OCT. 1946 **AEROMODELLER** 1/3

Digital Edition Magazines.

This issue magazine after the initial original scanning, has been digitally processing for better results and lower capacity Pdf file from me.

The plans and the articles that exist within, you can find published at full dimensions to build a model at the following websites.

All Plans and Articles can be found here:

Hlsat Blog Free Plans and Articles.

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

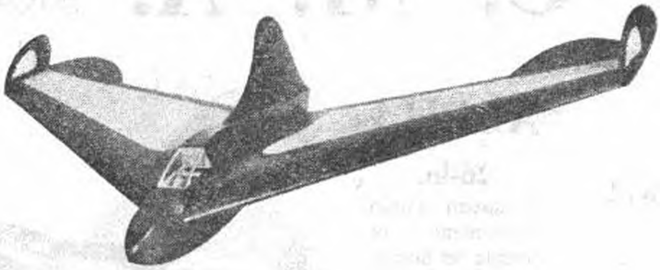
AeroFred Gallery Free Plans.

http://aerofred.com/index.php

Hip Pocket Aeronautics Gallery Free Plans.

http://www.hippocketaeronautics.com/hpa_plans/index.php

Diligence Work by Hlsat.



AT THE TOP — EVERY TIME!

because it's a **'VERON'** proven design.

Instant success of the '**KIWI**' Flying Wing Glider.

Complete kit to build this amazing Super-efficient, tail-less sailplane contains ample supplies of high-grade balsa strip, sheet with printed parts, tissue, cement, wire, ready shaped noseblock and our comprehensive

NEW STYLE PLAN

SPECIFICATION.

Weight 5 ozs. Span 42 ins.
Embodying an exceptionally stable reflex wing section developed in our researches into this new field of kit production.

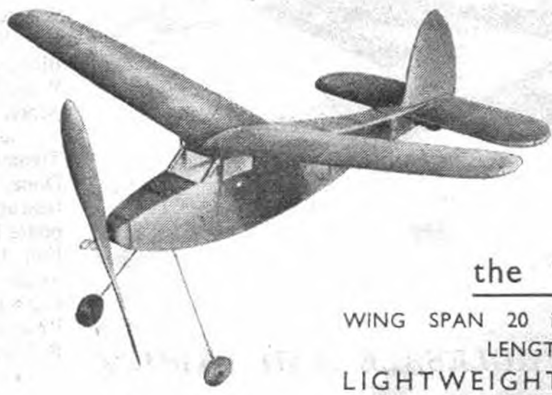
KIT PRICE 18/6 add **7d.** postage

We are happy to announce the re-opening of our **MAIL ORDER DEPT.**
Write for full lists of kits and accessories.

YET ANOTHER NEW KIT!

in the new **"VERON JUNIOR"** series.

The first of a new series of kits at a popular price, embodying duration, scale, semi-scale and experimental types.



the **'SNIPE'**

WING SPAN 20 ins. WEIGHT $1\frac{3}{4}$ ozs.
LENGTH O.A. 16 ins.
LIGHTWEIGHT DURATION MODEL

KIT PRICE 5/- add **6d.** postage.

MODEL AIRCRAFT STORES (Bournemouth) LTD.

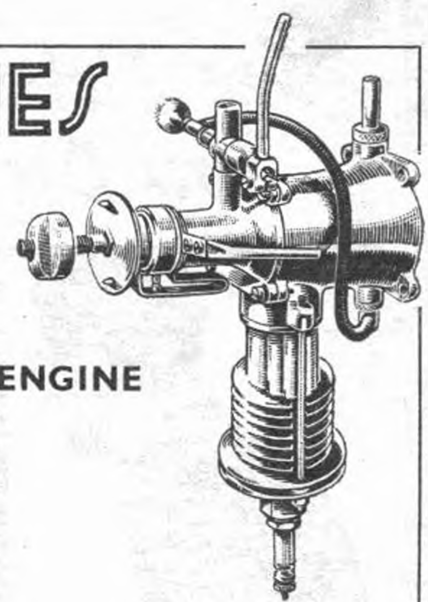
HEAD OFFICE & FACTORY:

Norwood Place, Pokesdown, BOURNEMOUTH

Phone: SOUTHBOURNE 2783

FROG ENGINES

TRADE MARK



"175"

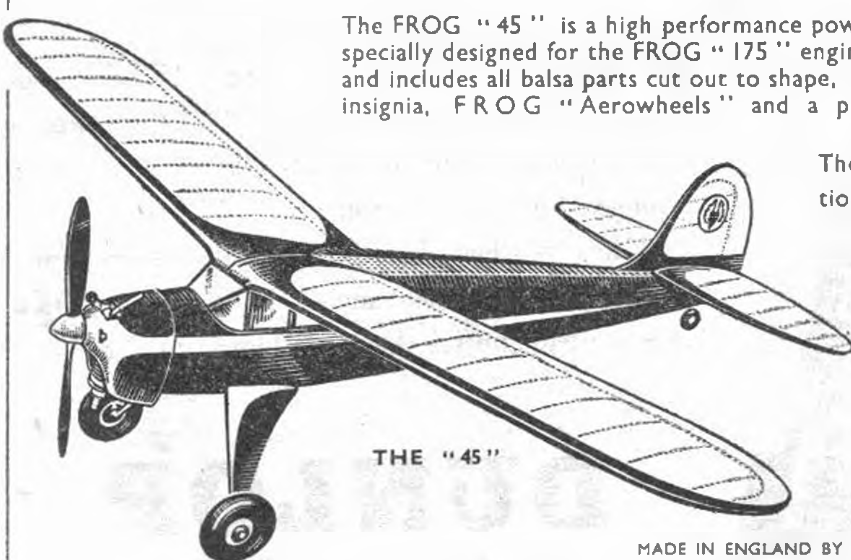
1.75 c.c. MODEL AERO ENGINE

COMPLETE WITH COIL,
CONDENSER AND
PLASTIC AIRSCREW

75/-

AN APOLOGY :—

We intended to give bulk deliveries of the "175" and "45" a while back but unavoidable delays in the supply of materials and machine tools held us up. Anyway, YOU are benefiting by our big scale planning. The price of the engine has just been reduced from 94/6 to 75/- and the whole outfit at 112/6 is less than the price of the average engine alone. Fair enough ?



THE "45"

The FROG "45" is a high performance power model, of 45 in. wing span, specially designed for the FROG "175" engine. The Kit is quite complete and includes all balsa parts cut out to shape, dope, lacquer, paint, cement, insignia, FROG "Aerowheels" and a pressed metal engine cowling.

The "45" is now in full production for both home and overseas markets.

37/6

PLACE AN ORDER WITH YOUR LOCAL DEALER NOW

MADE IN ENGLAND BY

INTERNATIONAL MODEL AIRCRAFT LTD · MERTON · LONDON · S.W.19

To ex-AIRMEN

DO YOU REMEMBER . . . how grand the old life was with its change of scene, its good fellowship and its security?

£125 RAF BOUNTY SCHEME

If you left the R.A.F. with 2 years service — and are 41 or under — the Bounty Scheme is for you. Rejoin for 3 or 4 years and get £25 down with £25 for each year of service — free of Income Tax and in addition to your War Gratuity. You will come back to the new scales of pay and to peacetime conditions and amenities. Post the coupon TO-DAY.

LONG-TERM SERVICE . . .
of 5 or 10 years is open in 100 trades to men of 18 to 33 from civil life.

I am interested in * joining/rejoining the RAF

Please send details without obligation.
* *Strike out word which does not apply.*

Name.. *No*.......................

Address..

.... 5EC

Post to Air Ministry, Dept. I. R., Victory House, Kingsway, London, W.C.2

The Ato-30

Ato-30. A neat little 30 in. span model that is a delight to build and fly. Just after the above photograph was taken this model won the premier model glider award in Northern Ireland—The Short and Harland Trophy—with one flight of 5 mins. 35 secs. out of sight. The model, the smallest in the contest, was found later 10 miles away. KIT **4/6**
Postage 6d. extra.

Unfinished Light Alloy DIE CASTINGS

Meteor ..	.. 5/-	Lancaster	.. 5/-
Fortress	.. 5/-	Lightning	.. 5/-
Mosquito	.. 2/6	Stirling	.. 2/6
Thunderbolt	.. 2/6	Wellington	.. 2/6
Hurricane	.. 2/6	Tempest	.. 2/6
Spitfire ..	.. 2/6	Mustang	.. 2/6
Large Base	.. 2/6	Small Base	.. 2/6

Screwed rod for mounting.. .. .. **6d.**
Postage 6d. per parcel

These castings require only a little work with file and emery cloth to complete a perfect model.

1/72nd SCALE BIPLANE KITS

Avro 504 k	Tiger Moth
Fokker DVII	Avro Tutor
Hawker Hind	Sopwith Camel
Bristol Fighter	Gladiator
S.E.5.	

Kit contains—Cut out Obechi wood parts, accurate plan cement, wheels, transfers, in fact everything but paint. Price **2/6** each
Postage 4d. extra.

The Ato-36

Ato-36. A 36 in. span model which combines a graceful "scale-like" appearance with that inherent stability which is so necessary in a reliable contest winner. The kit contains everything required to complete the model. *Postage 7d. extra.* KIT **6/9**

Ato-22. A 22 in. span light-weight duration model that has been specially designed for the beginner. Kit contains—Full size plan, illustrated instruction leaflet, celluloid wheels, ample supplies of tissue, Balsa, and Rubber, and a COMPLETELY FINISHED HAND-CARVED PROPELLER. *Postage 6d. extra.* KIT **5/6**

DEALERS—SEND TO-DAY FOR SMALL TRIAL ORDER AND WINDOW DISPLAY POSTER

Ato Model Crafts

36, WELLINGTON PLACE
BELFAST - Northern Ireland


INTRODUCING A
MARVELLOUS
ROCKET
PLANE
PROPELLED BY
ROCKETS WHICH HAVE RECEIVED
OFFICIAL SANCTION
NOW IN PRODUCTION
IT'S MARVELLOUS !
IT'S UNIQUE !!
IT'S A WOW !!!
ALSO TWO NEW FLYING SCALE MODELS
38" SPAN FORTRESS By H. J. TOWNER
31" SPAN VIKING
Trade enquiries to: Astral Mills, Dixon Lane Road, Leeds, 12. 'Phone: 37021 (3 lines)
WHEN IN LONDON CALL AT OUR SHOWROOMS 245 REGENT ST. W.1

The

AEROMODELLER

INCORPORATING THE MODEL AEROPLANE CONSTRUCTOR

ESTABLISHED 1935

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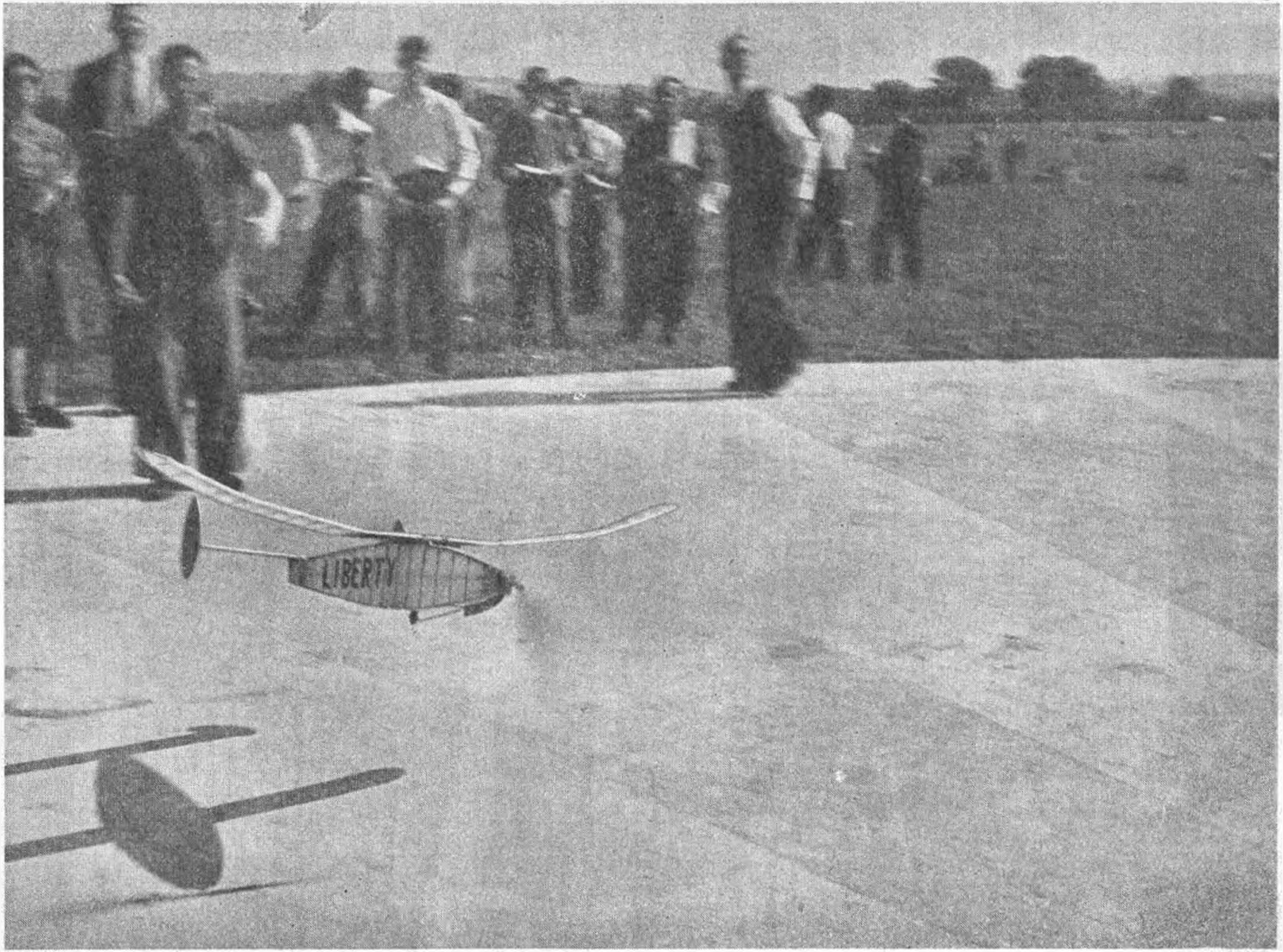


