JUNE 1947

# AEROMODELLER

1/3

# Digital Edition Magazines.

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All Plans and Articles can be found here:

Hlsat Blog Free Plans and Articles.

http://www.rcgroups.com/forums/member.php?u=107085

AeroFred Gallery Free Plans.

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# Hol-


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Due to circumstances entirely beyond our control, it is not now possible to include Airwheels in our "SPARTAN" kit. The revised retail price, excluding this commodity, is now **33/6**, post **1/-**. The inclusion of Airwheels will be resumed at the very earliest opportunity.

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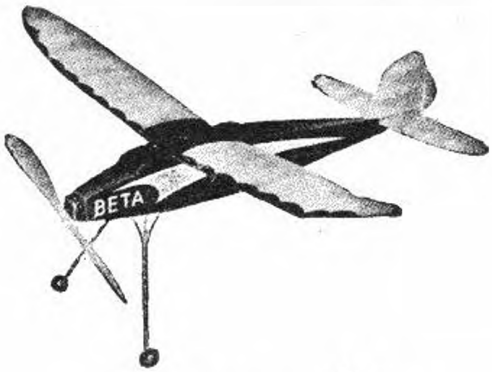


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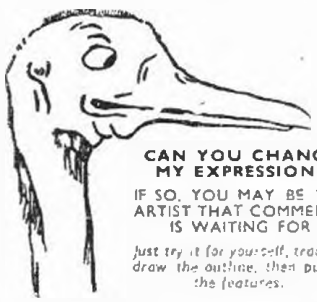

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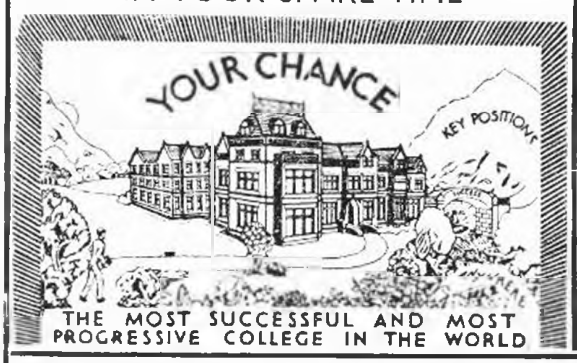


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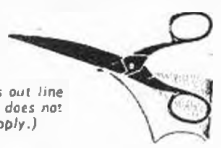

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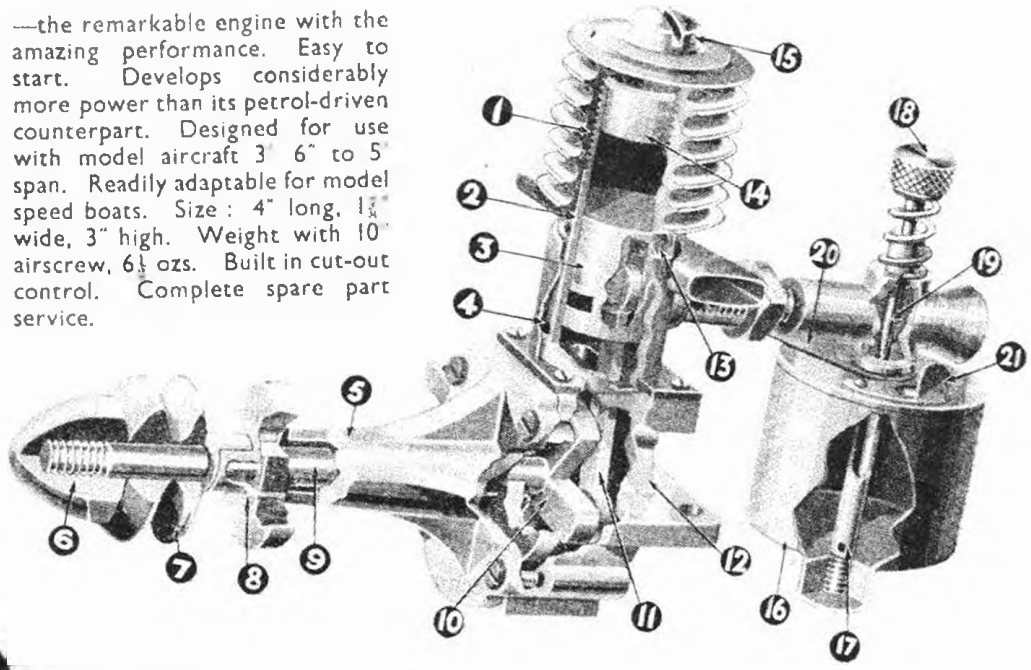

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The AEROMODELLER
INCORPORATING "THE MODEL AEROPLANE CONSTRUCTOR"
ESTABLISHED 1935

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*The Model Aeronautical Journal of the British Empire*



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# Contents

Super Soaring Country enjoyed by aeromodellers in Czechoslovakia, which numbers amongst its ten million inhabitants some of the keenest enthusiasts in Europe. An article on their activities by Milan Horejsi, Czechoslovakia's ace designer, will appear in an early issue.

# EDITORIAL

## "The Chief" Returns

LAST month, for the first time since the present proprietors acquired the AEROMODELLER nearly 12 years ago, an Editorial appeared with which the Managing Editor, Mr. D. A. Russell, had nothing to do. Now he is back at the helm, having been rendered *hors de combat* through nothing more sinister than that malady of our childhood, chicken-pox!

Son Timothy had it first, and father proceeded to follow suit, a most unexpected happening, since Mr. Russell is the possessor of an exceptionally sound constitution. Doubtless, however, his susceptibility to attack was not unconnected with the fact that during his many years as Managing Editor—a period during which the circulation of the AEROMODELLER has increased by many times the original figure—he has not spared himself even to the extent of a single extended holiday. At any rate, there he was confined in his bedroom for the first time since he was a youngster, and when the doctor said in effect, "Here's where you take a long-overdue rest, don't hurry back to your desk," he, with confidence that a trained staff would keep things going, was able to reply with an easy mind, "O.K."

Mr. Russell's choice of venue for his convalescence was Jersey, reached incidentally with comfort and appropriateness by air transport in the form of a trusty D.H. Rapide. In that magic isle he not only enjoyed the physical and mental tonic of 13 hours of sunshine daily, but the pleasure of contact with the local aeromods (where in these days are these interesting specimens of the *genus homo not* found?) and a delightful surprise meeting with one of the stalwarts of the movement, concerning which there was quite a dramatic touch.

Wandering one morning into a little shrine at St. Brelade's Bay, what should confront his gaze from the current page of the visitors' book but the name of Father Amiard, a name well-known and honoured throughout the movement. A spot of slick detection work served to locate this old friend in a hotel at St. Helier, he having brought a dozen or so boys and girls from Flers on a short trip to the island by fishing-boat.

Scarcely need it be added that a very convivial evening resulted, an occasion rich in renewed and heightened friendship, interesting interchange of up-to-the-minute "gen.", and cheery anticipatory reference to future meetings. And so, the brief holiday break over, the Managing Editor is back at his Editorial desk, with renewed vigour, and ideas in plenty for the immediate and not-so-immediate future!

## REPORT ON EATON BRAY

ELSEWHERE in this issue will be found the Director's Report and Chairman's speech at the Second Annual General Meeting of Eaton Bray Model Sportsdrome, Ltd. held at The Aerodrome on April 25th last. This Report on the "Aeromodellers' Mecca" as it has been fittingly called, covers a thirteen-month period ending January 31st last, and will, we think, be of interest to all readers of this Journal.

Eaton Bray is not only a pioneer venture, it was a bold and forward looking enterprise launched at a time of unprecedented austerity and dislocation in many departments of everyday life and activity. Under such unhelpful circumstances it is scarcely surprising that despite the expenditure of very considerable time, money and effort, much remains to be done to bring into actuality the full plans of the originators. Nevertheless, despite the handicaps referred to, plus long spells of atrocious weather that might well have cooled the enthusiasm of almost any other group of people than aeromodellers, the balance sheet shows a useful trading profit of something over £3,000 and a proposed disbursement in dividends of £640.

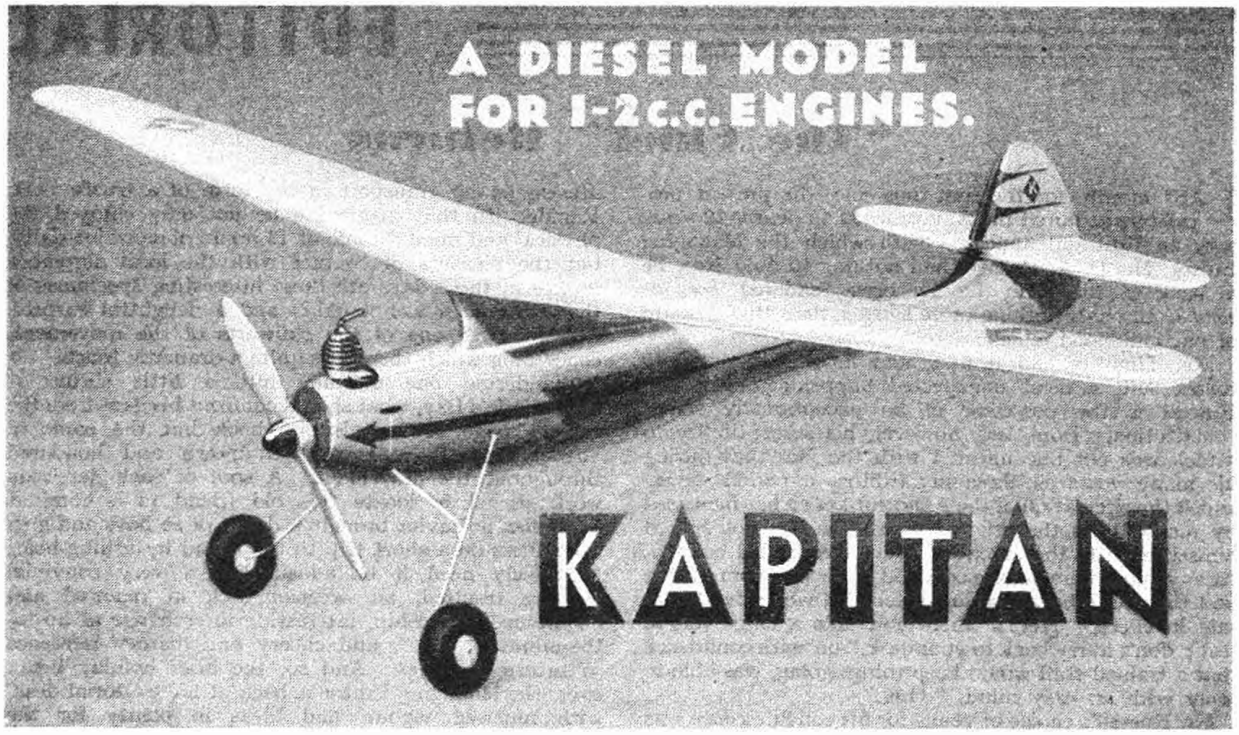
It is interesting to note from the Chairman's report, at the Second Annual General Meeting, that during the period under review the Company not only forged ahead with the development of the Sportsdrome, the erecting of buildings, and the provision of further facilities for visitors, but also strengthened its position by acquiring that flourishing enterprise, the Aeromodeller Plans Service Ltd.; also the North London Bookbinding Co. (binders of the "Aircraft of the Fighting Powers" series and various technical publications), the Drysdale Press (publishers of the Model Mechanic and Model Cars), and the Photographic Studio section of Aircraft (Technical) Publications Ltd.

The potential advantages of these arrangements, plus the trading results already reported, augur well for the future, especially when present rigours are abated. They can hardly fail to impress many to whom aeromodelling has hitherto been regarded with but superficial attention and interest, and they will be noted with particular satisfaction by the larger number of well-known aeromodellers who had sufficient faith in the movement in general, and the Eaton Bray management in particular, to back the venture financially.

Incidentally, the financing of the Eaton Bray project may be regarded very much as a co-operative effort by the management and the staff.

Out of a total subscribed capital of some £43,000, over £33,000 has been put up by the Directors and staff of the Company. In addition, something under £3,000 has been subscribed by members of the Model Aircraft Trade whilst the balance of about £7,000 has been subscribed by various friends of the Directors and well-known Aeromodellers throughout the country.

Despite restrictions on travel and the foulness of the weather, no fewer than 10,000 persons paid for admission to the Sportsdrome during the 1946 season—a pretty good start, it will be conceded. The International Rally which attracted entries from six countries is to be organised on an increasing scale each year. Camps and instructional facilities are also to be developed, and with these and other improvements, attendance should step-up progressively. In short, the prospects for the future are distinctly promising.




THE trend amongst builders of small models for the now immensely popular miniature diesels, particularly in the 1–2 c.c. class, seems to be towards the high pylon ultra lightweight contest style so popular both in the States and on the Continent. Whilst accepting its performance and almost vertical climb as something desirable, and even essential for competition success, we do feel that it often leaves much to be desired on the grounds of appearance. "Kapitan" would seem to be the answer to those who insist on high performance and yet require attractive lines.

This model is a proved machine, developed over several years by a leading Czech aeromodeller. Originally designed for all hardwood construction, it is even more attractive in balsa, as a monocoque fuselage may be employed. While not exactly a beginner's model, it is one that may be attempted by anyone who has built a sailplane of equal span, as there is nothing tricky in assembly, wing fixing or trim.

**The Fuselage.** Cut out formers of materials specified, notching for longerons with the side of a fine file. Fix top and bottom longerons first, holding them in place with rubber bands until cement is dry; then add the remainder in twos to avoid distorting the shape. This can safely be judged by eye, though there will be some who prefer to build on a jig. After fixing the undercarriage blocks and wing-mount, cover fuselage with sheet balsa and sand down smooth. Note that the front bay containing the engine is detachable. The actual fixing method will depend on the engine in use—with some designs it may be necessary to insert runners to take the fixing lugs. The undercarriage legs should be inserted through the reinforcing blocks and soldered together where indicated. If desired, a light fairing may be added for appearance, constructed either of rolled gummed brown paper or soft balsa bound with tissue or silk.

**Wings.** These are simple in construction and may be built in two halves. Note the reflex trailing edge of the ribs, which should be followed carefully if the best is to be obtained from the section. After completion, the two wings are joined together with the $\frac{1}{4}$ in. ply tongue between. This is a neat and simple fixing which enables the wing to fracture the retaining dowels without other damage in the event of a heavy landing.

**Tailplane.** This is light and simple and presents no difficulties. The dowel retaining tubes should be rolled to a good press fit. If they work looser after a time the dowels may be coated with cement until a sufficiently tight fit is achieved. Adjustment is made by slipping the wire prongs in an appropriate hole in the fin, pivoting about the dowel.

**Covering.** The advice to cover with strong bamboo paper may be difficult to follow, but in the absence of this, double covering with the best tissue obtainable will prove adequate. After doping, a little ornamentation with cellulose paint improves the general appearance, and, especially round the nose of the fuselage, protects the wood and covering from the effects of spilled and splashed mixture.

**First Flights.** Having tried the model for glide in the approved fashion over long grass, its first power flights may be undertaken. It is safer to start with rise-off-ground flights than to risk a hand-launch under power. In a small engine there will probably be no form of timer fitted, and flights should be regulated by the amount of fuel in the tank. A first trip of ten seconds' power will be enough to reveal faults without undue danger. Check potential faults one at a time, and increase power progressively as they are cured.

**Full-size Plans.** As usual, full-size working drawings may be obtained, price 3/-, post free, from Aeromodeller Plans Service, Allen House, Newarke Street, Leicester.

A 40" SPAN PYLON WING DIESEL MODEL

# KAPITÁN

DESIGNED BY B. PILAŘ

2/6

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ALLEN HOUSE NEWARKE STREET LEICESTER

POWER. A 1C.C. TO 2 C.C. DIESEL ENGINE

ALL WOODS USED UNLESS OTHERWISE STATED ARE BALSA

NOTE – NO ENGINE MOUNT IS SHOWN AS THIS VARIES WITH DIFFERENT MAKES OF DIESEL ENGINES

COVERING & DOPING

COVER ALL SURFACES WITH STRONG BAMBOO TISSUE. APPLY 1 COAT OF CLEAR DOPE & 2 OF BANANA OIL TO ALL SURFACES. MODEL CAN ALSO BE COLOURED DOPED

## MATERIALS REQUIRED

SHEET.
- 2 SHEETS OF BALSA 36"X 5"X 1/16"
- 1 " " " 3"X 3"X 1/8"
- 1 " " PLY 36"X 3"X 1/16"

STRIP.
- 1 STRIP OF BALSA 1/8"X 5/32"X 36"
- 4 " " " 1/8"X 3/16"X 36"
- 6 " " " 1/8"X 1/4"X 36"
- 1 STRIP OF BALSA 1/8"X 1/2"X 24"
- MISC.
- 30" OF 12 S.W.G. PIANO WIRE
- 3" " 1/8" INT. DIA. PAPER TUBE
- 8" " 1/8" DIA. BIRCH DOWEL
- 1 PAIR OF 2 1/2" DIA. AIRWHEELS
- ODD PIECES OF 1/16" PLY, 1/8" PLY & 1/16" & 3/32" SHEET BALSA

FUSELAGE FORMERS

HOLES TO TAKE 3/32" DIA BAMBOO PEGS

FORMER 1 OF 3/16" PLY, 2 OF 3/32", 3 OF 1/16" & FORMERS 4 TO 11 OF 1/16" PLY

3/32" SHEET BALSA

COVER FUSELAGE WITH 1/16" SHEET BALSA. SAND DOWN TO 3/16" AT REAR

HOLES FOR ADJUSTMENT OF TAILPLANE INC.

TAILPLANE E

1/16" PLY

1/16" SHEET

1/8" DIA BIRCH DOWEL 5" LONG. CEMENT FIRMLY IN PLACE

1/16" SHEET

1/16" PLY

1/8" SHEET

1/16" PLY

1/16" PLY GUSSETS

HARDWOOD BLOCK

1/16" X 3/32" STRINGERS

3/16" X 1/8" STRINGERS

1/16" PLY

1/8" SHEET

COVER NOSE WITH 1/16" PLY

DETACHABLE ENGINE MOUNT

THRUST LINE

HARDWOOD BEARER

3/32" DIA BAMBOO LOCATING PINS

BEND & SOLDER

12 G. WIRE

GLUE FIRMLY IN PLACE

HARDWOOD BLOCK DRILLED TO 1/G. WIRE

DETAIL OF U/C FIXING

U/C TRACK 2"

2 1/2" DIA AIRWHEELS

1/16" PLY

HOLES TO TAKE 1/8" DIA PEGS

1/16" SHEET

20 G. WIRE ROUND & CEMENTED IN PLACE

WING RIBS

ALL WING RIBS 1/16" SHEET

FIN RIBS

ALL FIN RIBS OF 1/16 SHEET

1/4" X 1/8" L.E.

1/16" SHEET TOP & BOTTOM

1/8" SHEET

5 1/2" DIHEDRAL UNDER EACH TIP

HOLES TO TAKE 1/8" DIA HARD BALSA PEGS 1 1/2" LONG

1/16" PLY

1/4" X 3/16"

1/8" SHEET

EXPLODED VIEW OF WING MOUNT

1/16" SHEET GUSSETS

SET RIB E AT THIS ANGLE

CEMENT WING HALVES TO F

PAPER TUBE TO TAKE 1/8" DIA. DOWEL

3/16" X 1/8" L.E.

3/16" X 1/8" SPARS TOP & BOTTOM

RIBS E & S OF 1/16" SHEET, D OF 3/32" SHEET

TAILPLANE RIBS

1/8" SHEET GUSSETS

1/4" X 1/8" SPARS TOP & BOTTOM

1/8" SHEET

1/8" X 1/16" T.E.

PET 247

# AERODYNAMIC DESIGN

PART EIGHT

BY JOHN HALIFAX

## Climbing Flight.

Because it is closely connected with the theory of "downthrust," the most publicised bone of contention in low speed aerodynamics, climbing flight has always remained an obscure subject to the average aeromodeller. Yet basically it is one of the simplest, and this introduction to it is intended to clear the air for later work.

FIG. 1.

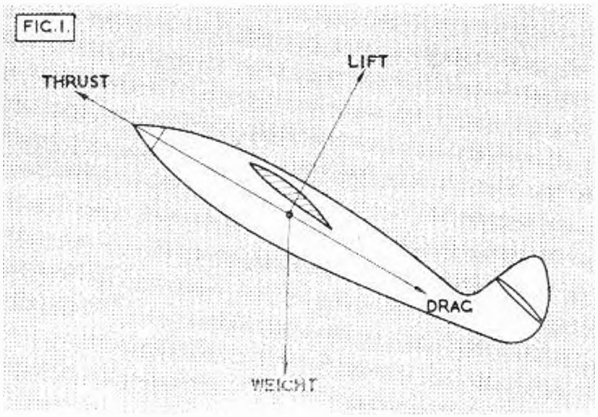
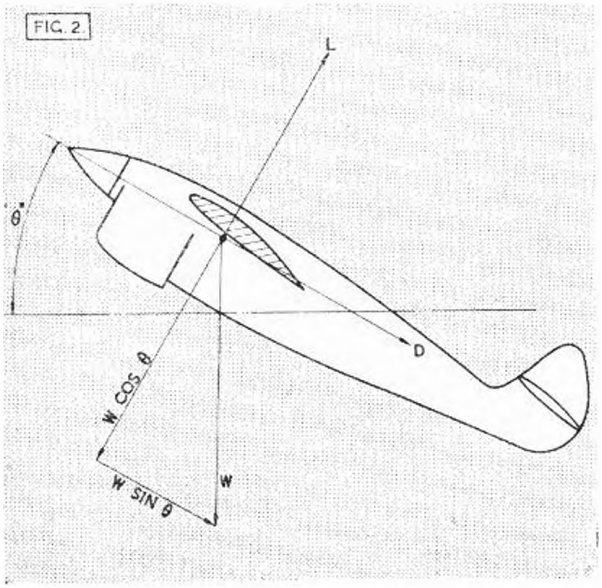



FIG. 2.




The forces acting on a model during the climb are shown in Fig. 1. This is obvious, and simple to understand; but in Fig. 2 we have a more comprehensive diagram which shows the simple picture to be rather misleading. In the first place, the lift is not equal to the total weight, as in normal horizontal flight, but to a component of it. Because of this, many modellers assume that the coefficient of lift must be smaller under climbing conditions, but this is by no means the case.

We have already seen that in the absence of any disturbing force, a statically stable aircraft must always fly at one and only one angle of attack, and thus any hypothesis which has to shield itself behind a varying $C_L$ as it were, is quite useless.

Now lift depends upon four variables: density of the air, wing area, coefficient of lift, and velocity. Only the last two can be varied in flight, and as we have considered and discarded the first of these, we are left with velocity. It is obvious then, that a machine climbs at less than its normal flying speed, and the actual figure is given by the formula.

$$V^1 = V\sqrt{\cos\theta}$$

where $V^1$ = velocity in climb.
$V$ = normal velocity (N.H.F.)
$\theta$ = climbing angle in degrees.

The reason for the reduction is not hard to find: in normal flight we have

$$\text{thrust} = \text{drag}$$

but during the climb:—

$$\text{thrust} = D + W \sin\theta \quad \ldots \text{ equation 1.}$$

If thrust is constant, as in a petrol model, then the flying speed must drop until the right hand side of the equation is equal to it.

