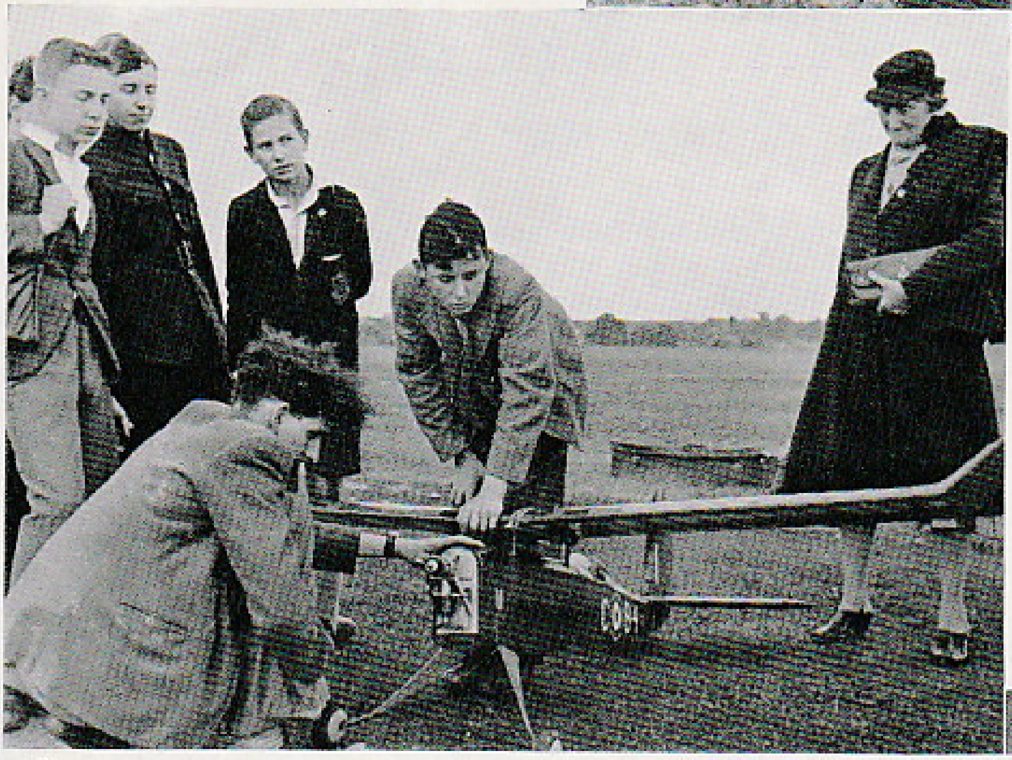
Aptly named the "Space Ship," it displays considerable thought in its design and is equipped with wing-tip ailerons, wing-tip leading edge spoilers, and two sets of trailing edge flaps.

On the day of the contest it displayed considerable promise during its trial flights, but it failed to live up to expectations in the actual contest, probably due to the high wind.

One of the largest machines entered in the Bowden Trophy was the 9-ft. span model shown in the photograph below.

Built by G. E. Dunmore, of Leicester, it displayed excellent workmanship, particularly in the engine and its installation. Unfortunately, it was assailed by one of those mysterious troubles which defy diagnosis, and it refused to run more than a few seconds at a time.

Mrs. Buckeridge stands on the right and appears to be thinking that she prefers her "Jim's" lightweights about the house.



Photographs by Lieut.-Commander J. R. Blunt.

News Review

Cover Story

Our cover picture shows Dennis Lees with his " Wakefield " model, at Springfield Park, Rochdale, on the occasion of the Northern Area Rally.

Dennis Lees has followed his father's footsteps to such good effect that he has to some extent overtaken him, and when Dennis sets out to make something good, Norman has now to look to his laurels.

Amongst the outstanding features which are incorporated in this machine are an efficient dethermaliser of the parachute type, using the pneumatic timer developed by Norman Lees ; exceptionally neat undercarriage legs which are individually detachable and cleverly fixed into the body ; a shapely streamlined cabin-type fuselage, and a neat wing fixing, which employs the minimum of rubber bands and is highly effective both when flying and taking landing shocks.

The machine is beautifully constructed, weighs but little over 8 ozs., and has a performance which will have to be reckoned with by future competitors for the Wakefield Cup.

Model Aircraft for 1946

A recent general increase in the paper allocation granted by the Paper Control enables us to give our readers the benefit of an increase in the size and scope of the journal of the S.M.A.E., commencing with this issue.

As the amount of paper we are permitted to use is still very much restricted, we have had to decide whether to increase the circulation or the size of the publication, and in view of the restrictions which the previous small size imposed on the presentation of plans and illustrations, it has been decided to give our readers the benefit of a larger size.

The effects of this will immediately be apparent on perusal of this issue, but it must be realised that the larger size precludes any increase in the number of copies circulated and that some enthusiasts may find it difficult to obtain a copy if they are not already regular subscribers.

We think you will be pleased with this issue, but if you are not, let us know the reason for your disappointment.

Naturally, the production of this improved version of the journal will be more costly and the price is now 1s. per monthly issue, but we feel sure our readers will agree that it is well worth it.

The World Speed Record

At last ! After much rumour and conjecture about the actual speeds of which jet-propelled aircraft are capable, " the cat has been let out of the bag," and an official speed record claim of over 600 miles per hour has been lodged with the F.A.I. by the Royal Aero Club on behalf of Great Britain and the Gloster Aircraft Co.

This record claim definitely establishes British jet-propelled aircraft as the fastest in the world and disposes of many uncertainties which existed.

That jet-propelled aircraft have come to stay is no longer in any doubt—indeed, to those " in the know " this has been evident for some time—but, as yet, the significance of this development on model aircraft has not been felt, although the time need not be far distant when this type of motive power is developed in sufficiently small sizes to suit model aircraft.

Pertinent Points on Jet Propelled Models

There are, however, some fundamental points in jet propulsion which must not be lost sight of by the modeller if he is to approach this development from the right view point.

Firstly, the physics of jet propulsion render this method of propulsion more efficient than the engine and propeller combustion at high speeds only—350 m.p.h. and over. Secondly, its attractiveness from the point of view of the full-size machine is its efficiency at high altitudes, as it does not suffer from the reduction of propulsion effort which the engine and propeller power plant encounters with increases in height.

From the model standpoint, neither of these features are commonly sought after, and when jet-propelled models are contemplated these points should be borne in mind. In any case, great care should be exercised when carrying out experimental flights that these are made at a place where damage to property is unlikely.

Fortunately our models use so little fuel that efficiency is not a paramount consideration.

1,000 Kilometres per Hour

In spite of the fact that there is a distinct possibility of the Gloster Meteor being able to reach the coveted speed of 1,000 km. per hour—621.3 miles per hour—for which Louis Bleriot, of cross-Channel fame, presented a prize, latest reports indicate that no attempt will be made to achieve this for the time being.

It would be a pity, however, if we allowed this achievement to elude us when we are obviously so close to it, but it is presumed that those concerned have carefully considered all aspects of the case and found that the effort is not justified at the moment.

1,000 Miles per Hour

It is of interest to note that amongst the German projects at the end of hostilities was a piloted rocket-driven machine which it was hoped would exceed 1,000 miles per hour. While this project was still in the early experimental stages at the termination of the war, in view of the results obtained with the V.2 rocket, there seems to be no reason why this speed could not be obtained after the difficulties of control and the protection of the pilot at these speeds have been solved.

Rocket Propulsion

Considerable ingenuity and technical skill are, of course, displayed in the design and conception of both the V.1 and V.2 rockets, in addition to the two machines referred to, and one is left with the impression that, so far as liquid-burning rocket propulsion units are concerned, Germany was in advance of the Allies.

It is to be noted, however, that neither the M.E.163 nor the J.U.263 possess a performance to equal our Gloster "Meteor," since the Germans claim a top speed of only 558 m.p.h. for the M.E.163B, although it is credited with the capacity for a top speed of 590 m.p.h. for a short burst of a few seconds' duration.

A Tailless Aircraft Experiment

In view of our recent model contests for tailless aircraft, it is interesting to note that both of the above machines are of the tailless type, but nothing has been indicated so far as to why they adopted this layout.

An interesting captured machine from the model aircraft point of view is the Horten IV tailless sailplane, which is of ordinary "arrow" plan form. The controls on this machine consist of wing-tip spoilers, which are used individually to function as drag rudders for turning, or both together to act as spoilers for speed control on landing, to assist the normal manually-operated spoilers which are also fitted.

The combined elevator and aileron control surfaces (for which the descriptive term "Elevon" has been coined) are divided into three parts on each semi-span, each part being so linked that operation of the control produces a progressive change in the effective wash-out on the wings to give optimum lift at minimum drag conditions throughout the control range and reduce the tendency to tip stalling.

A Question of Safety

One of the things which has given S.M.A.E. officials the greatest amount of trouble during the past year is the question of the safe flying of models during power-driven contests—that is to say, safe flying from the spectators' point of view.

Various dispositions of spectators relative to the take-off of the models have been tried without a foolproof arrangement having yet been discovered, owing to the variety of causes which make the model deviate from the course intended by the owner.

The most annoying antic developed by some power models is that of ground looping, that sudden reversal of direction which catches both the model flyer and the spectator unawares and lands them into trouble before they can do anything to avoid it.

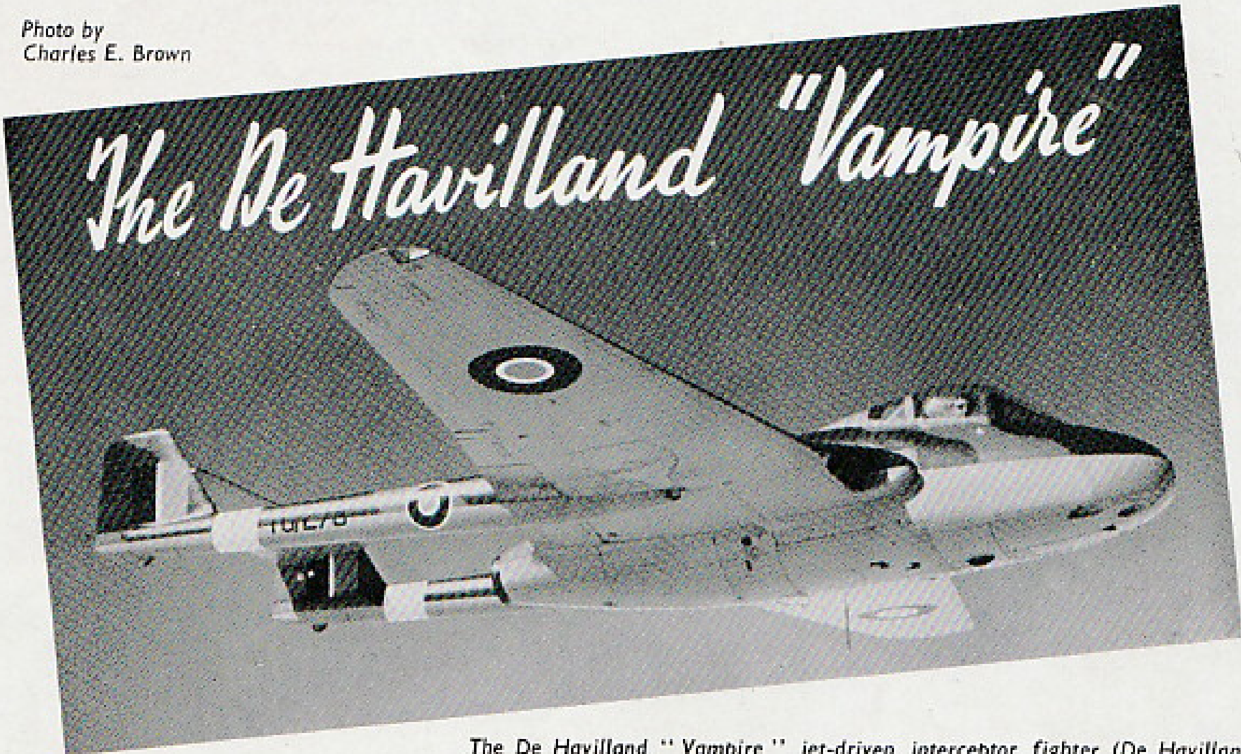
No legislation on the part of officials or competitors can overcome this trouble and it lies entirely in the hands of the designers of the models to ensure that they do not possess this fault. In most cases the trouble originates from the desire to mount the wheels well forward as a protection for the propeller on the conventional tractor machine with two forward wheels and a tail skid or wheel. This brings into prominence the advisability of more experimentation with tricycle undercarriages.

Incidentally, the tricycle undercarriage lends itself admirably to incorporation on machines of the pusher type, other attractive features of which are dealt with under the heading of "Purely Petrol" in this issue.

International Contest for Petrol Models

Recently we have heard a lot of talk about International gas model contests from American sources, and, apparently, it is expected that we shall soon be faced with such a contest, sponsored by America, and, no doubt, run on Wakefield contest lines, the rules being formulated by America and the contest being held in different countries, according to the nationality of the winner. In view of this, it is as well for us to consider exactly what kind of a chance we should have of winning with models of the present trend in this country.

Photo by
Charles E. Brown



The De Havilland "Vampire" jet-driven interceptor fighter (De Havilland "Goblin" turbine). With a top speed handsomely exceeding 500 m.p.h., the "Vampire" is believed to be the fastest single unit jet-propelled aircraft in production in the world.

THE De Havilland "Vampire" is the fastest single-engined turbo-jet machine in production at the moment and in addition to a phenomenal performance possesses many interesting design features.

The combination of a short central body, housing the pilot, power unit and armament, with twin booms to carry the tail assembly, and a sharply-tapered wing with a wide chord at the centre give it an unusual but pleasing appearance, while at the same time permitting the tail surface to be carried high up out of the way of the jet efflux.

The cockpit is constructed on similar basic principles to the "Mosquito" and is a monocoque structure formed from hard internal and external skins of ply separated with balsa wood filling, but the remainder of the machine is of all-metal construction.

The De Havilland-Halford "Goblin" turbo-jet power unit, with which it is equipped, was the first British engine of this class to complete its official type tests and it possesses the distinction of having the largest number of combustion chambers of any power plant in production in this country. The combustion chambers are of the direct-flow type, as distinct to the reverse flow type used on the original Whittle unit.