Aeromodeller Photo.

LIBERTY. A word full of implication to our European visitors is echoed throughout this splendid action shot of a Danish Wakefield model leaving the take-off area during International Week at Eaton Bray.

EDITORIAL

THE DORLAND MODEL

THERE has been an exceptionally enthusiastic response to the announcement that in connection with the forthcoming Third National Model Aircraft Exhibition at Dorland Hall, Westminster, there will be a competition for models to our new design known as the "Dorland." With the appearance in the August issue of a brief preliminary notice and a few details regarding the design, enquiries began to arrive at our offices, and with the inclusion in the September issue of an illustrated description of the machine and its construction, correspondence on the subject began to assume the dimensions of a flood. It is already apparent, in fact, that there is likely to be a large entry for the contest, and that our decision to divide the country into 12 contest areas meets with general approval.

All who have seen the prototype "Dorland" at close quarters or in flight at Eaton Bray are favourably impressed. Quite a few have taken the trouble to write us to that effect, among them a well-known exponent of this semi-scale general purpose class of model, who says, "I should like to congratulate you on this design, so pleasing in appearance, so satisfying in performance, and so eminently suited to its purpose. Quite apart from prize-winners in the competition, there should result a young army of enthusiastic "owner-pilots" of "Dorland."

The "Dorland" it will be recalled, is a high-wing cabin job of slick modern appearance, especially with its twin-finned tail-unit and tricycle undercarriage. The aerodynamic design is on sound and well-proved lines, while structurally it is about as simple and straightforward as it is possible to make it. With the aid of the available plan and building instructions, an accurate replica is within the capacity of even the most youthful constructor, and the ensuing trimming of the model should present no difficulty either. The 30 in. × 40 in. plan, together with a four-page illustrated leaflet giving full building instructions, a list of materials needed for the job, an entry form for the contest, and details of the 12 contest areas, can be obtained for three shillings, post paid, from the AEROMODELLER, Allen House, Newarke Street, Leicester, or from your model shop.

Models entered in the contest must have been built by the competitor, and be accompanied by a performance certificate signed by three witnesses and confirming that they have achieved in the case of those over 16 years of age, a flight of 60 seconds minimum duration and in the case of those under 16, a flight of 30 seconds minimum. The best models from each area will be on view at Dorland Hall, where the final judging will take place. There will be a cash prize of £20 and a silver trophy valued at £20 for the best effort by a senior and the same for the best by a junior, also second prizes of £10 and third prizes of £5 in senior and junior categories. The best model in each of the 12 areas will win £2. 10s. for the entrant.

1946 RETROSPECT

The 1946 flying season, the first since the ending of the war, has been marked by the most disappointing weather we can recall, at any rate since the never-to-be-forgotten 1931 season when 23 week-ends out of 26 were windy, wet or both. Sportive modellers out for a day's enjoyment have needed to be tough and even-tempered, while the contest fan has required a particularly sound model and a large measure of good luck. Often has it been suggested by the pessimist that aeromodelling is something of a fair-weather pastime, at least as far as this country, with its fickle climate, is concerned, and the season now closing would seem to offer ample ammunition for the argument.

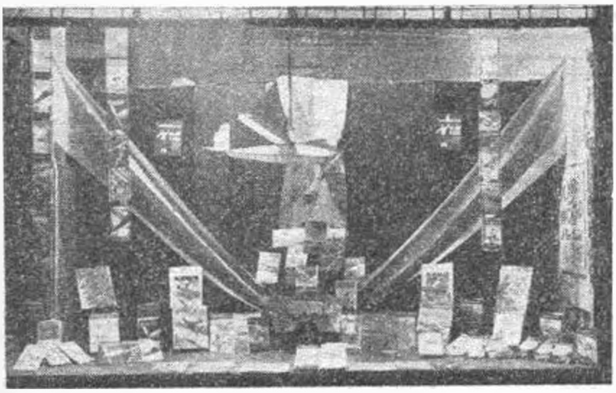
Nevertheless, aeromodelling achievement is not entirely conditioned by the weather, and the 1946 season has certainly not been without its highspots. First, there has been the bringing into regular use of Eaton Bray, first aerodrome in the world given over to and developed for the use of modellers. Scene of an informal "try-out" last Autumn, Eaton Bray has now taken its place as the recognised venue for contest, rally or "fly-as-you-please" outing. Very much has still to be done to bring it into line with the full scheme envisaged by the proprietors, but despite continuing wartime handicaps, the "shape of things to come" is already apparent.

Eaton Bray has also been the scene of another high-spot of 1946—the first visit to this country since the spacious days before the war, of modellers "in bulk" from across the Channel, and the eight-day international meeting in August, described elsewhere in this issue, will long be remembered. Then there has been the emergence of the diesel engine, not merely as an interesting experiment, but as the normal power-plant of quite a number of successful models.

Further, 1946 has seen the first sustained flight (upward of 60 seconds duration) by a jet model, and in substantially increased interest in types of model formerly much neglected. The tailless type, which began to attract serious attention last year, has now numerous keen exponents, and the Canard or so called "tail-first" has this year been revealed to be the subject of much more activity than had been realised.

Finally last month we were able to announce that research into low-speed flight conditions had culminated in the devising by members of the Low Speed Aerodynamics Research Association of new aerofoil sections suited to the laminar flow conditions of model flying. For too long have modellers been content to lift aerodynamic generalisations from full-scale aviation and quote them, unjustifiably, as gospel for modellers, and this new approach to the subject with its bright hopes for the future, is greatly to be welcomed.

All this activity, despite the war-weariness that is revealed in a general touchiness, and the slowed tempo resulting from the continuance of sundry deprivations and shortages, argues well for the coming days when the gradual swing-back to normal conditions enables the modelling movement to forge ahead at a speed more in keeping with a science that has produced such hustlers as the Meteor and the Vampire.



Harborough Books

At the request of the Harborough Publishing Company we draw attention to the fact that from August 1st their books have ceased to be obtainable from the AEROMODELLER offices at Leicester, and urge would-be purchasers, in view of the inevitable delay through shortage of trained staff, not to send orders and remittances there, but to their model shop, bookseller or newsagent. Orders now arriving at Leicester, in fact, are being sent on to the customer's nearest model shop.

The postal service from Leicester was begun for the convenience of country customers, and those in the Armed Forces, who were experiencing some difficulty in obtaining Harborough publications. But this post business had reached such a volume that the directors had to decide whether to enlarge and reorganise the staff and extend the premises, or to discontinue this side of the business and redirect the flow of custom into the broader channels afforded by the model shop, the bookseller and the newsagent. After careful consideration the latter course was adopted.

This new sales policy should have the effect of insuring a much larger volume of interest in aeromodelling activities among traders and a much wider "on the spot" service for the modeller. To give things a good send off, Harborough planned a special sales drive during August, with advertising material to boost the sales of existing stockists, and to induce those who had not previously sold modelling books to do so.

Good reports of this venture have been received, and we reproduce a photograph which has been sent to us by one firm which featured the special display. The firm was Stretford Model Supplies, of Stretford near Manchester, and the proprietor, an ex-Service man, says that not only did he sell at least four times more books than at any time since the business opened, but that the display attracted many people he had never seen in his shop before and a 25 per cent. increase in the sales of model kits.

Camouflage

Once again we have the pleasure of announcing a new Harborough publication. "Camouflage of 1939–1942 Aircraft" by Owen G. Thetford. The author's earlier volume, dealing with the camouflage of machines of the 1914–18 war had a remarkable reception and we have no doubt that the new book, which is on similar lines, will be as well received by scale model enthusiasts.

The new publication starts well by having a striking dust cover by Mr. C. Rupert Moore, A.R.C.A., whose pictorial covers for the AEROMODELLER are so widely appreciated. It depicts a pair of Hurricanes pouncing on a formation of Dorniers. There are 12 coloured plates of aircraft types and 20–30 pages of coloured four-view plans of machines, arranged two to the page except in one case of "big fellows" like the Fortress and the Dakota, which have a page to themselves. The greatest care has been taken to obtain accuracy of colours; to this end, Mr. Moore examined many crashed and captured aircraft and secured samples of dope and fabric, and later the producers were equally painstaking and spared no trouble or expense to reproduce the colours by the multi-colour litho process.

The text contains a concise but adequate description of the camouflage and national insignia of all British, American, French, Russian, German and Japanese types, as well as those of such of the smaller countries as could be obtained. There are also squadron and combat markings of all R.A.F. and R.N. aircraft, and so thorough is the work that even the combination of letters and numbers used on particular operations are included.

Very wisely, the author has concentrated on strictly relevant information, and by resisting the temptations to append specifications and performance figures (already dealt with in the "Aircraft of the Fighting Powers" series of books), has been able to deal comprehensively with his subject.

This most attractive volume contains 140 pages, 8¾ ins. by 5½ ins., is cloth bound and sells at 8/6. It is well worthy of a place on the bookshelf of every aviation enthusiast.

"Aeromodeller" Publishing Date

Readers will no doubt have read of the dispute between the employers and employees in the Printing Trade. During the run of the dispute and enquiry, employees have refused to work any overtime, setting back the publication date of the AEROMODELLER. The publishers regret these delays but, of course, cannot accept responsibility for them. The above explains why the AEROMODELLER has not been out on its usual publication date. For the same reason, it has not been possible to arrange for the list of Harborough stockists—some 1,100 firms—to be included in the AEROMODELLER; but arrangements have been made for this list to be published as a separate item, and it is now available and will be sent by return on receipt of a 3d. stamp to cover postage—application to be made to Allen House, Newarke Street, Leicester.

Vacancies at the Aerodrome

The following vacancies exist at The Aerodrome, Leighton Buzzard:—

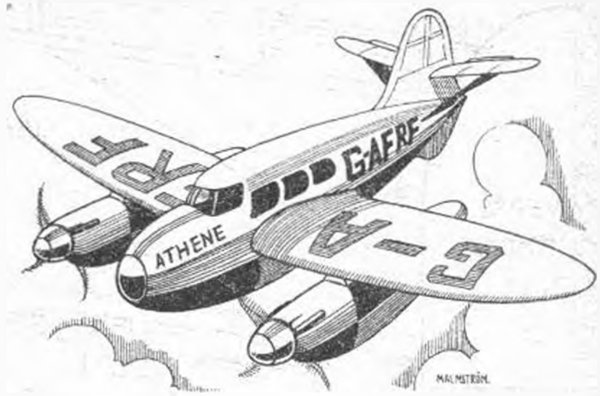
1. For a Production Assistant in the Magazine Department. Applicants should be in the 25/35 age group and have a sound knowledge of magazine production, including process work and printing. This is a good opportunity for a keen man capable of seeing a job through to Production schedule. Salary in the £7–£9 per week region according to ability and experience.