A rubber-powered model, with its preliminary burst of power and ever varying torque curve is a rather more complicated case, and since this is an introduction, I will deal with it later in the series.

## The Climbing Angle.

From equation 1, we get the expression

$$\sin\theta = \frac{T-D}{W} \quad \ldots \text{ equation 2.}$$

where $\theta$ = the climbing angle.
$D$ = drag during the climb

This last quantity is rather troublesome, because we only know the drag for normal flight, but the equation can be re-written to give

$$T-D\cos\theta = W\sin\theta \quad \ldots \text{ equation 3.}$$

TABLE 1.

| θ | Cos θ | D cos θ | T-D cos θ |
|---|---|---|---|
| 20 | 0·9397 | 0·9397 | 4·063 |
| 25 | 0·9063 | 0·9063 | 4·0937 |
| 30 | 0·8560 | 0·8560 | 4·1440 |
| 35 | 0·81915 | 0·81915 | 4·18085 |
| 40 | 0·7660 | 0·7660 | 4·2340 |

TABLE 2.

| θ | Sin θ | W sin θ |
|---|---|---|
| 20 | 0·3420 | 2·74 |
| 25 | 0·4226 | 3·41 |
| 30 | 0·5000 | 4·0 |
| 35 | 0·5736 | 4·59 |
| 40 | 0·6428 | 5·15 |

This must be solved graphically, as in Fig. 3, the calculations for which are given in tables 1 and 2. It is evident that the use of equation 3 is simplicity itself, but in the case of Fig. 3 it seems wasted effort nevertheless.

Consider the example in full. We have a model whose weight is 8 ozs., thrust 5 ozs. and drag 1 oz. From the approximate equation 2, we obtain

$$\sin\theta = \frac{5-1}{8} = \frac{1}{2}$$

therefore $\theta = 30°$.

Now calculating equation 3, as in tables 1 and 2, we get Fig. 3, where it is evident that the true climbing angle is 60·1°. The error involved in this case by using the approximate formula is 0·3 per cent.—a negligible amount.

But now consider a higher powered machine, with thrust equal to its weight, say. Then we shall derive a graph similar to Fig. 4—and in this particular example equation 2 erred by 18·6 per cent.

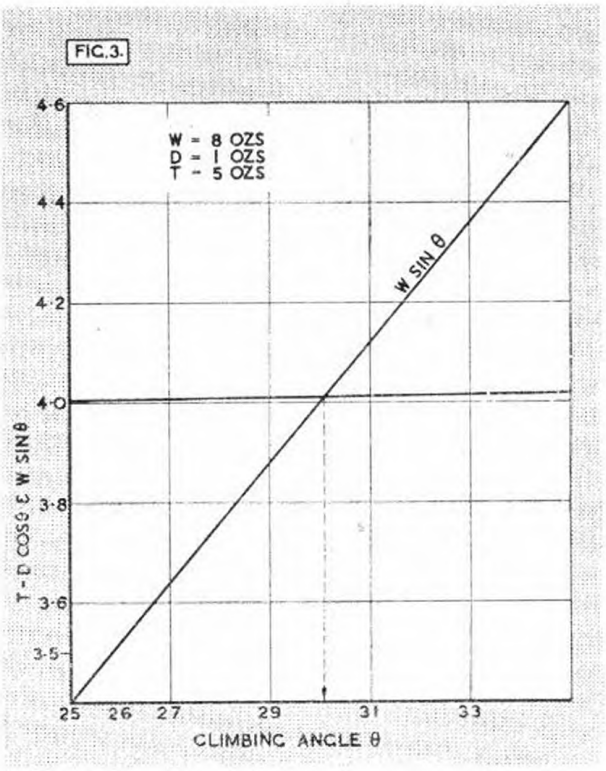
So a general rule seems clear; *for low powered models, equation 2 is quite accurate; for high power/weight ratios, equation 3 should always be used. Note that in this latter category the much used rate of climb formula,* i.e.,

$$R/C = \frac{33{,}000\ \text{E.H.P.}}{W}$$

*gives an accurate answer,* thus providing another example of the fact that formulæ in use in full-size aviation cannot be applied to models *ad lib.*

### Rate of Climb.

The speed at which a model climbs, for a given value of θ, is given by the equation




$$Vc = \sin\theta \sqrt{\cos\theta}\, V \quad \ldots \text{ equation 4.}$$

where Vc = climbing speed.

V = normal flying speed (N.H.F.)

Suppose a machine flies at 20 ft./sec., and is climbing at $\theta = 30°$.

$\sin 30° = 0{\cdot}5$

$\cos 30° = 0{\cdot}856$

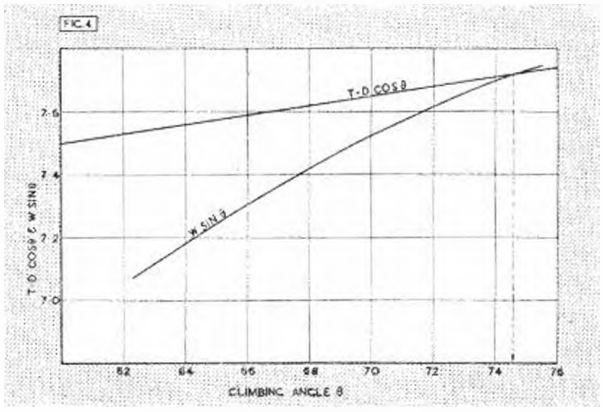
$\sqrt{\cos 30} = 0{\cdot}9253$

equation 4 becomes

$0{\cdot}5 \times 0{\cdot}9253 \times 20 = 9{\cdot}253$ ft./sec.

—and the rate of climb is obviously sixty times as great -

555 ft./minute.



# JET PROPULSION

## THEORETICAL THOUGHTS

BY F. G. IRVING

WHILST it is true that model jet units of the duct type can be made with some considerable degree of success by the well-tried methods of guesstimation, the time now seems ripe for a spot of theory. If possible, we wish to consider firstly what are the best types of jet unit for models, and secondly whether we can obtain some sort of guide to the expected performance.

To answer the first question we must decide what we want from a model jet unit. In the opinion of the writer, the most important requirements are (*a*) that the thrust/weight ratio shall be as high as possible, and (*b*) that the dimensions, particularly the diameter, shall be reasonably small. In full-size practice there is another very important requirement: that the specific fuel consumption shall be low, but this does not apply to models. Within very wide limits, the thermal efficiency is of very minor importance, provided, of course, that it is not so absurdly low that the weight of fuel required cancels out any advantages obtained under (*a*). But in general, the weight of fuel required for, say, one minute's running will be small, even if the thermal efficiency is a fraction of one per cent., as it probably will be. The pure jet, after all, is a high-speed method of propulsion, so that we can't expect very much from it at, say, 20-30 m.p.h. from the efficiency point of view.

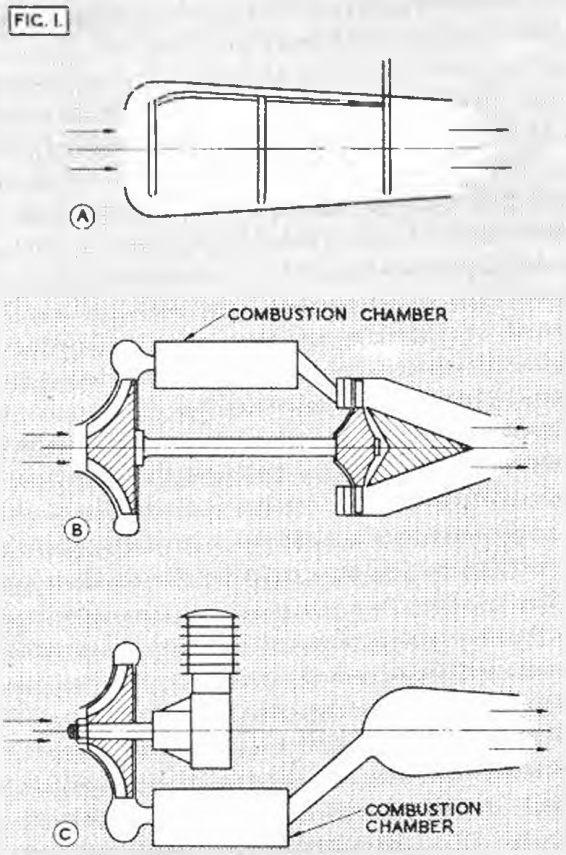
The types of jet unit which are, or may be, at our disposal are :—

(*a*) Propulsive ducts—either " straight through " à la Henwood, or of the VT variety.

(*b*) Turbo-jets, more or less of the full-size Whittle type.

(*c*) " Compound " units, *i.e.*, similar in principle to (*b*) but with the compressor driven by a reciprocating engine.

FIG. 1.




Both variations of type (*a*) would seem to be quite practicable as model units, and readily lend themselves to light construction from thin sheet metal. The thrust appears to be reasonable, in fact, if the figures given in the May AEROMODELLER for the Gianni Unit are accurate, the VT type should be very good on this score. Since the pressure rise due to ram is small, the thermal efficiency is exceedingly low, as shown below. (Which reminds me, how do these people arrive at their figures for thrust ?)

With regard to type (*b*), here I am somewhat pessimistic. In order for this type of unit to work at all, the turbine must be capable of driving the compressor, which means that there is a certain minimum adiabatic efficiency for the turbine-compressor combination, depending on the pressure ratio and max. temperature of the cycle, below which the contraption refuses to work. This combined efficiency is something to be reckoned with : for example, if the pressure ratio is 2, the air inlet temp. 15° C. and the max. temp. 1,000° abs., then the compressor and turbine will each need an adiabatic efficiency of about 50-60%. Whether we can get efficiencies of this order from the very small units we will be using, particularly from the turbine, remains to be seen. All honour to those who are trying to find out. Another point to be borne in mind is that to get a useful pressure ratio out of the compressor, which would presumably be of the centrifugal type, a truly phenomenal speed of rotation would be required. Without going into great detail, this results from the governing factor being the impellor tip speed, so that if the reader considers the speeds at which full-size units run, and then considers the relative diameters (say 12 : 1) of the full-size and model impellors, some idea will be gained of the speeds involved.

In the case of type (*c*), we do at least know that the compressor will revolve, but the above remarks about rotational speeds still apply. If the compressor is placed directly on the end of the engine crankshaft, its diameter

would have to be fairly large, adding weight and bulkiness, whilst on the other hand reliable yet light gearing would be very difficult to devise. However, this type might be a practical proposition for large scale models of jet-propelled aircraft.

Briefly then, type (*a*) is the most practical proposition, (*c*) is a doubtful second, and (*b*) is very doubtful indeed. The big advantage of (*a*), of course, is its simplicity, so since this is likely to be the most popular for the time being at any rate, let us see what sort of performance we can expect from it, and roughly what are the best proportions of duct to use. The following applies to continuous combustion units of the Henwood type, operating *without* "intermittent burring sounds."

Adiabatic compression and expansion are assumed, the changes of pressure and temperature being taken as small. It is also assumed—somewhat doubtfully—that combustion is complete at the section at which the full ram pressure is developed, and that the maximum cross section is sufficiently large compared with the inlet area to give a pressure rise of $\frac{1}{2}\rho v^2$. (Thus, if it is four times the inlet area, *i.e.*, twice the diam., 15/16ths of this pressure rise will be developed.)

Referring to Fig. 2, let $P_1$ be the absolute atmospheric pressure (lbs./sq. ft.), and let $P_2$ be the max. pressure (*i.e.*, $P_1$ + ram). $V_1$ is the velocity of entry of the air, assumed equal to the forward speed of the model, and $V_2$ is the exit velocity. $T_1$ is inlet temp. (° C. absolute), $T_2$ the temperature after compression due to ram, $T_3$ the temperature after combustion has taken place and $T_4$ the temperature at exit.

Then for compression between sections (1) and (2)

$$V_1^2 = 2\,Jg\,Kp\,(T_2 - T_1) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ 1$$

and for expansion to exit conditions

$$V_2^2 = 2\,Jg\,Kp\,(T_3 - T_4) \quad \ldots\ldots\ldots\ldots\ldots\ldots\ 2$$

Now the pressure ratios of compression and expansion are the same, so the temperature ratios are also the same *i.e.*,

$$\left(\frac{P_2}{P_1}\right)^{\frac{\gamma-1}{\gamma}} = \frac{T_2}{T_1} = \frac{T_3}{T_4} \quad \ldots\ldots\ldots\ldots\ldots\ 3$$

Whence from these equations :—

$$\frac{V_2^2}{V_1^2} = \frac{T_3 - T_4}{T_2 - T_1}$$

$$= \frac{T_4}{T_1}$$

$$= \frac{T_3}{T_1} \quad \text{very nearly}$$

or

$$V_2 = V_1 \sqrt{\frac{T_3}{T_1}} \quad \ldots\ldots\ldots\ldots\ldots\ 4$$

Hence, if we can find $T_3$, the max. temperature, we can find $V_2$.

Let the air/fuel ratio by weight be R, and let C = calorific value of the fuel (C.H.U. per lb.).

Then

$$Kp\,(T_3 - T_2) = C/R.$$

or, approximately,

$$Kp\,(T_3 - T_1) = C/R. \quad \ldots\ldots\ldots\ldots\ldots\ 5$$

where Kp = 0·24 C.H.U. per lb. per °c.

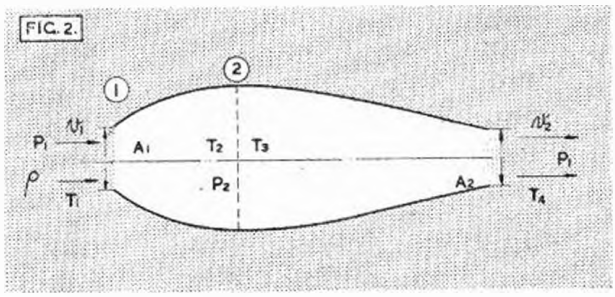
Thus we know $T_3$, and thus $V_2$.

If $A_1$ is the area of the duct at inlet, the thrust is given by :—

$$T = \rho A_1 V_1 (V_2 - V_1) \quad \ldots\ldots\ldots\ldots\ldots\ 6$$

And $A_2$, the exit diameter, by :—

$$\frac{A_1 V_1}{T_1} = \frac{A_2 V_2}{T_4}$$




*i.e.*,

$$\frac{A_1}{A_2} = \frac{T_1 V_1}{T_1 V_2} = \frac{T_3}{T_1}\sqrt{\frac{T_1}{T_3}} \quad \text{very nearly}$$

$$= \sqrt{\frac{T_3}{T_1}} \quad \ldots\ldots\ldots\ldots\ldots\ 7$$

So, knowing $V_1$, the speed of the model, $T_1$, the atmospheric temperature (15° C. = 288° C. abs.) and $\rho$ (= ·002378 slugs/cu. ft.), together with $T_3$ obtained either from equation 5 or from the maximum temp. the material will withstand, we can find (i) $V_2$ from equation 4, (ii) T from equation 6, and (iii) $A_2$ from equation 7. The maximum cross sectional area of the duct may be any convenient multiple of $A_1$, say three or four times $A_1$.

Suppose, for example, that $V_1$ = 30 ft./sec., the fuel being alcohol (C = 6560) and the mixture chemically correct (A/F. = 9 : 1).

Then $T_3$ = 288 + 3080 = 3368° C. abs. (looks as if we'll need an asbestos duct !).

Therefore

$$V_2 = 30\sqrt{\frac{3368}{288}} = 102 \text{ ft./sec.}$$

and $\frac{A_2}{A_1} = 3{\cdot}42$

Suppose the inlet is 2 in. diam. = ·0218 sq. ft.

Then the thrust is

·002378 × ·0218 × 30 × (102 — 30)

= ·112 lbs. = 1·8 ozs.

And the exit diam. will be 3·7 ins.

Although this is a usable amount of thrust, it does not seem very large. It would be very interesting to get some accurate experimental values, in order to compare them with the above. What about it, L.S.A.R.A. ? It would also be rather valuable if more were discovered about the increase in thrust when this type of unit starts to make odd noises. Another point which emerges is that if we keep the air/fuel ratio constant (*i.e.*, if the rate of fuel flow is made proportional to the speed), then $V_2$ is directly proportional to $V_1$, and therefore, from equation 6, the thrust is proportional to the square of the forward speed $V_1$. This seems to explain the increase in performance of the Henwood unit on a rotating arm with increase of fuel pressure.

The above, I trust, will provide some food for thought and experiment. It also makes one feel that there is far more in these very simple-looking devices than meets the eye—their small size makes analytical treatment a somewhat precarious business. To make them fully practical (and commercial ?) methods of propulsion, the accent must be on experiment, with possibly some slight guide from the above considerations.

# HELICOPTERS

*Parnell Schoenky with his four-foot Helicopter, winner of the Open Class 1946 American Nationals.*

PART ONE

BY R. H. WARRING

IT is a strange fact that whilst the very elementary helicopter is one of the easiest models to make and fly, the layout is particularly difficult, or even impossible, to adapt or scale up. Even full scale development is still in its infancy and this is one very good reason why experiments with model helicopters is to be encouraged.

Now what is a helicopter? The British Standards Institution define a helicopter as a "flying machine designed for vertical ascent whose support in flight is derived from the reaction of the air on one or more power driven rotors on substantially vertical axes." Thus a helicopter is primarily an aircraft with *power-driven* rotors generating lift. Translational velocity, *i.e.* flight in a forward or backward or sideways direction is a secondary consideration.

Quite a number of people confuse the *helicopter* with the *rotaplane* or *autogiro*. Both have rotors, and both derive their support from the rotation of these rotors. The basic difference is that whilst the rotors of the helicopter are power-driven, those of the autogiro are not. Rotation of an autogiro rotor is given by moving them forwards through the air, when they rotate automatically due to aerodynamic reaction.

Although they have much in common, especially in rotor design, helicopters and autogiros are really quite distinct and should be treated separately. Hence this particular series deals only with model *helicopters*.

**Principles.** For simplicity, first consider the rotor of a simple helicopter as a propeller (or "thrust producer"), and then compare such a model with a normal rubber driven type—Fig. 1.

For a normal power driven aeroplane to maintain height it is obvious that the *Lift* developed must equal the total *Weight* of the machine. Lift is obtained by propelling the machine through the air by means of applying a *Thrust*. This Thrust must be of such a value to be equal and opposite to the *Drag* resulting from forward motion.

The two basic equations of equilibrium are therefore :-

Lift = Weight. Thrust = Drag.

Now the ratio Lift : Drag gives a measure of efficiency for the aircraft. For models a good average value is 6:1. That is to say, the lift obtained in normal flight is six times as great as the drag. Hence it follows that the *Thrust* required is only *one-sixth* of the total weight.

For the simple helicopter also shown in the Figure there is only one equation for equilibrium. Only two forces are acting on it, and to maintain height the *Lift* developed by the rotors must equal the total *Weight*, viz.–

Thrust = Lift = Weight.

Hence to support the same weight as in the first instance the simple helicopter requires six times the previous thrust.

On this basis, then, it would appear that the helicopter is indeed a most inefficient form of flying machine.

Fortunately this direct comparison is not strictly true, particularly with models. The total weight can be reduced considerably, for wings and tail unit are not required and even the undercarriage can be dispensed with. Total structural weight can be reduced to at least 40 per cent. of that of an orthodox rubber model and should be very much less, if possible. Even with a two-thirds saving in total weight the direct efficiency ratio is 2:1 in favour of the conventional layout.

Hence one of the most important factors in successful model helicopter design is to reduce structural weight to the very minimum possible. The lower this weight the greater the potential duration.

For climbing flight conditions are rather more favourable to the helicopter since the rotors can be designed to have a high working efficiency, but it is not until a helicopter can be given *forward* as well as upward velocity that the efficiency of the system can begin to compare with a conventional aeroplane. In forward flight aerodynamic lift is added to the rotor thrust, increasing the *total* lift available for ascent—see Fig. 3. Note that this must be forward flight relative to the rotor itself and not just forward *inclination* of the whole model with flight direction still along the direction of the rotor axis.

A similar effect is obtained in a wind if the model "holds its own" against the wind. That is to say, if there is any airflow *across* the rotor axis some additional aerodynamic lift is generated by the rotors.

The main problem of model helicopter design is, however, *stability*. One can always add more power to obtain extra lift (with resulting decrease in power run), but unless stability is inherent in the design it will not be able to utilise that power. The Thrust Weight equation is the easiest to balance, but the upsetting forces of Torque and gyroscopic action must be counterbalanced and the centre of gravity and side areas must also be correctly related.