The undercarriage is of the tricycle type and, since a high ground clearance is not necessary with jet propulsion, it is both short and neat, folding away very effectively to present a clean exterior.

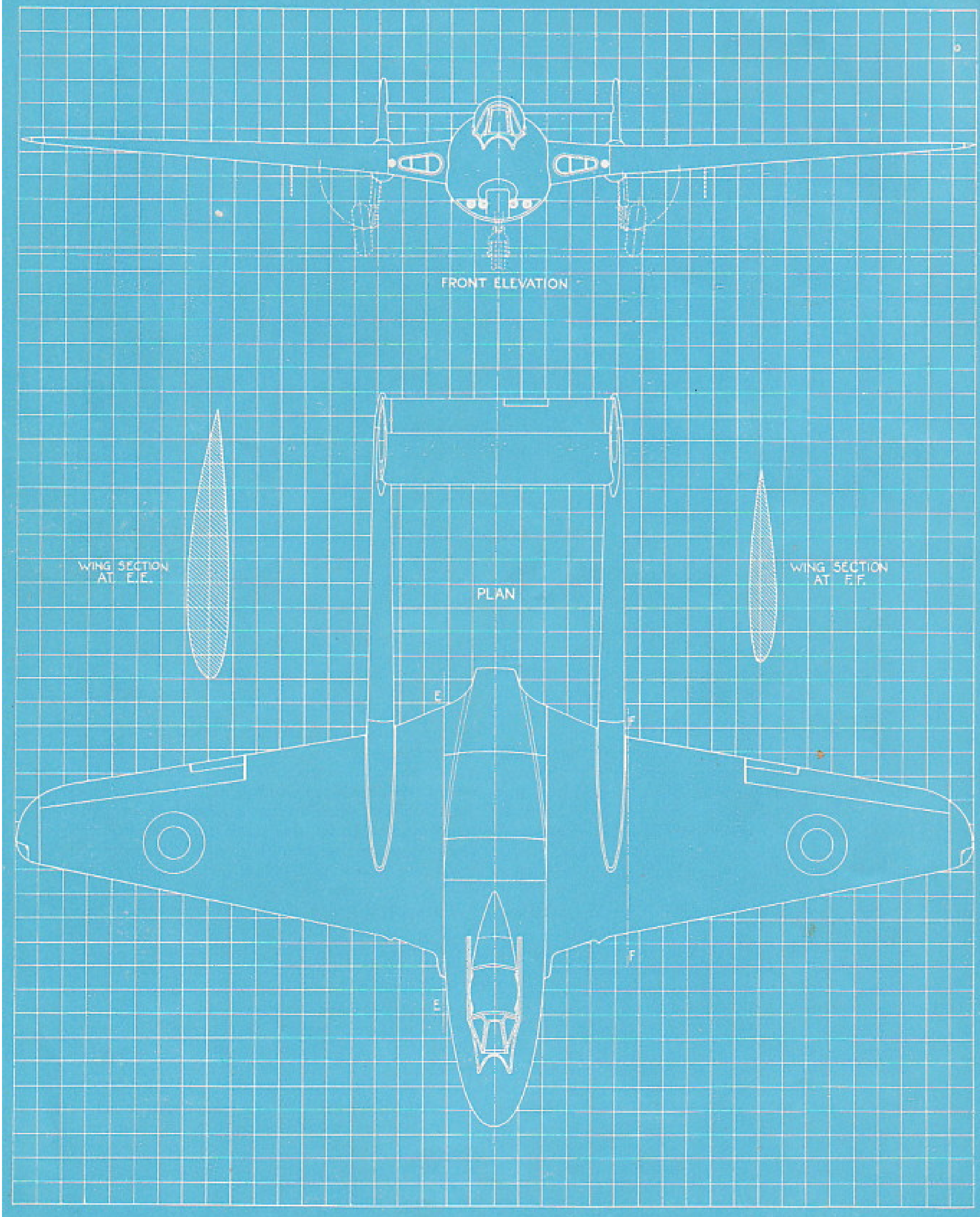
On the original machine, tall, narrow rudders were fitted, with the outer ends of the elevators cut away to give them operational freedom, but on the production examples the rudder area has been cut down and divided rudders are used operating above and below the elevator, which now runs right across between the fins.

The only feature marring the clean lines of the machine are the large double air scoops on the leading edge of the wing, adjacent to the body, which feed the power unit with its air supply, but it is difficult to conceive a better arrangement aerodynamically.

As one would expect, the operational ceiling of this machine is high and it has no difficulty in reaching 50,000 ft. in an astonishingly short time with an almost vertical climb.

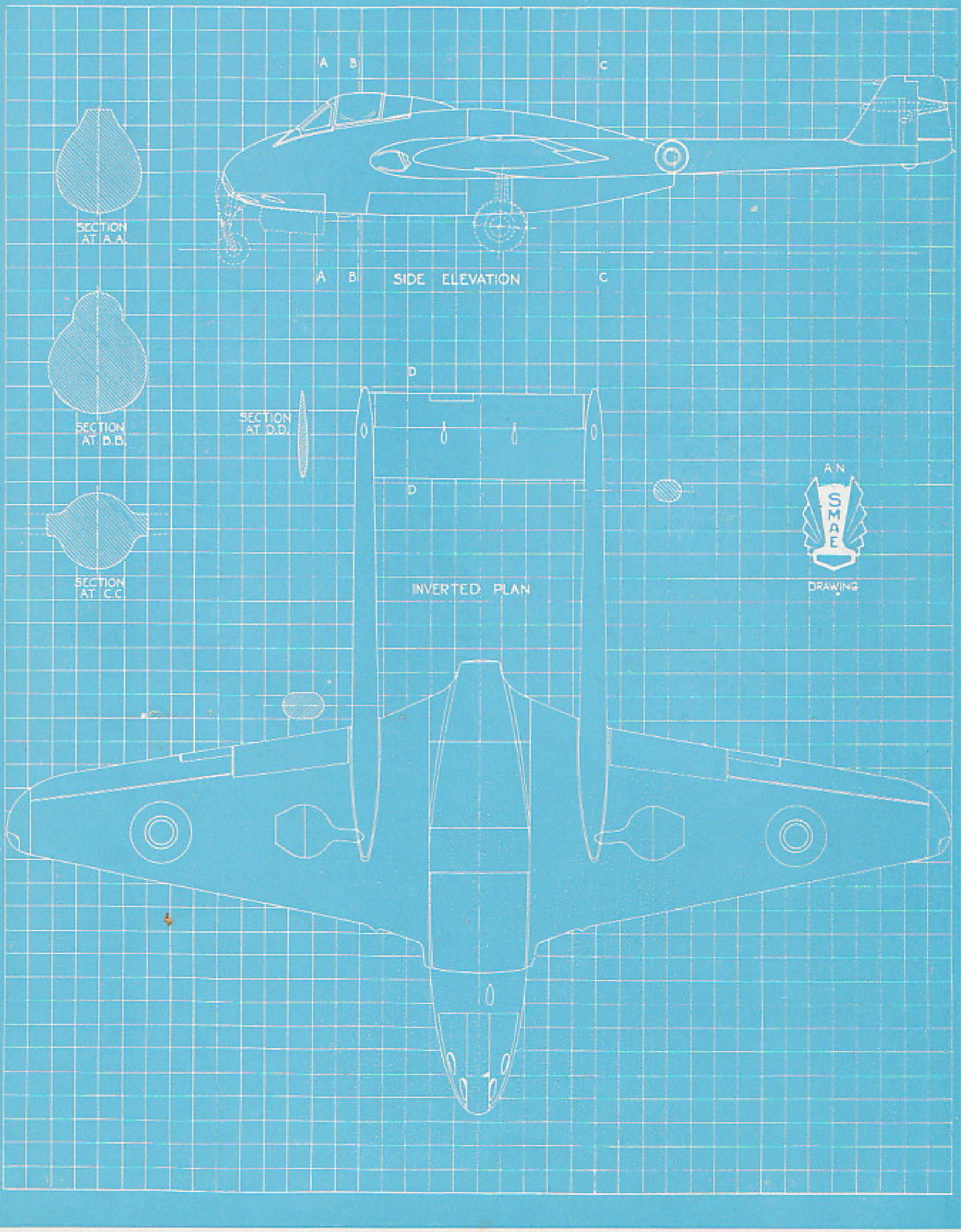
Provision is made to pressurise the cabin at high altitudes to deal with the detrimental effects of high operational heights on the pilot.

THE D.H.100 SINGLE SEAT FIGHTER "VAMPIRE"

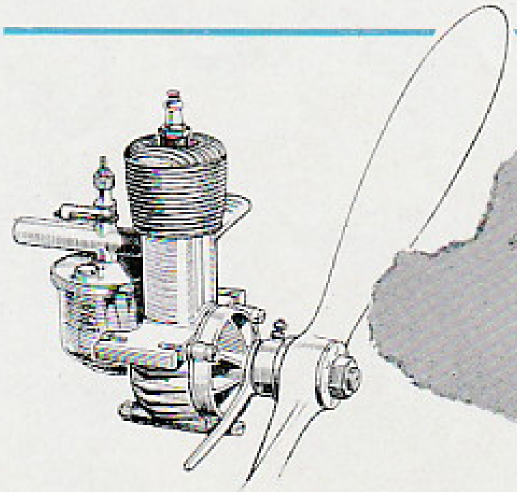


Data : *Span,* 40 ft. *Length,* 30 *ft.* 6 *in. Wing area,* 258 *sq. ft. Wing loading, Halford "Goblin" turbo-jet engine. Ceiling, approximately* 50,000 *ft. Speed,*

WITH DE HAVILLAND-HALFORD JET POWER UNIT



31 lb. per sq. ft. Armament, four 20-mm. cannon. Power plant, De Havilland-
well over 500 m.p.h. For the purpose of scaling, each square is equal to half an inch.



Purely Petrol—

R. V. BENTLEY

writes about the performance of American models and the possibilities of the pusher type.

WHILE reading through some reports of our recent power model contests, I came across some very interesting remarks—interesting, that is, from the point of view of the possible forthcoming competition against the cream of America's duration power experts—which makes it evident that the majority of British power modellers have not yet realised just exactly what fast climbing, as practised in America, is. Extracts from these reports go as follows : "The lightly-loaded and over-powered models in the American tradition sky-rocketed up with phenomenal climbs," "the model literally hanging on the prop," and "Winner . . . whose plane, with the stipulated motor run of 20 sec., made a flight of 55 sec." The "winner" and the model "hanging on the prop" were one and the same model, although the occasions were different contests, but if hanging on the prop turns in a total duration of only 55 sec. on a 20-sec. motor run, then there is an immense gap to be filled before American skyrocket climb is obtained.

Let it be understood here and now that, unless consistent flights of two minutes can be made on ten-second motor runs, a model is not fit to represent Great Britain in international power contests run on American duration rules. My own 1940 duration model of 2 sq. ft. wing area, all up weight of 22 ozs., powered by Ohlsson 23, could turn in one-minute flights consistently on ten-second runs, and that model can stand a lot of cleaning up and weight reduction, all of which will serve to increase the ultimate duration.

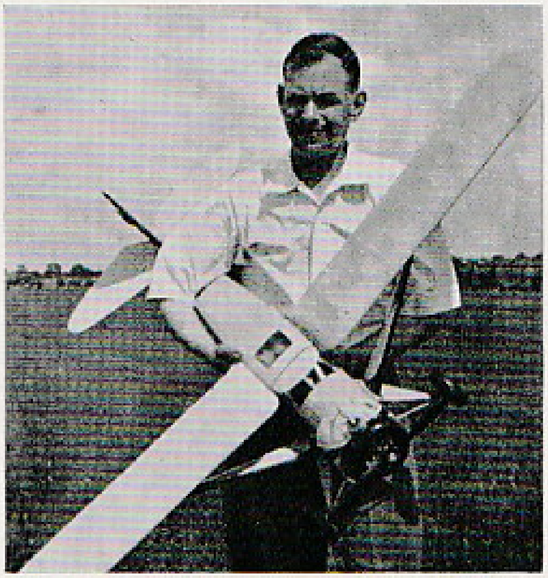
Nor does the problem lie only in the models we have, but also, to a large extent, on the reliability (or lack of it) of our motors. There was a great deal of truth in the remarks of one very well-known modeller who recently said that he considered that the majority of our power enthusiasts made use of contests to iron out the bugs. I think we would do well to organise a gathering of our best power exponents and use it to get really well acquainted, talk about our troubles and try to solve all the problems by which we are confronted.

It is obvious, however much some of our writers on the subject dislike it, that we must familiarise ourselves with the typical enormous rate of climb, followed by the roll out on top, and slow floating glide possessed by the Yankee models. If we are wise we shall make use of all the development work carried out in America on this type and base our designs accordingly rather than build up our own experience and eventually reach the same conclusion through far more laborious channels. After the first of these international contests, whenever that may be, we can then investigate further and see what improvements we can evolve ourselves, and thereby develop our own particular style. It would be sheer folly to ignore what is already known in America. On account of the rulings which may be expected, it will be essential, for the safety of our models, to have dethermalisers efficiently working on all entries, therefore we must equip our models accordingly and do all our experimental work with full dethermaliser gear installed. Again, we would do well to take heed of previous experience in dethermalising, making use of the S.M.A.E. booklet on the subject and of Bob Copland's and Carl Goldberg's findings. Personally, I favour Goldberg's method of allowing the tailplane up to 40 degrees negative incidence, but not yet having tried it out personally, I am not in an authoritative position, and I may have to change my preference. We must make allowances for the fact that the dethermalising problem on the super-contest model may be different to that on the Wakefield type of rubber-driven model, owing to the slightly different characteristics. I have already had considerable experience with the super-duration power model, but, unfortunately, I can no longer refer to the models with which I gained that experience, as one has

The author's American class "B" model, made in 1940, undergoing examination by Mr. C. S. Rushbrooke after giving a demonstration of its climbing abilities.

gone "the way of all flesh" and the other, which I sold, is beyond my recall. They were both Class B models under American rating, one powered by an Ohlsson 23 and the other with a Spitfire, the one having an angle of climb of about 80 degrees and the other, slightly heavier and packing much less power, about 45 degrees. Neither of the motors are still in my possession, but I have replaced them by a couple of Ohlsson Gold Seal motors in excellent condition; in fact, I doubt whether either has done much more than its running-in period, and I have commenced the construction of three models for these motors. Maybe you wonder why three. Well, in these days of rationed motors it is up to us to make the best of our lot, and I am arranging each of the motors on an interchangeable mount-cum-bulkhead which I shall be able to fit in either a control line model of about 30 in. span, or in a super-duration job of 6 ft. span, the latter corresponding to the American Class C ruling. A little later I shall build a third model for the same motor units, this time an 8 ft. pusher for the nomination type of fixed duration contest. There is no reason, as you can see, to limit your models just because you have only one motor—make it into a motor unit and use it on as many different models as you like. In order to help those who intend going in for work on duration contest jobs, I will shortly describe the construction of my Class C duration model, the specification of which is :—

Span, 72 in. Chord, 12 in. Area, 674 sq. in. Length, 54 in. Wing section, Goldberg G5. Tail section, 3/4 Clarke Y. Power, Ohlsson 9-c.c. Weight, 48 ozs. Tailplane dethermaliser.