2. There is a vacancy for a Draughtsman who is also a practical aeromodeller. Applicants must be capable of producing first-class engineers' drawings from the pencil stage to the finished tracing on blue linen. Applicants should be in the 20/25 age group. Salary £6–£8 according to ability and experience.

"ATHENE"

BY

RAYMOND MALMSTRÖM



This drawing by the author gives a good impression of the graceful appearance of the model. Full-size plans are printed on the next four pages.

WITH the transition from war to peace, and new civil passenger aircraft, either on the drawing board, or actually in reality on the runway, it is natural for the designers in the model world to lay aside, at least for the moment, those plans for a super model fighter or bomber, and ponder on the pleasant problem of creating an original and well-proportioned flying model of a civilian passenger aircraft.

The Athene is one answer to the fascinating problem, and although by no means the only solution, its proportions and graceful lines may recommend it to aeromodellers, no less than its steady consistent flying ability.

Here, then, are the milestones along the pathway of building the Athene, not that in the simple construction is there much likelihood of the builder going astray.

Fuselage. Straightforward keel-principle construction The block carrying the front undercarriage leg should be firmly cemented, and the wing transverse bridges should be carefully and accurately positioned. The positions of these bridges are shown on F. 5 and F. 6. Sand entire frame work and cement on fin. Shrink tissue. Give one coat of banana oil.

Engines. Built in the same way as the fuselage. Sheet carefully where indicated on plan, particularly the sections on either side of the master keel. Work accurately, warped or twisted nacelles result in much unnecessary adjustment when the model is being flown. Undercart blocks should be firmly cemented in position. Wheels may be made from balsa, bushed hardwood or celluloid.

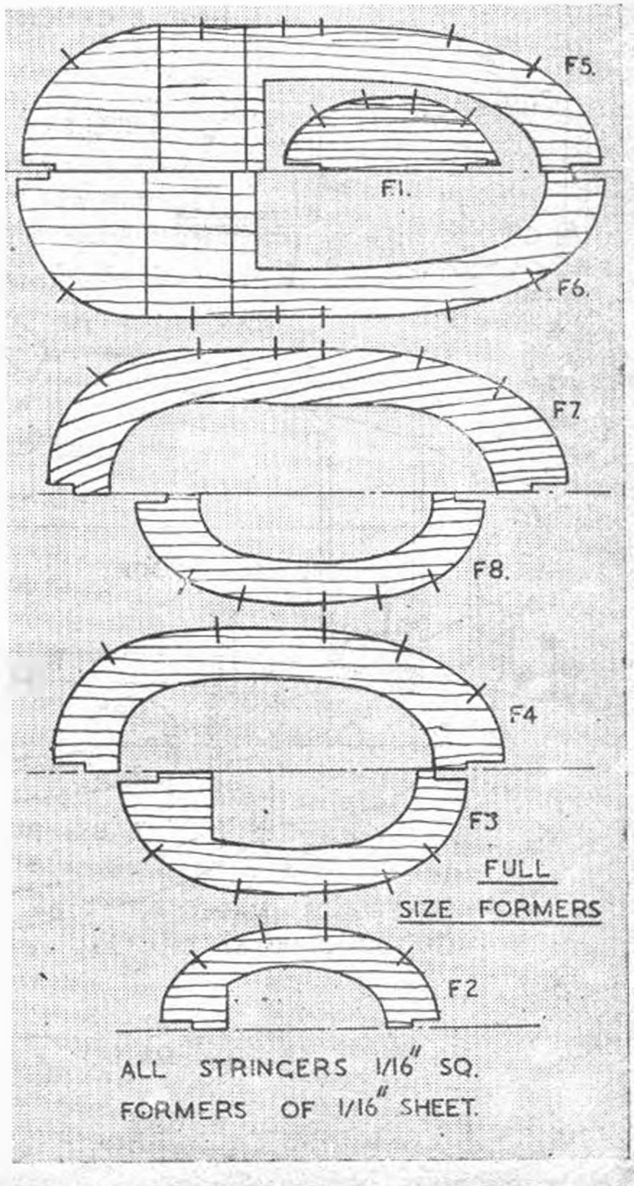
Wings. Constructed in two halves. Cement these halves to fuselage, and see the wing bridges are firm fits in their rib slots. Engine nacelles complete with incidence blocks must be cemented firmly to the platforms of 1/16 in. sheet, on the wing bays.

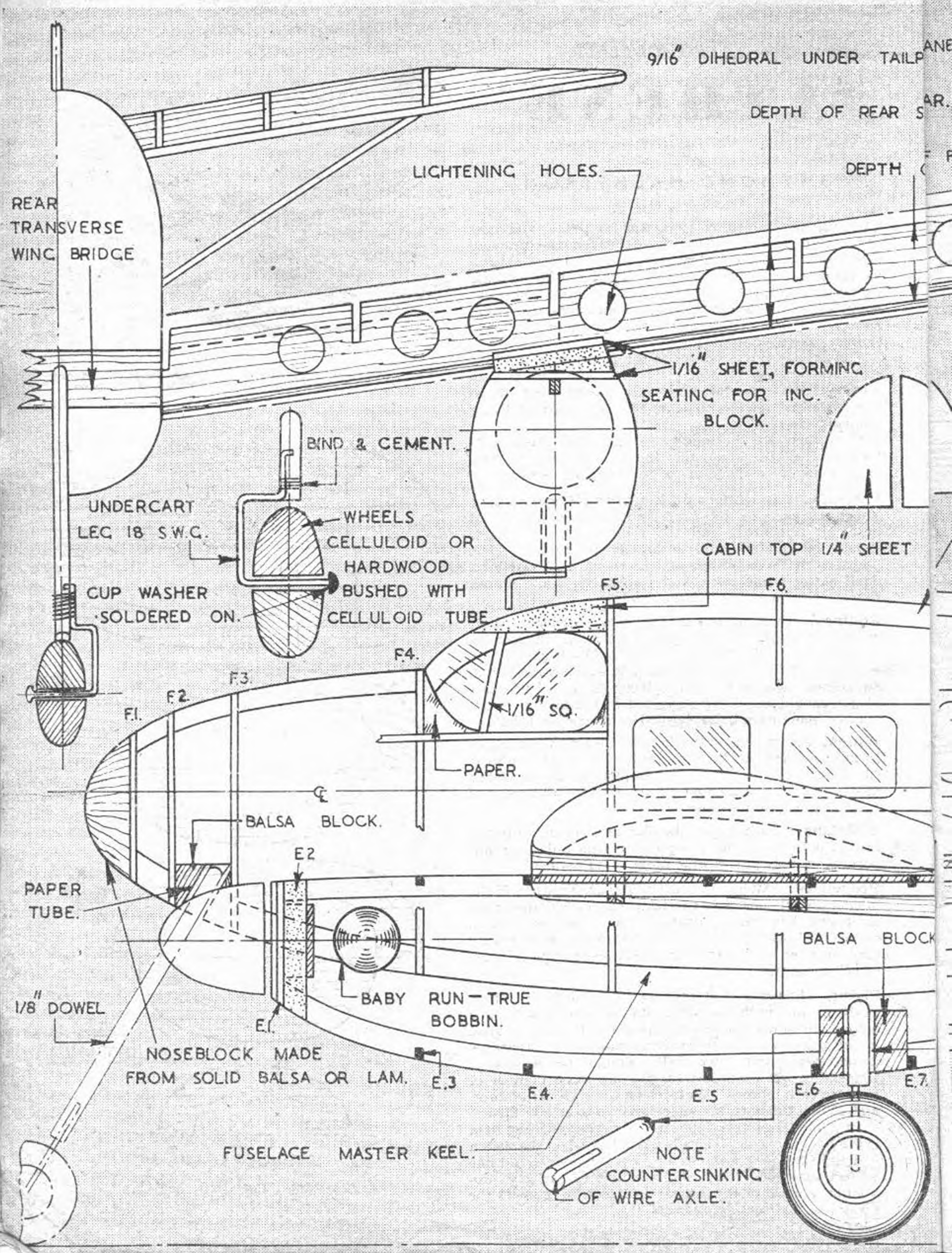
Tailplane. Built up on the plan and cemented to fin, braced with single strut support. Trim tabs are important as they give a wide range of adjustment.

Propellers. Alternative assemblies are shown. If the builder already possesses two ready carved 5 in. diameter, right and left hand propellers, these may be used to excellent effect. 4½ in. diameter three-blade propellers may also be used. In both cases some type of free-wheel is essential.

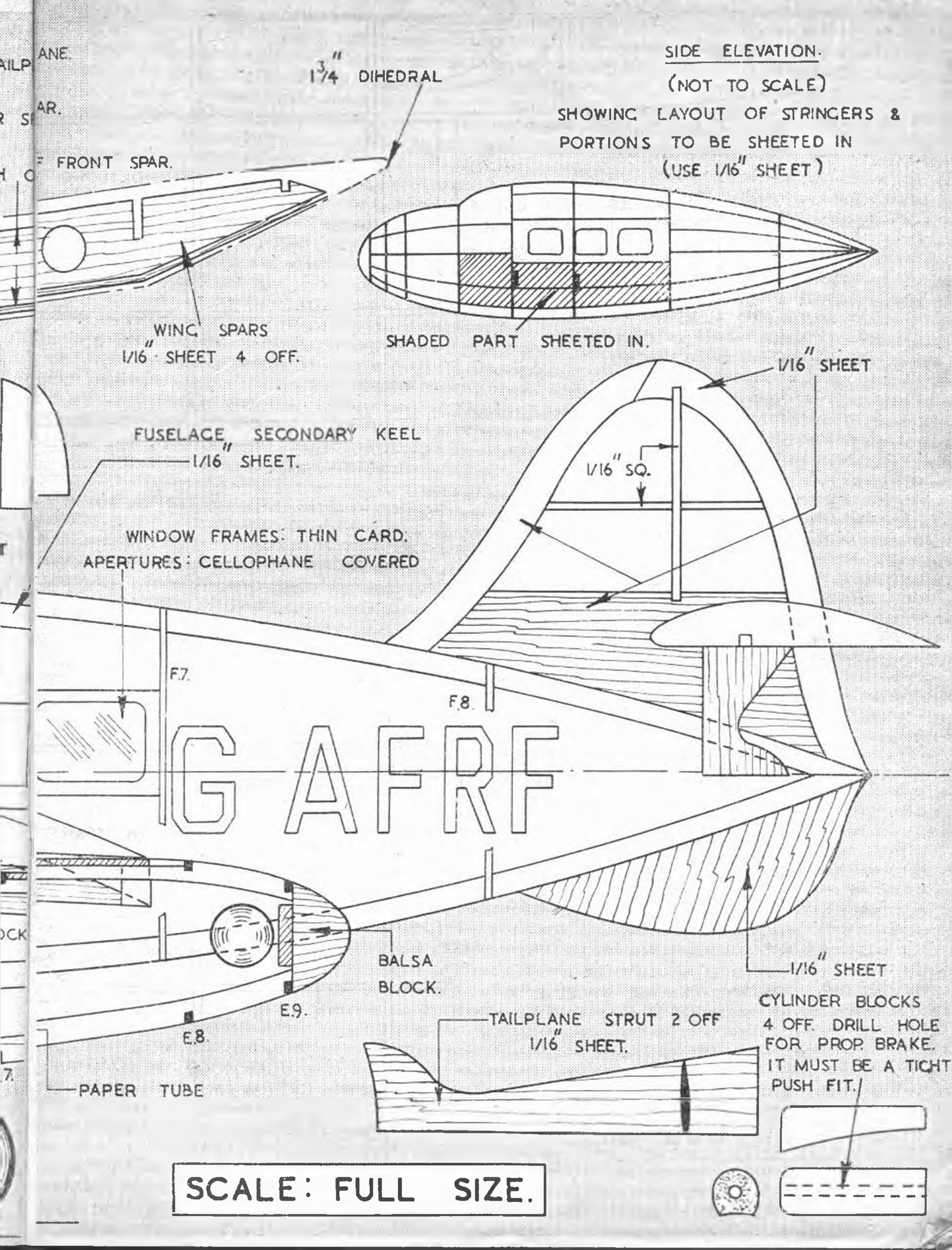
Flying. Power is 4 strands, ⅛ in. by 1/30 in. strip, 12–14 in. in length, to each motor. Lubricate well, after having pre-wound the motors. As usual obtain a flat glide before using power. Downthrust may be incorporated if necessary, but very little should be necessary. Remember when winding to give the same number of turns to each motor. 650 turns on the starboard motor, and 250 on the port, are *not* conducive to steady flight.