*Torque* is the most immediate problem and the whole series of helicopter layouts are based on compensating this. The first design problem is, therefore, *to eliminate or compensate for the torque reaction of the lift generator (i.e. the rotors).*

**Single Rotor Systems.** It is possible to use a single

# A PRIMARY SINGLE ROTOR HELICOPTER.

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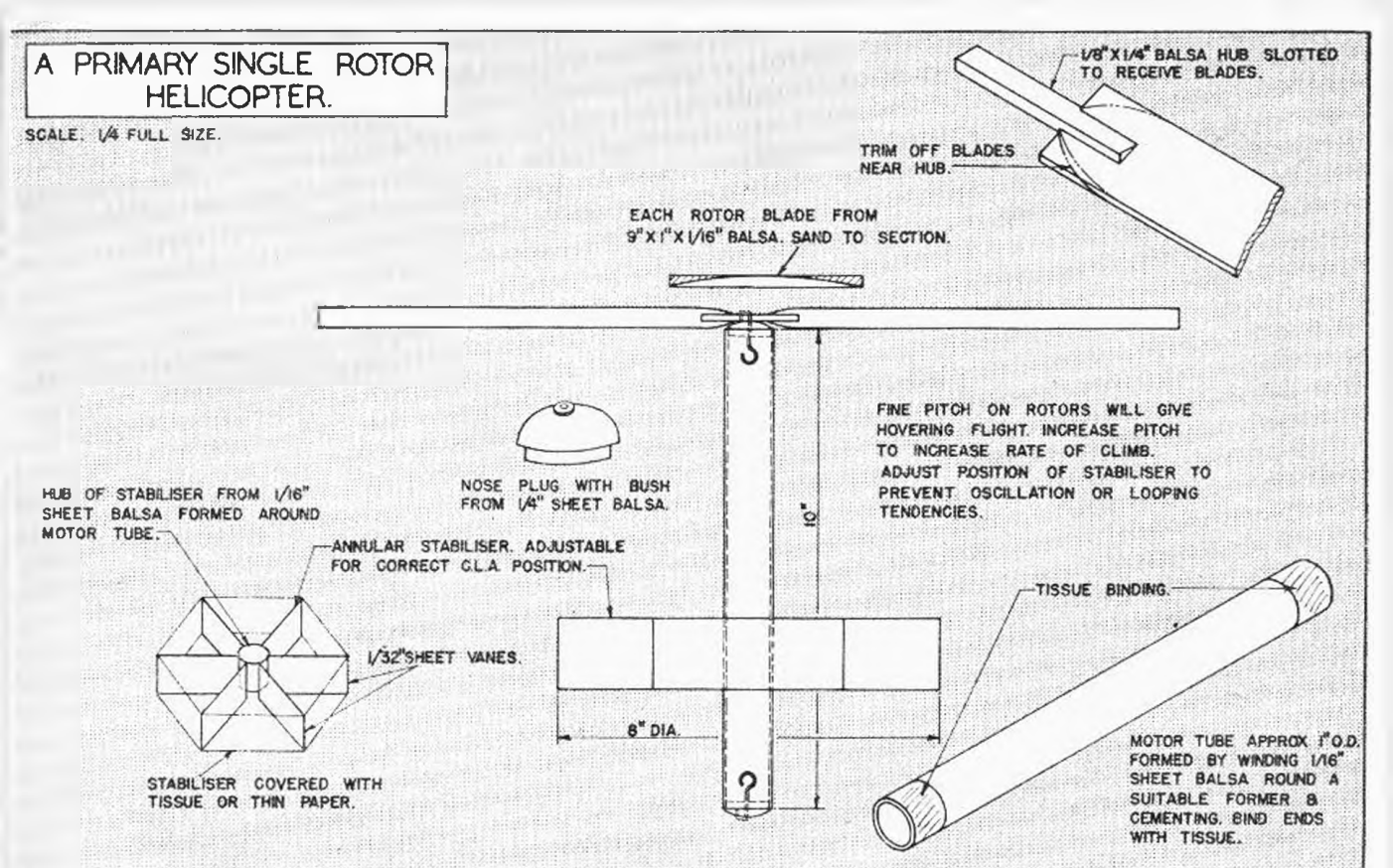
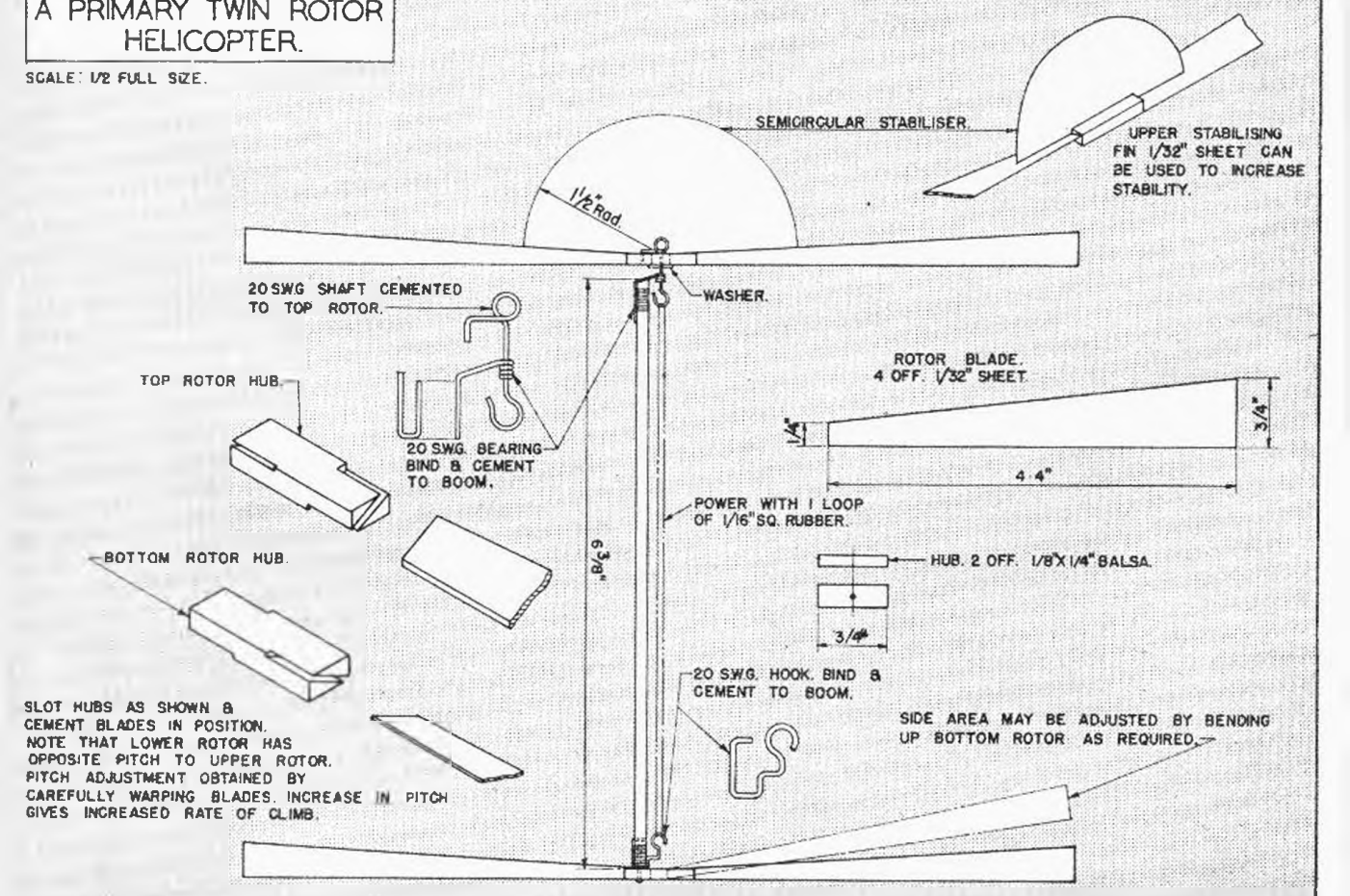
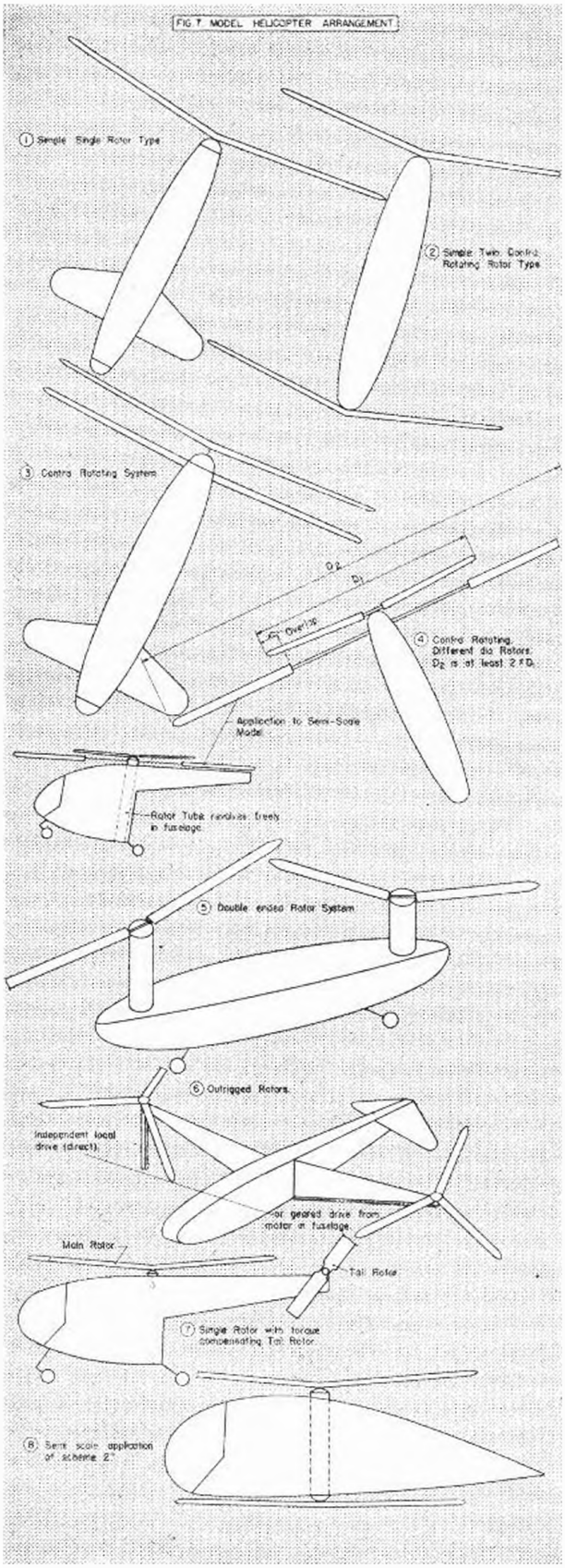



# A PRIMARY TWIN ROTOR HELICOPTER.

SCALE: 1/2 FULL SIZE.






rotor and allow the remainder of the model to rotate in the contra direction under torque—Fig. 4. The efficiency of this system is very low for a large proportion of the power is wasted in turning the fuselage assembly, this loss being roughly proportional to the relative rotational speeds of the rotor and fuselage. To keep the latter as low as possible very large damping fins are required, whose area should be concentrated as far as possible from the centre line of the model. The system works best when rotor velocity is low and the fuselage revolves at not more than one half the speed of the rotors. Gyroscopic effects are then not likely to be apparent, but balance of side areas will need attention.

As described later, unbalanced side area will cause instability and it may be necessary to raise the C.L.A. (centre of lateral area) if the bottom damping fins are large. This can be done by raising the fins themselves, or by fitting a stabilising fin on the rotors as shown. This stabilising fin rotates with the rotors.

This system is only recommended for small indoor models. Rotor span should not exceed 24 inches. Best proportions are as follows :—

Rotor blade aspect ratio—9

Ratio rotor diameter : fuselage length—3:2

Semi-scale models of this type have not proved successful and the single rotor system is not readily adaptable for model work. The semi-scale model of Fig. 5 utilises the fuselage pod and fin as the damping fins. The whole fuselage, of course, rotates and apart from simplicity and looking something " like the real thing " this particular model has little to recommend it.

A generous tail rotor diameter is essential to get *any* compensating force and this rotor *must* be coupled to the main rotor to achieve satisfactory equilibrium. Increasing the number of blades will not help greatly for a four-bladed rotor only gives a decrease in effective diameter of about 5 per cent. Hence it may be difficult to get clearance between the main rotor and the tail rotor and still conform to the desired arrangement of side areas. The ratio r.p.m. main rotor : r.p.m. tail rotor should be roughly of the order tail rotor diam : main rotor diam.

A simple pulley scheme was tried at one stage of development on another series of semi-scale types, this being shown in Fig. 6. Although this worked, the performance of the model did not justify further development along these lines and it was modified to the present accepted co-axial scheme. If a pulley scheme is used it is essential that the cotton " belting " run at right angles to the axis of the pulleys otherwise it will run off or foul the flanges of the pulleys.

After an initial series of experiments with model helicopters nearly two years ago it was quickly realised that two counter-rotating rotors offered the best means of torque compensation, so that more attention could be devoted to the remaining stability problems. To date this has been justified in that *all* the best and most consistent flights have been made with such models.

But even twin rotors present special stability problems and can be used in a variety of ways.

**Simple Twin-rotor System.** The simplest twin rotor system is merely an adaptation of the elementary stick model, consisting of a fuselage with a rotor at each end. The rubber motor runs from one rotor to the other, so that equal torque is applied to each rotor—*one of the essential requirements of a twin-rotor system.*

Models of this type can have a very good performance, although stability is not of a very high order. Without stabilising fins on the fuselage it is difficult to obtain correct C.L.A. positioning. Also the two thrust points

being distant instability will result if one motor is markedly more powerful than the other. A form of spiral instability will be greatly pronounced under full power if the two thrust lines are not along the model's axis.

In trimming a model of this type it is extremely difficult to differentiate between instability caused by unbalanced side areas and unbalanced (*i.e.* unequal thrusting) rotors. The latter effect is generally more pronounced and may hide the former.

Models of this type will frequently perform quite well under moderate power, but when wound up go into a series of loops or just turn over and dive in. Generally this can be traced to the fact that the bottom rotor is developing too much thrust and pushing the whole model up against the top rotor. A loop, or indeed almost any manœuvre, can result.

Alternatively, if the top rotor is developing too much lift the bottom rotor acts more as a brake and will tend to describe spirals in flight. The correct balance can only be achieved by careful adjustment.

Proportions of such a model should follow those of the model depicted on the plan. Dihedral is practically essential on the bottom rotor, but should not be used on the top.

The majority of the free-lance duration helicopter models have been based on this layout and these are detailed fully in the second part of this series.

Spacing the rotors closely together as in Fig. 7(3) immediately eliminates some of the troubles experienced with the above and this system is, indeed, the basis of the latest developments applicable to both duration (free-lance) and semi-scale designs.

This system is similar to the single rotor layout with rotating fuselage, with the difference that a second rotor is attached to the fuselage and hence there is little power wastage. The fuselage becomes a *torque tube* and the basic requirement of equal applied torque to each rotor is maintained.

The chief problem is now to minimise or eliminate interference between the rotors—a task which accounted for a considerable proportion of the time spent in experimentation before a practical solution was reached. In the form shown in Fig. 7(3), the system can be made stable, but there do not appear to be any golden rules to success and too much guesswork (and luck) is involved.

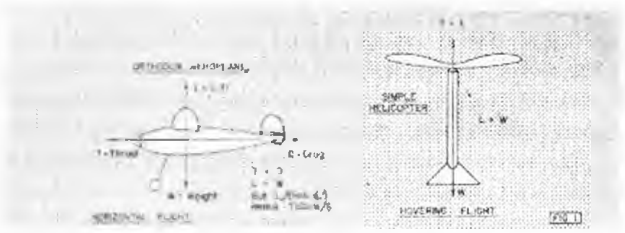
The final solution arrived at employs rotors of different diameters mounted on a torque tube as before. Some overlapping is permissible without interference effects becoming noticeable, allowing a reduction in the diameter of the lower or compensator rotor. A patent is pending on this rotor arrangement which does appear to have solved the immediate problem of a co-axial counter-rotating rotor unit.

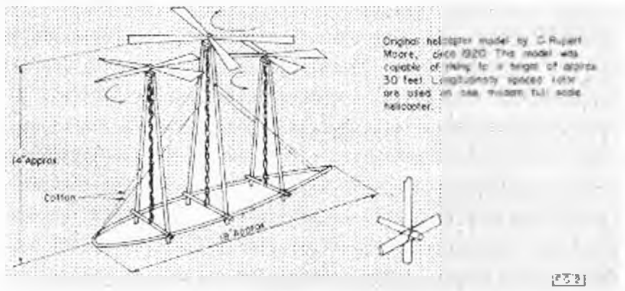
Twin counter-rotating rotors in any other arrangement do not appear to offer any practical possibilities or advantages over the scheme so described. Typical layouts which have been used are shown in Fig. 7. Here both torque and interference can be eliminated, but several mechanical complications arise which, of necessity, means increased weight.

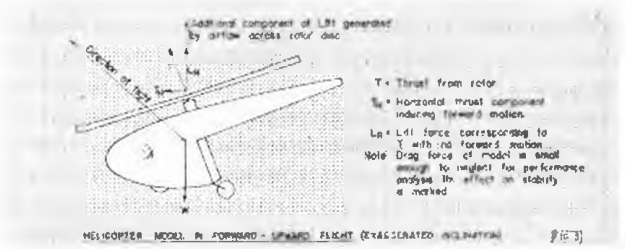
The side-by-side rotor system is attractive and has been used in full scale work with success. A full scale design of the fore-and-aft system has also appeared although no flight characteristics are known to the writer.

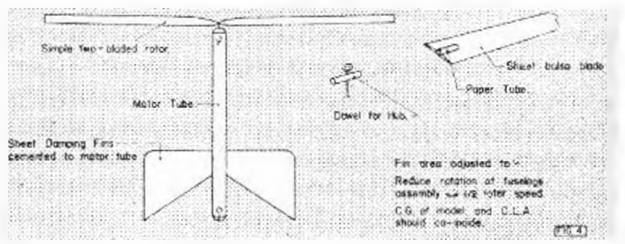
On a model it is essential that on systems of this type the two rotors must be coupled together in some way to match the speeds of rotation. If this is not done a roll or loop is inevitable. That is to say, unless the speed of each rotor is similar, catastrophic instability will result.

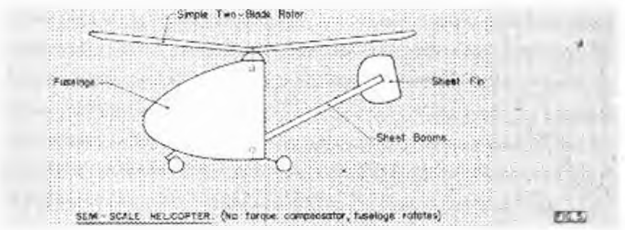
(*To be continued.*)

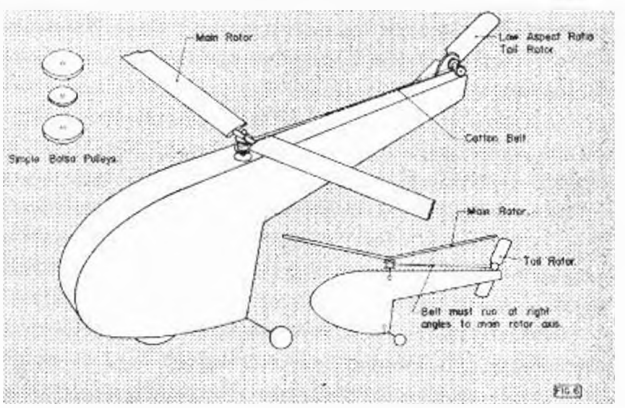


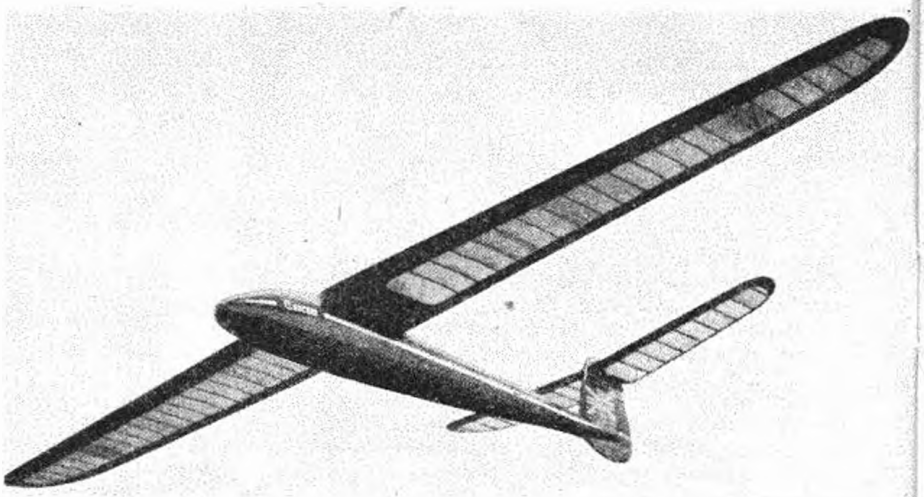



# CRACOW

## MARK II

A HIGH PERFORMANCE
72-IN. SPAN SAILPLANE
designed
by

**L. GEORGE TEMPLE**



*A fine shot of Cracow in flight, showing its polished monocoque fuselage and high aspect ratio wings to advantage.*

THIS highly efficient design by George Temple, whose name needs no introduction to aeromodellers, affords wide scope for that excellence of finish that can be given to sailplanes without undue worry on the score of unwanted weight. This is certainly not a "pocket-knife" model that can be chipped out in a few casual hours, but demands a degree of care and patience as the whole machine is constructed of ply and hardwoods in the model aeronautical sense. When finished it is virtually indestructible and should offer very many hours of enjoyable soaring in the summer months.

**Fuselage.**

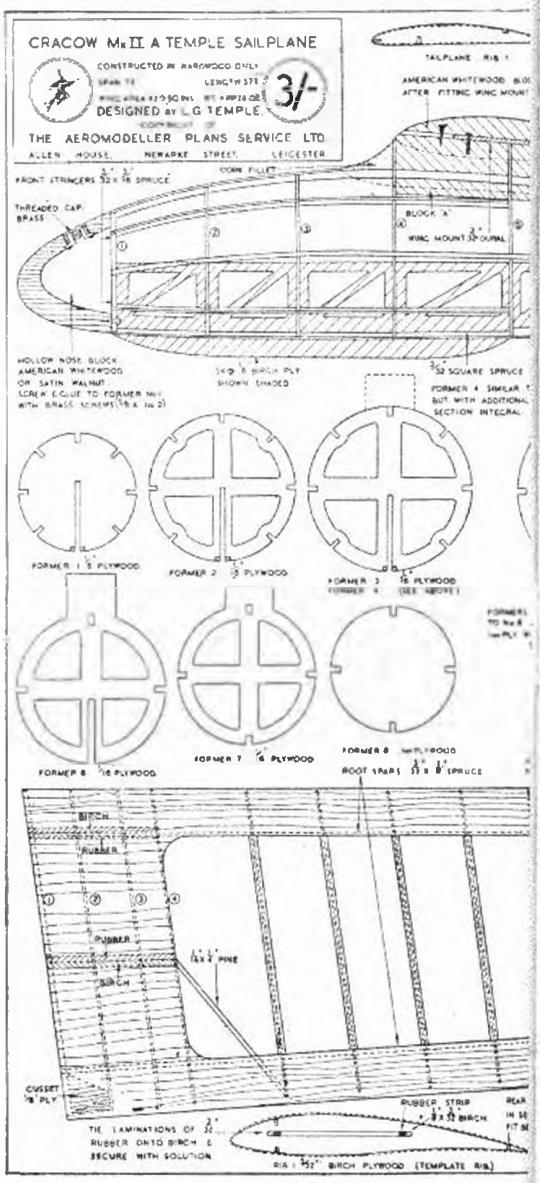
As usual the fuselage is built first. The circular formers should be cut from ply of the appropriate thickness and carefully slotted to take the stringers. Care at this stage will be amply repaid by smooth contours and well aligned wings. The skid and forward keel is made in one piece and will serve to line up the front formers. After this has set, using a slow drying glue, fit the top and bottom stringer and line up by eye, carefully binding them in place with thread or rubber bands until thoroughly set. Next add the two side stringers, and then the balance which extend to just aft of the wing fixing only. The underskid and tailblock should next be fixed and then covering with thin sheet may be commenced. This may be done in four pieces with care, but many will prefer to plank with a larger number of narrower strips. Either method is satisfactory. When about two-thirds of the circumference has been so covered and the fuselage is quite stout to handle the wing fixing blocks and the fin structure should be fixed in place. It is worthwhile to fit the fuselage in a temporary cradle on the workbench and carefully line up for this operation, as the whole success of the model depends on these being fixed exactly square. When this has been done continue with the covering and fair in the wing mount with cork as shown on the plan. The hollowed out nose block should be fitted after rough shaping, and sanded to the flow of the fuselage when fixed in place. A small portion of the covering should be left to enable the securing screws to be driven home. These are necessary as the nose takes most of the shocks in a bad landing.

**Tailplane and Fin.**

Before proceeding to the mainplane it is as well to complete the fin and build the tailplane. This it will be noticed has slight dihedral, a departure now recognised as desirable in high performance design. Beyond ensuring that this dihedral is built in correctly there is nothing tricky in this part of the work. The finished tailplane, and small upper fin sit securely on top of the main fin, and are held by stout rubber bands, thus enabling them to spring off in the event of a sharp impact.

**Mainplane.**

The high aspect ratio mainplane deserves care and attention. Built mainly of thin plywood it will take a lot of punishment, but



requires patience in building. The leading edge curvature is best obtained by bending the ply over a solid former and steaming to desired shape. Be sure to cap all ribs, top and bottom and fit refinements such as rubber buffers in the wing fixing tongue boxes.