Mr. S. Mitchell, of Brentford and District M.F.C., with his scale-type petrol model. This is an excellent example of what can be achieved in this direction with care in design and patience.

A model to this specification should be capable of a rate of climb of up to 1,600 ft. per minute and, with its wing loading of just over 10 ozs. to the square foot, it will hang about "up there" as though it hated coming down. A colleague of mine who possesses a new Ohlsson 23 motor is working on a 4-ft. edition of the same model for Class B work and I will cover the variations necessary for readers to construct their own Class B jobs with this popular size of motor.

When Constructing the Model

I can recommend the procedure of building flying surfaces first, not as some people seem to think, because I am inclined to take more pains at the commencement of construction, but because, if the wing and tail units are at hand when the fuselage is being built, it is possible to achieve better results when the mounting details are being worked out. Particularly is this the case when using the hinged tail dethermaliser, as it is advisable to have the tailplane at hand while the rear of the fuselage is fitted with the hinged mounting for the dethermaliser gear, and it has been found extremely handy to be able to offer up the tailplane during the planning and construction of this part. However, more about this later.

Topic of the Month

Come into the old workshop, blow the balsa shavings off the spare chair, watch your elbows on that tube of cement, and let's have a talk about pushers. "Wonder why pushers are neglected so much?" Whenever anyone talks or thinks about an aeroplane, we always visualise the airscrew coming first these days, with the plane dragging along behind it. When we read the words of wisdom in the technical books we are told how horrible it is for our wings to struggle through the churned-up air from the prop. and how much better it would be if only they could work in undisturbed air. But what do we do about it? Precisely nothing. And why?—Because we are afraid that if we build the pusher which both theory and common sense tell us is the goods, we just may not make the grade in contest with the conventional tractors. Mostly, I think, this failing is the result of not having sufficient time to build two models—one conventional and the other for experiment. We have in England some very good reasons for shelving our fears and getting down to really useful development work on pushers—our major contests are so-called "precision" contests, in which the models are required to fly for a stipulated time, and in some cases are to be judged for originality, quality of design, capacity for foolproof take-off and landing without suffering damage—what better type is there than the pusher for such a contest? It is an ideal type on which to use a tricycle nose-wheel undercart, with a very wide wheelbase which will ensure excellent take-off properties and will certainly improve the landings. The airscrew is way back where it cannot suffer any damage in anything short of a somersault landing, and we will, therefore, be saved the toil of carving innumerable props., or buying them! The type of pusher I am thinking about is the more conventional type with tail surfaces supported by twin booms attached to the main wing, with the motor between the booms at the rear of the centre "Pod" type of fuselage. The rear wheels of the tricycle landing gear would be under the booms, where they join the wing, and on an 8-ft. span model, would be be about 2 ft. apart, with the nose wheel about the same distance in front of them. Just imagine what steady take-offs and landings would result on an undercart like that! Why should we not make the grade with such a model? There is no reason at all.

If you are not looking for the large reliability type of model, but instead, prefer the duration type, there is still no reason why it should not be a pusher. A pusher duration model recently introduced on the American market has already made a name for itself—but, and this brings me to a sore point—it is what some people call a freak.

Unconventional Models

I have been guilty, in the past, of using the same term when referring to the duration model, probably for the want of a word with more popular understanding, but, on giving the question due thought in the light of other writers' views, I cannot now understand why certain types of models, designed with a particular purpose in mind, should be termed freakish and others should be exempted from the slur. I think it will be agreed that any particular object, model aircraft included, can only be termed freakish if it differs entirely from the usual and more common trend of current design. If conditions arise which necessitate current designs changing to suit the new conditions and, in doing so, following the one-time freakish outlook, then the latter is no longer deserving of the term, which leads the average person to assume that it is something undesirable and, therefore, to be shunned as "bad medicine."

To get back to our pusher argument: duration type pushers can be varied widely in layout by the versatile designer, from Pod fuselages with twin wing-booms supporting the tail, as in the eight-footer mentioned earlier, to a deep fuselage supporting a high wing and cut down deeply at the trailing edge to form a single low fuselage continuation boom to the tail, the motor being installed inverted with the airscrew turning in the cut-down portion, thrust line just below the wing chord line. Let's think hard about this pusher problem; believe me, there's something in it!

The Gutteridge TROPHY WINNER 1945

by R. COPLAND

THE machine which won the Gutteridge Trophy this year follows in general the design features which have been developed by the designer in a long line of successful Wakefield models. It employs an oval section streamlined fuselage with the wings mounted at shoulder height and well faired in.

The wings are constructed with generous leading and trailing edges without intermediate spars, a method of construction which has been favoured by the designer for some time. The tail unit also follows the usual Copland practice. It is to be noted, however, that a two-bladed non-folding propeller is employed, as it has been found that the additional climb obtained with this more than counterbalances any advantages possessed by the single-bladed folding variety.

The Wings

The wing frames should be built first, as it is necessary that the wing-spar boxes in the fuselage should be built to fit the stub ends of the spars properly, and the position of formers 6 and 9 for the fuselage is also governed by the wing structure.

The leading edge is hollowed out for lightness.

The wing stubs are cut away on the underside and built up on the upper side to give the required dihedral angle, and care should be taken to see that both half-wings are alike in this respect. The wing stubs are also cut away and built up in plan to render them parallel for entry into the wing boxes.

All ribs are cut from 1/32-in. sheet, except the inner ribs adjacent to the body, which are cut from $\frac{1}{16}$-in. hard balsa sheet. The section is the "Davis" (thick section) given in the *Model Aeronautical Digest*.

The wings are not covered until the fuselage is built, and the wings have been correctly fitted with the 1/32-in. sheet balsa fillets, making a snug fit along the fuselage contour.

In the prototype they were covered with white jap tissue, and it should be noted that there is 1 degree washout at the wing tip.

If the wing boxes have been correctly built into the fuselage, the wing incidence at the root should be 3 degrees measured on the datum line.

The Fuselage

The basis of the fuselage is sixteen oval-shaped formers, which in the prototype were cut from laminated sheet balsa. Formers 2 to 6 (counting from the nose) are cut from three laminations of 1/32-in. thick hard sheet balsa and formers numbers 7 to 16 are cut from two laminations of 1/32-in. sheet.

Wound formers would make a better job if the builder is prepared to go to this trouble, in which case four layers of 1/32-in. × 3/32-in. balsa should be wound round suitable templates, which must, of course, be $\frac{1}{8}$ in. smaller in dimensions all round than the sizes given on the drawing. The nose former is cut out of two laminations of $\frac{1}{16}$-in. balsa sheet faced with 1-mm. ply.

Whichever type of former is employed, they must be adequately supported while the stringers are cemented in position on them. A square hardwood rod (not more than $1\frac{1}{4}$ in. square) passed through the centre of the former templates, to which the formers are temporarily fastened with spots of cement, is a suitable method, but any of the other schemes which have been evolved from time to time may be used if preferred.

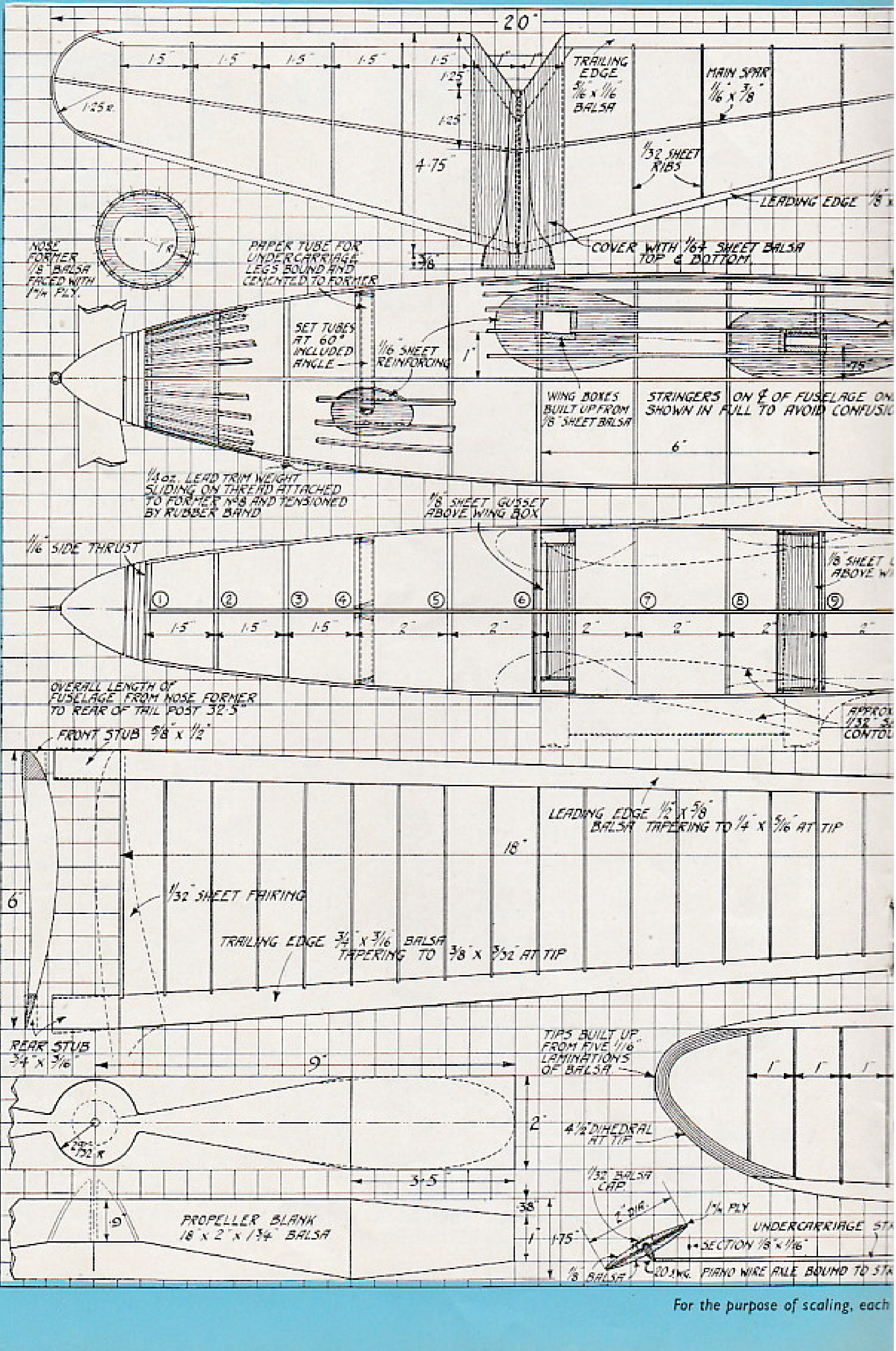
Note formers 6 and 9 are located on opposite sides of the 2-in. dimensions to give a clearance between them of the 6 in. required for the wing stubs.

When setting the nose former, remember that it should be inclined to the right to give $\frac{1}{16}$-in. side thrust.

The wing spar boxes should be built up separately, taking care to see that they are a good fit on the wing stubs. Care must also be taken to see that they are correctly located on the formers to give the right angle of incidence and ensure that the wings make the same dihedral on each side.

The paper tubes for the undercarriage struts should also be cemented and bound in position against the rear face of former No. 4 before the stringers are cemented in position.