In a model of this type, not the least exciting item is the colour scheme. The scheme indicated on the sketch is definitely only a suggestion. The designer would like to feel that some very bright, if not to say gay, production models of the Athene will soon be gracing the air above the local flying fields.

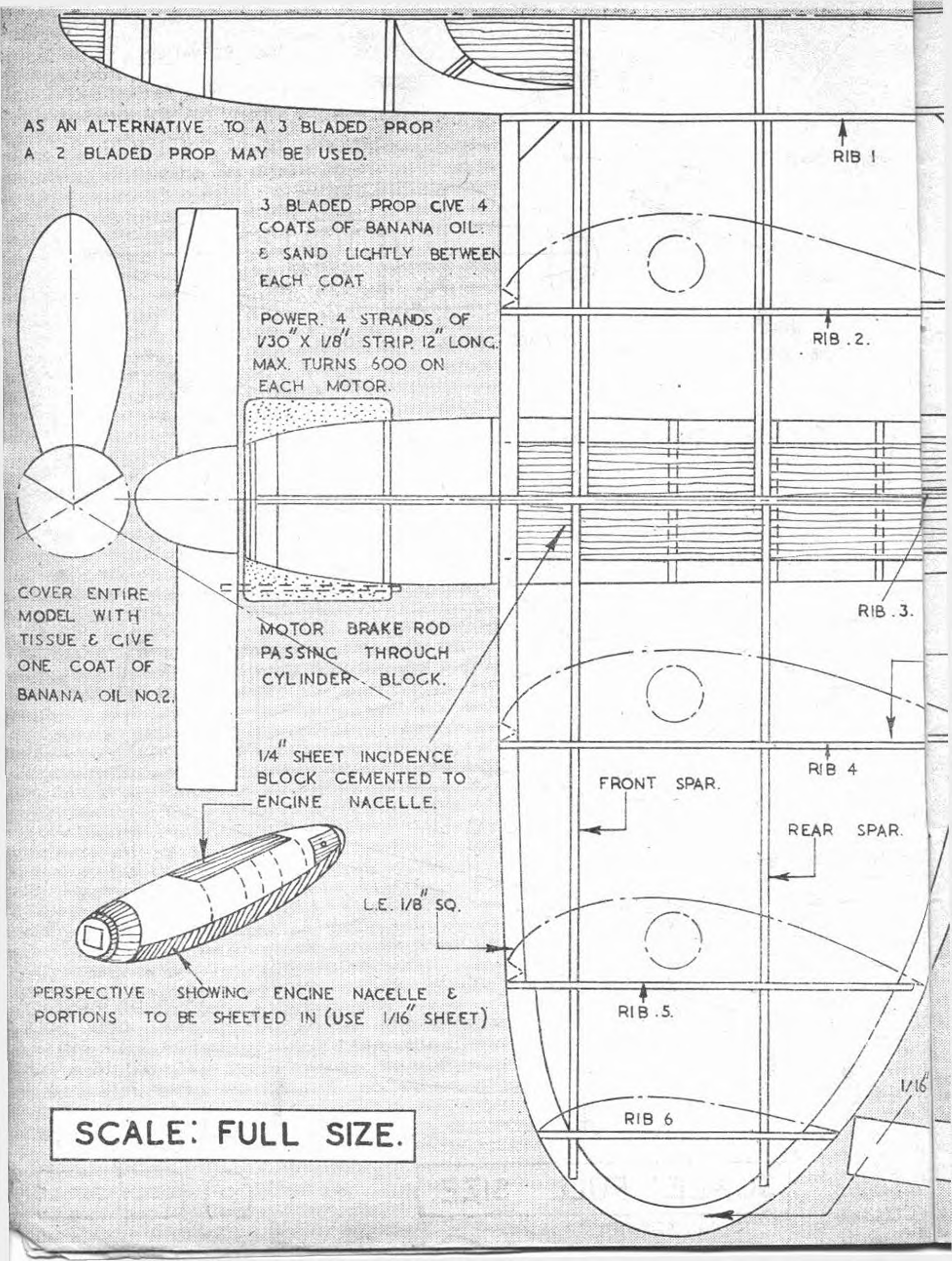


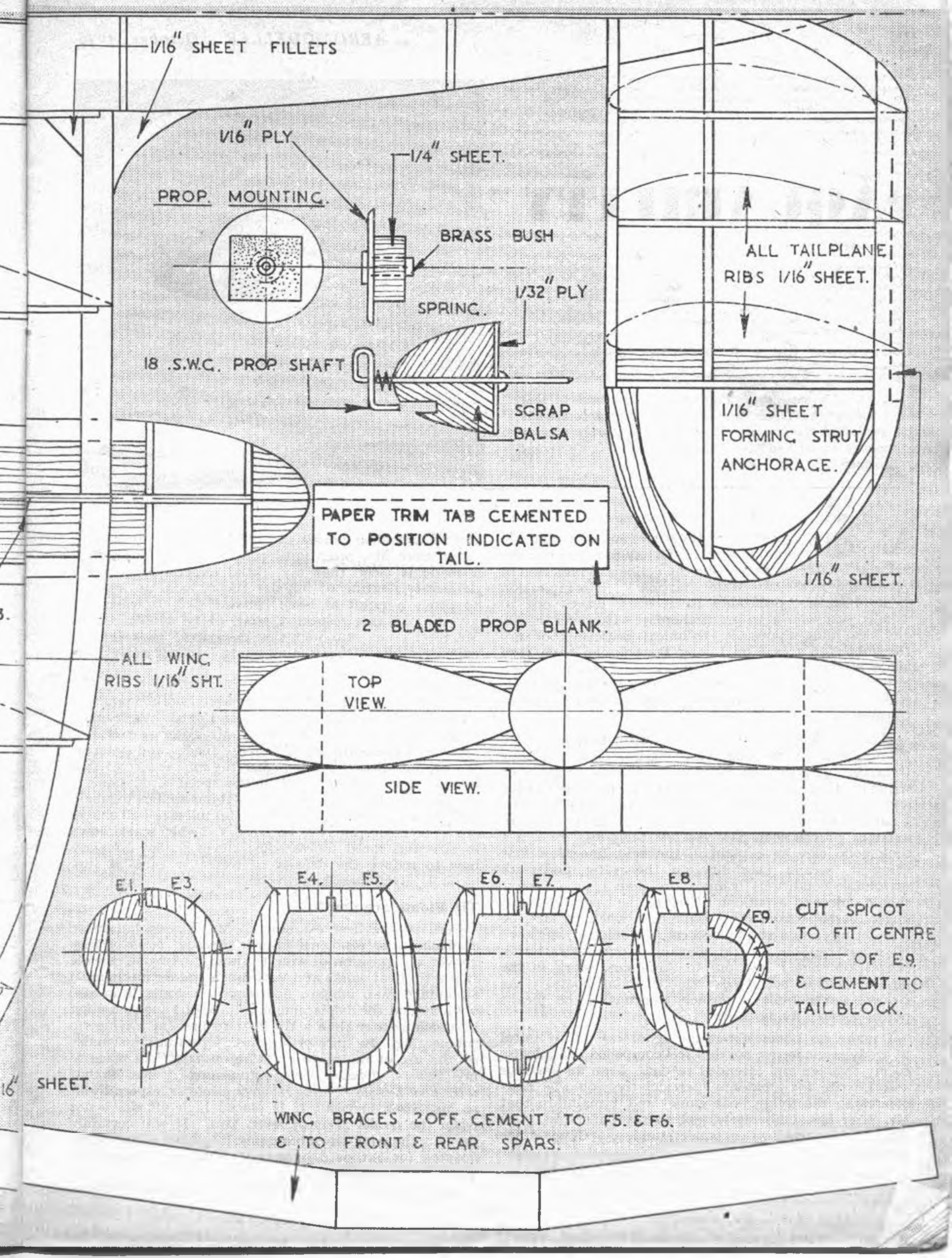


9/16" DIHEDRAL UNDER TAILPANE
AR.
DEPTH OF REAR S
DEPTH O
LIGHTENING HOLES.
REAR TRANSVERSE WING BRIDGE
1/16" SHEET, FORMING SEATING FOR INC. BLOCK.
BIND & CEMENT.
UNDERCART LEG 18 S.W.G.
WHEELS CELLULOID OR HARDWOOD BUSHED WITH CELLULOID TUBE
CUP WASHER SOLDERED ON.
CABIN TOP 1/4" SHEET
F.5.
F.6.
F.4.
F.3.
F.2.
F.1.
1/16" SQ.
PAPER.
℄
BALSA BLOCK.
E.2
PAPER TUBE.
BALSA BLOCK
BABY RUN-TRUE BOBBIN.
1/8" DOWEL
E.1.
NOSEBLOCK MADE FROM SOLID BALSA OR LAM.
E.3
E.4.
E.5
E.6
E.7.
FUSELAGE MASTER KEEL.
NOTE COUNTERSINKING OF WIRE AXLE.



AILP ANE.
R SP AR.
F FRONT SPAR.
1 3/4" DIHEDRAL
SIDE ELEVATION.
(NOT TO SCALE)
SHOWING LAYOUT OF STRINGERS & PORTIONS TO BE SHEETED IN
(USE 1/16" SHEET)
WING SPARS
1/16" SHEET 4 OFF.
SHADED PART SHEETED IN.
1/16" SHEET
FUSELAGE SECONDARY KEEL
1/16" SHEET.
1/16" SQ.
WINDOW FRAMES: THIN CARD.
APERTURES: CELLOPHANE COVERED
F.7.
F.8.
G AFRF
BALSA
BLOCK.
E.9.
E.8.
1/16" SHEET
CYLINDER BLOCKS
4 OFF. DRILL HOLE FOR PROP. BRAKE. IT MUST BE A TIGHT PUSH FIT.
TAILPLANE STRUT 2 OFF
1/16" SHEET.
PAPER TUBE
SCALE: FULL SIZE.


AS AN ALTERNATIVE TO A 3 BLADED PROP A 2 BLADED PROP MAY BE USED.
3 BLADED PROP GIVE 4 COATS OF BANANA OIL. & SAND LIGHTLY BETWEEN EACH COAT
POWER. 4 STRANDS OF 1/30" X 1/8" STRIP. 12" LONG. MAX. TURNS 600 ON EACH MOTOR.
COVER ENTIRE MODEL WITH TISSUE & GIVE ONE COAT OF BANANA OIL NO.2.
MOTOR BRAKE ROD PASSING THROUGH CYLINDER BLOCK.
1/4" SHEET INCIDENCE BLOCK CEMENTED TO ENGINE NACELLE.
L.E. 1/8" SQ.
PERSPECTIVE SHOWING ENGINE NACELLE & PORTIONS TO BE SHEETED IN (USE 1/16" SHEET)
SCALE: FULL SIZE.
RIB 1
RIB .2.
RIB .3.
RIB 4
FRONT SPAR.
REAR SPAR.
RIB .5.
RIB 6
1/16"


1/16" SHEET FILLETS
1/16" PLY
1/4" SHEET.
PROP. MOUNTING.
BRASS BUSH
1/32" PLY
SPRING.
18 S.W.G. PROP SHAFT
SCRAP BALSA
ALL TAILPLANE RIBS 1/16" SHEET.
1/16" SHEET FORMING STRUT ANCHORAGE.
PAPER TRIM TAB CEMENTED TO POSITION INDICATED ON TAIL.
1/16" SHEET.
2 BLADED PROP BLANK.
ALL WING RIBS 1/16" SHT.
TOP VIEW.
SIDE VIEW.
E1.
E3.
E4.
E5.
E6.
E7.
E8.
E9.
CUT SPIGOT TO FIT CENTRE OF E9. & CEMENT TO TAILBLOCK.
16" SHEET.
WING BRACES 2OFF. CEMENT TO F5. & F6. & TO FRONT & REAR SPARS.

"AQUABILITY"

BY J. F. P. FORSTER

The calm waters of Porlock Bay, as seen in this photograph of Dr. Forster's Neptune, appear somewhat ruffled at the present moment as the worthy Doctor wades in with a reply to Mr. A. J. Sizer's recent article "Go Fly a Boat."

AS Mr. Sizer's reaction to the use of coined terms and phrases seems akin to that of a bull to the proverbial red rag, I make no excuse for the deliberate infliction of yet another in the title of this "article"! His invitation to hold forth "profitably in debate" leaves one to wonder just who is to profit thereby. However, as his quibbles and supposedly technical criticisms of my December '45 article on Flying Boat design have been made in the form of an article, I have no alternative but to reply in the same form, and I trust that our technical differences, at least, may prove of interest to readers.