### Covering.

The model is now complete with the exception of covering. Some builders are content to sand and polish a fuselage such as this, but it is recommended that it be covered with bamboo paper if obtainable, or double-covered with tissue. The wings and tailplane should also be bamboo paper covered, or again a double covering of tissue. Of course silk if available is the ideal covering, but few will have any these days. The model should then be doped with full strength glider dope; rubbed down lightly with very fine sandpaper and doped again. Cellulose paint may then be applied, preferably by spray, or carefully by brush. Two or three coats give a delightful finish—how good depends on the painter's skill, but a true "coach" appearance *can* be achieved.

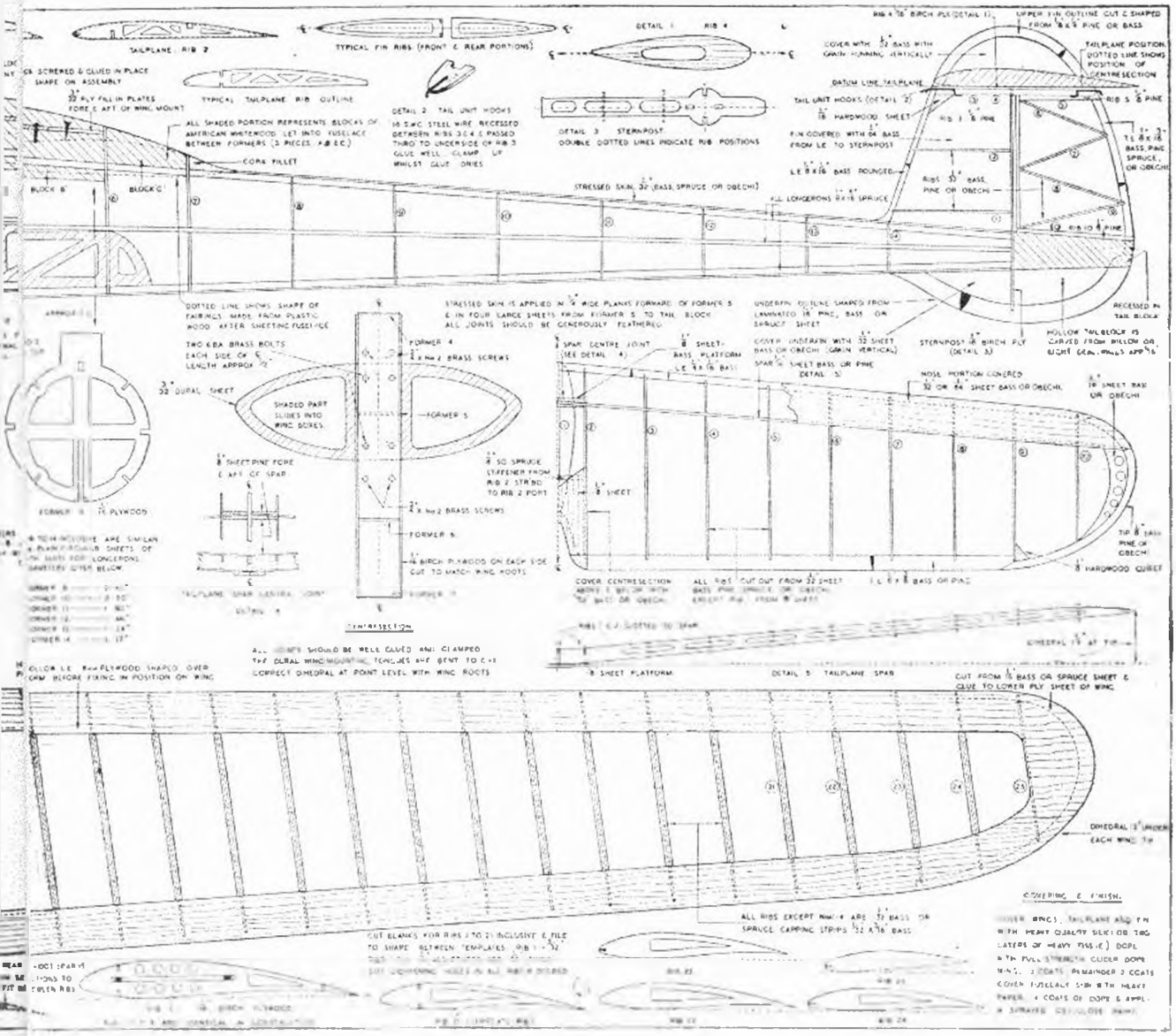
### Flying the Model.

It will be noted that no provision is made on the landing skid for a towing hook, nor is this necessary for slope soaring, but if it is desired to fly the model from a towline then a small brass tube should be sunk into this skid inclined forwards at an angle of sixty degrees just below former number 1. Into this a hook of suitable gauge steel wire can be inserted in place of the more usual ring engaging with a protruding hook on the conventional model glider.

Test flights should be carried out in comparatively calm weather. Hand launch into wind, adding lead shot to the weight container in the nose until a nearly flat glide is achieved. Only when this is just right should towlaunching be attempted.

### Full-size Plans.

Full size working drawings are available from Aeromodeller Plans Service, Allen House, Newarke Street, Leicester. Price 3 — post free.



# The Midland Area Spring Rally

An aerial shot of some of the mammoth crowd in attendance.

PLANNED to co-ordinate the S.M.A.E. semi-centralised events, the Midland Area "Spring Rally," held at Walsall Airport on April 13th, 1947, was blessed by almost perfect weather conditions, a record entry, and a crowd that exceeded all expectations.

An entry of over 500 competitors proved almost embarrassing to the organisers, and flights had in consequence to be restricted to one flight per contest. This is an occurrence that is cropping up at almost every meeting nowadays, and we understand that an entirely different method is to be tried out at the Autumn meeting, the results of which will be watched with interest.

A light wind and bright sun made conditions just about ideal, and a threatened haze did not persist long enough to worry the fliers or timekeepers. In fact, the lay-out was almost perfect from an aeromodeller's point of view, the grass aerodrome sloping sharply upwards at the "take-off" boundary, giving a fine natural grandstand for the public.

Apparently word had got around that this meeting was to be something special, as coach loads of competitors started to arrive from all over England! Many London clubs turned up in force, and we contacted other visitors from such far places as Bristol and Cheadle.

The meeting commenced with a Concours class, which produced a galaxy of tip-top models, ranging through all classes and types. A condition of entry to this event was a stipulation that all models had to prove their flyability by competing in one or other of the flying events, and this seemed to meet with general approval.

"Mick" Smith proved a winner once again with his National Exhibition Champion model "Mercury," but had to be eliminated from the final results through crashing the job whilst testing later in the day. This brought up Geoff. Dunmore to first place, his beautifully finished glider turning in an extremely steady flight in the Glider event. Another "Mick"—this time Mr. Booth of the Zombies club (incidentally he comes from St. Annes and is not a Londoner as some people thought) carried off the second prize with a sleek little diesel powered job, while another Leicesterite, Jack Marsh, took third position with another glider.

Numerous take-off boards were provided for the Rubber Duration event, and timekeepers were soon hard at it sorting out their particular charges. The Northampton group had a fine collection of models, and the results proved that they could also fly to no mean purpose. The Midland chaps carried the day in this event, the top "outsider" being K. Lloyd of Harrow, who was placed eleventh.

As usual, the glider class created a certain amount of confusion owing to the towline question. However, some very fine flights were recorded, and thermals were contacted by a number of models with "out-of-sight" consequences.

Power models were out in force, and an entry of over ninety gave the organisers something to think about. Unfortunately, the general public, whilst keenly interested in the models, were not alive to the requirements for safe flying, and the contest had to be held up from time to time while the crowd was got into some sort of order. Mick Booth made a spectacular flight to win, the rocketing climb of his model bringing a gasp from the crowd! The usual crop of engine troubles was experienced, but taking it all round the power flying at this meeting was of a high grade. One or two lurid crashes pleased the crowd—and caused more grey hairs to the builders—but some very fine flights were recorded, and the fliers are to be congratulated on their showing.

This Rally brought a vital factor to mind in the conduct of present day meetings where the public are invited. Crowd control is becoming an increasingly difficult situation to deal with, and at the Midland Rally matters did at times become out of hand. Every means of dealing with such a situation had been provided in the form of public address systems, police and other officials, but the numbers—over 6,000 during the afternoon—were too many to handle, and the organisers had their work cut out dealing with the matter.

The Midland Area is to be congratulated on the success of their first Rally, and we are informed that the Autumn meeting will have a better chance from lessons learned at the Spring event. May all Rallies be blessed with such weather, to the better enjoyment of the increasing numbers of real enthusiasts.

## RESULTS

**SENIOR CHAMPION:** G. M. Booth (Zombies)

**JUNIOR CHAMPION:** E. Hickman (Wolverhampton).

### CONCOURS D'ÉLÉGANCE.

| | | |
|---|---|---|
| 1. | G. E. Dunmore | (Leicester). |
| 2. | G. M. Booth | (Zombies). |
| 3. | J. Marsh | (Leicester). |

### RUBBER DURATION.

| | | | |
|---|---|---|---|
| 1. | F. Redley | (Northampton) | 3 : 32·8 |
| 2. | L. Turner | (Rugby) | 3 : 07 |
| 3. | M. J. Withey | (S.E. Birmingham) | 3 : 05·5 |

### GLIDER.

| | | | |
|---|---|---|---|
| 1. | E. R. Jones | (Unattached) | 7 : 29 |
| 2. | C. Smith | (Warwickshire) | 6 : 42 |
| 3. | K. Lloyd | (Harrow) | 4 : 29 |

### POWER.

| | | | |
|---|---|---|---|
| 1. | G. M. Booth | (Zombies) | 1 : 45 |
| 2. | B. C. Gunter | (Bushy Park) | 1 : 27 |
| 3. | R. Moulton | (Zombies) | 1 : 2·56 |

# PETROL VAPOUR

BY LT. COL. C. E. BOWDEN

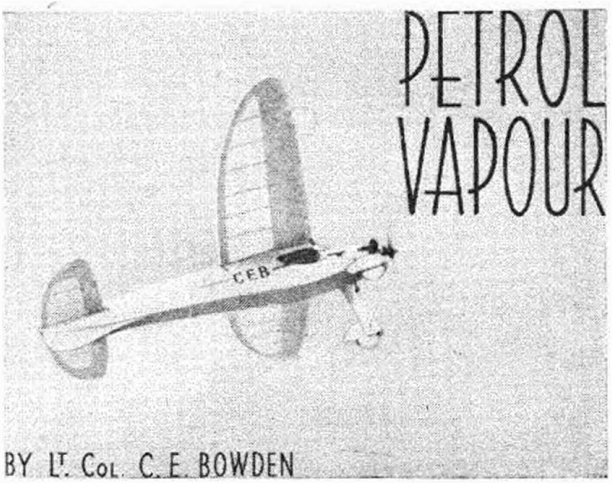



*Photo I. The author's 45" span "Meteorite" flying under the power of 0.9 c.c. B.M.P. The low weight of these diesels give such models a very low-wing loading.*

**Nylon Covering and Finishing.**

SOME few months ago I wrote an article on covering powered models with Nylon on the " wet " principle —I explained that I had followed the American lead and at my first attempts covered " dry," *i.e.* put on the nylon dry and stretched it, later giving it a coat of clear dope. I did this because I had been told in the American article and by people in this country that nylon was not affected by water. This is a common belief, and is a fallacy. I was not satisfied with the little wrinkles that occasionally cropped up when dry covering. I then had a curious experience, in that a large model of mine landed right in the topmost branches of the tallest clump of trees in the neighbourhood, and they were an outsize in trees, too! Neither I, nor even the most active youngsters could reach the model by the ancient method of tree climbing. I therefore prevailed upon a local aerodrome fire brigade to bring their fire engine up to the scene of action, and we directed a terrific spray of water upon the trees below the model; leaves and small branches were torn off, and eventually the model was blown clear, bit by bit. The wings came off, the tail and fin and so on, but it was undamaged because the rubber fixings gave way. However, one thing struck me almost as forcibly as the water hit the model. The beautiful taut nylon covering of the wings and tail, etc., was all limp through damp! So all this talk about water not affecting nylon was evidently all ballyhoo! I laid out the wings and bits and pieces to dry in the sun, with a few judicious weights to prevent warping, and I found that everything in due course went up taut again when dry. I then tried covering my next model with nylon on the old " wet " principle of silk covering. Not a single wrinkle of any sort could be seen, and since then I have covered many models " wet " with no failures to record, and I can say nylon does become very slack when water is applied. It tautens up as it dries, like silk, only more so.

Now I mention all this because I still hear people say that nylon is not affected by water, and that fellow Bowden is talking nonsense. Someone wrote and told me he had made a mess of his " wet " nylon covering, so I took the trouble to check up what he had done. He had not followed out the sequence of events that I gave in my article in the AEROMODELLER. He tried again and is now a happy nylon addict. In actual fact I would say that *nylon stretches even more than silk when wet*, but it takes longer for the water to act upon it, and it is quite vital to use photopaste as an adhesive, because it sometimes happens that when one covers the " other side " the damp from this final covering slackens off the first side so seriously that a little extra pull up is required. Photopaste can be softened by water around the edges and the desired pull up given. Britain is full of conservative diehard, doubting Thomases, so should you be one, read an extract from a Yachting journal which I quote below in connection with a report on the New Nylon Sails, which may clear any doubts you have about the effect of water upon nylon. These doubts are raised by the incorrect statements made by theorists who have never actually tried the use of nylon for sails or model covering.

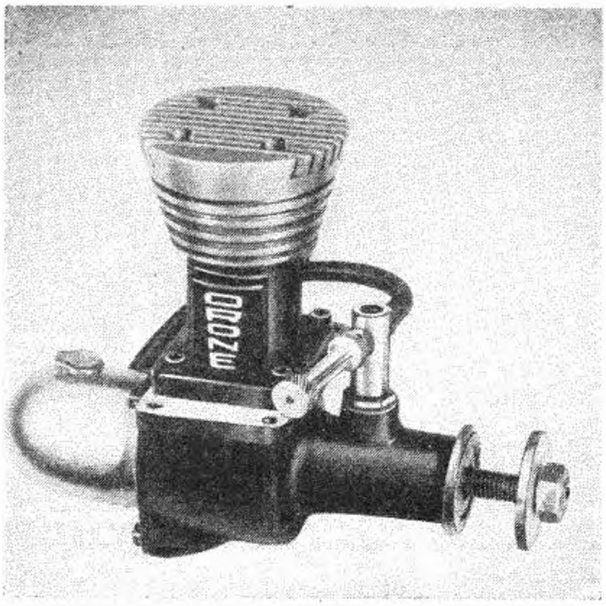
" Incidentally, nylon tends to stretch more easily when wet and apparently shrinks when it dries after having been wet."

The article goes on to say that nylon sails for full-sized boats should be sewn with nylon and not ordinary thread because the latter stretches at a different rate. One delight of nylon sails is that they cannot become mildewy through damp and they are lighter in weight than cotton. I have found that one disadvantage of nylon as a covering for flying-boat wings is that, in spite of the full strength, full-size glider dope that I always use, the covering slacks off as soon as seawater spray gets into the wings. This is far more evident than with my old silk covering. Nylon is far stronger than silk and is the ideal material for medium-size and large land plane gas models and provided one COVERS WET. If flying-boat wings slack, then weight the wings when drying them out or they may warp as the nylon takes up. They say people always hear ill of themselves. The other day I heard indirectly two young men criticise a model of mine over its finish. " It looks as if he lined the thing with a broom handle." This is what I heard and it took me down a peg or two. I confess, that in my case I design a new model when I am half-way through building the previous one. I am always wanting to try out something else, and as a result I hurry on to the next job, and provided my model is a first-class flying machine I do not unduly bother about the final finish— I like to fly my models to death and there is no denying that a beautiful finish takes a lot of time, and when completed, oil, fuel carrying in the car, and an occasional flight into a tree, hedge or bush will between them quickly see off all those hours one has put into the " super finish."

I personally admire a good finish by the man who produces one or two models for the year, but for myself I just have not the time. Anyway, it takes all sorts to make a world and it is all according to the ambitions of each individual. My trouble is designing and building too many models per year.

But I do consider it is essential that one should learn to cover a model properly so that the covering is smooth. Now look at Photo 6, which is not a "Bowden Horror" but is a very nice view of a pleasantly finished model built by Mr. Smythe of Bournemouth, and which houses a 6 c.c. " Stentor " petrol engine. I have one of these engines, and have found it a robust and reliable British engine with plenty of power—a stout job.

The finish of this pleasant looking 'plane called the " Stentorian " is practical and good, but after six months' flying will not look as fetching as when my camera caught it on its first day out. Petrol and oil will do their foil work. There is no doubt that a high gloss




*One of the first American diesels, the Leon Schulman "Drone" 4·9 c.c. This is a first-class engine which bears a strong "tybe" resemblance to the Micron lay-out.*

finish is essential for a sailplane, and of course scale solids are useless to look at without a good finish. But the diesel or petrol model does not normally require a very high finish other than to please, because there is plenty of spare power, and one actually does not want it to slip through the air like a hot knife through butter, for the idea is to keep its flying speed slow.

Some people wonder why I usually dope my models white, and I only put on one coat to keep the weight down. Well, as we are on the subject of finishes and personal peculiarities, perhaps I had better explain—years ago I admired the all-white German racing Mercedes cars, and the lovely all-white Lockheed Vega monoplane that used to fly around the country. I watched these machines in action, and it struck me then that a white or light machine shows all its action up to the best advantage *when in action*—any defects or scars of wear and tear, etc., are not then noticed—since I build all my models for action and often take photographs of them performing and because I get my greatest fun when watching a model perform, I usually dope or paint my aeroplanes and boats white. If I obtained greater satisfaction through looking at my models on the ground or at rest I think I should more frequently go in for colours, although one must admit that a light colour stands out well against a green grass background, and also on water. In fact that is why so many yachtsmen paint their dream ships white. My other main hobby in life happens to be full-size yachting—so you see I am bound to be white-minded.

### Diesel Models.

I have recently had several requests from my "fan mail" for a few words on diesels in this column.

Although the diesel is such a simple type of power unit, there is a lot to say about it and it becomes difficult to decide what to include in a short article. There is such a lot to say that the Harborough Press has recently published a whole book dealing with nothing else, called "Model Diesels."

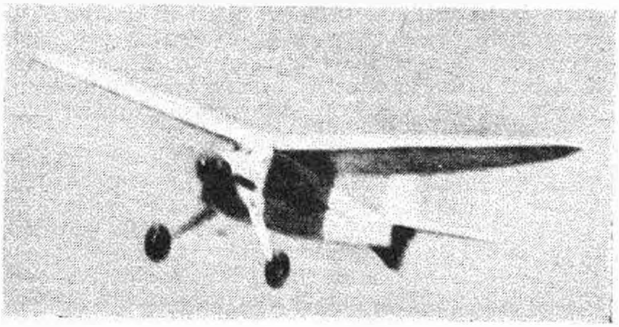
It occurs to me that readers themselves might well pose some questions that I will endeavour to answer in these columns, so if you have any questions of general interest, jot them down and address them to me, c. o the AEROMODELLER, and I will make a selection of what I think will interest aeromodellers. But I cannot reply to those letters not used, because I fear I am too busy, there is much to do, and life is short! Whilst awaiting this "quiz post" I will confine myself in this article to a few general observations that I think people may be asking themselves.

### Big and Little Diesels—their advantages and capabilities.

After extensive experience of all sorts of diesels, foreign and British, I would now say that the baby and the small-sized diesel are serious rivals to the baby petrol engine. The little 'uns are so much lighter than their petrol brothers combined with the latter's ignition gear. They permit the small model to fly with a lighter wing loading and also the really midget diesel permits the building of far smaller practicable models than the petrol engine with its ignition gear ever will allow. The real difficulty of a baby model has always been its inevitable high wing loading and therefore its damaging speed. A fast petrol model becomes touchy if everything is not in perfect trim. Because of diesels we can now make models of 45 in. span fly really slowly with a great stability. I have just produced a little 45 incher called the "Meteorite" that flies with the same steady stability as a large model of stable design. The glide and subsequent landing is just as slow and steady as a really big model. Photo 5 shows the model and Photo 1 gives an impression of the model in flight. I have used various diesels on this model from the little 0·9 c.c. B.M.P. engine with its twin ball bearings that make it turn over so easily, to the 1 c.c. "Frog" diesel and also the 1·3 c.c. "Mills" diesel. Even with the very small 0·9 c.c. B.M.P. this model climbs like a fighter. In fact I had to over richen the mixture and reduce power, and also give excessive turn to the model in order to keep it low on its first circuit in order to obtain the photograph of flight in Photo 1.

The "Frog" 1 c.c. diesel has a very hot performance in this model, and I think this engine will intrigue people when it is eventually available in quantities. I have one of the prototypes which had done over 30 hours running before I got it. This answers another question that people ask. Do diesels wear well? The answer is, yes, if they are robustly designed, have good workmanship and are made of suitable materials. My German diesel of 6 c.c. has now spent a very great time running. I have two "Majesco" 2 c.c. diesels that have run a long time in all sorts of aeroplanes and boats and 1½ oz.

*The author's little 23" span model equipped with a 0·7 c.c. diesel which flies with all the stability and slowness of a larger model.*



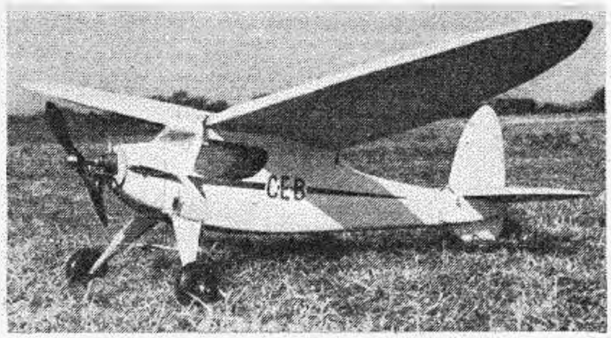




Photo 4. The 23" span diesel model fitted with full-length slots by the author and powered by a 1¼ oz. "Majesco Mite" diesel.

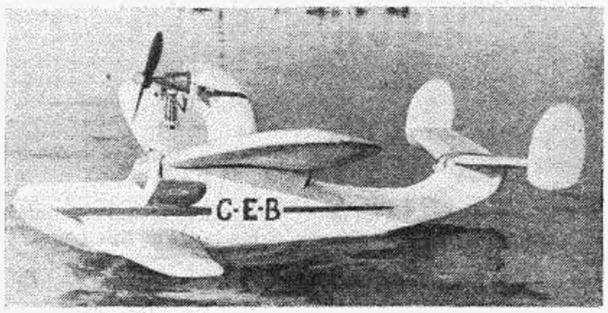



Photo 5. Another view of the 45" span "Meteorite" which has been flown by the B.M.P. 0·9 c.c., the "Frog" 1 c.c. and "Mills" 1·3 c.c. Above it is fitted with the "Frog."

Photo 6. The 6' span "Stentorian" powered by the well-known 6 c.c. "Stentor" engine. Mr. Smythe, the builder, achieved a very fine finish.

Photo 7. The baby cabin flying boat of 38" span powered by the 1 c.c. "Frog" which the author has been flying. Diesels are particularly suitable for flying-boats.