(Turn to page 14)



For the purpose of scaling, each

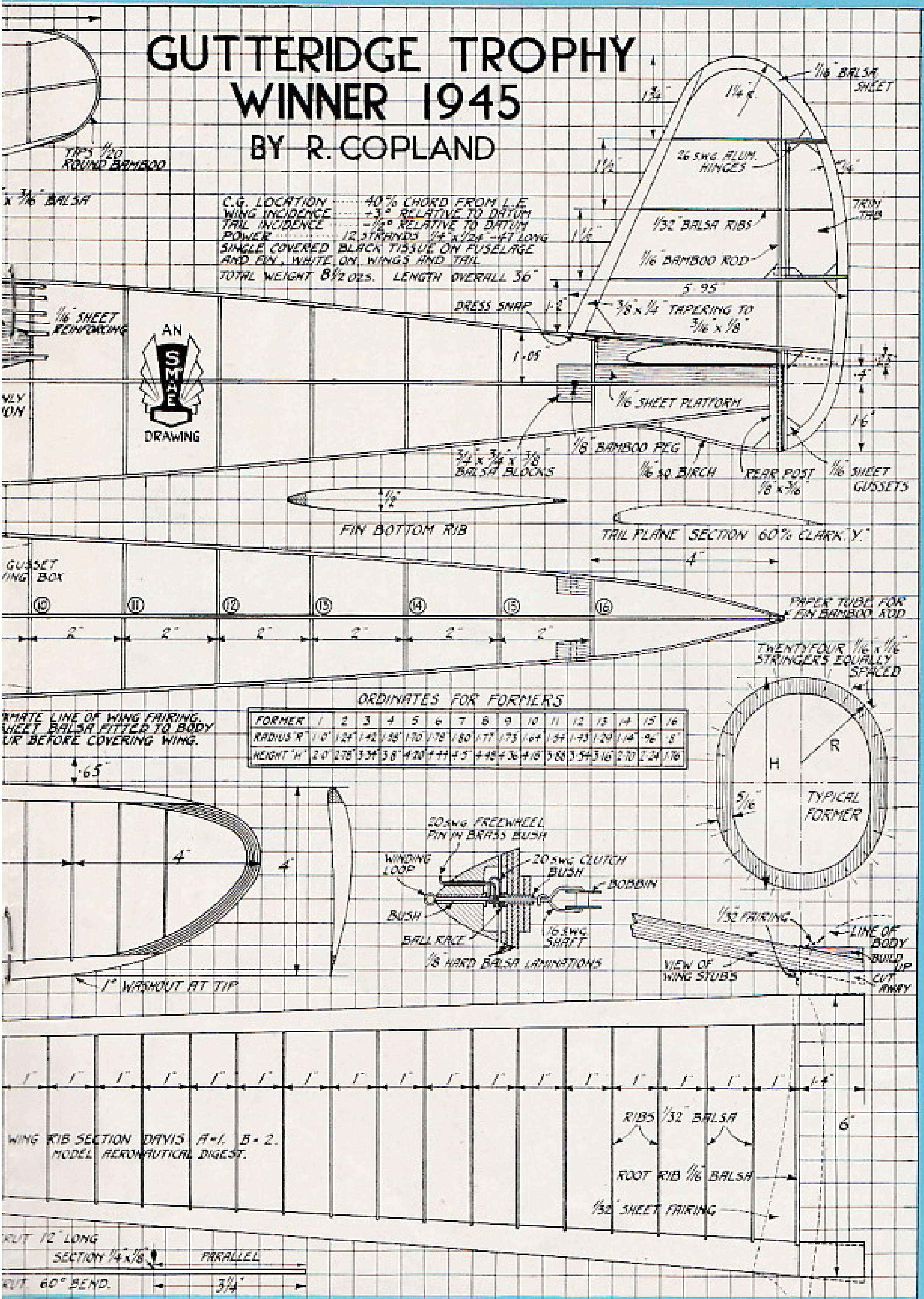
GUTTERIDGE TROPHY WINNER 1945

BY R. COPLAND

C.G. LOCATION .... 40% CHORD FROM L.E.
WING INCIDENCE .... +3° RELATIVE TO DATUM
TAIL INCIDENCE .... −½° RELATIVE TO DATUM
POWER .... 12 STRANDS ¼" x 1/24" − 47 LONG
SINGLE COVERED BLACK TISSUE ON FUSELAGE AND FIN, WHITE ON WINGS AND TAIL
TOTAL WEIGHT 8½ OZS. LENGTH OVERALL 36"

ORDINATES FOR FORMERS

FORMER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
RADIUS "R"	1·0"	1·24"	1·42"	1·58"	1·70"	1·78"	1·80	1·77	1·73	1·64	1·54	1·43	1·29	1·14	·96"	·8"
HEIGHT "H"	2·0"	2·78"	3·34"	3·8"	4·20"	4·44	4·5"	4·48	4·36	4·18	3·88	3·54	3·16"	2·70	2·24	1·76



square is equal to half an inch.

THE GUTTERIDGE TROPHY WINNER

(Continued from page 11)

Twenty-four $\frac{1}{16}$-in. sq. stringers equally spaced round the formers are used, and when these are cemented in position the formers can carefully be released from their supporting templates, which are in turn released from the square rod to enable it to be withdrawn. The templates are then easily withdrawn from inside the fuselage.

The space between the stringers from the nose former to former No. 2 is filled in with pieces of $\frac{1}{16}$-in. sheet to stiffen the nose and the areas round the wing spar boxes are dealt with in the same way, as indicated in the drawing.

At the rear end, the stringers in the bottom half of the fuselage are cemented to a fin post of $\frac{1}{4}$-in. × $\frac{3}{16}$-in. hard balsa tapered to suit. This fin post projects 0.4 in. above the central datum stringer and 1.6 in. below it to form the rear spar for the underfin, which is made from $\frac{1}{16}$-in. square birch steamed to shape.

A platform for the tailplane is built up on the central stringers from $\frac{1}{16}$-in. sheet, 0.4 in. wide, and a length of paper tube to take $\frac{1}{16}$-in. round bamboo is cemented against the fin post to take the fin peg.

Two pieces of hard balsa $\frac{3}{4}$, in. × $\frac{3}{4}$ in. × $\frac{3}{8}$ in. thick, are cemented against the forward face of the rear former and the inner faces of the stringers to take the $\frac{1}{8}$-in. round bamboo peg which forms the rear anchorage for the rubber motor.

The fuselage is covered with a single layer of black tissue.

The Tailplane

The construction of the tailplane is quite straightforward and its section is an 80 per cent. Clarke "Y."

The space between the two centre ribs is covered with 1/64-in. sheet on each side and a short decking is fitted on the top side to fair into the fuselage. This may be built up with a front former and stringers or with 1/64-in. sheet.

The tailplane is rigged at an incidence of $-\frac{1}{2}$-degree to the datum line.

The Fin

The fin is built on a vertical spar of $\frac{1}{16}$-in. round bamboo with a leading edge of $\frac{3}{8}$-in. × $\frac{1}{4}$-in. balsa tapering to $\frac{3}{16}$ in. × $\frac{1}{8}$ in. The fin tip and trailing edge are cut from $\frac{1}{16}$-in. sheet. The trailing edge of the fin extends downwards to complete the underfin and, in order to leave the bamboo spar free to engage the paper reception tube on the fin post, a false spar is provided adjacent to it.

The bottom rib is of $\frac{1}{16}$-in. sheet balsa, but the remaining ribs are cut from 1/32-in. sheet

The trimming tab is hinged with two pieces of 26 s.w.g. aluminium sheet $\frac{1}{8}$ in. wide let into slits in the bamboo spar and the spar of the trim tab and cemented in position.

A dress snap is fitted to the underside of the nose of the fin to engage with the other half of the snap which is fitted to the top of the fuselage.

The undercarriage legs are made from $\frac{1}{4}$-in. × $\frac{1}{8}$-in. bamboo 12 in. long and are tapered down to $\frac{1}{8}$ in. × $\frac{1}{16}$ in. at their lower end and streamlined. Care should be taken to see that the upper portion which fits into the paper tubes is parallel and that the tapering does not take place except on the exposed portion of the struts. The wheels are built up from two laminations of $\frac{1}{8}$-in. sheet balsa cemented on either side of a central disc of 1-mm. ply.

On the prototype the outer balsa lamination is cut back to the ply centre to provide a blind bearing for the axle and the recess is covered over with a piece of 1/32-in. sheet after the outer axle stop has been soldered in position.

The propeller is carved from a block of balsa 18 in. × 2 in. × $1\frac{3}{4}$ in., cut to the dimensions indicated in the plan. When the blank has been cut to shape, it should be carved from edge to edge before giving it its final contour.

The propeller hub follows the contour of the fuselage nose and requires a small addition on the forward face to complete the streamlining of the spinner.

The nose block is built up from three laminations of $\frac{1}{8}$-in. hard balsa with two further laminations on its inner face to engage the fuselage nose former.

The arrangement of the free-wheel device, spindle and winding loop will be clear from the detail on the drawing. No stop is provided, as the designer used a roped motor.

Power

Three ounces of $\frac{1}{4}$-in. × 1/24-in. flat strip rubber, making 12 strands approximately 47 in. long, forms the motive power, and it is made up into a roped motor by the White method.

Rigging

The centre of gravity should lie at 40 per cent. of the wing chord from the leading edge and a streamlined $\frac{1}{4}$-oz. weight sliding on a thread tensioned by a rubber band is fitted to the underside of the forebody to provide adjustment.

Before flying the model, it is advisable to check the incidence of the wings and tailplane and make sure they are set at the angles stipulated.

The Trend of MODEL SAILPLANE DESIGN

by "Zephyr"

OBSERVATION of various sailplanes which have made their appearance on the competition field during the past season has not helped to solve the outstanding problem of the heavily-loaded machine *versus* the lightweight, which has exercised the mind of every designer, since a decision on this point has to be made before any attempt can be made to place the design on paper.

Above
A study in Aspect Ratios by members of the York Model Aircraft Society.
Photo by A. Warrie.

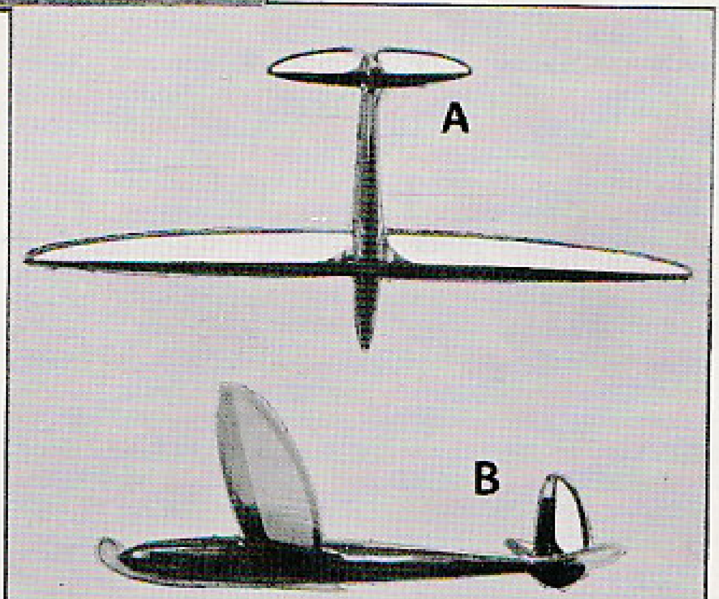
The two lines of thought on the subject are both sound in conception and should be understood fully by the would-be designer if he wishes to arrive at the right decision in choosing the type of model he is going to build.

The Sinking Speed

The main argument revolves around the question of the sinking speed of the model; the lightweight enthusiasts rightly claiming that their light loadings provide a lower sinking speed — other things being equal—than the more heavily-loaded type, for the following reasons.

The Effect of Loading on the Sinking Speed

It is common knowledge that the loading of the machine does not in any way affect the *gliding angle* of the model and that this performance feature is governed by the lift/drag



Below
(A) This plan view of a sailplane built by A. D. C. Pollard and A. E. Laws exhibits the ideal plan form.
(B) The attractive profile of the same machine.

ratio of the complete machine and is lowest when the value of lift/drag is lowest.

Since the gliding angle is dependent on the aerodynamical design qualities of the model and not on the speed factor, it is important to realise exactly what effect the loading has on the sinking speed of the model.

Taking an actual example of a clean machine with a gliding angle of 1 in 15, which is equivalent to a L/D ratio of 15.

Assuming that we have a lightly-loaded machine of 3 sq. ft. area, weighing 10 ozs. and using a good section which provides us with a lift coefficient of 0.7 at model air speeds.

By applying the well-known formula

$$V^2 = \frac{W}{C_L \times p \times S}, \text{ in which}$$

W = the weight in lb., C_L = the lift coefficient, p = the air density in slugs (0.00238) S = the area in sq. ft., we find that the model under consideration has a speed of :—

$$V^2 = \frac{0.625}{0.7 \times 0.00238 \times 3}$$

$\therefore$ V = 11.2 ft. per sec.

The sinking speed of the model is given by the equation $\frac{V}{L/D}$ and, substituting the figures obtained above, we get $\frac{11.2}{15}$, or a sinking speed of 0.746 ft. per sec.

If we now increase the weight of our model to 20 ozs., we obtain the following results :—

$$V^2 = \frac{1.25}{0.7 \times 0.00238 \times 3}$$

$\therefore$ V = 15.8 ft. per sec.

and this gives us a sinking speed of $\frac{15.8}{15}$, or 1.056 ft. per sec.

Setting this out graphically will help those who dislike mathematics to appreciate the point. From this it is seen that the lightly-loaded model definitely has the advantage of a lower sinking speed—to the extent of 0.31 ft. per sec. in the examples we have taken.

Comparing these two machines under actual flying conditions in calm air launched from 300-ft. lines and released at an altitude of 200 ft.

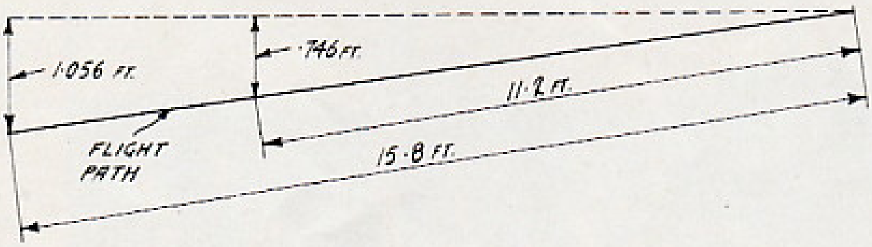
The lightweight will take 265 sec. to reach the ground level, whereas the heavyweight will take only 190 sec. ; a loss of duration of 75 sec.

From this we see the importance of light loading on the performance of our gliders, and it would appear to be irrefutable proof of the advantages of light loadings.

The Effects of Air Turbulence

Unfortunately, conditions of still air do not exist very often—they are, in fact, decidedly the exception rather than the rule—and the effects of air disturbances have to be taken into account.

By reason of its low flying speed and consequent small momentum, the lightweight becomes easy prey to the attacks of every gust of wind which comes along, and if we assume that both models have the same quality of stability built into them, it is obvious that the



Above : The effect of varying the loading on the sinking speed of a sailplane is here shown graphically.

Right : An elliptical wing loading can be approximated while retaining straight taper by careful planning.

lightweight will be at a disadvantage on the score of immunity from disturbance, as the heavyweights will not be affected by the minor disturbances and will better be able to deal with the larger ones.

The high performance sailplane designer is thus faced with one of the many compromises which face those desiring to carry out aircraft development.

Fortunately, there is one aspect of the heavyweight model which can be employed to its advantage in offsetting the advantage which the lightweight possesses in the way of low sinking speed.