Having made it clear from the outset that he has so far not built a petrol-engined flying boat, nor flown one from the open sea, he leads us to suppose, rightly or wrongly, that he has spent his life in full-size marine and hydrodynamic circles. Assuming this to be the case, I cannot see why he should object to my coining an amateur phrase such as "*Aquatic Stability*" (which I took good care to explain in the next line after first using it, meant "stability on the water under all reasonable conditions") any more than I, as a doctor, should object to a patient telling me he has a poisoned finger (perhaps from prop swinging!) when, in fact, he is suffering from a staphylococcal peri-onichial whitlow! If we must quibble, I might take him up over his flattering suggestion that I had put in "immense work in the development of petrol-*driven* model flying boats." As I have never built a pusher, presumably he means petrol-*powered* flying boats!!

I make no bones about my ignorance of technical hydrodynamic terms, nor do I feel compelled to apologise to my average and intended reader. I am an amateur and I write for amateurs (particularly would-be newcomers to the flying boat game) and I maintain that Mr. Sizer has deliberately, not to say childishly, gone out of his way to misunderstand my home-made terminology.

Leaving aside my admitted lack of education in these matters, to which I unreservedly plead guilty, there are several technical points on which I shall continue to differ from Mr. Sizer until proved wrong in practice. I made it clear that my initial experiments were a deliberate flouting of full-size theory, and an attempt to prove a point at issue between Col. Bowden and myself. In this respect I seem to be vindicated by Mr. Sizer's own statement that designers "took years of expensive and disheartening effort" to get away from accepted speed-boat practice.

Personally, I ignored it from the beginning and had a lot of fun arriving at conclusions which work in practice. Until I find something better (and I'm always trying!) I swear *by* it because it works. Mr. Sizer swears *at* it because it flouts the latest full-size theory and practice. We are just beginning to realise the importance of that horrific Reynolds number R in low speed aerodynamics. My guess is that the same sort of thing applies to small-scale hydrodynamics, and successful full-size hull shapes are by no means likely to be successful when scaled down in size and speed unless some clever fellow discovers how to reduce the density of water or turns it into alcohol. (God bless him!)

Tip Floats are Out!

Perhaps the best example of Mr. Sizer's failure to appreciate my problems from a *practical point of view* is over the question of wing-tip floats. Anyone can see that a tip float works at a very much greater mechanical advantage than inboard floats or sponsons. It is also obvious that the displacement volume of a sponson must be much greater than a tip float to prevent a wing-tip submerging. In spite of Mr. Sizer's pedantic insistence on the use of the term "*righting moment*" in place of my "*lateral flotation*," the astonishing (?) fact is that *a tip float has no righting moment whatever*, especially if, as Mr. Sizer suggests, it is placed high off the water when the model is on an even keel. It will certainly prevent the wing-tip submerging by virtue of its *lateral flotation* (or outboard buoyancy) but *it cannot right the model on to an even keel*.

Now a sponson, or even a float placed well inboard as on Bogalino Marino's B.M.160 illustrating Mr. Sizer's article, *has* that property. Once a model has blown over on to a tip float, placed high, as Mr. Sizer suggests, it will remain so unless or until the wind changes or the tail eventually swings round. Unfortunately the latter will not occur *quickly* without either an enormous fin or very long tail moment arm because, owing to the exaggerated dihedral on models, the undersurface of the upturned wing on the windward side presents too large a projected area in front of the C.G. if the wind blows from behind the mean chord line (or abaft the beam, if you will!). This projected area tends to cancel out much of the tail side area and prevents rapid " weather-cocking " into wind. This is a main reason for reducing the dihedral to the minimum safety limit. On the other hand, it is worth noting that the incorporation of some dihedral in the tailplane helps to counteract this by increasing the effective side area of the empennage as the model heels over to a gust.

" The trouble with most experts is that they are so frantically dogmatic "! So states Mr. Sizer. Well, in spite of all he has to say I again say, " Wing-tip floats must be ruled out." There are a number of reasons for my sticking to my guns on this point, and in passing, let me correct Mr. Sizer's unfounded accusation that " the rational thing to do would be to investigate a point before deciding it must be ruled out—— " I have done so. He asks, " Who is going to say what virtues attach to a hull wider in the beam . . . in conjunction with tip floats ? " I have already made the point that *tip floats have no righting moment*. Granted that they will prevent a tip submerging, such a hull must be built wide enough to give not merely a righting moment, but a considerable additional righting moment to overcome surface tension in order to lift a float out of the water at rest. I know that the beam necessary to provide this is very nearly equal to the span of my sponsons (which are capable of lifting a wing-tip out of the water unassisted). Such a hull would be heavy and produce enormous drag in the air, whereas, if the hull is kept reasonably narrow and sponsons are added, not only are the drag and other practical disadvantages of tip floats and their bracing eliminated, but the drag of the sponsons is at least largely paid for by their contribution to the model's total lift when airborne. Furthermore, sponsons do not interfere with a rapid yawing response to wind direction (what I loosely termed " weather-cocking action ") when the model is at rest on water, whereas tip floats slow this down considerably.

Quite apart from all these theoretical considerations, well proven in practice, come the essentially practical snags of tip float attachment to wings. Of all models likely to develop wing warp, flying boats reign supreme! The difficulty of placing a wing down on a true surface and weighting it, with either permanently fixed wing-tip floats or attachments for same projecting from its undersurface, is such as to require a special jig or board with a hole in it through which the float can be passed. No, Mr. Sizer ; tip floats are just a b—— nuisance in *every* way and they are not as efficient, portable or invulnerable, as sponsons. Therefore I am sure of my ground when I say to any novice embarking on his first flying boat— " rule them out."

" Why all this fogging ? " asks Mr. Sizer. He wants me to state in *inches* what he insists on my calling " forebody volume." Apart from the impossibility of stating a *volume* in *inches* (!), he quite misses my point. I advocated plenty of *length*, irrespective of volume, to the forebody. I dislike the vague and ugly term " forebody," and more accurately described it as the hull in front of the C.G. The length, in inches, obviously depends upon the size of the model. The article was on *general* design considerations.

He states that " it is possible to avoid a large fin by making the hull longer, but *not* on the water-line." I quite agree, but the disadvantages of this are pointed out. It produces a large side area at or above the C.G. level, and at insufficient moment arm from the C.G. to give rapid yawing into wind when at rest on the water. Furthermore, it increases the tendency of a model to be blown over on to a wing-tip before the " weather-cock action " has taken place. This is my reason for keeping " the total side area low down by continuing the foredeck level right back to the tail." In other words, there is as little side area as possible above the C.G. until the actual fin, which, working on a long moment arm, rapidly swings the model into wind. I dispute his claim that with his arrangement the " *centre of pressure* of combined hull and fin would then have been lower." It would probably be at exactly the same level or possibly higher, but, what is far more important, it is further aft using a large fin on a long moment, and *this* is the practical consideration.

Returning to the D.O.18 hull bottom, I did certainly know that this full-size hull was " dirty running and inefficient." That was why I remarked that its successful use on a model was interesting. It is possible, if not probable, that this hull form, having proved satisfactory in small-scale tests in tanks, was erroneously hoped to behave as well in full-size practice. The Germans were very thorough, but they were the first to discover and admit that those hulls were a failure in rough water. Hence their later adoption of types of full-size hull more nearly resembling our own. None of this proves that the D.O.18 hull form is not a better form for model use than, say, a Sunderland type hull. I've tried both (or at least several hulls more nearly resembling the V-bottomed Short boats than the D.O.18, and more recently, the D.O.18 type on " Neptune ") and I can definitely state that the latter is an improvement on the former, especially as regards take-off, though not, I think, for alighting. (Yes, I grant you that one about " landing " on water, Mr. Sizer ! !) Incidentally, since building " Neptune," I have built yet another type—a compromise between the two types—on " Mermaid III " which I have still not finished testing at the time of writing (August, '46), but which promises to combine the best points of both types.

Finally, Mr. Sizer has let his sarcasm get the better of his sense of justice : by tearing phrases from their context he has joined them together to make his final crack—" spare no weight and make as light as possible " . . . " Just what the doctor ordered." I certainly had a good laugh over this and I hope this gives him satisfaction since he was patently out for a cheap laugh at my expense. Anyone reading my article could not, I think, fail to compare what Mr. Sizer *says* I said with my own words, which read : " I therefore spared no weight in the construction of the trickily-shaped bows . . . at the same time keeping the tail boom as light as possible." I think fair-minded readers will judge the justice of the rest of Mr. Sizer's article by this example of deliberate, not to say libellous, misrepresentation.

The joke is on me, Mr. Sizer, but the laugh is at you! Come, fly a boat with me!

THE GREAT TREMBLE TRICK

By ROBERT JAMIESON

SEVERAL times during the course of these memoirs we have seen fit to record the wild cries emitted by Mr. C. U. Tremble when roused ; but no sound given out by that rather irascible gentleman could ever equal the wild blood cry which poisoned the peace of a quiet summer's evening in Teuchle Toorie. It was a hoarse bawl of frustrated rage and fury which wakened children from sleep, turned milk in nearby dairies, and blighted the very leaves on the trees. The reason for the glider expert's fury is hereafter related.

It was during Mr. Tremble's annual visit to our neighbourhood that someone suggested a very novel competition, which—for a wonder—evoked an enthusiastic response from all concerned. It was mooted that an open comp. for all aeromods. in the district be held, all flying the same type of machine—to see who could get the most out of any given design. After some discussion, a simple slab-sider of 30 inches span was chosen, and quantity production embarked upon by all intending entrants.

Weird and wonderful were the tricks resorted to by the builders to pep up the performance of their models. Props. were shaved to wafer thinness ; ribs were lightened till they were nothing but a series of holes ; and when it was announced that even the great Tremble was building an entry, efforts at tuning up were redoubled. One and all, however, voiced the same complaint. With no coloured tissue available, all had to make do with white. This necessitated a touch up with coloured dope if mistakes in identification were to be avoided, and this meant added weight.

It was one evening, while several members—the Maestro included—were working at their models, that Snooky Munroe burst into the club, full of the great Tremble trick.

" It makes the Indian rope trick look like kid's play," he announced. " Honest, you otter see 'im. You turn a bicycle upside down, and get someone to turn the pedals till the back wheel's simply flying—then 'e feeds the model through the spokes—chews up the whole thing to bits—marvellous ! Then, when the job's all in pieces, 'e claps 'is 'ands—whuot ! And ther' it is, all together again."

" And where did he learn to do it ? " asked McSwindle.

" Out in Indiar," said Snooky, " from one of them there faker fellows. 'E says it's all a matter of faith."

McGillicuddy looked up, paint brush in hand, from the model he was tastefully touching up with green. " Well," he said, thoughtfully, " here's one man who hasn't enough faith to give him a model to feed through the wheel of a bike."

" Ho—so you're yellow, eh ? " asked Snooky.

" No—green," the Maestro announced calmly, ignoring the insult. " It would suit Mr. Tremble a lot better if he would conjure up some coloured tissue," he added.

" But you gotter 'ave faith ! " Snooky protested. " It stands to reason that——"

" It stands to reason that I wouldn't risk it, faith or no faith," the Maestro interrupted curtly. " I'll no' deny that Tremble's a clever lad, but he'll no' feed one of my models through the back wheel of a bicycle—I'm no' as green as all that, though I'm using that colour on my model."

" So I see," Munroe said sourly, " an' I'd say that was the right colour for you. You got no faith—you got no imagination!" And with that he stamped out of the club.

After he had gone, the members fell to discussing the great Tremble trick.

" I wonder if it really is possible ? " McSwindle asked. " Some of the Indian Yogis can do wonderful things."

" It'll be the same as the Indian rope trick," observed the Maestro. " You hear a lot about it—but you never actually see it done. If you ask Snooky if he's seen Tremble doing it he'll tell you no, but he knows a chap who knows another fellow who's brother had a letter from somebody else who heard about somebody who had seen it——." McGillicuddy broke off and stared thoughtfully at his model. " I don't know that I like white and green—think I'll strip it off and touch up with yellow."

"If you use yellow," said McSwindle, "Tremble'll say that's just the right shade."

"He can say what he likes," replied the Maestro, "but he'll never feed one of my models through a flying wheel—I'm no' that yellow—or green, either," he added.

"Are you really going to re-cover and re-paint your job?" I asked. "It's getting late, and the competition's tomorrow."