"Majesco Mite" that is getting better every day as the running time goes up. On the other hand I have seen some terribly worn diesels after quite a short period of running life. Apart from poor design and material and inadequate bearings, one sure way of knocking a diesel to pieces rapidly is to run it at too high a compression. Also remember that diesels will not *start if too high a compression* is used. They cannot carry over to the next stroke. Many people seem to think that all they have to do is to raise the compression by screwing up the contra piston to get a start, and make a big mistake. The great advantage of a diesel fitted with a variable compression lever for contra piston adjustment is that one can slack back the compression after a start has been made and when the engine becomes warm until one hears the note change to the most powerful and easy running. Should a diesel knock, or run with a muffled note, slow up, or even subsequently stop, then you are running with too high a compression, often allied with too weak a mixture.

Another engine I have used on my little "Meteorite" of the small span but big area because of the elliptical shape of its wings, is the well-known "Mills" 1·3 c.c. diesel which has been available to the public for some time. With this engine I obtain an American type "rocket climb." I slow up the glide further by the use of wing-tip slots.

So we may sum up by recommending these little 1 c.c. size diesels for models around the 45 in. span mark. The delightful feature about the diesel of 1 c.c. is its power, quick starting, absence of electrical gear bothers, also quick climb due to low wing loading and at the same time we can design a model of only 45 in. span or less, that as soon as the power ceases will come into land with a lovely slow glide that creates a genuine safe three pointer landing. A little judicious use of a large central chord with elliptical wing or tapered wing and small simple wing-tip slots together with the light power plane load (minus its coil and battery) allows the model to land like a safe old crow settling down to have a good meal . . . and yet we can have that exciting climb because of the high power weight ratio (*i.e.* a lot of power for the weight of the power unit).

Photo 7 shows the "Frog" diesel fitted in a little flying boat I made for these small diesels. The wingspan is 38 ins. and the complete hull made from 1/16 sheet balsa. The engine has ample power for the take off, because of the elimination of electrical gear which gives a light water loading, which means that the boat floats practically on top of the water instead of deep down as it would do if fitted with battery and coil, etc. It therefore does not require a lot of power to force the hull up on to the surface to start planing for the take off, as a heavily loaded boat does.

Little diesels in my opinion have a great advantage over little petrol engines—but when it comes to large engines of 6 c.c. and upwards I still prefer the petrol engine, because the big diesels that I have met run roughly, and are often difficult to start due to their high compression. They can give one a hefty kick back too. There is something very sweet about the running and the howl of a larger petrol engine, which the larger diesel does not possess at present. Now to give the reader a picture of the capabilities of the smaller diesels, let us take one or two examples of good 2 c.c. diesels, and what sort of models they like. Unfortunately the number of photographs that the Editor can publish with one article is limited, and as I want to include a midget and one other engine at the end of this short article, I must content myself on this occasion with talking only about the 2 c.c. class. Perhaps next time I will send in a few photographs of models being flown by 2 c.c. diesels when I deal with the 3·5 c.c. and 5 c.c. to 6 c.c. diesel engines I have recently been using.


THE Airspeed Consul is becoming increasingly popular amongst the air charter firms both in this country and abroad.

Derived as it is from the Oxford navigational trainer, the Consul utilises Oxford components and, with the exception of the internal arrangement of the cabin, it is more or less a civilianised version of that type. The prototype, G-AGVY, was registered in November, 1945, and was originally known as the Oxford eight-seater before being given the type name of Consul. It was later sold abroad to Bata Air Lines. The first three production Consuls were registered G-AHEF, G, and H in March, 1946, and since then machines have been rolling off the production line at Portsmouth at the rate of two or three per week.

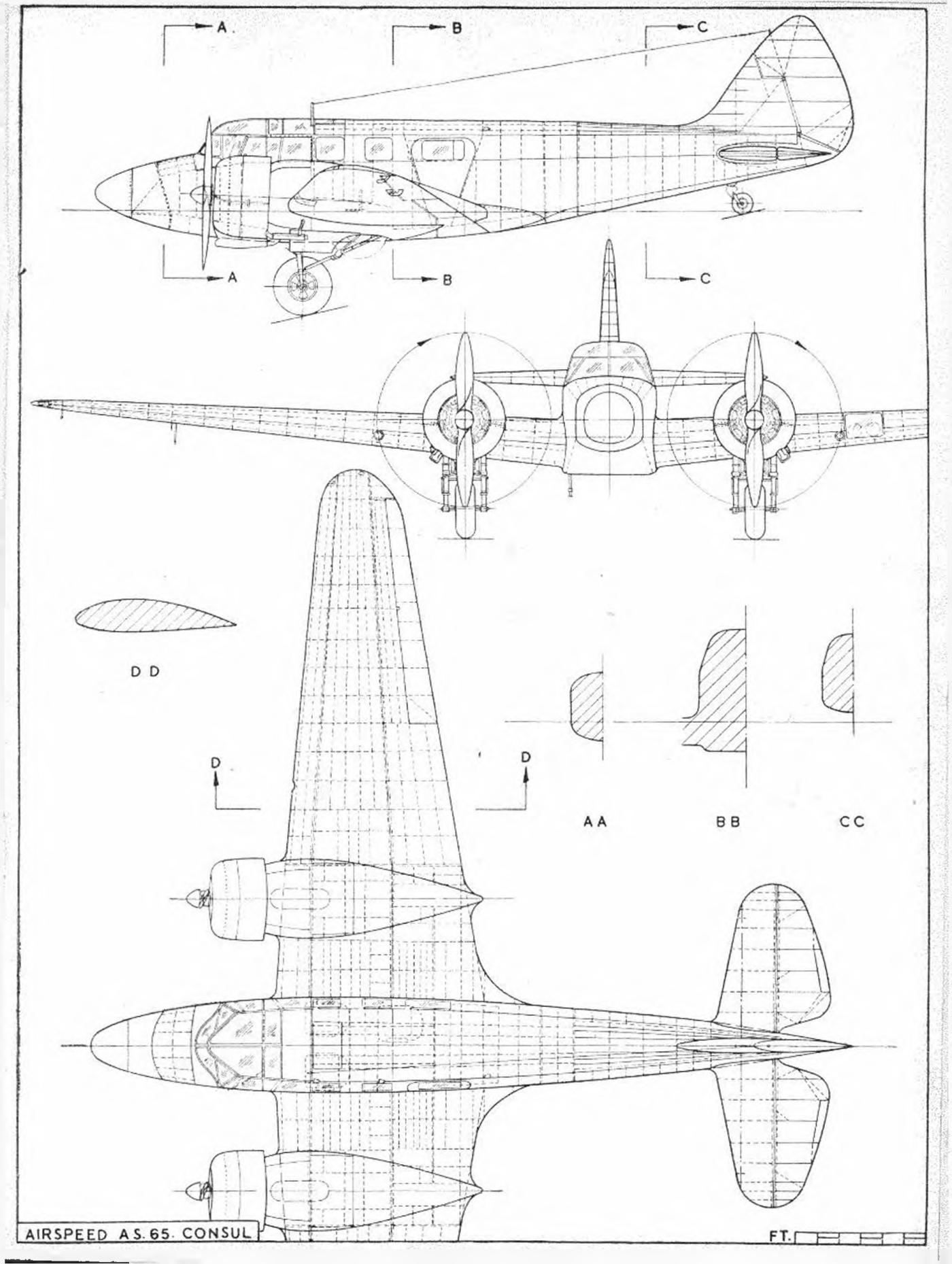
The standard Consul has seating accommodation for a crew of two and five passengers. The crew, are separated from the cabin by a bulkhead in the centre of which is a hinged door. The front two passenger seats are located above the front spar of the centre section, with a gangway between.

Behind them, directly over the rear spar and on the starboard side of the cabin is the third seat, and to the rear of this is a continuous seat for two passengers, running across the width of the cabin. Baggage can be stowed behind this seat, and also in a special compartment in the extreme nose. The standard of comfort is high, although the noise at full throttle is somewhat excessive. An efficient heating system assures a constant supply of warm fresh air, and directly above each seat is an adjustable ventilation duct.

**Construction :** The fuselage is built up from spruce longerons and stringers covered with a plywood skin. The rear decking has a fabric covering carried on light wooden stringers running longitudinally down the fuselage. The wings include laminated spruce spars carrying girder type ribs with a plywood covering ; it is built in three portions, comprising a centre section and two outer wing panels. Split flaps sub-divided into five sections are attached to the underside of the fuselage, centre plane and outer wings. The ailerons are slotted and mass balanced. The flaps and rearward retracting undercarriage are hydraulically operated. The elevators, rudder and fin are fabric covered. Power is supplied by two 395 b.h.p. seven-cylinder Armstrong Siddeley Cheetah X moderately supercharged radial engines driving Fairey fixed-pitch metal airscrews.

**Colour :** The standard Consul colour scheme is electric blue all over with gold letters unless otherwise specified. Machines belonging to Morton Air Services Ltd., a charter firm which operates six Consuls—G-AHFT, G-AHJX, G-AIAH, G-AIOU, G-AIOS and G-AIOW—are painted aluminium all over with light blue letters and flash. The heading photograph shows one of these machines flying near Gatwick during a lull in the blizzards of February this year. The other machine, G-AIKX, is owned by Chartair Ltd., and is dark blue all over with crimson letters.

*SPECIFICATION : Span,* 53 *ft.* 4 *in., length,* 35 *ft.* 4 *in. ; height,* 10 *ft.* 11½ *in. ; wing area,* 348 *sq. ft. ; tare weight,* 6,000 *lbs. ; max. loaded weight,* 8,250 *lbs. ; max. speed,* 190 *m.p.h. ; cruising speed,* 150 *m.p.h. ; landing speed,* 70 *m.p.h. ; range,* 900 *miles. Price,* £5,500.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AIRSPEED A.S. 65. CONSUL
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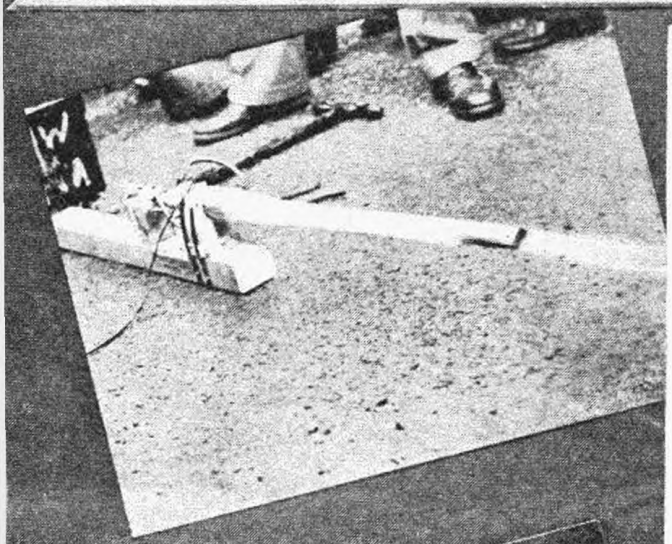
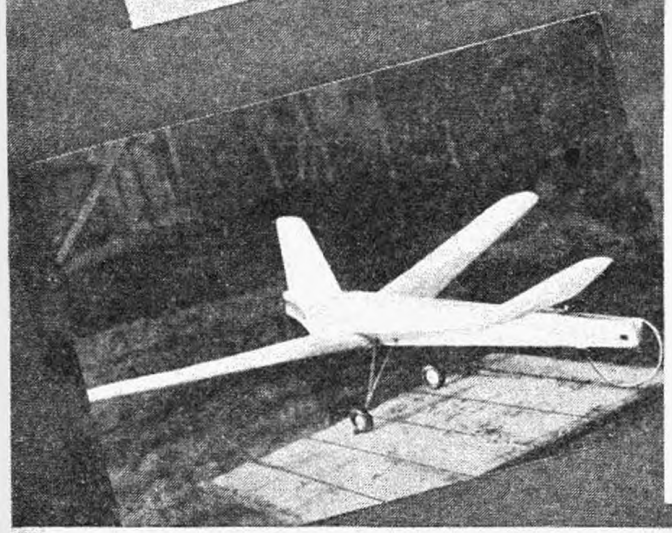
# MODEL NEWS


## SELECTED ITEMS BY FLIAR PHIL





FLIAR Phil camping out under his toga amidst the classic architecture of Aetonium Bracius, takes a leaf from Mark Antony's book to ask the loan of his reader's eyes while he comes along to praise them—or at any rate some of them!

The coveted laurels of *Victor Ludorum* for the Model of the Month go to C. A. Shaw of Upper Norwood—who will actually receive a little more than the fag-end proffered by Malmstroin above! The Model is a 14 oz. power model of 44 ins. span, powered by a Mills diesel. Its graceful lines and generally intriguing appearance promise great things, to which the excellence of the construction and the finish will contribute more than a little. At the time of writing we have not received "all the orrible details" of its first flight, but Fliar Phil is confident that the machine will fly as well as it looks. Anyway, with its stout 3/32nd monocoque skin it will take any ordinary knocks with a smile.

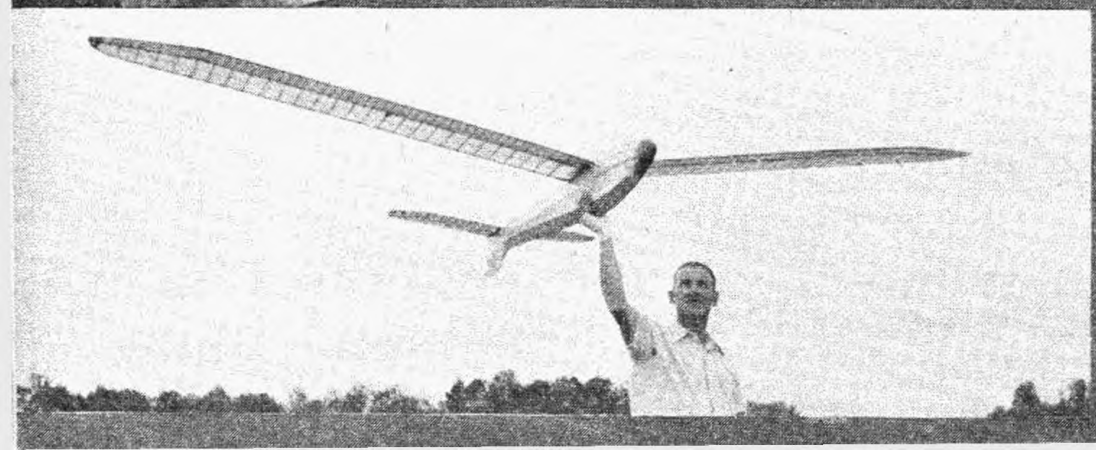
Going merrily, the Minijet shown in the photo top left was heard emitting its characteristic hearty woof at Little Rissingdon last year. There was certainly plenty of power from the glowing cherry red tube, but they are tricky to start to judge by the three Fliar Phil has seen in this country.

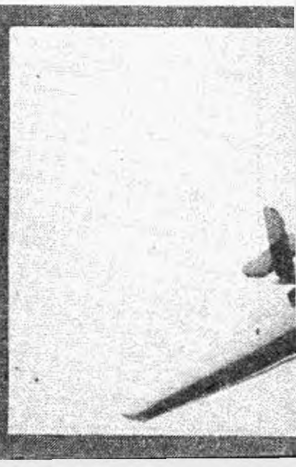
Our recent article on canards stirred up a lot of interest which shows no sign of dying down, and amongst those who are exploring the many good points of this type is another aeromodelling doctor, W. R. E. Harrison of Buxted, and his model, illustrated centre left, is proving itself an excellent performer. The all-up weight is 8¼ ozs. and the span is 46 ins. with a loading for the total flying surfaces of 4 ozs. per sq. ft.

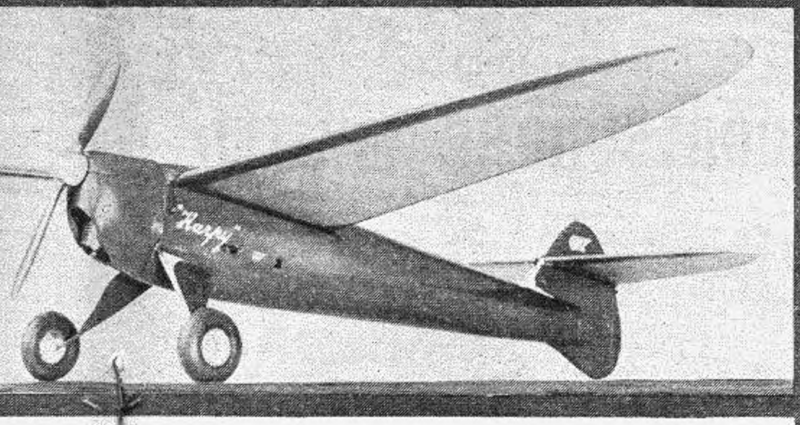
Switzerland still proudly sports the title of world record holder for sailplane duration, and the holder is Trougott Haslach of Zurich, who is shown in our photo bottom left with the winning model, the design of Emil Glunkin. The record flight of 2 hours 21 minutes made by this model has stood for over a year. Let us hope that British modellers may figure to some extent in the International lists, which at the moment are completely devoid of winners from this country.

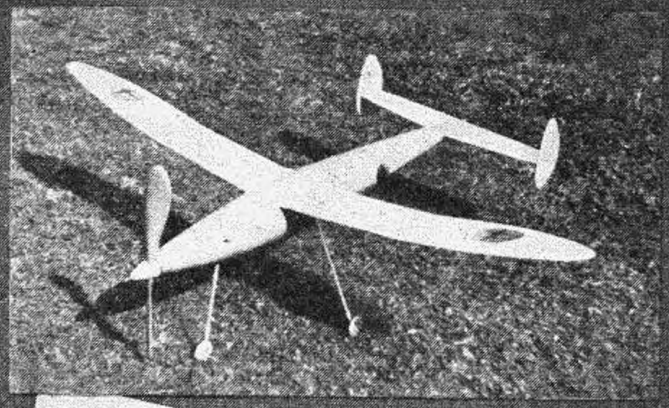
Dr. Pistelli's description of new airscrew installations in last year's AEROMODELLER provides an interesting sidelight on our bottom centre photo. This shows a beautifully finished wind tunnel model of an Italian project for a full scale machine featuring four "tunnelled" airscrews. What success attended the idea is not known, but single twin, and triple engined versions were also experimented with.

The best way to get new recruits to the movement nearly always is through the medium of an exhibition, and most clubs realise









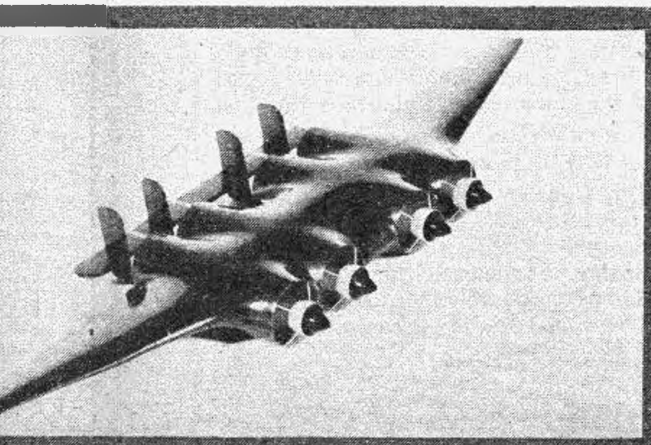
this fact only too well and put on some really attractive shows. Fliar Phil is inclined to the view that badly made models on display are little help to the end, unless the contributor is of really tender age. It is pleasing therefore to see from photos that the exhibition organised by the Southern Cross Aero Club at Brighton at the beginning of the year preserved a remarkably high standard of workmanship. An excellent example is provided by the bottom right hand photo. It is a most attractive petrol model powered by an Ohlsson 19 and built by G. Bowley.

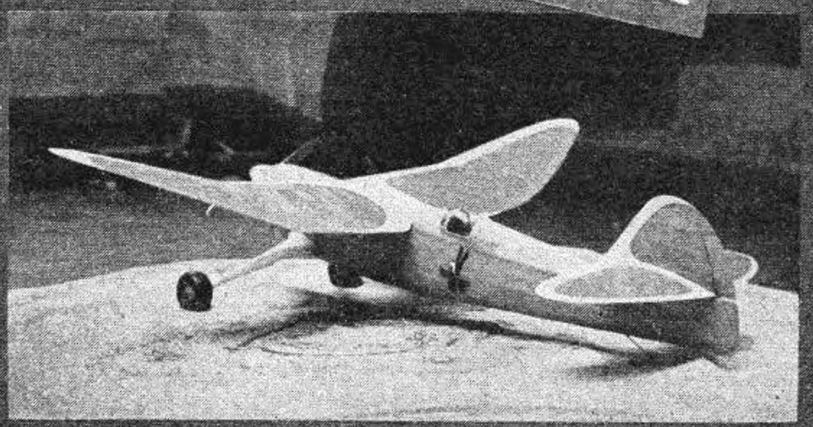
However horrible they may be, no one can deny that the present trend of contest power models do perform in competition manner, and one can notice nowadays a definite formula in English design, of which the photo right illustrates a typical example. Shown in the hands of Pete Neate, St. Albans, it is his own design, and is now powered by a Mills instead of the Frog 175 in the picture. The span is 36 ins. and power flight vertical corkscrew. Note the high pylon, the long thin semi-triangular fuselage, and the extra two finlets on the tailplane. Fliar Phil here makes a confession : in the interests of fairness he is himself building one of these "Zombies" on the accepted principle that the more hideous the appearance the better the performance. His model should be phenomenal . . . . !

We had a bigger solid last month, but hey presto, this month Flair Phil has his customary gasp at a bigger flying model. The gasp is even bigger than usual as the builder of the 8 ft. 8 in. span sailplane in the top centre photo left is only 15½, and designed and built the whole affair himself. The model, which is very nicely finished, consistently puts up a steady 3-4 minutes and the best flight has been one of over fifteen minutes. Young J. Cleland, however, not content with this first prodigy, has pressed on to greater things (and how) and has now finished and is flying a *sixteen* foot span model of his own design. We are promised a photo in the course of time, meanwhile congratulations for tackling such an adventurous project.

Last item on the menu is an old favourite from Plans Service, whose unorthodox appeal yet graceful flyability has won it many friends. This W. A. D. 20, Bill Dean's veteran design, was built by another deft youngster, 14 year old John Luchford, who says "little unkindly" the photo was taken by my sister Joan, but it was only luck it turned out so well". Well, good work, John, and the same to Joan, too. Send Fliar Phil another effort from the same combination and he'll tell you if it is only a flash in the pan.

Until next month Fliar Phil loosens his collar in the heat-wave, and watts off to the local on his own private thermal . . .





# EATON BRAY MODEL SPORTSDROME LIMITED

*Chairman and Managing Director :*
D. A. RUSSELL, M.I.Mech.E.

C. S. RUSHBROOKE
P. H. HUNT
M. N. BROOM, A.C.A.
E. J. RIDING

*Directors :*

D. B. M. WRIGHT
L. H. SPAREY
H. G. HUNDLEBY
D. J. LAIDLAW-DICKSON

*Secretary :*
M. N. BROOM, A.C.A.

## REPORT OF THE DIRECTORS SUBMITTED TO THE SECOND ANNUAL GENERAL MEETING OF THE COMPANY, HELD ON APRIL 25TH, 1947

The Company has continued with the development of the Sportsdrome, the erection of buildings, and the provision of facilities for visitors. Well attended meetings were held throughout the season, and competitors from the continent were welcomed at an International Rally.