Taking Advantage of Weight

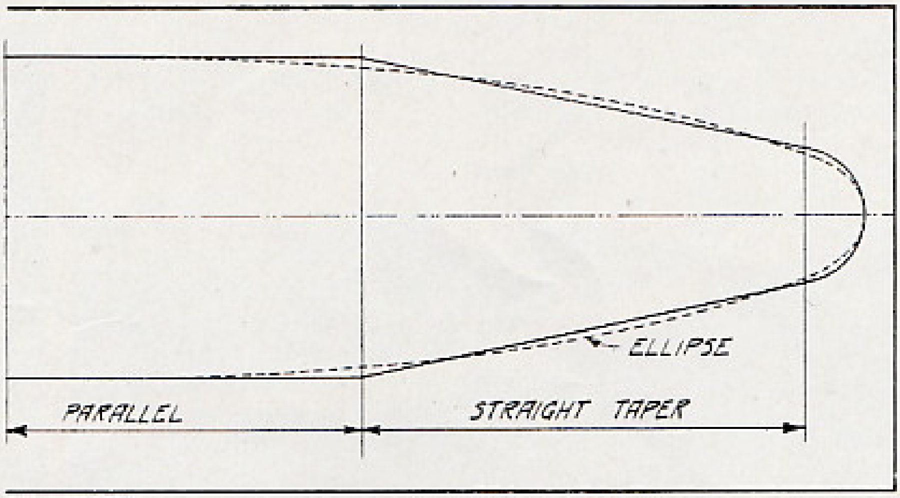
As we pointed out earlier, the sinking speed is determined by the ratio $\frac{V}{L/D}$, from which we see that any improvement in the value of L/D will result in a lower sinking speed.

Now, if we use the extra weight which we build into our model to improve the L/D ratio of the machine, whether by means of imparting to it a better aerodynamical shape or by giving it a better finish which will reduce its resistance and thus improve its L/D ratio, we shall to some extent reduce the disadvantage in sinking speed which the higher speed introduces.

Thus, by careful design, taking full advantage of the additional scope which the matter of the greater weight of material provides, it is possible to produce a machine with a sinking speed equal to the lightweight and at the same time possessing the advantages of the heavyweight in the matter of steadiness of flight and ability to ride disturbances.

The importance of a reasonably heavy loading makes itself felt in windy weather or hilly ground, although occasions have been met where the lightweight performs well under adverse weather conditions.

One thing that must be conceded is that it is more difficult to design and build a good heavyweight than it is to produce an equally good lightweight, but since the main attraction which our hobby possesses is the opportunity which it provides us for overcoming difficulties, this is no great drawback to the average modeller.



Developing the Heavyweight

How, then, can we improve our heavyweight models so that they have a better performance, as the ideal condition is a heavyweight with the sinking speed of a lightweight.

In the first place, considerable care has to be used in the selection of the right wing section and the incidence at which it is used.

The minimum sinking speed is attained with any particular machine when its value of $\frac{C_D}{C_L^{1.5}}$ is lowest (the complete machine, not just the wings only), and this setting of the wings can only be achieved by plotting the $\frac{C_D}{C_L^{1.5}}$ curve of the aerofoils under consideration on a base of C_L and then transferring these values to the table of lift and resistance at all angles of attack which has to be prepared if the design is being carried out properly.

From this table the effects of the various wing sections can be observed quite clearly, as can also the angle of incidence where the lowest sinking speed is achieved.

A well-shaped body, with a low resistance coefficient, is, of course, essential, and in this connection just good looks is not necessarily the deciding factor. Too much time is often spent by the model designer in obtaining a good-looking body without proper consideration of its aerodynamic properties, judging by some of the models one sees.

Small variations in shape are apt to make quite a big difference in the resistance of a body and it is far safer to work on the results of wind tunnel tests on known good streamline shapes than venture into the realms of shapes which have no experimental data to support them. We do not mean that new shapes should not be evolved, but that they should be based on the results of authentic tests and the lessons which they imply, rather than indulge in random design.

In particular is it important to consider the *speed* at which the experimental tests were carried out, as there is even more difference in the performance of solids of revolution at low Reynold's Numbers than is the case with wing sections. A study of the results enumerated in R. & M. 607 will give a good indication of this.

The Wing Junction

One of the points which can with advantage also receive more attention on the part of designers is the junction of the wing to the body.

In spite of the better attention which has been given to this aspect of design recently, enough attention is still not paid to it by the average model designer, who seems to imagine that any old fairing will do, whereas, on the contrary, careful fairing has to be carried out if optimum results are to be obtained.

It has been proved that the ideal condition to aim at is a form in which the combination of profile form and incidence provide a lift distribution on the machine which approximates to the lift distribution of the wing alone.

To achieve this, it is obvious that no haphazard fairing will meet the case and that wing and fuselage must be treated as associated units and not separate entities. For those who wish to examine a good example of this feature, we recommend a study of the Fafnir II sailplane.

The attainment of the conditions outlined above leads to the employment of a wing plan form having a somewhat higher taper than is satisfactory from the point of view of absence of wing-tip stalling and subsequent spinning, and since our models have no pilot aboard to correct any vicious tendencies, the ideal conditions may be difficult of attainment, and we will probably have to fall back on " compromise."

Avoid Sharp Corners

As a general guidance to beginners in design, it may be taken as an axiom that angles of less than 90° made between the wing and the surface of the body should be avoided, as should any sharp corners at the point of junction. It must be remembered when designing that the air dislikes being crammed into a smaller space or bustled past a restriction and that it always retaliates when we force this upon it by grabbing at the machine with its unseen fingers, thereby adding to the resistance. The maintenance of a free and easy flow is essential.

The Wing Plan Shape and Aspect Ratio

Apart from the question of the degree of taper which is built into the wing, the problem of the best aspect ratio and plan shape is still with us.

It is, however, definitely established that the elliptical plan shape is the best from a purely aerodynamical standpoint and, for those who have the time and patience to work out the details of such a wing, it is the obvious choice.

Unfortunately, few of us are blessed with unlimited time at our disposal and we are once again driven to the nearest compromise—a wing with a straight taper.

If carefully planned, a wing can be produced which, while possessing a straight taper, very closely approximates the elliptical shape, and it is obviously desirable to aim towards this condition. An examination of the accompanying illustration will show what we mean.

So far as aspect ratio is concerned, argument has not yet decided the ideal ratio for our model work, as we are torn between the demands of maximum efficiency, strength and stability, and we are again called upon to compromise between these three contesting requirements.

Generally speaking, we find that recent tendencies amongst models are towards a relatively modest aspect ratio and an examination of the practice in full-size sailplanes produced just before the war produces a similar result.

For instance, the Fafnir II previously referred to possessed an aspect ratio of 20, whilst two of the last designs produced in Germany, the " Kranish " and " Habicht," possessed aspect ratios of 14.3 and 11.7 respectively. From this it would appear that the value of attempting the achievement of an aspect ratio above 12 is extremely doubtful.

The Tail Unit

One feature which has definitely developed recently is the high tailplane mounting with the tail located halfway up the fin or actually on top of the fin. This location of the tailplane is a decided advantage from the point of view of stability, as it is an effective anti-spinning device, but, apart from this, it would appear from observation to improve the general performance of the machine.

This is probably due to the fact that in this type of mounting the tailplane is well above the region of downwash from the main plane and is therefore able to carry out its stabilising duties in less disturbed air and with greater precision.

As the achievement of the lowest sinking speed is very sensitive to changes in the angle of attack of the machine it is logical to suppose that any improvement which can be obtained in the longitudinal stability will have its reflection in an improved overall sinking speed.

In Conclusion

The discerning reader will therefore gather that the lines of progress which are to be followed in sailplane design are :—

(1) A better consideration of body shapes and wing sections.

(2) More careful design of the merging of wings into the body (if in doubt, use a parasol arrangement).

(3) Wing plan forms approximating the elliptical and of moderate aspect ratio.

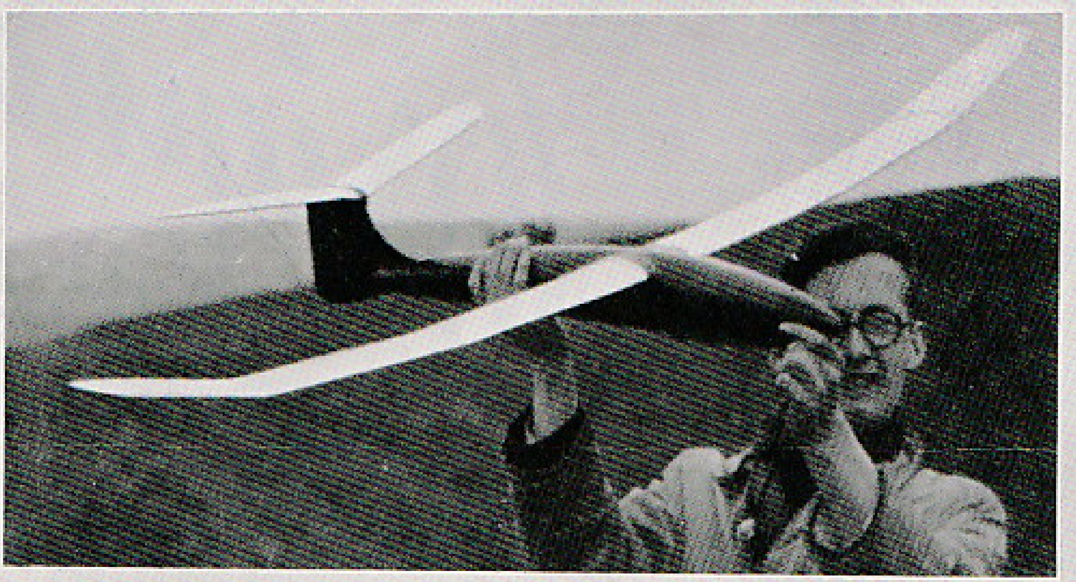
(4) High mounting of the tailplane.

Outstanding Gliders

The fine glider shown on the left is one which has been a consistent performer throughout 1945, gaining first place at the Rochdale Rally and third place at the Huddersfield meeting.

It is to F.A.I. specification and is the product of P. Uttley, of the Blackpool Club, who is seen launching it at the second Northern Area Rally at Baildon Moor.

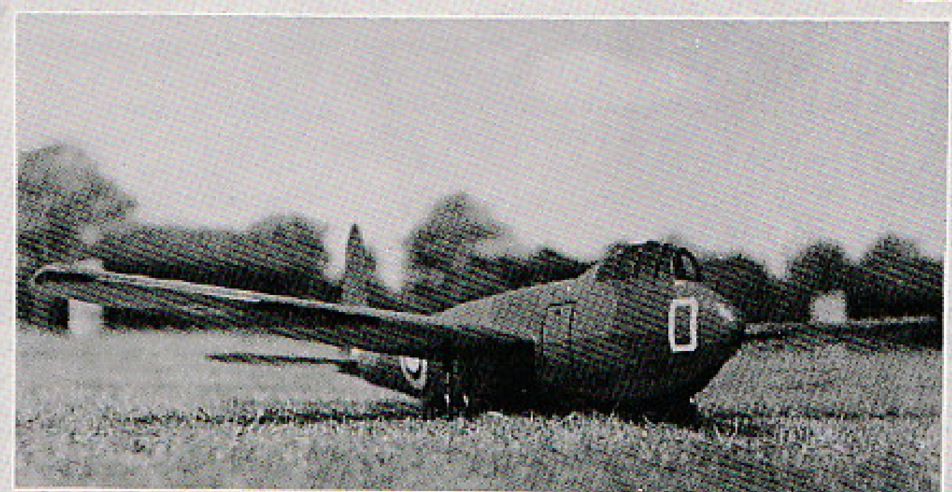
Photo by R. V. Bentley.



One of the most attractive sailplanes produced in 1945 is the "Princess of Mars," conceived by I. S. Cameron.

It is shown above, in the hands of the launcher, at Baildon Moor.

Photo : W. Titterington.



An excellent combination of good workmanship and fine photography is depicted in the illustration on the right, which shows a "Hotspur" glider built and photographed by A. R. Parker, of the North Kent Club.

Original

WHILE discussing one of my recent models with an experienced aeromodelling friend he made the remark, "This is a design of your own, isn't it?" My reply, in the affirmative, was followed by a query as to why he didn't have a shot at original design work himself instead of building machines to other people's specifications and plans. It was pointed out that he would be able thereby to put his extensive constructional and flying knowledge into concrete form through the medium of a model which he could rightfully and proudly call—a creation.

His answer was to the effect that, although he would very much like to design a model aircraft of his own, he was at a loss as to how to set about putting his ideas on drawing paper in a sufficiently accurate form to build on.

This set me thinking, with the result that I decided to try to "clear the air" for such enthusiasts as my friend in a practical form. By setting out the design of a model step by step, aspirants to original work will be able to understand the gradual build-up of a full-size working drawing. To those familiar with drawing-office practice, the preliminary steps will seem elementary; but it is hoped that those countless and capable model-makers who, up till now, have been content to reproduce to the designs of other brains due to being unfamiliar with the elements of draughtsmanship, will find a door to new endeavour opened to them.

Equipment Required

The tools required are few and simple.

A perfectly flat, smooth board, about 3 ft. by 2 ft. and about $\frac{3}{4}$ in. thick, is the first essential. One edge of the board must be perfectly straight. A T-square, long enough to span the length of the board, is required, and this slides against the edge of the board. Set-square, school compasses (if no others are available), drawing-pins, paper, ruler and a sharp pencil of at least H grade conclude the list.

Think before you draw

Before pencil can profitably be put to paper, a clear mind-picture should be developed of the future model. This will require some forethought with respect to type and size of model, points that will determine the lines on the drawing paper.

For our purpose, let us assume that a small handy-sized, orthodox duration model of 30-in. span and 4-in. chord is required. Having decided this, the overall length of the model can be ascertained because, for normal purposes, the length of a duration model should be approximately three-quarters of the wing span; therefore, the *overall* length of the model will be $22\frac{1}{2}$ in. Now, one of the rules governing competition model aircraft and laid down by the S.M.A.E. (and the F.A.I., which has adopted the same formula) is that the cross-sectional area of a fuselage at its "fattest" part must be a *minimum* of $\frac{(\text{overall length of model})^2}{100}$ sq in.