Evening was, indeed, drawing in. Already it was dark in the clubroom, and still McGillicuddy lingered, staring thoughtfully at his model. "Yellow or green—I wonder," he mused.

"You can stay and do your wondering without me at any rate," said McSwindle. "I'm for home."

We all went off, leaving the Maestro still staring thoughtfully at his model.

The next day was bright and sunny, but with a stiffish breeze which did not promise ideal flying conditions when the competition came to be flown off. We were hopeful, however, that the wind would abate somewhat by evening.

During the day, from various sources, came further bits of gossip and information about Mr. Tremble's wonderful trick. All seemed certain that he could do it—though there were none who had actually witnessed it. But it was true—they swore it; he could feed a model through the whirling spokes of a bicycle wheel until it was chewed to pieces—and then—with a wave of his hand and a magic word—put it together again. So much talk of this was bandied about that the coming competition faded into the background.

I must confess I felt far from happy about the whole business. The more so as the chief talkers about the trick were our old rivals, the Teuchle Toorie mob. The whole business seemed very much like some deep-laid plot for our undoing—yet for the life of me I could not see how they meant to bring this about. Still in this dark and apprehensive mood, I proceeded to the club that evening to collect the model, and meet the others. McGillicuddy was not there, though he had arranged to meet us.

"He must have been here earlier on," said McSwindle. "His model isn't here, either."

Still pondering a little over the stories of the Tremble trick, I accompanied the others to the Teuchle Toorie club's flying ground. It was still a little too windy for flying, so all the entrants were assembled in a little hollow, with the models parked before them. It was rather a strange sight to see so many models exactly the same—except for the various "touch ups" with coloured dopes, but I was greatly relieved to see the Maestro sitting chatting happily with the rest. Everyone seemed to be in the best of spirits. Even Tremble seemed in an affable mood—and that alone should have warned me of trouble ahead.

Sure enough, the talk soon veered round to the famous trick, and there were insistent calls that Mr. Tremble should perform it there and then—come on and let's have a demonstration now.

"No, chaps," said Tremble. "It isn't so simple as that—it's a matter of faith—and—and confidence."

"You see," he continued, "the chap who lends me his model to do the trick with can't be sure that it'll work—he's just got to have faith. For instance, if my worst enemy was to lend me his model——" he wheeled round suddenly and faced the Maestro. "You now, Mac, for instance—if you were to lend me your model—and have faith that I could do the trick, then the aural spectrum of the receptive allergic would be in rapport—and——"

"You mean you want to try it with my model?" demanded McGillicuddy, cutting him short.

"Sure—if you're game," replied Tremble.

In a flash the whole diabolical plot was plain to me. I tried to call out—to warn the Maestro—but my tongue stuck to the roof of my mouth. A strange, dramatic hush fell on the gathering, the very wind seemed tense and waiting.

"All right—carry on," said McGillicuddy, calmly.

Two of the Teuchle Toorie mob brought forward a bicycle, and turned it upside down, their faces gloating with anticipation. At last my tongue moved.

"Don't let him do it, Maestro!" I called out. "He'll smash up your model."

Tremble turned on me in a flash. "Quiet, you!" he snarled. And Snooky Munroe called out: "What yer worryin' about, Bob? 'snot your model what's going to cop it."

Tremble turned to McGillicuddy again, and his voice was melted honey and molasses. "Still willing for me to carry on, Mac? Good! Which is your model? They all look so much alike—sure. It's the one with the yellow touch up."

So saying, he picked up one of the models, and gave a sign to his assistants. They began to turn the pedals of the bike. Faster—faster—until the wheel was spinning at a terrific speed, and the spokes invisible.

With the model in his hand, Tremble stepped up to the machine. His face was evil with savage gloating, his mouth drooled with anticipatory delight. He turned back his cuffs, then, slowly and deliberately, he began to feed the model through the whirling spokes.

In desperation I tried to shut my ears against the horrid rending scrunch which told me a good model was being wantonly destroyed. The sound seemed never ending. Bits of balsa, shreds of tissue, and slivers of chewed-up rubber rose in showers from the other side of the wheel, till at last there was nothing left.

In despair I gazed at the pathetic remains; yet the Maestro seemed quite unconcerned. There was a quiet smile on his face as he sat and watched, one leg crossed over the other.

Tremble straightened up. "Alla coo! Alla coo! Alll y cammy hammy roo!" he cried, and clapped his hands.

Nothing happened. The model did not appear magically whole again. The tiny shreds lay as they had fallen.

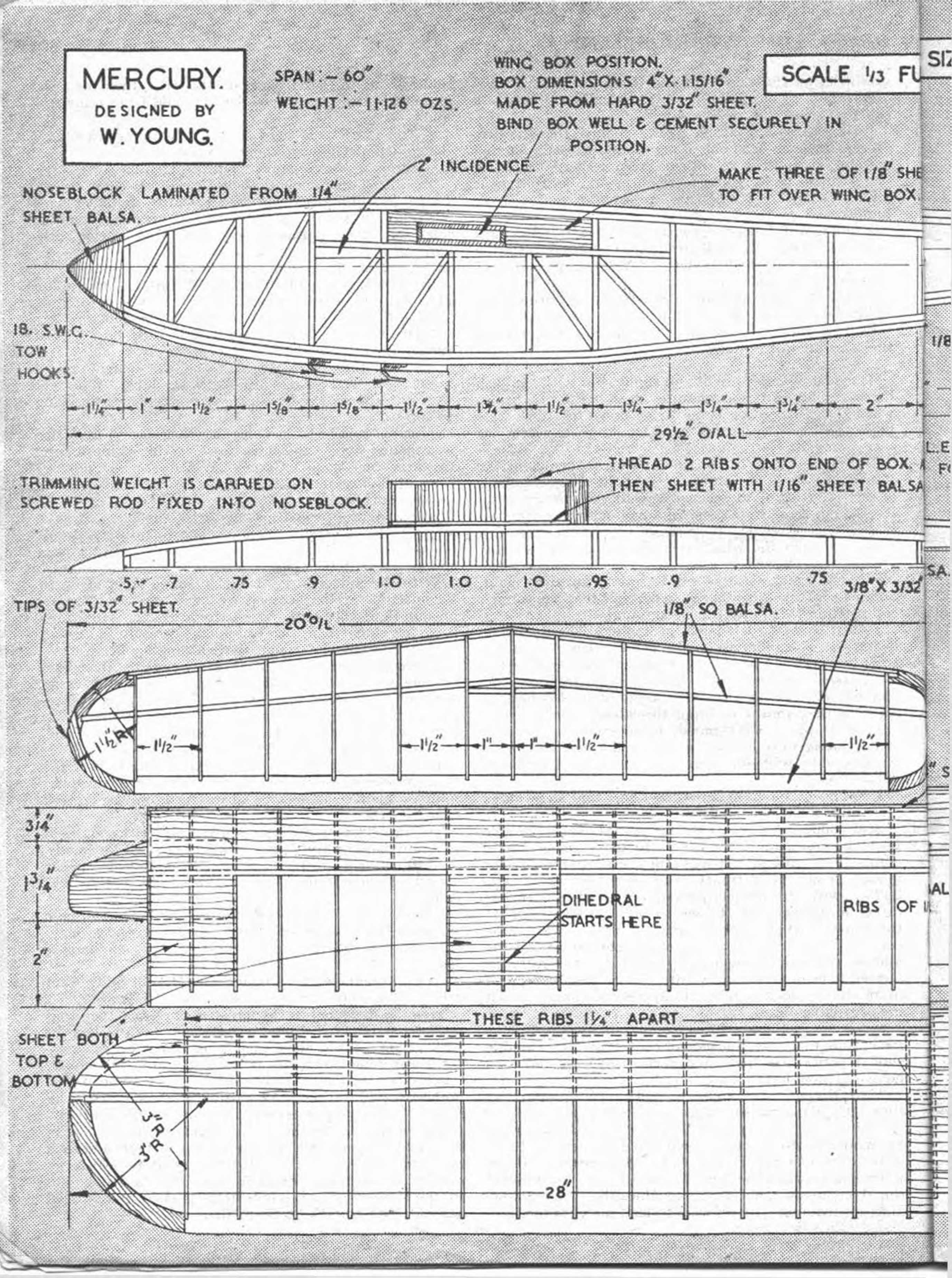
"Funny, that," Tremble remarked. "It should have worked all right—but something must have gone wrong." He turned to the Maestro: "Sorry about your model, Mac."

"Och—don't worry about it," McGillicuddy said calmly, "it's no' my model anyway—it's yours."

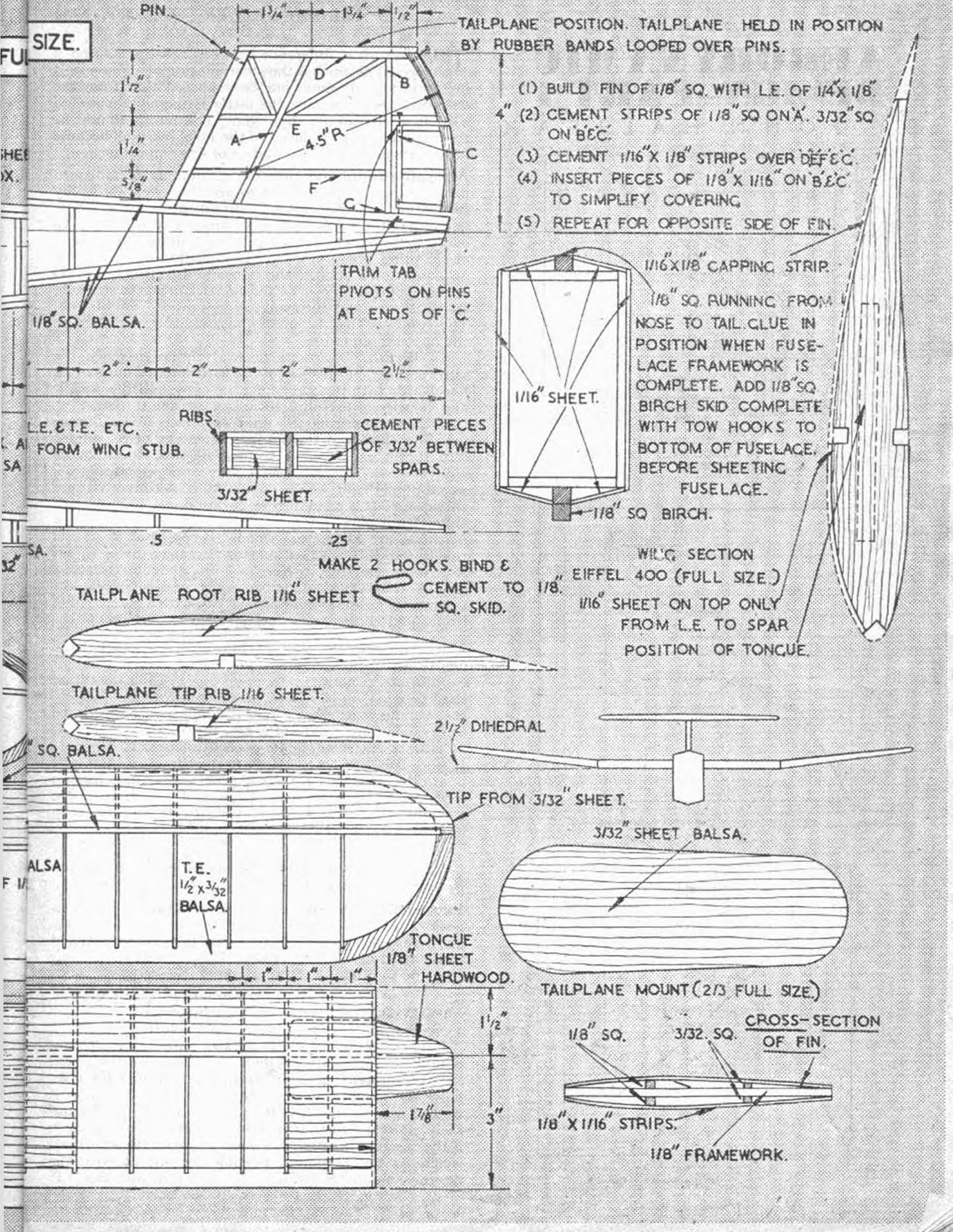
Tremble staggered as though struck. "But they told me," he stammered, "that your plane was touched up with yellow—you'd changed it from green."

"I was going to change it," said the Maestro calmly, "but och—the green looked fine, and I couldnae be bothered re-covering. You should always see," he added, "that your spies get last-minute information."