The Company has further strengthened its position by acquiring all the paid-up capital of Aeromodeller Plans Service Limited, producers of the popular model aircraft plans, by purchasing the businesses, goodwill and assets of The North London Bookbinding Company Limited, The Drysdale Press Limited, publishers of The Model Mechanic, and Model Cars, and the Photographic Studio Section of Aircraft (Technical) Publications Limited.

The accounts show a Profit on Trading of £3,432. After necessary Provisions have been made, including Provision for Taxation £1,170 and Depreciation £869, there remains an available balance of £682. The Directors recommend the payment of Dividends on the 7½ per cent. First Preference Shares, 10 per cent. Second Preference Shares, 15 per cent. Third Preference Shares, and a Dividend of 4 per cent. on the 5s. Ordinary Shares, amounting in all to £640, the balance of £42 to be carried forward.

## CHAIRMAN'S SPEECH

In the course of his address to the Shareholders, Mr. Russell shortly reviewed the past year's working of the Company and offered the Board's opinion as to the future prospects.

He pointed out that, during the past year, so far as the Sportsdrome itself was concerned, the Company had been handicapped, firstly, by a very bad weather season, and secondly by the continued severe restrictions on petrol supplies to the (Aeromodelling) public, which naturally had restricted the attendance.

Notwithstanding these handicaps, the paid attendance at the Sportsdrome during 1946 had exceeded the 10,000 mark, and the revenue therefrom had about equalled the expenditure in providing its staffing and maintenance.

Mr. Russell pointed out that the Company had only had the benefit of some seven months trading of the business of Aeromodeller Plans Service Ltd., and certain other businesses which had been acquired; but he was pleased to report that sales from the Aeromodeller Plans Service business were usefully larger than in the previous year, and that to date in this year, they had been usefully greater than in the same period last year.

The Board was of opinion that in acquiring the Aeromodeller Plans Service Ltd. business the Company had obtained a very valuable asset.

The recently-introduced publications—"The Model Mechanic" and "Model Cars"—had been very well received, and were selling out all copies which limited paper supplies allowed to be printed.

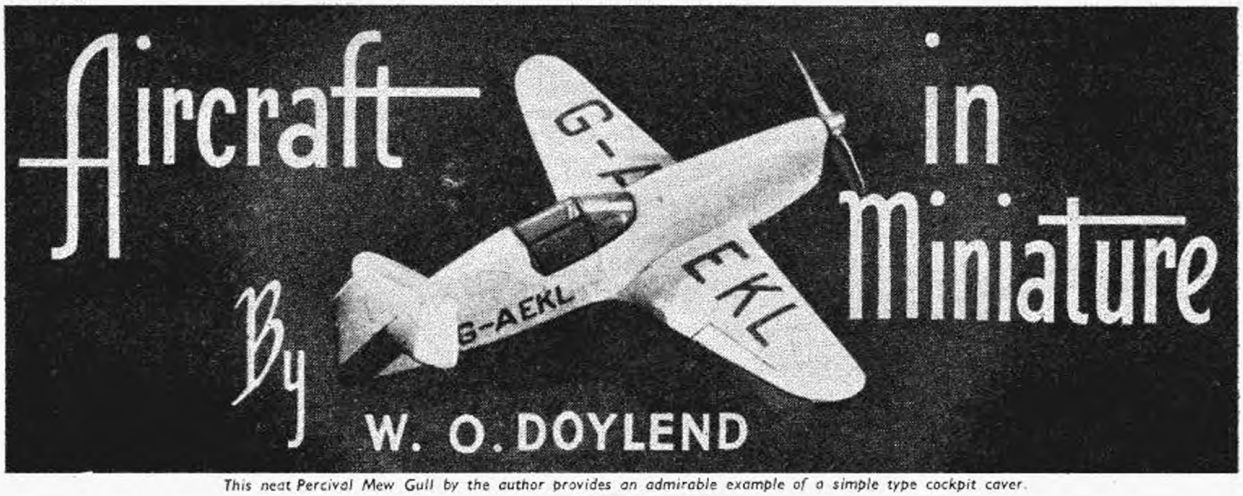
During the winter an indoor track had been operated for model cars, and throughout the summer an outdoor track, exceeding 70 feet in diameter, would be available.

Continuing, Mr. Russell spoke of the very close tie-up between the Eaton Bray Company and Model Aeronautical Press, Ltd. (Publishers of AEROMODELLER) and the Harborough Publishing Co. Ltd.

Through the AEROMODELLER a tremendous amount of publicity had been obtained for the Sportsdrome, and all activities connected with it.

Turning to the future, Mr. Russell expressed the hope that the weather would be very much better than last year and, if this was the case, they would be able to look forward to a considerably increased attendance figure, and an improved trading account.

# Aircraft in Miniature




By W. O. DOYLEND

*This neat Percival Mew Gull by the author provides an admirable example of a simple type cockpit cover.*

PART IV

THE actual sizes and shapes of these seatings will vary according to different aircraft. The shape should be cut out with a tenon saw and the seating filed to a true finish. Nose turret seatings are similarly treated. (Fig. 10.)

Mid-upper turret seatings will also vary with each type, but generally will consist of a circular well drilled in the fuselage top. This is best done with a brace and centre bit if one is available, and in this case the hole should be drilled immediately after Stage 4 of the fuselage construction and before the final shaping of the top deck. If a brace and centre bits do not feature in the modeller's tool kit, the seating must be carefully cut out with a suitable sized gouge.

### Cockpits.

The important points in the hollowing out of cockpits are, firstly, to prevent damage to the top decking of the fuselage, especially where two cockpits are cut close together. Secondly, a good side view shape to the cockpit is necessary as this materially affects the lines of the fuselage. The shape will vary with the different types of aeroplane, being sometimes curved, as in the "Moth Minor," and sometimes angular, as in the "Tiger Moth." A good finish to the sides can be obtained by using a half-round file or a piece of fine sandpaper rolled around a pencil in the former case. In the latter, a fine flat or three-cornered file is used.

Open gunner's cockpits are usually circular and may be cut with a drill. In some cases the gun ring is built up from the rounded top deck as in the Hawker "Hart" and "Audax" types. This effect can be obtained by using a strip of tin bent round the inside of the cockpit.

Fig. 11 shows a modification of this type of gunner's cockpit found on the Hawker "Demon," "Hind" and "Hector" aircraft, in which the top deck of the fuselage is cut down to provide greater protection for the gunner from the slipstream. The seating is best cut down before the top deck is rounded, a tenon saw or a fret-saw being used. The cockpit is then drilled out in the normal way.

In the older types of twin-engined bomber, the nose and tail gun positions are open cockpits and in these positions they should be drilled out after Stage 4 of the shaping.

### Tailplane seatings.

In most cases where the tailplane is mounted on top of the fuselage it will be necessary to cut a shallow seating for it, as described in Chapter 4. In some types a better seating will be obtained by a curving of the forward end, as in Fig. 12A, but in other cases, where the tailplane is notched into the fuselage, as in the various Hawker biplane types, the seating should be square, as shown in Fig. 12B.

### Cowling panels.

The appearance of a fuselage is always enhanced by the representation of engine cowling panels, inspection hatches, etc. These should be scored just sufficiently deep to prevent the lines being filled in when the paint coats are applied.

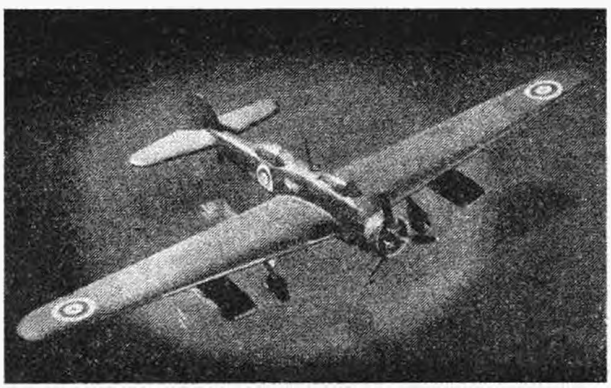
### Enclosed cabins (solid).

So far we have dealt only with the open cockpit type of fuselage, but the modeller will also have to cope with the enclosed cabin type. The construction of a solid cabin fuselage presents even less difficulty, and with the cabin windows painted in silver or represented by silvered paper glued on, the effect is very realistic.

When marking out the block the cabin should be drawn in and the fuselage shaped in the normal way. The shaping of the forward windscreen and deck is carried out in the following manner.

During Stage 3, a transverse saw cut is made along the line of the windscreen from the top of the cabin down to the level of the forward decking, A to B in

*This Vickers "Wellesley" features built up engine details with moulded cockpit covers and a fully detailed "office."*



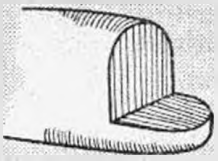


FIG 10. TAIL TURRET SEATING

FIG 11. GUNNER'S COCKPIT ON HAWKER DEMON ETC

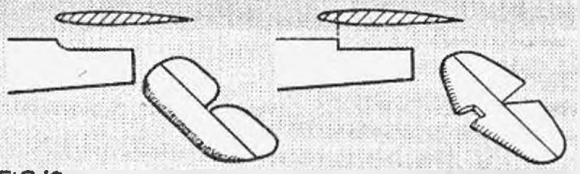


FIG 12. TAIL PLANE SEATINGS.

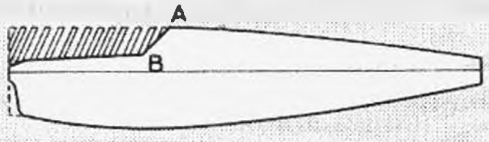



FIG 13. FIRST STAGE IN SHAPING SOLID CABIN.

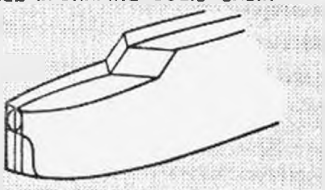


FIG 14. SECOND STAGE IN SHAPING SOLID CABIN.

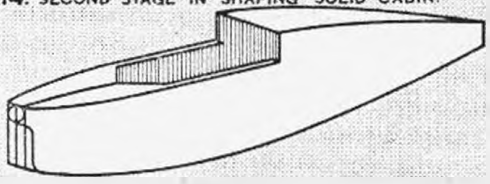


FIG 15. CONSTRUCTING HOLLOWED-OUT CABIN.

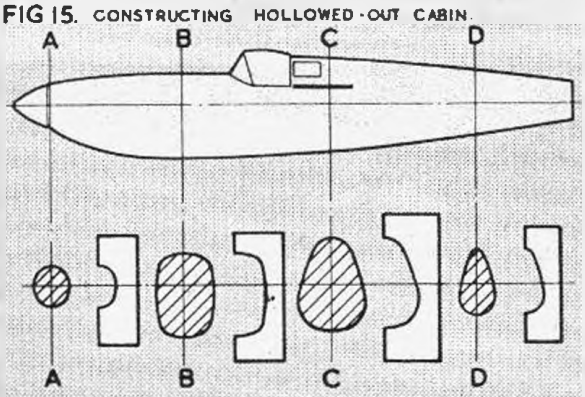



FIG 16. CROSS SECTIONS & TEMPLATES FOR SPITFIRE FUSELAGE.

Fig. 13. The forward decking is now shaped, as much as possible being done with a chisel, cutting towards the nose and finishing off around the base of the windscreen with a file.

Then, during the plan shaping of the fuselage in Stage 4, the rake of the side screens will have to be cut with a tenon or fret-saw, bringing the shaping to the stage shown in Fig. 14. The top decking of the cabin and nose is now finished off, the side screens being deepened at point A to allow for the rounding of the nose decking. If the front windscreen of the cabin is curved, the corners left after this operation can be rounded off with a file until the correct shape is obtained. Curved types of cabin windscreen are found on such types as the Percival "Proctor" and the G.A. "Cygnet," whilst angular screens are used on the Airspeed "Courier," and "Oxford," the De Havilland "Puss Moth" and the twin-engined Handley Page "Harrow."

**Enclosed cabins (built-up).**

A more realistic effect can, of course, be obtained by hollowing out the cabin and building up the windscreen and side panels with some transparent material such as thin celluloid or perspex.

In such cases, the whole of that part of the block representing the cabin windows is cut off and the cabin hollowed out by first drilling holes and then finishing with a chisel or gouge. See Fig. 15. The shapes of the transparent panels are then built up in sections, each carefully glued in place. Where the front windscreen or cabin top are curved surfaces, perspex is the most suitable material to use, since it can be filed to shape and then polished with ordinary metal polish to preserve its transparency. Narrow strips of paper are glued on the outside of the windows to represent the frames, and these also help to hold the windows firmly in place. Needless to say, considerable patience is required to make a good job of this type of cabin, and the novice is advised to keep to the solid type until he has acquired sufficient skill to tackle a built-up cabin.

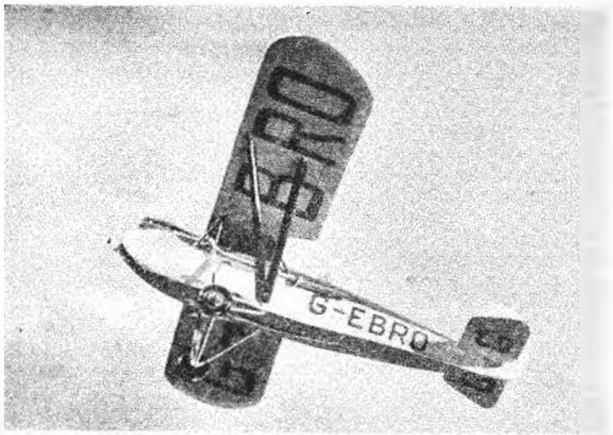
**Cross sections.**

At all stages during the construction of fuselages attention should be paid to the cross section. The drawings available may not always give cross sections, but an idea of their general shape can always be obtained from the front elevation drawing and by a study of sketches and photographs. When cross sections are given, templates should be cut from stiff cardboard and used to check the section at various points of the fuselage. Cross sections and their corresponding templates are illustrated in Fig. 16.

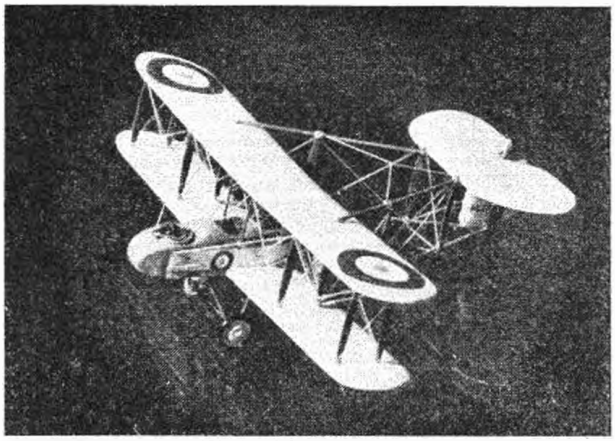
**Head rests.**

In some early aircraft, mainly single-seat fighters and racing types, a streamlined head rest was fitted behind the cockpit. Examples are the S.E.5A fighter of 1917 and the Fairey "Flycatcher," which was at one time the standard fighter of the Fleet Air Arm.

These head rests can be allowed for in the marking out and built into the fuselage shaping in Stage 3, or they may be formed from a separate piece of wood and glued into position when the fuselage has been finished. Since the separately made head rest will be rather small, it may be glued in position after being roughly shaped and finished off on the fuselage with a small file and sandpaper. It is also advisable to reinforce the glue by pinning the head rest, a small pin being inserted in the top deck of the fuselage, point upwards, and the head rest pressed carefully on to it, taking care not to split the small piece of wood.




*An example of an in-line engined machine with exhaust pipes and early civil markings, to wit the Westland Widgeon.*



*The wind in the wires. A 1914-18 F.B.9 requiring much patience on the part of the builder.*

**Ribbing.**

External ribbing is sometimes employed on the fuselages of aircraft, the Handley Page "Heracles" class of air liner and the little B.A. "Swallow" light aeroplane being two instances, and also the nose of the "Heyford" bomber. Ribbing can be reproduced by scoring fairly deep lines and then glueing in lengths of thread. The thread should be well glued and the ends should receive special attention. They should be cut a little longer than required and when in position the ends are trimmed off with a razor blade.

This method can also be used on the Supermarine monoplanes built for the Schneider Trophy races, the S.5, S.6 and S.6B, to represent the radiators on the sides and bottom of the fuselage.

Although the scoring of the lines for this ribbing can be done in the earlier stages of the construction of the fuselage, the thread should not be glued in place until just before the model is ready for its first coat of paint. If done before, the continual handling which a model receives during its construction will be likely to dislodge the threads. *(To be continued)*

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


DEAR SIR,

With reference to the March-April issue of the AEROMODELLER, in which you have a photograph of myself (A. C. Ellis) in the article headed "Meet the Modellers," I should like to point out an injustice to the designer of the machine (Mr D. V. Figgins).

It was over a year ago that D. V. Figgins designed the model and I might add flew it straight off the Drawing Board.

I was not in any way a co-designer as you put it.

D. V. Figgins, built the machine in heavy obeechi, Balsa then being very scarce.

However, shortly afterwards he passed the design on to me for building a lightweight job of it.

I myself built and successfully flew the model with the results you have published under my photograph.

All the models that have been built of this design have had the same good flying features, namely, super stability and a rocket-like climb, with a good glide. Without any exaggeration this machine has yet to make a flight of under a minute.

The photograph you published shows my machine which is still flying and is now a year old. This is by the way the same machine which did 18 mins. 13 secs. (official) and 25 mins. (unofficial).

Flights of 90 secs. to 2 mins. come within easy reach.

To show how easy the model and design is to construct and fly, it was built and flown by one of the youngest members of the club—a lad of 15. He has flown it with equal success.

I might add a third mark is now under construction by D. V. Figgins.

Portsmouth. A. C. ELLIS

*Apologies — and congratulations — to Mr. Figgins.* (Ed.)

DEAR SIR,

When I was first taught to write advertising copy one golden rule was hammered into me "Remember the cabman's wife."

The implication of this rule is that anything written must be understandable by those to whom it is addressed. I have recently struggled with the instructions and drawings supplied by two makers of model aircraft kits, who, obviously have never heard of this maxim.

The two kits I bought are described as "elementary kits." There is all the more reason, therefore, to suppose that their purchasers have no previous knowledge of model aircraft building at all beyond the ability to read a drawing.

Obviously the two makers of these kits have not realised the problem which they, themselves, have created. They have taken a great deal of trouble in designing their aircraft and in working out how they can be built with the minimum wastage of material, but they have not spent anything like the same amount of time in worrying out their assembly instructions. Sectional drawings and front or rear elevations

*(Continued overleaf.)*

## Readers' Letters . . .

(*continued from previous page*).

of essential parts are lacking ; especially the sectional drawings which are so essential for the understanding of a plan or profile.

It is not easy when you are in full possession of all knowledge about any subject to put yourself in the place of one who knows nothing about it, and explain that subject in words of one syllable. In my experience, years of training and self-discipline are needed, so that it almost becomes a specialised craft. Unfortunately lack of attention to this very important matter can lead to widespread results.

Only the bare minimum of material needed is supplied with the kit and one false cut may mean that the particular piece is ruined and wasted. It is comparatively easy for anyone living in London, or some other big city, to find a shop which stocks material and to replace the wasted part. But consider the position of somebody living miles away from anywhere, who buys a kit and spoils a part of it ; he may have no shop to go to, nor even know where to write to get it. If this can be bad when occurring to anyone living in the remoter parts of Great Britain, how much worse would it be for anyone living in South Africa or India.

Visualising then, the export trade—and one of the firms I refer to is trying to create an export market—we begin to understand the vital importance of making drawings and instructions to beginners in model making clear beyond any doubt. Export, in fact, all selling, is dependent on goodwill, and goodwill is not created by frustrated irritation.

The trouble seems to be aggravated by a desire for economy of space. I have had a good many years' experience in laying out instruction sheets of one type and another and have found always that it is false economy to skimp information in the desire to use only one sheet. There is a limit to the size of sheet which can be used ; also the cost of making blocks to print an outsize sheet becomes unnecessarily large, but it would be easy to make two sheets which, incidentally, might be handier for the user than one, and get every single drawing needed on to them.

The printed directions must also be absolutely clear. This, as I have already said, is the hardest thing to do. I shrewdly suspect that the two sets of instructions which I have read and tried to understand were written by somebody in the firm who thought he could do it. There is no more dangerous mistake. Simple instructions are the hardest thing on earth to write and the simpler the instructions, the harder it is. It takes a special knack, rounded off by much hard work, as the Air Ministry realised when they produced the admirable *Training Monthly* and the War Office their training manuals. Experience taught them that it takes experts to do the job.

So may I urge all makers of kits, especially those who make kits which retail salesmen will sell as "easy for beginners", seriously to revise their drawings and instructions. Let them spend as much time, trouble and money on them as they evidently spend on the design of the aircraft itself.

London, W.C.1. N. C. STONEHAM.

DEAR SIR,

May I place on record two thoughts? One is that Colonel Bowden has written an admirable article on the construction of wings with elliptical dihedral ; the other is that it would be hard to think of a form of dihedral which is more unsuitable for a model.

For the sake of readers who did not know this, I would point out that it is conducive to tip stalling and lateral instability (spinning, etc.), unless the wings make an angle with the centre section to start with, and the degree of elliptical variation is small. Then, of course, it is highly irrational to use it at all.

The most efficient form of dihedral, proved in practice and by theory, is the plain "straight" form, starting either at the fuselage or from a flat centre section.

Campden P. R. PAYNE.

*Readers may be interested to know we are shortly publishing some non-technical articles by our contributor John Halifax giving the modern viewpoint, based on low speed research, on some of the old "chestnuts."* (Ed.)

DEAR SIR,

I have been reading the AEROMODELLER for a number of years, and now that the war is over I am anxious to hear about aeromodelling in Europe.

Notes by the Boffin are extremely interesting, but I wish that space would permit more news to be published on modelling in foreign countries.

Aeromodelling has just "woken up" here in South Africa after the war and things are slowly coming back to normal.

If any modeller in England, Switzerland or France would care to correspond with me, he (or she) is welcome. I am now seventeen years old and I am interested in all sections of aeromodelling, from "solids" to "canards." The Eastern Province Model Aircraft Association" has just been formed in Port Elizabeth, and so far only two big contests have been arranged.

Port Elizabeth, South Africa. WILLIAM SAPSFORD.

DEAR SIR,

For some time past I have successfully dyed my models a variety of colours.

My method is to use Tintex Dyes. Just mix the dye with boiling water, shaking it up until it has dissolved, I use a medicine bottle for this. When cool, pour off the liquid into a spray gun making sure that any sediment or undissolved dye is left behind. The dye is sprayed on to the tissue making sure that the colour is even. When dry the tissue will have shrunk and may be doped in the usual way.

After practice the result is undetectable from that obtained by using coloured tissue, which is so hard to obtain, and of course one has a wider range of colours.

Bristol. G. WOOLLY.

DEAR SIR,

I was pleased to see the published letter from that versatile pioneer of power driven model aircraft, D. A. Pavely, on the above subject. It was the very impressive performance of one of his monoplanes I witnessed over Wimbledon Common in 1920 which revived my interest in models after the Great War, further, Mr. Pavely machined up the components of my first C.A. engine before I acquired a lathe and I am very grateful to acknowledge the valuable help he subsequently gave me. He was a great expert at building the air containers and I have today put 150 lbs. per square inch pressure into a container he made in 1927. I still have one of Pavely's twin opposed engines, and also one of the very ingenious "Autoplan" three cylinder engines in which one cylinder serves as the inlet valve for the next.