This is known as the fuselage formula. In our case, this will result in a minimum cross-sectional area of $\frac{(22\frac{1}{2})^2}{100}$ sq. in., which equals $5\frac{1}{16}$ sq. in.

To be on the safe side, let us design the fuselage with a cross-section of $5\frac{1}{4}$ sq. in. at its maximum depth and breadth. The next thing to decide before we can start drawing is the shape of the fuselage section; so let us assume that it is to be rectangular. Any convenient combination of depth and width of fuselage can be used to give the desired $5\frac{1}{4}$ sq. in., but the ratio of depth to width should preferably be no greater than 2—1. A maximum fuselage depth of 3 in. and a corresponding maximum width of $1\frac{3}{4}$ in. will, therefore, prove convenient.

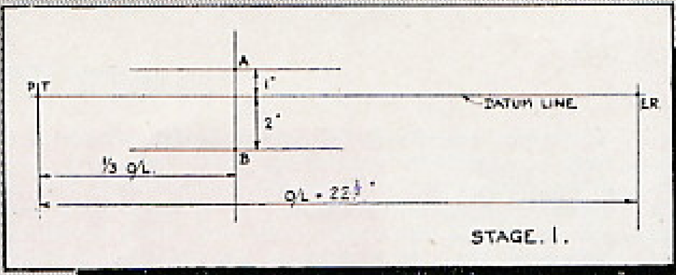
Making a start

Using the T-square, a firm line is drawn across the length of the paper. This is known as the datum-line and is shown in stage one of the illustrations. Two points are made on the line, P.T. and E.R., $22\frac{1}{2}$ in. apart. (The overall length of the model marked O/L.) P.T. represents the *point of thrust* (the centre of the air-screw), while E.R. represents the extreme rear of the model.

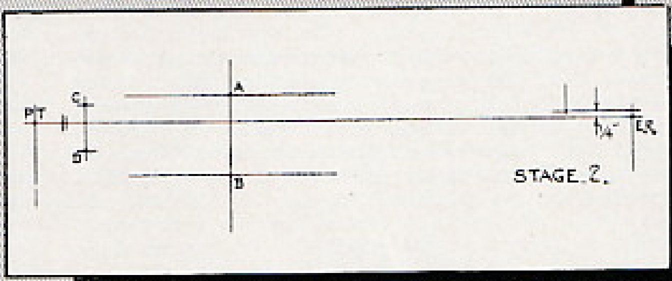
As we are dealing with the side view of the model first, it will now be necessary to distribute the depth of the fuselage about the datum line. A vertical line, intersecting the datum at a point one-third the overall length of the model

Designing

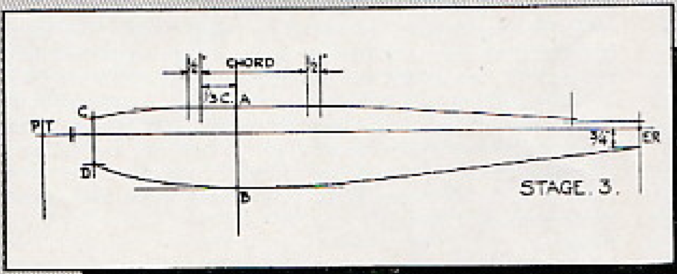
by Gordon Allen



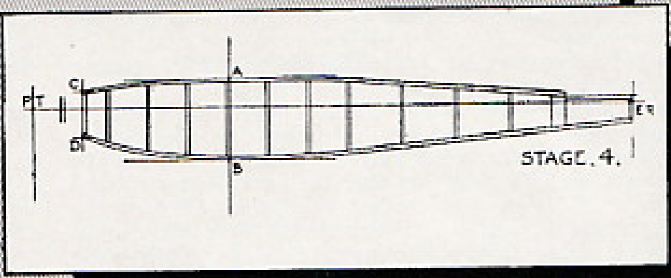
STAGE. 1.



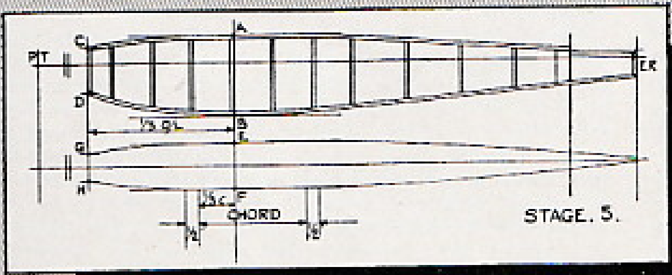
STAGE. 2.



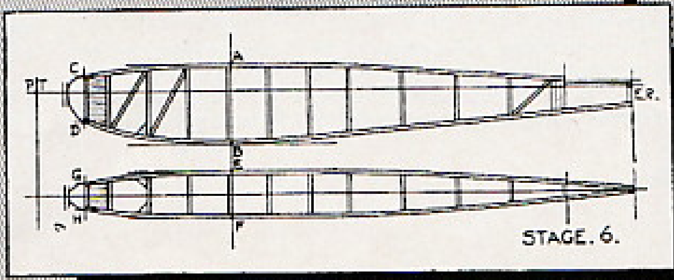
STAGE. 3.



STAGE. 4.



STAGE. 5.



STAGE. 6.

from PT is drawn and on this line the maximum depth of the fuselage is fixed.

It is a sound policy on most ordinary high-wing duration models to keep the line of thrust (a line drawn through the centre of the airscrew and at right-angles to it) as high as possible in relation to the fuselage. This helps to keep the line of thrust near to the centre of drag, the latter being in the vicinity of the top longerons. As this thrust line will be either coincident with the datum or very close to it, it follows that the top of the fuselage should be near to it. Running clearance for the rubber motor must be allowed for ; so, for our purpose, let us put the top of the fuselage 1 in. above the datum. Accordingly, a point " A " (stage 1) is marked on the vertical line, 1 in. above the datum, and a faint line drawn through it parallel to the datum. Likewise point " B " is fixed 3 in. away from " A " and a horizontal line drawn through it as before. These faint lines provide the boundaries of the fuselage.

Stage 2.

From here we pass to stage 2. Before we can find the true position of the front of the *fuselage*, a point must be made on the datum at a distance from PT equal to the sum of the widths of the airscrew boss, the bearings behind the airscrew, and the nose-block. In the example provided, convenient widths have been marked off representing these dimensions. One inch has been allowed for the airscrew hub width (although this will vary according to the airscrew to be used, the diameter of which should not exceed one-third of the wing span plus 2 in.) and ¾ in. allowed for the nose-block width. The width of the bearings will vary according to the methods to be employed. However, ¼ in. is a safe dimension for most purposes. A vertical line drawn through the rearmost of these points represents the front face of the fuselage.

The next procedure in stage 2 is the fixing of the *tailplane* datum ; this is the line upon which the tailplane will sit in side view. The positioning of tailplanes is one of the many controversial topics among model aircraft designers. For the beginner to original design work, however, who is dealing with a straightforward machine, a position lying on or close to the body datum line will prove suitable. Therefore, a horizontal line drawn ¼ in. above the fuselage datum at the place indicated in stage 2 (sketch) will be decided on for our example.

On this tailplane datum-line the chord at the centre of the tailplane is marked-off, measuring from a line drawn vertically through point ER. This chord can only be decided by obtaining the desired shape of the tailplane which will agree with the area required. However, as the reader will have built other models, he will no doubt have an idea, through experience, of the chord he requires for the tailplane. After all, the original designer is not rigidly tied to any particular tailplane chord for any given design. The point marked on the tailplane datum, therefore, marks the position of the leading edge of the tailplane centre section.

On the vertical line representing the front face of the fuselage, two points are located, one above and one below the datum-line (C and D). These indicate the extremity of the fuselage depth at this location. It will be necessary to allow sufficient clearance *above* the datum-line for the driving hook at this location, which will therefore fix the height of the upper point. The overall depth of the nose should bear some proportion to the maximum depth of the fuselage, provided that sufficient depth is provided to allow for the entry of a knotted rubber motor.

Stage 3.

The next stage is the draughting of the fuselage outline, using the various points and lines already fixed as guides. From " C " a curved line is drawn to meet the horizontal line previously drawn through " A " (stage 3 of sketch). This curved line should not meet the horizontal one at an angle ; it should be " smoothed " into it gradually. It is also important that it should meet the horizontal line at a sufficient distance from point " A " to allow for at least ½ in. of forward movement of the wing which sits on the horizontal line. As a guide to the wing leading-edge position, it is safe to assume that the line drawn *vertically* through " A " corresponds to a line drawn vertically through the wing at one-third the distance from its leading edge.

The curved line should not be a severe one and must be drawn smoothly, firmly and finely. A French curve will be of assistance to the designer here, but, failing this, a piece of thin springy, even-grained timber about ⅜ in. × ⅛ in. (called a spline) bent to the curve desired, over the paper, will serve as an edge against which the line may be drawn.

The same amount of aft movement of the wing must be allowed for when drawing-in the rear portion of the fuselage top. This rear portion must likewise blend into the upper horizontal line, and can then be carried to the leading edge of the tailplane as a straight line if desired. The actual termination of this line at the rear should be either 3/32 in. or ⅛ in. above the point denoting the leading edge of the tailplane centre section, according to the thickness of the section to be used for the longerons of the fuselage. The reason for this is that, when the structure is complete, a stop will be provided for the tailplane.

The line representing the bottom of the fuselage is now drawn in. Starting at " D," a smooth curve is drawn to meet the horizontal line drawn through " B." The latter is, in fact, a tangent to the curve. It is very important that the curved line is not too severe, otherwise difficulty will be encountered when trying to bend the longeron to it. The rear portion of the line, as in the case of the upper one, can be carried to the back of the fuselage as a straight line if desired and should terminate at a position no more than 1 in. below point E.R., ¾ in. is suggested as a better measurement.

Stage 4.

All that is required to complete the side view of the fuselage is the addition of the structure as shown in stage 4. The thickness of the longerons must first be shown by lines drawn parallel to the outside lines of the fuselage. This is done by measuring off the thickness of the longerons at regular intervals along the outside lines of the fuselage and then joining up the points by rule and spline.

Positions of uprights and diagonal braces will, of course, be governed by the positions of the undercarriage, etc.

To complete the fuselage drawing, the plan view has now to be added, and it should be drawn directly beneath the side view drawing.

A centre-line is drawn right across the paper and on this is marked the front and rear of the fuselage. A thin vertical line is then drawn through each point.

Stage 5.

On each side of the centre-line, again at one-third of the fuselage length from the front, a point is marked at half the overall width of the fuselage from the centre-line, i.e. ¾ in. from the centre-line, and the points are represented by E. and F. in stage 5. Horizontal lines are then drawn through each point. The width of the fuselage nose must be decided (which must allow for the entry of a driving hook and knotted rubber motor) and this is measured off equidistant about the centre-line (G. and H.). From the two points thus obtained and the point E.R., smooth curves are drawn to meet the horizontal lines at positions that will allow the ½-in. forward and aft movement of the wing without the fuselage narrowing, for the reasons already given.

The complete fuselage line below the centre-line must be identical with the upper one. Therefore, a tracing of

(*Turn to page 26*)

NEWS from the CLUBS

IMPORTANT NOTICE

The S.M.A.E. Annual Dinner, Prize-giving and Dance is to be held at the Lysbeth Hall, Soho, London, W., on Saturday, February 16th. Tickets are obtainable from **F. E. Wilson, 9, Dorset Drive, Cannons Park, Edgware, Middlesex** (*Telephone*: 3658), price 10s. 6d. each. Book your tickets early to avoid disappointment. The annual general meeting of the S.M.A.E. has been fixed for Sunday, February 17th, at 11 a.m., at the Waldorf Hotel, Aldwych, London.

The important event of the past month has been the Extraordinary General Meeting of the S.M.A.E. to deal with the competition programme for the 1946 season. This meeting was called to enable the council to present the programme in printed form to members in the early part of the New Year, so that they have full details before them in good time to prepare for the competitive season. This should remove one of the difficulties encountered in the past and improve competitors' chances of entering the contests.

THE EXTRAORDINARY GENERAL MEETING of the S.M.A.E.

Held at the Waldorf Hotel on Sunday, Dec. 2nd, 1945

The Hon. Chairman, Mr. A. F. Houlberg, opened with a short speech defining the purpose of the meeting. The Agenda was confined, he said, to "competition matters." He hoped for concentration by the members on this subject.

The Manchester Delegate Meeting's proposal, moved by Mr. Hemshall and seconded by Mr. N. Lees, "That all S.M.A.E. competitions be to F.A.I. loadings," was supported by Mr. R. Jeffreys, but did not receive the backing necessary to carry it through. The amendment, moved by Mr. N. Gregory and seconded by Mr. C. S. Rushbrooke, "That F.A.I. formulas be used for specified competitions only," was carried with a useful majority.

Mr. K. Tansley explained his formula for petrol-driven model contests decided by duration, which was designed to level the performances of various types of these machines by the use of a constant fixed by the judges on the day of any of these contests in accordance with the conditions existing. After remarks made by Mr. R. V. Bentley, who gave the meeting examples of how this formula would operate, the members requested that Mr. Tansley's proposal go before the Flying Council for their consideration.

Note.—During the latter part of the meeting a "Power Council" was elected, and this matter will naturally be referred to this Council for its recommendations.

Efforts by Mr. Vanderbeck to persuade the meeting to amend some of the rules for the Handley-Page Tailless Contest were not successful, and the Society will continue to use those employed in the 1945 contest, excepting that points for aerodynamic design will not exceed 25.

Mr. A. Cripps's proposal, "That four S.M.A.E. contests only shall carry Plugge Cup points value," was seconded by Mr. S. Lanfranchi, and carried with the handsome majority of 72 to 45.

It was natural that this resolution should influence the decision of the following proposal moved by Mr. Hemshall and seconded by Mr. S. Lanfranchi, "That the four S.M.A.E. contests carrying Plugge Cup points value be organised by each area as semi-centralised contests." This was carried.

Another proposal which met with great favour was that moved by Mr. T. W. Wickens, "That the S.M.A.E. fuselage formula be used in all the Society's competitions, excepting the Gamage Cup." This was seconded by Mr. K. Tansley and carried 80-34.