The veins on Tremble's forehead began to swell; he lifted his clenched fists to the skies, and there and then he gave vent to the dreadful blood-call to which we referred at the beginning of these notes. And as he did so, the Maestro put his hands in his pockets and strolled casually over to pick up his model.



MERCURY.
DESIGNED BY
W. YOUNG.
SPAN :– 60"
WEIGHT :– 11·126 OZS.
WING BOX POSITION.
BOX DIMENSIONS 4" X 1.15/16"
MADE FROM HARD 3/32" SHEET.
BIND BOX WELL & CEMENT SECURELY IN POSITION.
SCALE 1/3 FU
2° INCIDENCE.
MAKE THREE OF 1/8" SHE
TO FIT OVER WING BOX.
NOSEBLOCK LAMINATED FROM 1/4" SHEET BALSA.
18. S.W.G. TOW HOOKS.
1¼" 1" 1½" 1⅝" 1⅝" 1½" 1¾" 1½" 1¾" 1¾" 1¾" 2"
29½" O/ALL
THREAD 2 RIBS ONTO END OF BOX.
THEN SHEET WITH 1/16" SHEET BALSA
TRIMMING WEIGHT IS CARRIED ON SCREWED ROD FIXED INTO NOSEBLOCK.
.5 .7 .75 .9 1.0 1.0 1.0 .95 .9 .75
TIPS OF 3/32" SHEET.
20" O/L
1/8" SQ BALSA.
3/8" X 3/32"
1½" R
1½" 1½" 1" 1" 1½" 1½"
3/4" 1¾" 2"
DIHEDRAL STARTS HERE
RIBS OF
THESE RIBS 1¼" APART
SHEET BOTH TOP & BOTTOM
3" R
5" R
28"



FULL SIZE.
PIN.
$1^3/_4$"
$1^3/_4$"
$1/_2$"
TAILPLANE POSITION. TAILPLANE HELD IN POSITION BY RUBBER BANDS LOOPED OVER PINS.
(1) BUILD FIN OF 1/8" SQ. WITH L.E. OF 1/4" X 1/8"
(2) CEMENT STRIPS OF 1/8" SQ ON 'A'. 3/32" SQ ON 'B' & 'C'.
(3) CEMENT 1/16" X 1/8" STRIPS OVER 'D' 'E' 'F' & 'C'.
(4) INSERT PIECES OF 1/8" X 1/16" ON 'B' & 'C' TO SIMPLIFY COVERING.
(5) REPEAT FOR OPPOSITE SIDE OF FIN.
4"
$1^1/_2$"
$1^1/_4$"
$5/_8$"
D
B
A
E
4.5" R
C
F
C
1/8" SQ. BALSA.
TRIM TAB PIVOTS ON PINS AT ENDS OF 'C'
2"
2"
2"
$2^1/_2$"
1/16"X1/8" CAPPING STRIP.
1/8" SQ. RUNNING FROM NOSE TO TAIL. GLUE IN POSITION WHEN FUSELAGE FRAMEWORK IS COMPLETE. ADD 1/8" SQ BIRCH SKID COMPLETE WITH TOW HOOKS TO BOTTOM OF FUSELAGE, BEFORE SHEETING FUSELAGE.
1/16" SHEET.
1/8" SQ BIRCH.
L.E. & T.E. ETC. FORM WING STUB.
RIBS.
CEMENT PIECES OF 3/32" BETWEEN SPARS.
3/32" SHEET.
.5
.25
MAKE 2 HOOKS. BIND & CEMENT TO 1/8" SQ. SKID.
WING SECTION EIFFEL 400 (FULL SIZE)
1/16" SHEET ON TOP ONLY FROM L.E. TO SPAR
POSITION OF TONGUE.
TAILPLANE ROOT RIB 1/16" SHEET
TAILPLANE TIP RIB 1/16 SHEET.
$2^1/_2$" DIHEDRAL
SQ. BALSA.
TIP FROM 3/32" SHEET.
3/32" SHEET BALSA.
T.E. $1/_2$" x $3/_{32}$" BALSA.
TONGUE 1/8" SHEET HARDWOOD.
TAILPLANE MOUNT (2/3 FULL SIZE)
1"
1"
1"
$1^1/_2$"
3"
$1^7/_8$"
1/8" SQ.
3/32. SQ.
CROSS-SECTION OF FIN.
1/8" X 1/16" STRIPS.
1/8" FRAMEWORK.

AERODYNAMIC DESIGN—PART 1

BY JOHN HALIFAX

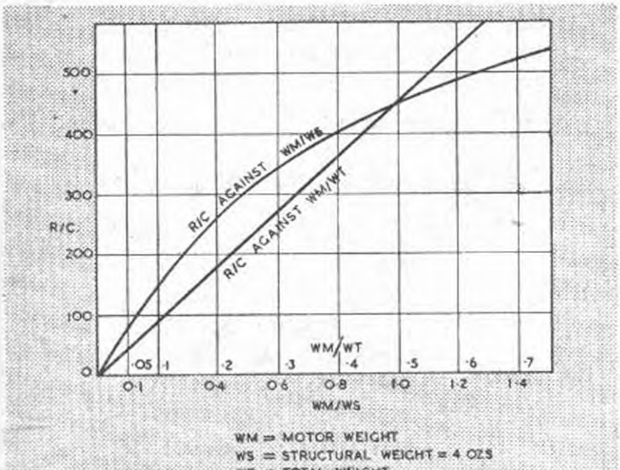


FIG. 1

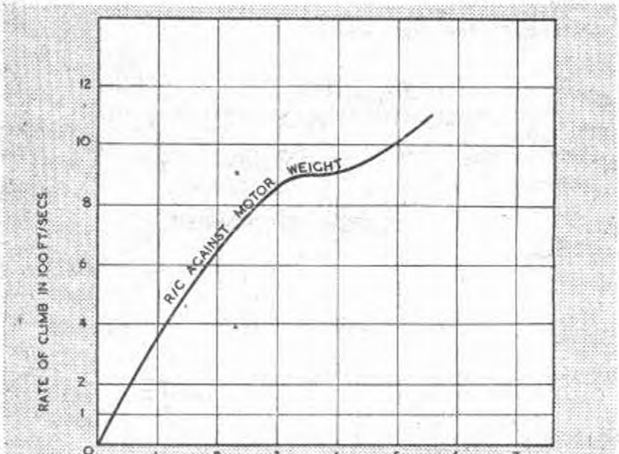


FIG. 2.

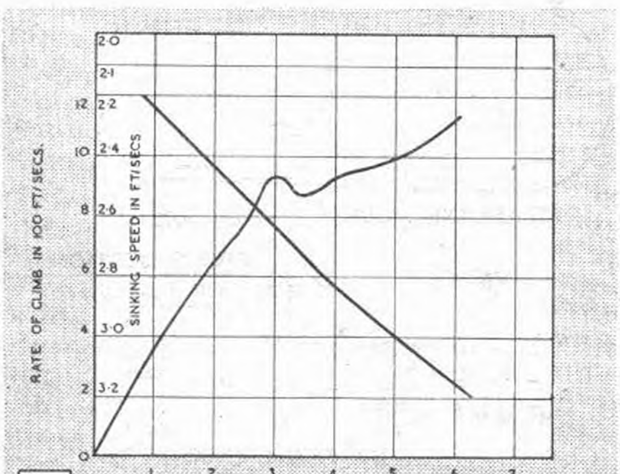


FIG. 3.

THE one great difference between a sailplane and a powered machine is the incorporation of a power unit in the latter. It must not be supposed that from the designer's point of view the latter is merely a powered edition of the former, however. The motor should be regarded as the very heart of the machine, and, because of this, its performance a matter of first importance.

Aircraft propulsion. Before examining the motor in detail, it would be as well to see that we thoroughly understand the principles of aircraft propulsion. Now one of Newton's famous laws of motion states that "to every action there is an equal and opposite reaction," or, in other words, if a force is applied in one direction, an equal force acts in the opposite direction. A good example of this is given by the old trick of a man standing on ice skates and throwing a brick away from himself. The result is that he moves backwards over the ice, in the opposite direction.

An aircraft obtains its forward thrust in much the same manner, but instead of bricks, it forces a mass of air backwards with the aid of its airscrew, and the weight and velocity of this slipstream governs the thrust.

It is obvious from this that an airscrew is a simple machine; that is, it transforms the energy of the engine into thrust energy, and because of this it cannot be 100 per cent. efficient. As a very approximate figure, about 80 per cent. of the engine's h.p. is converted into thrust h.p. (t.h.p. in future) at normal flying speed. Diameter, r.p.m., pitch, and the forward speed of the machine, are all factors which affect it, but a general rule to remember at this stage is that for a given thrust it is more efficient to have a large diameter airscrew forcing a large mass of air backwards at a relatively low velocity, than it is to have a small one with a much higher r.p.m. and slipstream velocity.

H.P. required. When a machine is moving through the air, it is subject to drag, and thus a condition for equilibrium in normal horizontal flight is that the thrust shall be equal to it. If it were greater, we should expect the machine to accelerate until reaching a speed where the drag would be as great as the new thrust, and conversely, for a lower thrust we should expect the speed to drop.

Since it is simpler to calculate the thrust in t.h.p. and not in lbs., it is necessary to express a machine's drag in terms of t.h.p. absorbed. Thus, if D = drag of the machine in lbs. and V = velocity in ft./sec. then h.p. absorbed $= \frac{D.V.}{550}$ *(equation 1.)*

This is very easily solved for model values of ozs. and ft./secs. by Nomograph 8.

Excess H.P. The difference between the h.p. required for normal horizontal flight and the thrust h.p. available is known as excess h.p. (E.H.P.) and is directly proportional to the machine's rate of climb. The exact relationship is given by formula $R/c = \frac{E.H.P.}{33{,}000\ W.}$ *(equation 2.)*

where W = total weight of the machine in lbs.

Nomograph No. 10 gives a rapid solution.

Equation 2 clearly shows the two important factors in obtaining a high rate of climb; a powerful motor, and a low total weight; both are of equal importance for, if we halve the weight we shall obtain the same result as if we had doubled the E.H.P., and vice versa. Unfortunately, however, these two improvements are at variance: if the designer has done his work properly, the structural weight is the minimum possible, consistent with the desired amount of rigidity and strength, and thus the only way to improved performance lies in increasing the size of the motor. This cannot be indulged in indiscriminately because above a certain limit the total weight grows out of all proportion to the increased E.H.P. (Figs. 2, 3 and 4) and the choice of a suitably-sized motor reveals itself to be a matter for thoughtful compromise.

A simple method of determining the optimum size of a rubber motor is shown by Figs, 3 and 4. As the length of motor run for the projected machine is first arbitrarily decided, a word on the subject would not be amiss. Fig. 5 clearly shows that the total energy delivered by a motor is the same, whatever the duration of the run, but a maximum value for this is fixed by the necessity of delivering sufficient h.p. to maintain level flight. This condition is of no value in practical flight, of course, because it is essential that sufficient E.H.P. is available for a reasonable climb, and thus it is usual to regard 90 secs. as a practical maximum for a motor run, and 60 secs. as a good " general purpose " figure.

Design Procedure. The weight, wing area, angle of attack, tail unit areas, general dimensions and flying speed having been provisionally estimated as for a sailplane, the total drag is roughly computed, and from this the h.p. required is found with the aid of Nomographs No. 8; h.p. available for various motor sizes is obtained from No. 9; and the difference between the two tabulated as in Table 1. The total weight is obtained by adding the structural weight, which is constant, to the motor weight, which varies.

Rate of climb is now computed from columns 2 and 7 and the result entered in column 8. In order to determine the sinking speed, the gliding angle is obtained from Nomograph No. 7 and the sine of this angle looked up in ordinary trigonometric tables. Then this is multiplied by the velocity of the machine, the product being the desired sinking speed (V_s).

There is, of course, no need to plot V_s and R/C as in Fig. 3, this being included for illustration purposes only. Column 8 is divided by No. 9, and this plotted against motor weight, as in Fig. 4. The weight corresponding to the peak of this curve is the optimum value for maximum duration. With a very flat peak, the value on the extreme left of the peak region should be chosen, for obvious reasons. In Fig. 4 the weight is obviously $2\frac{7}{8}$ ozs.

Rubber motors—general. The weight having been decided, the only other physical dimension needed is the length of the skein, and this is usually taken to be 20 per cent. greater than the distance between the two hooks; the fitting of a tensioner is essential, of course. The h.p. delivered by a rubber motor is by no means constant: Fig. 6 clearly shows that the average value upon which we base our calculations is only being delivered for about one second in actual practice. The agreement between theory and practice is so good, however, that no useful purpose is served by adopting a more complicated method.