There was a certain amount of charm around the air engines ; they started immediately, they ran without the bark of the internal combustion engine, so you could do a little testing after midnight, and they developed an amazing amount of power, but they had to be reasonably well made, and they certainly required some pumping. The compressed air plant suffered somewhat from a number of useless commercial efforts which came on the market—some were not only useless but dangerous. I have an old "news" film made by Paramount News giving excellent views of one of my C.A. engined models, and the climb is quite good in spite of the fact that only 50 lbs. pressure was used instead of the more normal 150. The idea being to get the machine to circle round the camera.

The C.A. plant certainly was an alternative to the ubiquitous rubber of the time, and without the complications of the flash steam plants, though the latter, in the very capable hands of Mr. H. H. Groves provided some excellent power flying.

Wembley Park. R. J. TREVITHICK.

DEAR SIR,

I've turned up the S.M.A.E. Journal dated August, 1929, and the actual times in the "Wakefield" for that year, for the first two were :—

Bullock : 67·1, 68·1, 70·4 secs.
Paveley : 58·8, 67·6, 59 secs.

Mr. Newell placed third with best duration of 66.6 secs.

London. D. PAVELEY.


**Chinese Champions.** Recent comments on contests in Singapore between the R.A.F. and local Chinese clubmen have produced the results of one of these historic combats. Correspondent A/C.I Legg refers embracingly to the opposition as Civilian Modellers, and suggests that they are a little behind with the latest ideas on account of the Japanese habit of putting any confessed aeromodellers straight into the concentration camp. This makes our own wartime ban on power models seem very lenient. In spite of their enforced idleness, however, the civilian modellers have managed to trounce their more up-to-date R.A.F. adversaries on more than one occasion. The results of their last meeting show Pang (or should it be Prang?) Ting Ming leading the field with an average of 1:17, followed by Chang Pah Siong with 1:02, while in third place comes E. Holloway with 51:6.

**South African Sunday.** An old friend, E. Allen, late of Blackheath and Worthing M.F.C. now dentisting in South Africa, sends news and views of activities with the Pretoria M.F.C., who run a monthly Gas Competition on a spot of local veldt at nearby Waverley. There seems little fear of any harm befalling a model in such surroundings if we discount the activities of local fauna as the harte wilde or other marks of the beeste. It is interesting to learn that Mick Smith's Mercury design is still popular with South African enthusiasts. Times seem rather on the low side, latest winning figures being 75 seconds, with a motor run of 20 seconds, with second and third man on the minute mark.

**Light in India.** Rusi B. Mobed, secretary of the Aeromodellers' Society of Karachi, gives an account of club activities in India. The Society celebrated its seventh anniversary in January of this year, and are pleased to record that many of their members were able to serve in one or other branch of the forces. Back once more, the Secretary is alarmed at the rate with which they have been consuming the communal store of balsa and other rare commodities, carefully husbanded in past years. Rusi himself has been working for the past six months an average of two hours a day on his Lizzie, from Aeromodeller Plans Service drawings, and has now arrived at the covering stage. This works out at something over 250 hours on one model, so that we can hardly accuse the Secretary of squandering the club balsa stocks.

**Parasols over Penang.** A very brief note, signed only with the initials, enclosing a Singapore Sunday Times cutting, gives the Boffin gen on model activity in Penang. An Australian, Mr. A. J. Drake, who is Captain of the local flying club, and himself an aeromodeller, has promised assistance and encouragement to the growing band of enthusiasts who meet every Sunday on the polo ground. Local record, so far, is over 33 minutes, so Bob Copland and others had better look to their laurels. Members have no clubhouse, yet with umbrellas covering them from the hot sun they gather faithfully week by week. We, too, can often use those same umbrellas, though, alas not for the same purpose.

*Top: Indian Summer—Lady members of the Karachi Aeromodellers' Society hard at work in their clubroom.*

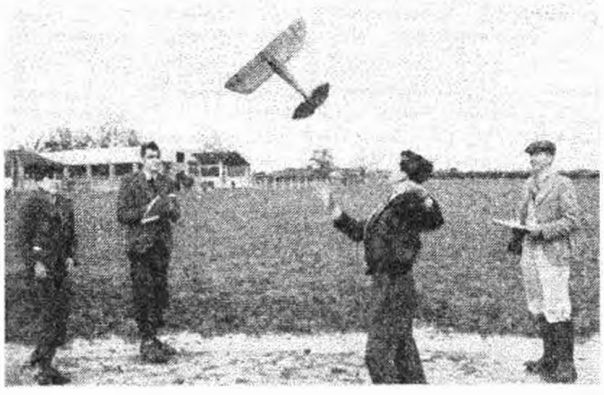
*Upper Centre, left: American angle—Paul Degatto with his own design "Grenadier."*

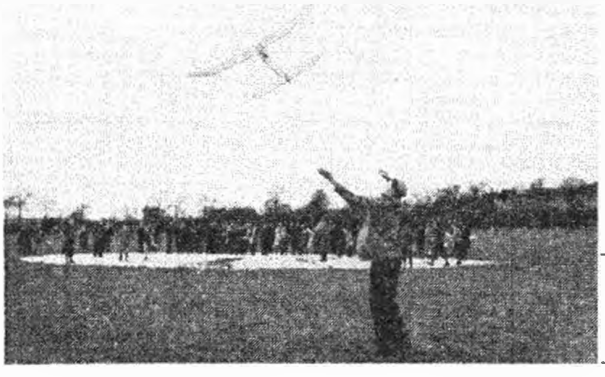
*Upper Centre, right: South African meet—A Mick Smith "Mercury" setting off over the Veldt.*

*Lower Centre, left: Chinese Champion—Pang Ting Ming with his winning model.*

*Lower Centre, right: Bihar Builder—Lt. Bew with his successful Ato 22 kit sent out from England.*

*Bottom: Bedroom Big Stuff—Robert Cordier from Brussels gets ready for International Week.*



# CONTEST

THE British Nationals will just beat publication of these notes by a few days, so that all we can do is to remind you that you've had them in case news of the venue failed to come your way. Gravesend Airport was the scene of this first post-war Nationals on anything like pre-war scale and we hope the weather kept fine for a mammoth crowd including our own reporters, who will give the full story in words and pictures next month.

**June.**

This month opens at Eaton Bray with a Grand Sailplane Contest on the 1st. Sailplanes of all classes will be eligible and this event offers opportunities for everything from Fillon's Champion to the amazingly popular little Arnhem glider, now building in its hundreds for the Arnhem Trophy in September. We make no forecasts, but, given the weather, expect a goodly attendance.

The week-ends of June 8th and 15th offer general flying with contests for rubber duration, power and sailplanes again. A similar programme is arranged for June 29th.

For Sunday, June 22nd, sees the inauguration of Flying Scale Contests for a £20 Trophy. This will give some of our rather shy scale model builders an opportunity to make the most of their own special day. Rules will be simple, giving special encouragement to accuracy of scale outline and characteristic flight, with actual duration a secondary feature, requiring only a short minimum flight to qualify. This means that, for example, a Vampire with a short "whooshing" flight and good lines will be able to hold its own with a lightly built Leopard Moth capable of several minutes in the air. In order to give the organisers an opportunity of judging the probable entry, intending visitors are urged to write in for detailed rules, stating the model they hope to enter. Any flying scale model, irrespective of motive power—or even scale gliders—may enter. This is your chance, scale model fans. Rise and shine!

**July.**

First Sunday in July—the 6th—is allocated to a Special Summer Meeting with a prize list valued at £30. It will also be the occasion of eliminating contests for International Week commencing on July 27th. Leading British aeromodellers will be invited to take part in International Week, but, to avoid an unwieldy entry, those who have not placed high before either at Eaton Bray or in National events will have to qualify—and may take some good prizes in so doing. There will be events for Sailplanes, Wakefield models, Open Rubber Duration and Power models. Book this date.

**Bowden Contest.**

We are indebted to Lt.-Col. Bowden for a few preliminary notes on this year's Bowden Contest now scheduled to take place on Sunday, 3rd August, at Fairlop Aerodrome, which lies near Ilford, Essex. This famous event is of course open to modellers of all nationalities, and poses as big a problem as it ever has. New and rather exacting rules, shortly to be released, will make this a specially interesting occasion. Will a

*Heading picture. Mick Farthing brings out his model, which placed third in the duration event. Upper centre: H. J. Evans of Northall, an E.B. "regular" puts up his sailplane. Lower centre: J. Wingate of Streatham with his low aspect ratio 5 c.c. Ace diesel engined power model. Bottom: Pete Brown of St. Albans lets go watched by an attentive crowd.*

# CALENDAR

British or a foreign entry win? Is a petrol or a diesel-engined model to gain the "Bowden International Trophy"? We shall see.

**Continental Contests—Switzerland.**

The Aero-Club of Switzerland announce that they are holding a two-day International Meeting on June 21st—22nd for gliders and power-driven models. The contest is limited to teams of six together with a team manager, representing the participating national aero clubs for which the sponsors are making special arrangements. Non-competitors can also be accommodated at approximately 20 Swiss francs per day (this is about 23/-). Venue is not yet fixed but according to latest reports will be either at Basle or Zurich, in either event entrants and spectators are assured of flying over some of the most magnificent scenery in Europe. Intending visitors should inform the S.M.A.E. Secretary *immediately* so that the Swiss organisers can make arrangements.

**France.**

A final reminder that the Third International Contest for Tailless Model Aircraft will be taking place at Corbas, near Lyons on July 6th, organised as usual by the Aero Club of the Rhone. Rules in English may be obtained free from the AEROMODELLER, or those anxious to get on with it in French may write direct to Guy Borge, 25 Quai St. Vincent, Lyons, France.

**Looking Ahead.**

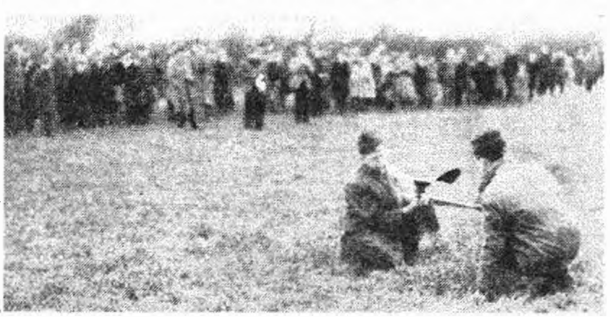
Those with holidays to fix may like to be reminded of a few outstanding items on the Eaton Bray programme falling later in the year. We should also mention, for those who come from far afield, as more and more seem to be, that rather more substantial snacks are now available on Sundays, featuring such delicacies as eggs and chips . . . so even if you don't win a prize . . .

Three more Aeromodelling Camps are arranged, each running Saturday until the following Sunday week, when jolly good flying can be well enjoyed as well as instruction in your aeromodelling problems. Food and accommodation are included in the very modest all-in charge. Vacancies still exist in Camp No. 2 starting on July 5th, and Camp No. 4 commencing September 6th. No. 3 beginning August 16th, is pretty full, but maybe another one or two *could* be squeezed in.

International Week this year runs from July 26th to August 4th, and thus includes two Sunday Meetings and August Bank Holiday Monday. A "Trade Day" is laid on for Sunday, August 3rd when it is hoped the Aircraft Trade will give us an aeromodelling "Hendon."

Highlights of September include the Autumn Meeting on the 7th for the £20 Victory Challenge Cup—this year eligible for duration models—while on the 21st is the Arnhem Trophy finals, when qualifying entrants will fly off with their Arnhem Gliders under the watchful lens of the Gaumont British News Camera, who are sponsoring what is hoped to be an annual event in honour of that epic airborne action.

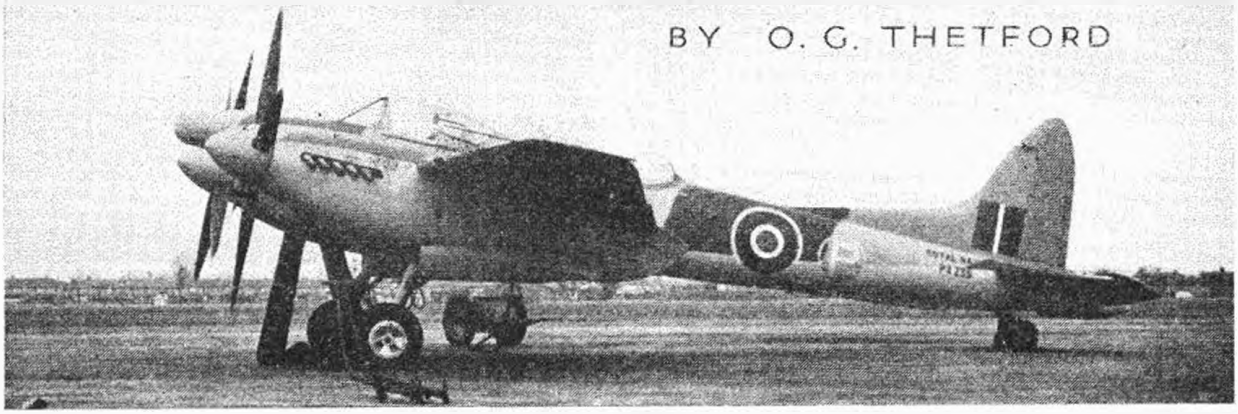
Finally the season winds up with our own Pterodactyle Trophy—a £20 Cup for Tailless models of all kinds.

*Top—Pete Brown of the St. Albans Cement Squeezers adjusts his timer before hand launching his model into the wind and rain. Centre—A group of competitors developing "No Starters' Cramp," and below part of the crowd round the Control Tower listening to an announcement. Bottom—Another competitor makes final adjustments, watched despite the weather, by several hundred interested spectators.*

# MONTHLY MEMORANDA

BY O. G. THETFORD



GILDING THE LILY. The first prototype Sea Hornet 21 night fighter for British Naval Aviation. Note prototype marking and serial number PX 239. This version is a two-seater, with rear cockpit cupola for the navigator radar operator, and a radar scanner is fitted in the special nose. The dorsal fin fairing is now standard on all Hornet variants.

POSITIVELY LAST APPEARANCE. The last Handley-Page Halifax to be built, a Mk. IX serial number RT 938

Below is the U.S. Navy's latest jet fighter, the Chance Vought Pirate, which succeeds the famous Corsair.

SQUIRT BOMBARDMENT. First jet-propelled bomber for U.S.A.A.F. squadrons is the North American B-45 below. The B-45 has four jet units and spans over 89 ft.

## Hythe Boats Named.

The names of the twenty-one "Hythe" Class flying-boats for British Overseas Airways were announced recently by Short Bros. They are as follows:—*Hungerford, Halstead, Hadfield, Hawkesbury, Hazlemere, Harlequin, Huntingdon, Hunter, Hudson, Hanwell, Henley, Harwich, Hythe, Howard, Hotspur, Hobart, Hampshire, Hamilton, Handbury, Honduras, and Hemsdale.*

## Export Markings.

British military aircraft for export recently have included Firefly IV naval fighters for Holland, ex-R.A.F. Beaufighters for Turkey and a batch of Spitfires, Mosquitos, Ansons and Oxfords for Norway.

The Firefly IV aircraft for the Netherlands Navy are of special interest as they are the first post-war Dutch aircraft to revert to the old national marking of a tri-sected disc of red, blue and white, with a yellow centre. These markings appear above and below the wings and either side the fuselage. On the fin red, white and blue stripes are painted horizontally, forming a small rectangle with the red at the top. This is a post-war modification, as the old tail marking was painted on the rudder. The first of the Dutch Firefly IVs has the identification numbers "H" and "31" painted before and aft of the fuselage insignia on the port side, the order being reversed on the starboard side. At the bottom of the fuselage, well aft below the tailplane root, the name "KDN MARINE" appears in small block capitals. It is of interest to note that the private Fairey serial number for the first Dutch Firefly IV is "F. 8227".

The Turkish Beaufighters carry a red square, with a thin white border, above and below the wings and on the fuselage. On the fin is a rectangle of red against which is painted the familiar Turkish symbol the star and crescent in white.

The aircraft sold to the Norwegian Air Force include forty-seven Spitfire fighters; three Spitfire XI photographic reconnaissance aircraft;

eighteen Mosquito bombers and twenty Oxfords, ten Ansons and five Mosquito IIIs for flying training.

The new Norwegian markings, introduced in 1946, are carried by all these aircraft. The new marking consists of a red triangle with a blue centre stripe outlined in white, against a circular white background, the whole being outlined in blue.

**South African Equipment.**

During 1947 a total of 136 ex-R.A.F. Spitfire IX fighters is to be ferried from Britain to South Africa to equip the fighter squadrons of No. 7 Wing, S.A.A.F.

No. 2 (Coastal) Wing and No. 3 (Bomber) Wing of the South African Air Force are equipped with Lockheed Venturas, which serve both as bombers and as general reconnaissance aircraft. The two remaining squadrons, Nos. 28 and 35, are equipped with the Dakota and the Sunderland flying-boat respectively.

Aircraft of the South African Air Force can be recognised by their blue, white and yellow roundel (the yellow in the centre) painted on wings and fuselage. There are no markings on the tail assembly of S.A.A.F. aircraft.

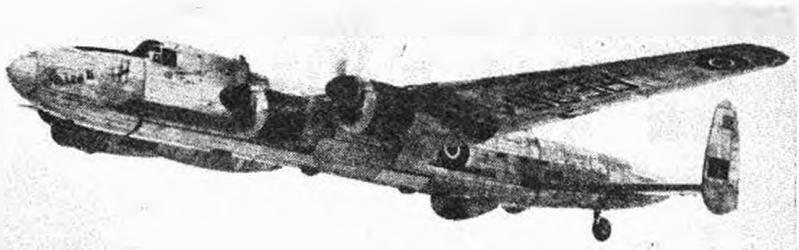
**Off the Secret List.**

News has now been received of a whole range of new aircraft for the Royal Air Force and Naval Aviation. As yet, only names and brief details may be published.

The Avro Shackleton is a long-range general reconnaissance aircraft for Coastal Command and is fitted with four Rolls-Royce Griffon motors. It is generally expected to be a development of the Lincoln bomber. Another new type from the Avro stable is the Athena three-seat trainer, which is fitted with an Armstrong-Siddeley Mamba or a Rolls-Royce Dart airscrew turbine. The Athena is in the same category as a new Boulton Paul trainer, the Balliol, which is also a three-seat advanced trainer with the same type of power-plant.

Three new types for Naval Aviation include the S. 28/43, a development of the Firebrand from Blackburns; the Seagull spotter amphibian monoplane from Supermarines, and the Wyvern torpedo fighter monoplane from Westlands. The Seagull is fitted with single Griffon motor driving a tractor airscrew and has a variable-incidence wing. It will replace the Sea Otter biplane.

The Westland Wyvern is fitted with the new Rolls-Royce Eagle sleeve-valve motor. It was designed to Specification N. 11/44 and is confidently expected to be the fastest airscrew-driven fighter in the world.



(*Central Press*)

*TAKING THE AIR. Aries II, Lincoln RE 364, which replaces the Aries I Lancaster at the Empire Air Navigation School, Shawbury, Shropshire. Note the natural metal finish*

(*Martin and Kelman*

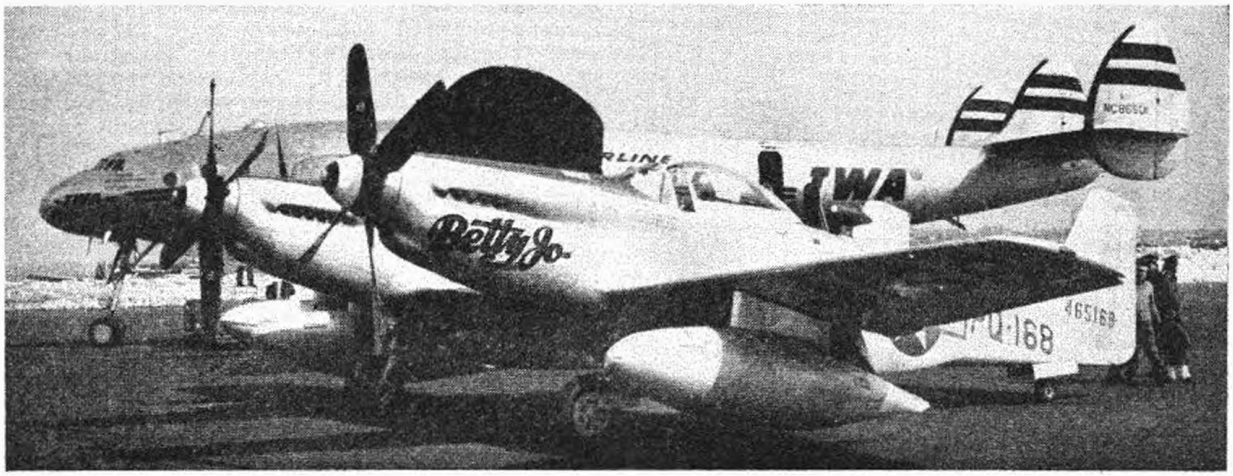
*UGLY DUCKLING. Latest Utility Amphibian for the U.S. Navy is this Columbia XJL-1 which revives the old Loening ideas but with a tricycle undercarriage as a concession to modernity.*

(*Central Press*)

*RECORD BREAKERS. Above is the Douglas Invader "Reynolds Bombshell" in which Milton Reynolds of Chicago beat Howard Hughes' round-the-world record recently.*

*Below is the P-82 Twin Mustang "Betty Jo" which flew non-stop 5,000 miles from Honolulu, Hawaii, to La Guardia Field, New York, in 14 hours 33 minutes, thus setting up a distance record for fighter aircraft.*

(*Martin and Kelman*)



AEROPLANES DESCRIBED L

# THE BELL MODEL 47B HELICOPTER

The Bell Aircraft Corporation of Niagara Falls, N.Y., has become notable for its progressive design policy in recent years. Its P-39 Airacobra, with the engine mounted behind the pilot amidships, earned fame in the war years and Bell's Airacomet was the first American jet-propelled aircraft. At present, Bell is concentrating on the development of the XS-1 supersonic aircraft and a series of helicopters of outstanding merit. The Model 47B helicopter is probably the most useful all-round type in this category flying to-day. Well over a year ago, in March, 1946, the Bell Model 47 was granted a type certificate by the U.S. Civil Aeronautics Administration, thus being the first helicopter ever permitted to carry passengers "for hire or reward".

The Bell Model 47B is a two-seater helicopter for either civil or military use. The civil model has normal automobile type of cabin with roomy interior and excellent visibility. The military YR-13 is being built for the Army and the Navy and differs from the civil version in having a near-spherical bubble canopy enclosing the pilot and passenger, who sit like goldfish in a bowl with perfect vision in all directions. Fitted with rubber floats instead of wheels, the Model 47B has been ordered for geological surveys in Northern Canada, and the civil version is already in regular commercial use for pipe-line patrol, mining and exploration, forest ranging and timber survey, postal deliveries, crop spraying and a wide variety of other duties. Two Bell 47B helicopters are being delivered to British European Airways this summer at the cost of £7,000 each. They will supplement the work of the three Sikorsky S-51 helicopters already on order.