Plugge Points

Mr. F. Buxton moved, seconded by Mr. T. London, "That the 1945 Plugge Cup points system be used for the 1946 flying season." Carried.

Mr. T. W. Wickens moved, "That where competitions call for a team of four from each club, the clubs shall return to the Hon. Competition Secretary of the Society the names of the top four members to constitute the club teams!" This was seconded by Mr. R. Jeffreys. Carried.

Mr. T. London moved, seconded by Mr. R. F. L. Gosling, "That the contest for the Gutteridge Trophy be a centralised contest for Wakefield models." Carried.

Drogues

The following resolution moved by Mr. K. Tansley, seconded by Mr. F. Haines, "That the use of drogues in S.M.A.E. glider contests be discontinued." Carried.

Mr. H. R. Turner's proposal, "That all contestants in S.M.A.E. glider competitions shall operate the winch or towing end only," was seconded by Mr. K. Tansley and carried.

A Council for Power-driven Models

Mr. Hemshall moved, second by Mr. Parker, "That a Council for Power-driven Models be elected." Carried.

The meeting agreed that this Council should number seven with the Chairman. Mr. R. V. Bentley was unanimously elected Chairman. The gentlemen elected to this Council were Messrs. S. Lanfranchi, M. W. White, G. W. W. Harris, C. Doughty, R. Monks and G. Dunmore.

The function of this Council will be to report from time to time to the Council of the S.M.A.E. on all matters affecting the power side of the hobby, i.e. petrol, rocket, etc.

The Recommendations for the 1946 Flying Programme

The four contests carrying Plugge Cup Points value are:—

"*M.E.*" *No.* 2 *Cup.*—Open Rubber (S.M.A.E. formula).
Pilcher Cup.—Open Glider (S.M.A.E. formula).
Thurston Cup.—F.A.I. Glider.
Weston Cup.—Wakefield Models.

The other competitions agreed upon are:—

Gamage Cup.—Open Rubber.
National Cup.—Team of four. Open Rubber (S.M.A.E. formula).
Flight Cup.—Maximum wing area, 144 sq. in.; maximum rubber, 1 oz. Total minimum weight, 5 ozs.
"*M.E.*" *No.* 1 *Cup.*—F.A.I. Gliders. Team event similar to National Cup.
K & M.A.A. Cup.—Open Biplanes, except that S.M.A.E. fuselage formula must be used and the small wing area to be no less than 50 per cent. of the larger wing area.
Women's Challenge Cup.—Contest for either rubber-driven models or gliders.
White Cup.—Flying Boats.
Lady Shelley Cup.—Open Seaplanes. All models subject to 30 seconds flotation test. Three flights r.o.w.
Civil Service Cup.—Each model to carry a "pay load" of 2 ozs., to be concealed but removable. This load to be in one piece. Maximum wing area, 210 sq. in.
Frog No. 1 *Cup.*—Semi-scale. Minimum span 36 in.
Frog No. 2 *Cup.*—Open Rubber for juniors under fourteen.

The meeting agreed that the three contests for petrol-driven machines, the Bowden International Trophy, the Hamley Trophy and the Sir John Shelley Cup, should be organised by the areas as centralised competitions. The Bowden International Trophy by London; the Hamley Trophy by the Northern Area and the Sir John Shelley Cup by the Midland Area.

The complete competition programme for 1946 and rules for the contests will be published at an early date after this meeting

The "Vote of Thanks to the Chair" was moved by Mr. T. W. Wickens, seconded by Mr. F. E. Wilson, carried and brought the meeting to a close at 5.5 p.m.

A. G. BELL.

S.M.A.E. Ex.G.M. DINNER

The Ex.G.M. dinner held by the S.M.A.E. on Saturday, December 1st, at Wilson Restaurant, Crouch End, was attended by well over a hundred members.

The Chairman, Mr. A. F. Houlberg, proposed the toast to the King and then called upon Mr. Jeffreys to propose the toast to the guests and absent friends.

Mr. Hoyle, of the Brentford M.F.C., replying, said that he was proud to have been a member of the K.M.A.A. in the "old days of piano-wire and spruce," and that the S.M.A.E. were to be congratulated upon the excellence of the arrangements for the dinner. He was sure that the Forces members would be grateful to the S.M.A.E. for the fine job which they had done in keeping the hobby going.

Mr. Greaves, of the Midland Area, proposing the toast of the Press, said the Press had been very co-operative in the past and he hoped that a close relationship would be maintained with the S.M.A.E.

Mr. Rushbrooke replied, saying how pleased he was to be at an S.M.A.E. function and to see so many provincial members there. He paid tribute to the work of the Press side of the S.M.A.E. by Mr. York, Mr. Laidlaw-Dickson and Mr. Wilson.

The toast to the Clubs, Areas and the S.M.A.E. was proposed by Mr. J. P. Buckeridge, who said that the dinner was an example of what the S.M.A.E. could provide for its members, in bringing clubs and individual members together. He expressed the opinion that the clubs had done more for the model aircraft movement than all the books written on the subject, as they provided a means for the effective pooling of ideas and knowledge.

In his reply, Mr. Bentley said that he believed that the S.M.A.E. were approaching an era of organisation and success with which the clubs and the areas would be proud to be connected.

Mr. Silvio Lanfranchi, in a very humorous speech, proposed the toast to the ladies.

Paying tribute to the ladies, he thanked them for coming along in such numbers and said that he hoped that there would be a dance next time.

Mrs. Hoyle, of Brentford, replied on behalf of the ladies, thanked Mr. Silvio for his remarks, and hoped to see many ladies present at future functions.

A toast to our "friends from the provinces" was proposed by Mr. M. R. Knight.

Mr. Lawton replied on behalf of the provinces and said that the provincial members had thoroughly enjoyed themselves and he hoped that many London members would visit the provinces, where they could be sure of a hearty welcome.

A very enjoyable evening closed with Miss Rene Harrison, a B.B.C. artist, singing, and playing a piano-accordian, accompanied by Miss Hammond at the piano.

NORTHERN AREA COUNCIL MEETING

Northern Area Council Meeting, held at Y.M.C.A., Peter Street, Manchester. Chairman, Mr. A. B. Molyneux (Wallasey); Secretary, Mr. W. Titterington, B.Sc. (Ashton). Clubs represented: Ashton, Bradford, Cheadle, Keswick (P), Lancaster, Morecambe (P), Rochdale, Rhyl and Prestatyn, Huddersfield, Sale, Salford, Merseyside, Wallasey, Whitefield.

Minutes of last meeting read and approved.

It was stated that 49 clubs had been circulated *re* future announcements; 29 had replied, 20 had not replied. These 20 were now crossed off the list for future letters.

A letter was read from York M.F.C., but their proposed resolution was considered not to be in keeping with the spirit of the Northern Area Council.

A complaint was also dealt with from the Manchester and District Council with regard to sale of balsa.

Mr. Cripps announced result of the October decentralised Glider Competition: 1—Cookson, 492 sec.; 2—Whittle, 392 sec.; 3—Wakefield, 390 sec.

All the above are members of the Whitefield Club. Congratulations to the winners.

The Northern Area delegation to the S.M.A.E. Council meeting in London then gave an account of their meeting with the S.M.A.E. Council, and the splendid welcome and courtesy accorded to the delegation by the S.M.A.E. Council, and of the kindness of the secretary, Mr. Bell.

Mr. D. Salloway was appointed publicity secretary.

Next meeting at Y.M.C.A., chairman to be Mr. Calvert, on December 15th or January 5th, at 3 p.m.

The meeting closed with a vote of thanks to the chairman.

MIDLAND AREA INDOOR RALLY

The Birmingham M.A.C. Indoor Rally, held at the "Friends' Institute," Birmingham, on December 8th, was well attended by most of the Midland clubs.

The 1-oz. R.T.P. was won by R. Parham, of Worcester, flying an all-microfilm machine which had double-surfaced wings and double covered fuselage, which also proved its worth by winning the 2-oz. event, using a heavier motor.

The next contest was for speed models, being won by that well-known all-rounder R. Monks. His model was an all-balsa slab-sider, which looked suspiciously like a miniature "Peewit."

The last contest was for free-flying models, where microfilm and tissue-covered jobs competed together. The winner was G. Bradwell, with his well-known 30-in. microfilm.

Results

1-oz. R.T.P (agg. 2 flights).

R. Parham (Worcester), 332.4 sec.; K. Thomas (East Birmingham), 297.6 sec.; R. Monks (Birmingham), 176.2 sec.

2-oz. R.T.P. (agg. 2 flights).

R. Parham (Worcester), 204.7 sec.; K. Thomas (East Birmingham), 196.7 sec.; R. Oliver (Kings' Heath), 129 sec.

Speed Contest (5 laps, 6 ft. line).

R. Monks (Birmingham), 28.6 m.p.h.; G. Bradwell (Birmingham), 27.9 m.p.h.; J. Hickling (Birmingham), 25.7 m.p.h.

Open Free-flying (1 flight only).

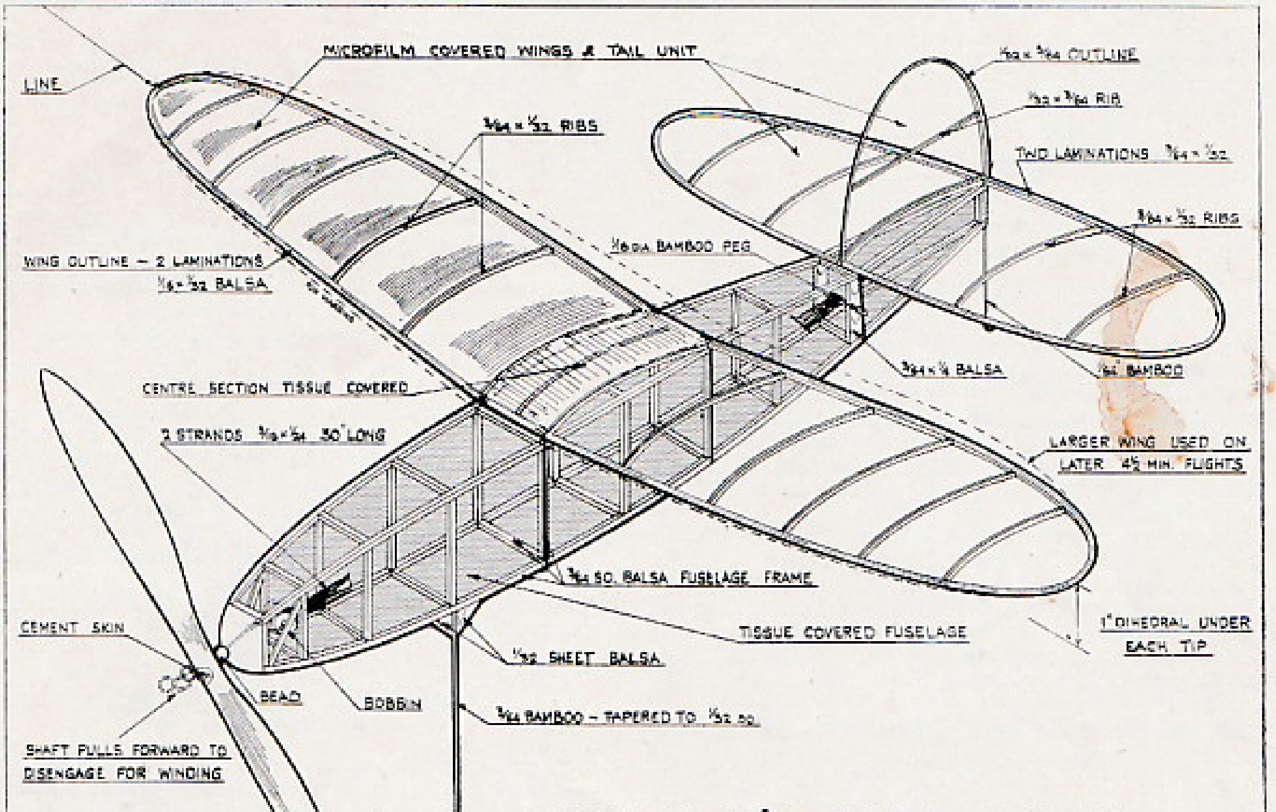
G. Bradwell (Birmingham), 138 sec.; S. Ward (Wolverhampton), 120.6 sec.; P. Winter (East Birmingham), 101 sec.

SOUTH BIRMINGHAM M.F.C.

So far we have been unable to use the hall at Turves Green for indoor flying, but we shall be able to use this room every fortnight starting from November 30th, and we intend to make full use of this opportunity.

Preparations are also being made for next season. We have high hopes of securing the use of a private field of generous proportions not far from our present ground on Cofton Park.

Negotiations are going on for an Education Committee grant to cover a large percentage of our expenditure during 1946.



COPLAND'S R.T.P. MODEL

SPAN: 21·5" LENGTH: 17·6"
TOTAL WEIGHT 5/8 OZ.

A lightweight rubber model of 36-in. span has been designed, as a standard club model, by Messrs. Boonham, Cook and Joines.

Mr. H. G. Cook, our President, is presenting a silver cup for the best indoor flight of the year. Two shields are also being made for the Points Contests.

BLACKHEATH M.F.C.

Great indoor activity is now evident in the club and monthly meetings are held in the clubroom. The first round of the L.A.C. Indoor Championship was a December attraction, the club flying against Chingford.

Several members attended the N.H. prize-giving dinner at Crouch End on November 9th, and also the Bromley club dance on November 10th, and thoroughly enjoyed themselves.

BLACKPOOL AND FYLDE M.A.S.

We had nine entries for the Northern Area October Sailplane Contest, and on two Sundays we were lucky to have almost perfect flying weather. F. Mitchell made the best aggregate, flying a "Vagabond," but he was unlucky to lose his model on its second flight of 258.5 sec. o.o.s. His total of 357.5 sec. was closely followed by a junior member, M. A. Rowles, flying a 20-min. glider, his total of three flights being 344.3 sec. J. Pennington was third with a total of 279.4 sec. F. Mitchell thus won the local prize of £1 1s. for this contest, kindly presented by Mr. Uttley, sen.