The Bell Model 47B is powered by a 178 h.p. Franklin air-cooled six-cylinder engine mounted amidships. The most interesting feature of the aircraft is the Bell-patented two-blade rotor, which employs a special stabilising bar. This bar is mounted on a seesaw pivot immediately beneath the main rotor. It rotates with the mast . . . at right angles to the rotor blades. However, because it is a large rotating weight, the bar tends to hold a given plane of rotation independently of

*Photos: Martin & Kroman.*


either mast or rotor. Linked mechanically to the rotor, the stabilising bar prevents sudden changes of rotor-blade angle (hence tilting of the rotor disc) which can be caused by inadvertent swinging of the fuselage and mast by gusts and other disturbances. A small tail rotor compensates torque and provides directional control.

Complete dual controls are fitted as standard equipment and conventional control columns are provided for tilting the main rotor by means of cyclic rotor blade angle change. The tilt of the rotor plane, and hence direction of flight, follows the corresponding motion of the control column. A collective pitch lever, operation of which causes each rotor blade to increase or decrease its geometric angle a like amount, is located at the left of each seat. Upward motion of this lever produces more lift; downward motion, less lift. The conventional rudder pedals operate the pitch-changing mechanism on the anti-torque rotor.

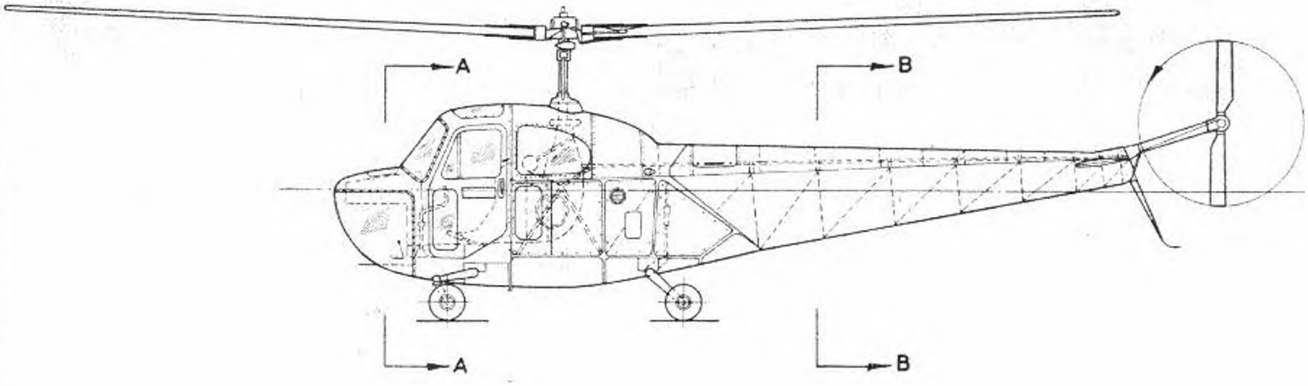
Safety and ease of operation are paramount in the Model 47B helicopter. A test version made hundreds of safe landings from various altitudes with the engine out of action. A safety device disengages the rotor from the engine; the rotor then turning by wind-power alone. Another advantage is that engine power is automatically correlated to the collective pitch of the rotor blades. Within normal flight range, correct rotor speed is always maintained. Throttle and pitch adjustments are thus held to the minimum.

Standard colour schemes for the civil Model 47B include Cinnabar red with cream trim; Salt Lake green with cream trim or Honolulu blue with silver trim.

*Specification.* Two-seat helicopter with two-blade rotor and one fan-cooled 178 h.p. Franklin engine. Non-retractable four-wheel undercarriage equipped with shimmy-dampened 360° swivel front wheels. Main rotor diameter: 35·125 ft. Disc area: 965 sq. ft. Blade area (total): 35·34 sq. ft. Disc loading (normal gross weight): 2·23 lb./sq. ft. Power loading (normal gross weight): 12·1 lb./h.p. Anti-torque rotor: diameter: 5·4 ft. Blade area (total): 2 sq. ft. Disc area: 23 sq. ft. Empty weight: 1,556 lb. Loaded weight: 2,150 lb. Petrol: 32 gallons. Maximum speed at sea level: 100 m.p.h. Operating speed at 75% power: 85 m.p.h. Maximum rate of climb at sea level: 1,000 ft./minute. Service ceiling: 11,400 ft. Time to climb to 5,000 ft: 6·5 minutes. Range at cruising speed: 212 miles. Endurance at 75% power: 2·5 hours.

**HARD TO SWALLOW.**

Few readers can have been more surprised than the author of this series when seeing the D.H. 108 brazenly labelled as a Dove last month. The text was passed as correct, but the heading title was added afterwards by a junior layout assistant whose enthusiasm is sometimes more in evidence than his respect for fact.—O. G. T.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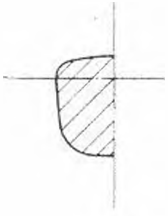
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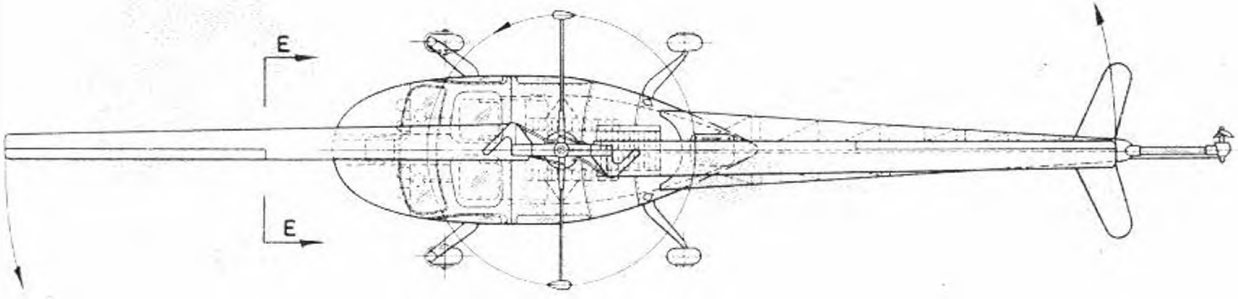
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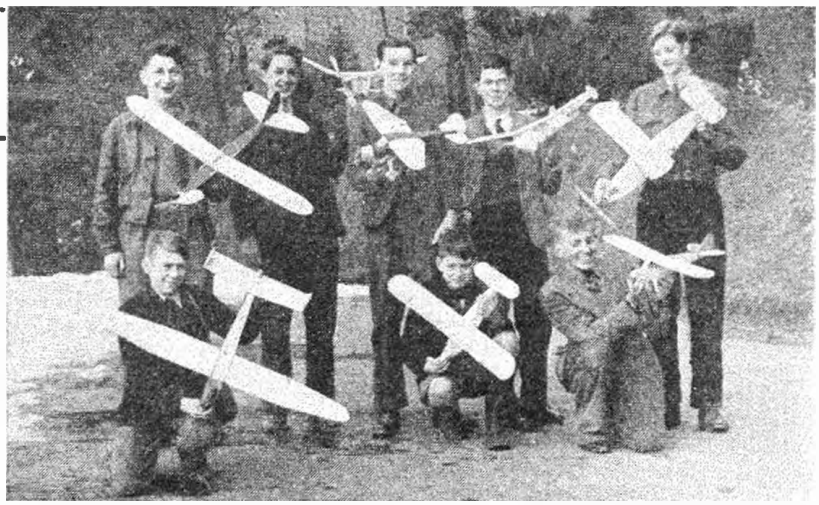
# CLUB NEWS
BY CLUBMAN



*Smiling faces at Scarborough High School's flourishing Aeromodellers' Club which we hope will encourage those schools at present "Clubless."*

THE latest A.B.A. news gives first indications of a move I suggested in January last, by which this body amalgamates with the S.M.A.E. thus combining the whole organised movement, to the benefit of all. Most of you know the reasons for the formation of the A.B.A., and have varied view-points on the whys and wherefores of such action, but it has become more and more apparent during the last couple of years that the major items of disagreement between the two bodies have been outgrown, and the ideals of the two groups have come more and more into line with each other.

A general re-organisation and better working of the S.M.A.E. should at long last bring about better service to its members, and I understand that the long advocated London office (at Londerry House) is now in full operation. I wish every success to those who are striving to place the Society in a position equal to its status.

One vital matter arising from the **S.M.A.E. NEWS SHEET** for 1947 is the decision to allow all models complying with the 1939 F.A.I. rules to be eligible for this year's contests. The new regulations apparently require a certain amount of modification, and this will be brought up at the next meeting of the F.A.I. in September. Of course, models built to the newly announced formulæ will be accepted for competitions.

Unfortunately, publicity for the **BRITISH NATIONALS** was not available for the model press in time, and they will be past history by the time you read this. However, I must record that already, immediately following the announcement of Gravesend as the venue for this event, there is a great deal of criticism at the selection of this ground. The main official reasons put forward against certain other fields has been the question of access and accommodation, but I fail to see that the Gravesend 'drome complies with these requirements, and I am fully in sympathy with would-be contestants from the Midlands and North who complain that their old pre-war grouse of ground selection for Centralised events is not being dealt with. An official statement on this vital factor for future events would not be out of place!

The **GAMAGE CUP**—once again living up to its old tradition of "Damage Cup"—attracted 79 entries, quite a drop on previous years. Congratulations are due to R. T. Parham of Worcester for placing first in an entry almost entirely from the London Area clubs, though Birmingham put in a good entry and placed three men in the top twelve.

R.A.F. stations, particularly those overseas, are starting model aircraft clubs to good purpose, latest news coming from the recently formed **KAI TAK M.A.C.** at far off Kowloon, Hong Kong. Most of the chaps were members of clubs back here in England, and therefore have a certain amount of experience. Flying weather is not too good, but the lads have their fun, one chap, A/C Curzon losing his glider after a flip of 6 minutes o.o.s. Most of the gliders are self designed, rubber being very hard to get—and a fantastic price—so gliders are the main concentration. Other good flights made on the same day ranged from 1 : 06 to 1 : 39, the spectators (erks!) having their sadistic glee satisfied when a model made a speedy if not graceful return to mother earth from a height of fifty feet.

An important matter noted in the **LONDON AREA** news-sheet for April is a warning about the careless flying of power driven models. This is getting a serious matter, and I had to personally "jump on the neck" of a complete nit-wit at the Midland Area Rally who hand launched and crashed a diesel powered model *smack in the middle of the public enclosure.*

**STREATHAM and NORTHERN HEIGHTS** are the finalists in the Area R.T.P. Marathon, which has been running throughout the winter season. (Incidentally, how is it that the London Area can print the results of their Area flights in the Flight Cup—held on the same date as the M.E. No. 1 Cup—yet no results are to hand from the S.M.A.E. ?)

Accompanied by "rival in crime" Mr. A. F. Houlberg, I paid a visit to Manchester last month for a special Dinner staged by the **WHITEFIELD** club, the occasion being the formal handing over to that group of the trophies and other assets of the old Lancashire M.A.S. It was a

## GAMAGE CUP 1947

| | | | |
|---|---|---|---|
| 1 | Parham, R. T. | Worcester | 417·4 |
| 2 | Green, A. W. | Walthamstow | 401·2 |
| 3 | Hall, J. | Croydon | 395·1 |
| 4 | Harris, G. W. W. | Croydon | 329·6 |
| 5 | Geddie, W. A. S. | Zombies | 321·0 |
| 6 | Warring, R. H. | Zombies | 301·5 |
| 7 | Ashon, P. | Birmingham | 296·0 |
| 8 | Dennett, B. J. | Birmingham | 291·0 |
| 9 | Deudney, F. E. | Walthamstow | 287·7 |
| 10 | White, R. | Northern Hts. | 283·4 |
| 11 | Clark, A. | Streatham | 272·6 |
| 12 | Salt, G. E. | Birmingham | 271·4 |

(79 entries : 69 Snr., 10 Jnr.)

## MODEL ENGINEER NO. 1 CUP

| | | | | | |
|---|---|---|---|---|---|
| 1 | Ravensbourne | 2065·2 | 7. | Luton | 1275·5 |
| 2 | Croydon | 1624·4 | 8 | Brentford | 1210·4 |
| 3 | Bristol and West | 1591·45 | 9 | Warwickshire | 1135·0 |
| 4 | Bushy Park | 1508·3 | 10 | Northern Heights | 938·3 |
| 5 | Streatham | 1458·65 | 11 | Brighton | 907·0 |
| 6 | Chelmsford | 1398·2 | 12 | Zombies | 865·1 |

(30 clubs entered.)

pleasure to meet some of the old members who made the Lancs. club famous in the pre-war era, and the general welcome was very warm—in fact a real good time was had by one and all. Here's hoping the recipients will have as much luck, and make as good use of the cups and trophies as the previous owners.

The **SURBITON and D.M.F.C.** wish to express their thanks to the many helpers at their Glider Gala on March 23rd. In spite of semi-gale conditions, and contrary to general belief, it was noticeable that light weights recorded some of the best times. Highest individual aggregate was by R. J. Palmer of Cheam, who totalled 4 : 49·9, his best flight being 3 : 15. This was remarkable considering that most models were o.o.s. after 40-50 seconds. Croydon won the event, with Streatham second, and Zombies third.

**BURY & D.M.A.C.** would-be competitors for the Gamage Cup were "pinned to the ground" by the conditions, but A. Partington showed what could be done by clocking 7 : 29 with his "Ivory Gull," the model unfortunately being lost.

After enforced hibernation owing to the snow etc., members of the **MERSEY M.F.C.** turned out in force on the 13th April, and a scratch comp. was soon in operation. Any type of model was entered, the winner proving B. J. S. Foster with a glider of his own design. Aggregate for two flights was 3 : 37, both flights being timed o.o.s. A great deal of work is progressing in this club with radio control.

The newly formed **AMPLEFORTH COLLEGE M.A.C.** is making good progress, membership now being in the twenties. Two cups have been acquired, and a couple of comps. already run off. The glider event was won by junior M. D. Pitel, whose "Sunnanvind" clocked a 3 : 01 aggregate for three flights in very dull weather. R. A. Towney's own designed 42 in. span model totalled 2 : 42·2 in even worse conditions to pull off the second event. Records in this club to date are; Rubber, 1 : 32 by D. Goodman; Glider 2 : 09 by M. H. Brackenbury; and Power, 3 : 15 by R. E. Gore-Lloyd. Not bad seeing that they did not form until last November, and you know the weather we have had since then!

During the past season, flying was carried out on every available day by the **MORDEN & D.M.F.C.** Records at present are—Duration, held by Mr. Fairey's "Jay" 2 : 00; R.T.P. also by Fairey, 1 : 51. Mr. Walpole holds the glider record, his "Vampire" being lost from a hand launch after clocking 7 : 17.

With a really fine day turning up all of a sudden, the **PEGASUS POWER CLUB** organised a comp. on the system being tried out this year at Eaton Bray, i.e. total duration divided by engine run. C. Bains won the event with a ratio of 26-1, R. White being runner up with 12·8-1. Experiments are being carried out with a powered auto-giro, also control line flying.

Postponed owing to the Easter gales, the competitions of the **HULL & D.M.A.C.** were held on April 13th, with the following results;

| | | | |
|---|---|---|---|
| Open Rubber : | W. Lithe | (Kingston) | 6 : 13 |
| | K. Dobbs | " | 4 : 42 |
| | R. Barnes | " | 4 : 37 |
| Open Glider : | E. Magee | (Hull) | 5 : 47 |
| | E. Day | " | 4 : 18 |
| | C. Turner | (Kingston) | 4 : 18 |

The Humberside Rally will be held at the Hendon Aerodrome on Sunday, August 3rd, and all clubs in the vicinity are extended a hearty welcome.

The **MERSEYSIDE REGIONAL COUNCIL OF M.A.C's.** exhibition held in April was a huge success, with over 160 models on show. The standard of the exhibits was higher than seen before, and many hundreds of visitors were amazed at the fine display. Prize-winners were;

| | | | |
|---|---|---|---|
| Power | T. Heckles | (East L'pool) | "Bowden Contest" |
| | E. G. Bibby | (Mersey) | "Frog 45" |
| | D. R. Hughes | (Merseyside) | "Free Lance" |
| Glider | J. E. Lovatt | (Mersey) | "Free Lance" |
| | N. Harrison | (Wallasey) | "Evander" |
| | R. F. L. Gosling | (Merseyside) | "Senior Gull" |
| Duration | R. F. L. Gosling | (Merseyside) | "Itzme IV" |
| | D. R. Hughes | " | "Proctor" |
| | H. Eaves | (East L'pool) | "Airacobra" |
| Juniors | J. R. Emery | (Merseyside) | "Frog 45" |
| | A. N. Brown | " | "Albatross" |
| | W. F. Jones | (Mersey) | "Mick Farthing" |
| Solids | R. Walker | (Aintree) | "Thunderbolt" |

Under the auspices of this group a Glider Contest will take place at the Vale of Clwyd, North Wales, on Sunday, 8th June. The contest will be for hand launched gliders of the following classes; "A" and "B" F.A.I. formula, and best senior and junior in an open class.

Permission has been obtained by the **SUNDERLAND & D.M.A.C.** to use Usworth Aerodrome, in conjuction with the local A.T.C.

The **DERBY M.A.C.** has recently been reformed under the secretaryship of Mr. R. Adamson of 111, Bower Street, Alvaston, Derby. Prospective members should apply to him direct, or call any Friday evening at the clubroom in Boulton Street, Alvaston.

Despite a disappointing Easter, the **LEICESTER M.A.C.** managed to do an appreciable amount of flying the following week, when quite a number of new models showed their paces, one in particular being a new pylon type power model flown by Mr. Lacey, flight being 5 : 06 on a 65 second engine run. Geoff Dunmore followed with a 2 : 30 flip on 40 secs. engine, and Wade clocked 2 : 30 on 50 secs. run.

Big news from the **CARDIFF M.A.C.** is a record flight of 23 : 10 o.o.s. following a 15 sec. motor run by Bill Burch's Mill's powered model. (This is surely a British record? Has a claim been made?)

Another club to have good luck with flying fields is the **COVENTRY & D.M.A.C.** who now have use of Bramcote Aerodrome. Any chance of the second Midland Rally being held there in September?

April 13th seems to have been a good day with almost every club, the **BRISTOL & WEST M.A.C.** having a real beano. M. Garnett started the ball rolling by losing his Wakefield model after a fine flight of 5 : 27 when competing in the Flight Cup event. M s. Jones and Taig followed his example, but on their third instead of first flights. Best times were;

| | | | |
|---|---|---|---|
| A. G. Taig | 9 : 38 agg. | M. Garnett | 5 : 27·87 agg. |
| D. Jones | 9 : 11·25 agg. | G. Woolls | 4 : 31·7 agg. |
| | C. S. Wilkins 4 : 18·15 agg. | | |

A fine display of glider flying was witnessed in the M.E.Nol event, though there were no flyaways, to the relief of the entrants! Best flights;

| | | | |
|---|---|---|---|
| H. Jones | 6 : 59·2 agg. | C. E. P. Smith | 6 : 05·4 agg. |
| A. G. Taig | 6 : 56·65 agg. | C. S. Wilkins | 5 : 05·9 agg. |
| J. F. Price | 6 : 30·2 agg. | J. Hanham | 3 : 37·45 agg. |

Junior members of the **KINGSBURY M.F.C.** seem to be able to show the way to the seniors—R. Stoward setting up a H.L. record for power models of 7 : 40 on a 10 sec. motor run, whilst H. J. Cleaves won first prize at the Kodak Exhibition. Senior G. Miles has set a R.O.G. figure for power jobs of 2 : 35 on a 12 sec. motor run, also a H.L. record for gliders of 1 : 14·5.

A. Gregory of the **LINCOLN & D.M.A.S.** has not been able to raise his current r.t.p. record of 2 : 22 owing to the club room being under two feet of water. What about R.O.W—or should it be Rise off Flood? However, some good outdoor flying has been seen recently, particularly by new member K. S. Raczac (Dorland Hall

contest winner) who lost his new Mill's engined model first flight.

The **WOLVERHAMPTON & D.M.A.C.** report use of Perton Aerodrome, and some new records put up mainly at the Walsall meeting. These were ; Wakefield, 5 : 43·5 by H. Dolan ; Glider, 12 : 23 by R. Ormerod ; and Power, 3 : 41 (15 sec. motor run) by E. Hickman.

D. Dudley, with an aggregate of 8 : 03 won the Secretary's Cup at the **BLACKHEATH M.F.C.** meeting recently, R. Galbreath placing second with 7 : 06 and S. R. Crow third with 5 : 14·5. A creditable fourth went to junior J. Holmes with 4 : 26. H. Simmonds of " King Peter Cup " fame has been showing the paces of well over F.A.I. loading streamlined glider. This 20 oz. job has already aggregated 3 : 25 in the M.E.

The **BLACKPOOL & FYLDE M.A.S.** club magazine has a strong (and legitimate) grouse at the way the Area suddenly switched the venue for the Flight and M.E. contests to their ground, without apparently warning the locals—or at any rate giving them sufficient warning. The lads had booked a coach to take them to Walsall, and had to cancel this at the last minute when the other plans were made known. Hardly the way to do things is it Northern Area ? ? ?

The past season finished up with a number of records being broken in the **VICTORIA M.F.C.** and this carried on through the winter ! The list stands at present as follows ;

| Duration. H.L. 10 : 30 | Glider 9 : 22 | Tailless Glider 1 : 41 |
|---|---|---|
| W. Morley | D. G. T. Reece | A. Ross |

The famed **NORTHERN HEIGHTS M.F.C.** Gala Day will be held again at Langley Aerodrome, (Nr. Slough) on July 20th. Programmes containing full particulars are obtainable from Mr. H. R. Turner, 61, Avenell Road, Highbury, London N.5, price 7½d. post free.

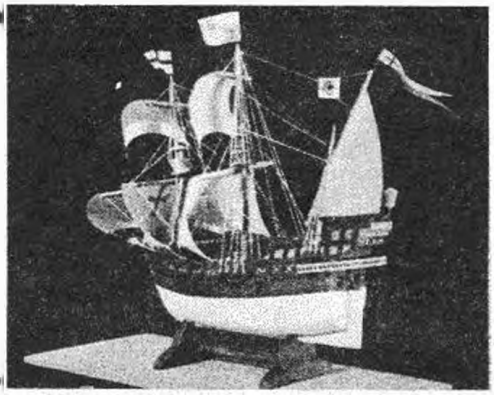
The first flying meeting of the **ILKESTON M.A.C.** created at the same time a set of records for the club. Winners were G. Barke, 2 : 11·2, P. Robinson (junior) 2 : 00, and M. Taylor 1 : 58.

A very well produced club magazine is that from the **SOUTHAMPTON M.A.C.** and one item featured in the current issue calls for recommendation to other groups. This club is forming groups amongst its members for the building and flying of models for the " Arnhem Trophy," and in the event of club members finding their way into the finals at Eaton Bray, the club will meet all the individuals' expenses. As the article states—" how about it juniors ? Here is an opportunity to improve your technique, win substantial club prizes, gain success in a National Competition, and support a worthy cause, the Airborne Forces Security Fund."

And now, to wind up on a note of warning ! I am getting far too many reports of power models making fantastic flights when " the owner forgot to set the timer " or " the timer did not function." I feel it is high time matters were tightened up with power models, and I only trust the modellers themselves will have sense enough to take matters into their own hands, instead of leaving it for Authority to step in.

The CLUBMAN.


"AND THEN HE LETS IT GO AND KNOCKS ME FLIPPIN' 'ELMIT OFF."



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Isle of Wight—Kits, parts, fittings for aircraft, railway, boats, galleons, in great variety.—The Sportshop, Castle Street (Nr. Ferry), E. Cowes.

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