During Thanksgiving Savings Week an exhibition was held in the local Grammar School and there was a number of fine models on show.

CARDIFF MODEL AIRCRAFT CLUB REPORT

We entered for the 1945 Welsh Rally in calm and dull conditions. Times were :—

B. Morgan	... 206 sec. agg.	(Percy III)
R. Prior	... 158 ,, ,,	(Dr. Tu)
P. Persen	... 280 ,, ,,	(Catswhisker)
J. Phillips	... 293 ,, ,,	(Happity)
Total	... 937	

This gave us our third successive win.

The "Wartime Cup" competition was held on October 7th. Only two visitors, Messrs. Horseman and Bartlett, from Mountain Ash, competed. The winner was Mr. B. Morgan with 168 sec.

A clubroom has been obtained, so we hope to do quite a bit of R.T.P. flying this winter.

HATFIELD M.A.C.

An inter-club rally was held between the Cranborne M.A.C. and ourselves on November 18th last. We managed to get some quite good flights, although the weather conditions were not favourable with a wind of nearly gale force. Mr. K. Taylor won the Open Rubber Duration for us with a flight of 1 min. 13 sec. with a machine of his own design. We also pulled off the glider event, but with only a few seconds to spare. !

Recently, Mr. Fraser broke the club's R.T.P. record with a flight of 1 min. 3.5 sec. As the previous record was rather low, this flight caused great excitement.

KENT M.A.S.

On November 17th members went to the Village Hall at Orpington, where the Bromley club were holding an exhibition of model aircraft in aid of the local hospital.

There was a very fine display of models and R. Bradford, a 16-year-old member of the N.K.M.A.S., took the third prize (silver medal) in the solid section with a very fine Spitfire, out of a "field" of 80 models.

Another member, R. White, received a certificate of merit for a fully-detailed Lancaster, while the Society itself was presented with a certificate for excellence of models.

LUTON AND DISTRICT M.A.S.

The annual general meeting of the club was held on Tuesday, November 27th, and members were pleased to see Dan Bateman with us again, having been demobbed.

The minutes of the last annual general meeting were read; the Treasurer gave his report, which was highly inspiring. The Competition Secretary finished his report with the hope that there would be more competitors next year and the meeting then went on to elect the officers for the coming year.

Sam Barret was elected as Chairman (the right man in the right place). The really difficult job was to find a man who would stand as Competition Secretary. However, one was found in S. Millar and a helper for him was E. W. Thorne. R. Brown was re-elected as Treasurer and the committee members were elected. Mr. E. Clark thanked the juniors for keeping the club on its feet during the war.

MERSEYSIDE MODEL AIRCRAFT SOCIETY

Outdoor flying virtually ceased at the end of October with the advent of a cold, damp, spell and the club has retired indoors to proceed with its activities. Quarters for winter flying have been procured at the Common Hall, Hackins Hey, Liverpool, and at St. James' School, opposite the Cathedral. The first meeting took place on November 24th at the Common Hall, and several members are busily engaged in building R.T.P. models.

Further meetings are to be held at fortnightly intervals.

NORTHAMPTON M.A.C.

Much enthusiasm for rocket models is still being shown—R. Goodman having several times demonstrated his rocket-propelled semi-scale He. 162 successfully. He is also testing a rocket-assisted speed model incorporating "laminar flow wings." Mr. Knight is also experimenting with a 16-in. span "Vampire," but is experiencing trouble with his rocket-units. Latest club meetings have shown a steady increase in numbers, many new members being joined.

Recently, the club was glad to welcome back Mr. E. W. Evans, a well-known modeller before the war, who has recently been demobbed.

PRESTON AND DISTRICT M.F.C.

After a season of very poor flying, a few of the members are really getting into their stride, with the result that at a recent meeting, A. Webber (the Club Secretary), flying a "Vagabond" lightweight glider, put up seven consecutive flights of 84.2, 91.2, 83.2, 83, 85.4, 66 and 47.6 sec. All but about two of these flights were clocked out of sight.

During the summer, we paid a visit to the Blackpool and Fylde M.A.S. flying ground at St. Annes. After waiting in a shelter nearly all the afternoon, we were given the thrill of watching Mr. J. Owen's "Yorkshire Pudding" (a duration of his own design) climb well into the clouds.

TWICKENHAM AND DISTRICT MODEL AIRCRAFT CLUB

An R.T.P. competition held recently was won by G. Cudmore, the hon. secretary, who was flying a "Warring" model. Several free-flying models have been flown recently, the highest time achieved being 60 sec.

G. Cudmore's "Hamilcar"—his own design—has created much comment, the construction and detail being excellent, and H. Martin is fitting his imitation "gas" model with interior lighting and hopes to be able to fly it "tether control."

WALTHAMSTOW M.A.S.

Now that the winter is here everybody is hard at work building new models for the coming 1946 competition season, the most oustanding model under construction being F. E. Deudney's original designed F.A.I. sailplane, span 50 in. An exhibition will be held early in the New Year to boost club membership.

CHANGES OF ADDRESSES AND NEW CLUBS

St. Georges Heights M.F.C. : Hon. Sec., Ray Jessop, 2, Burleigh Park, Addlestone, Surrey.

Grantham M.A.C. : Hon. Sec., P. Spalding, 99, Walton Gardens, Grantham, Lincolnshire.

Victoria M.A.C. : Hon. Sec., Mr. W. R. Clark, 31, Temple Dwellings, Old Bethnal Green Road, Bethnal Green, E.2.

CHANGE OF TITLE

Preston and District Model Aeronautical Society. Hon. Sec. : A. E. J. Webber, 18, Anchor Drive, Hutton, Nr. Preston, Lancs. (Previously The Preston & District Spotters and Model Flying Club.)

ORIGINAL DESIGNING

(*Continued from page 22*)

the upper line in relation to the centre-line and the front of the fuselage should be made and then inverted *below* the centre-line, correctly positioned and then traced through to the drawing-paper. Alternatively, the curve can be reproduced by transferring its dimensions at various suitable station points along its length with dividers or compass and drawing it in with the help of a spline.

Stage 6 shows the addition of the fuselage structure. This is done by drawing in a line round the inside of the fuselage sides, representing the thickness of the fuselage side frames and then, by use of a set-square and T-square, projecting the fuselage spacers shown in the upper *side-view drawing* on to the plan view.

Finally, such additions as sheet-filling diagonal braces, gussets, etc., can be drawn in.

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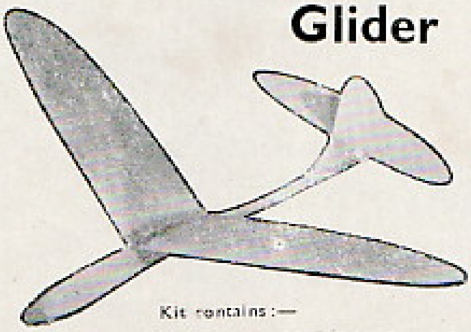
'ÉLITE' MODELS

The "BAT"

15-inch wing span.
Kit contains :—
CUT-OUT BODY, WINGS, PLAN, etc.

KIT **2/-**

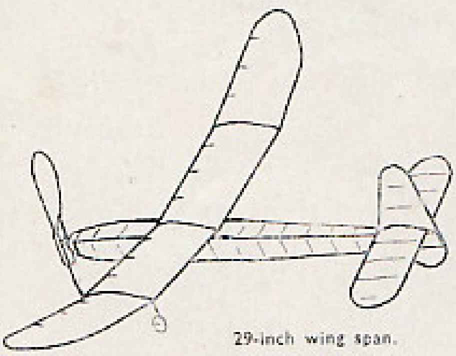
ELITE 20 in. Solid Glider



Kit contains :—
CUT-OUT BODY, WINGS, TAILPLANE AND RUDDER, CEMENT, PLAN.

KIT **3/6**

"SKYROCKET"



29-inch wing span.
Kit contains :—
CUT-OUT RIBS, BALSA STRIP AND SHEET, PLAN, PROP., etc.

KIT **7/-** post free.

"JUNIOR" CONTEST MODEL

33-inch wing span.
Kit contains :—
CUT-OUT RIBS, STRIP AND SHEET BALSA, CEMENT, 14-inch SAW-CUT PROP., TUBING, WIRE, BUSH, etc.

KIT **10/1** post free.

"ELITE" INTERMEDIATE GLIDER

20-inch wing span.

Complete KIT **3/6** post free.

Contains :—
CUT-OUT RIBS, CEMENT, TISSUE, etc.

GLIDER No. 3

45-inch span.
FULL-SIZE PLAN AND CUT-OUT RIBS ONLY

5/6 post free.

GLIDER No. 1

30-inch span.

Complete KIT **6/6** post free.

Contents of Kit :—
CUT-OUT RIBS, CEMENT, TISSUE STRIP, etc., and FULL-SIZE PLAN

GLIDER No. 2

36-inch span.

Complete KIT **9/1** post free.

"PETREL" Endurance Model

24-inch span. KIT **6/-** post free

Kit contains :—CUT-OUT RIBS, TISSUE, CEMENT, etc., FULL-SIZE PLAN.

"GNAT" GLIDER

16-inch.
Kit contains :—
PLAN, RIBS, SHEET AND CEMENT, etc.

2/6 post free.

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SERIES 1/72 SCALE

Supermarine Spitfire VB
Supermarine Spitfire VB (Clipped Wing)
Hawker Hurricane II C
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Zero

KIT **2/3** post free.

1/72nd MESS. 163.

JET-PROPELLED FIGHTER. Complete Kit with Cockpit Cover. **2/-**

MESS. 262. Jet. 1/72nd Solid Kit **3/6**
AIRACOMET. Jet. 1/72nd Solid Kit **3/6**
Above Kits contain Cockpit Covers.

Plans of two new duration models now obtainable—
Junior Contest Model 33-inch span **1/3** post free
Elite Skyrocket 29-inch span **1/3** post free
KITS WILL BE READY SHORTLY
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ALL ACCESSORIES STOCKED—Including Balsa Substitute, Cement, Dopes, Finished Props, etc., etc.

ELITE MODEL AIRPLANE SUPPLIES
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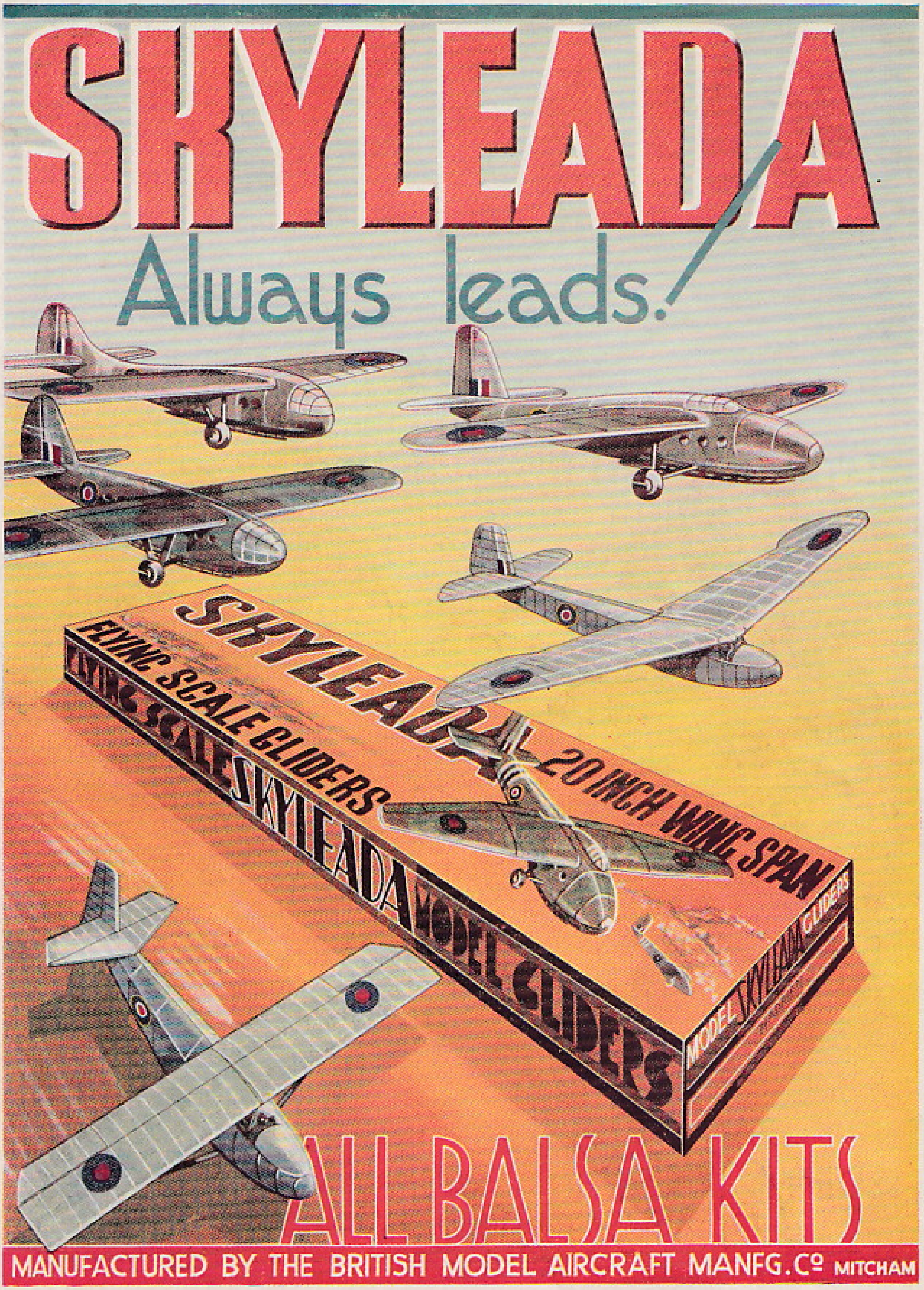
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Always leads!
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FLYING SCALE GLIDERS
20 INCH WING SPAN
FLYING SCALE SKYLEADA MODEL GLIDERS
MODEL SKYLEADA GLIDERS
ALL BALSA KITS
MANUFACTURED BY THE BRITISH MODEL AIRCRAFT MANFG.Cº MITCHAM