1	2	3	4	5	6	7	8	9	10
W motor	W Total	V ft./sec.	Drag	H.P. required	H.P. available	Excess H.P.	Rate of Climb	V sinking	R/C Vs
1	5	17·7	·626	·00125	·0045	·00325	340	2·24	152
1·5	5·5	18·6	·687	·00145	·0068	·00535	515	2·34	220
2	6	19·4	·75	·00165	·0091	·00745	660	2·44	271
2·5	6·5	20·2	·813	·00185	·0112	·00935	770	2·54	303
3	7	21	·875	·0021	·0136	·0135	933	2·635	354
3·5	7·5	21·8	·938	·0023	·0158	·0135	872	2·74	318
4	8	22·5	1·0	·00225	·018	·01545	934	2·825	331
5	9	23·75	1·125	·00305	·0225	·01845	994	2·98	333
6	10	25·2	1·25	·0036	·027	·0234	1135	3·16	359

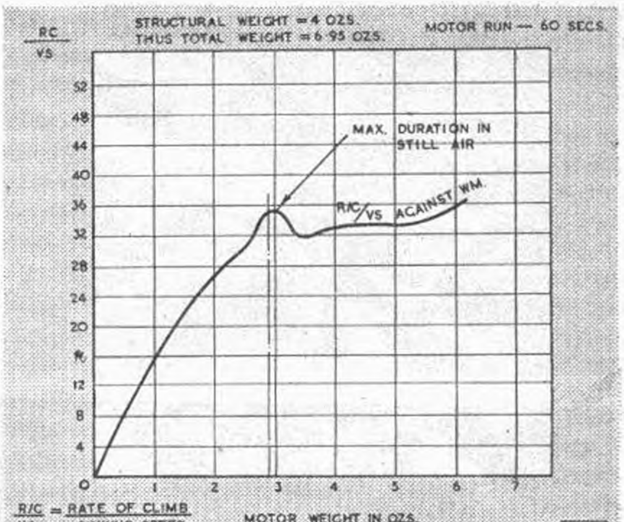
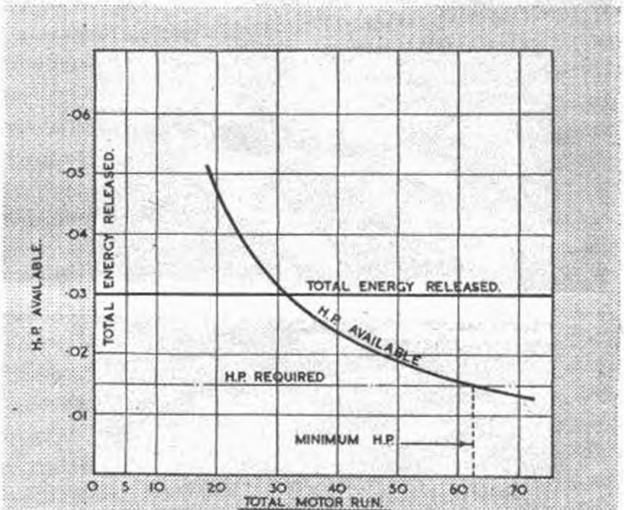


FIG. 4



NOTE THAT WHATEVER THE MOTOR RUN THE SAME AMOUNT OF ENERGY IS RELEASED. ALTHOUGH RATHER MORE IS ABSORBED BY FRICTION ON LONGER RUNS.

FIG. 5

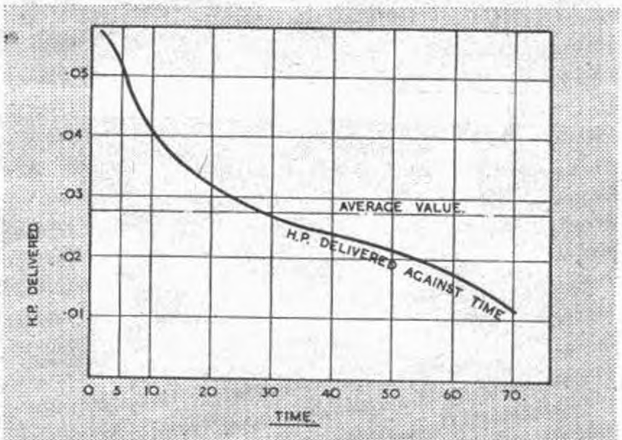
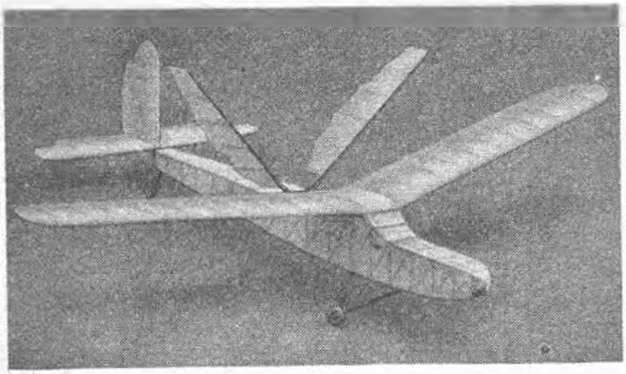
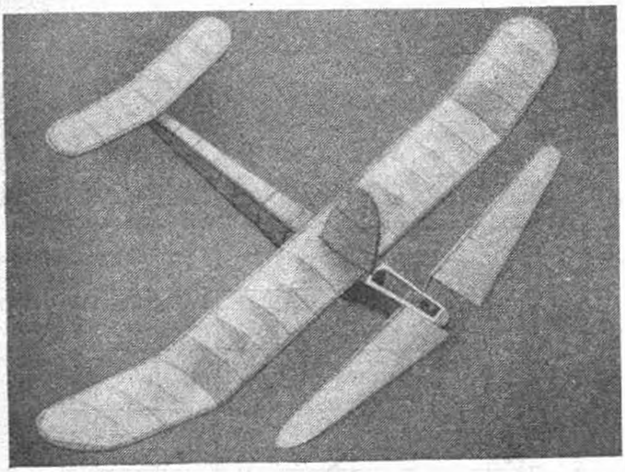
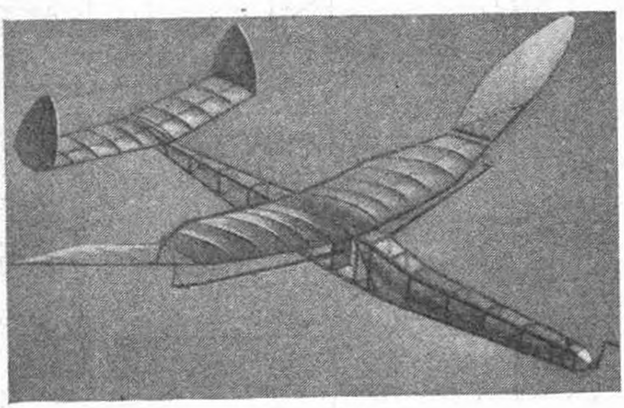
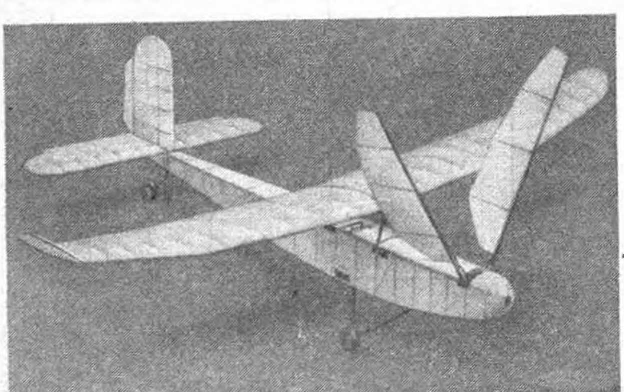


FIG. 6









UNORTHODOX ORNITHOPTER

BY - - - - - - - -

FOR those who feel the urge to get right away from accepted ideas of flight and make experiments unhindered—consciously or otherwise—by thoughts of "conventional" design the ornithopter offers immense scope. The fact that no one has yet succeeded in producing a satisfactory man-carrying machine should be no deterrent to the modeller, and in any event is open to question as both American and German engineers claim to have achieved this end. Such pioneers as Leonardo da Vinci in Renaissance times, the Australian Hargrave and Penaud in the nineteenth century toyed with flapping flight and only in the present century was the formula abandoned by the majority of full-size designers in view of the progress made with screw-driven aircraft. Nevertheless it may well be argued that countless millions of birds with unlimited time for biological development have failed to improve upon flapping their wings as a means of aerial travel.

In case there are some who are not clear as to the exact definition of an ornithopter, it may be described as a flying machine that relies upon flapping of wings for its means of propulsion—in other words an aeroplane that flies like a bird. This definition is apt to lead the uninitiated astray, as any attempt exactly to imitate the motions of a bird's wing is doomed to disappointment. These movements are too complicated to be a practical possibility for the modeller if only on account of the weight of the cams and cranks involved. In the early stages of experiment at least it is essential to concentrate on a simple up and down wing movement.

Experimental Layouts.

Before proceeding to the design of a model it is as well to consider the choice of layouts available and their merits or otherwise. The first and most obvious choice is to build a wing that provides both lift and thrust—that is copy a bird layout. There is a saving of weight as no airscrew is required and the wing is performing natural functions. A number of successful models have been built to this formula but snags arise at once.

In the first place there is a period in each flap where the wings contribute little or no lift, and in order to make this period as short as possible rate of wing beats must be speeded up. This results in the fuselage frame oscillating in the opposite direction to the wing beats, and soon shakes a light structure to pieces. By strengthening the fuselage this can be overcome but only at the expense of weight, which requires yet stronger wing beats. A suitable compromise can be achieved, but flights are merely long enough to prove that the basic principle is sound. Such a model will fly for 20-30 seconds and climb perhaps ten to twelve feet in an R.O.G. flight, or up to fifty feet hand-launched, if carefully constructed to the lightest possible specification. Most models are too heavy and will only maintain the height at which they are launched.

Top: Ornithopter with flappers placed behind the mainplane. Practical disadvantages outweigh any theoretical gain in efficiency. Upper centre. Canard ornithopter with rear flapping pinions. This layout offers great promise and is worthy of further investigation. Lower centre: The American record holder, embodying flapping wing tips. Although considered inefficient it is simple to build and will certainly fly. Bottom: Petrol engined model developed at Rothenburgh—representing the present peak of model flapper progress.

MODELS No. 3

EXPERIMENTS

D. J. LAIDLAW-DICKSON

Present knowledge of flapping flight is not sufficient to progress much beyond this stage with the whole wing flapping. By embodying a rigid centre section, flights can be improved up to nearly a minute, which leads naturally to the next stage of development, a fixed main wing with only the tips actually flapping. Here there is enough fixed wing to provide lift at all times, while at the end of the power flight, irrespective of the final position of the flapping tips, the model has a reasonable glide. Such a design holds the American Ornithopter record.

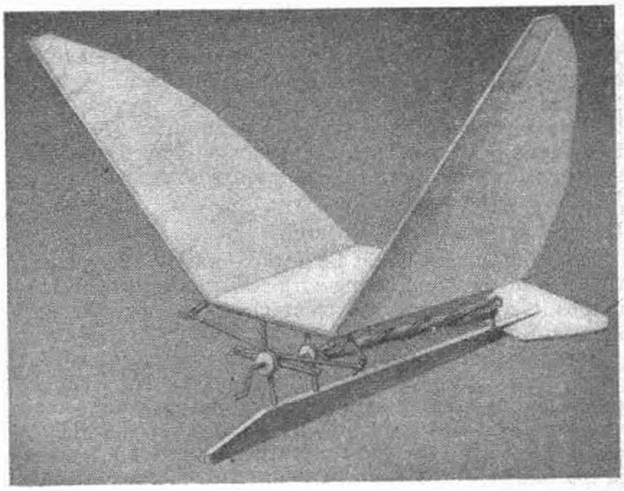
The next step is to divorce the flapping pinions entirely from the lifting wings, placing them in the position normally occupied by the airscrew. Results from such models carefully constructed are only slightly inferior to similar designs fitted with conventional propellers, the loss in performance being perhaps due to the extra weight of the cranking mechanism necessary to secure flapping flight. Care must be taken to secure the optimum lift of the mainplanes by putting them out of the disturbed air created by the flappers. This can be done by fitting gull wings or mounting them on a high pylon, so dear to American petrol modellers.

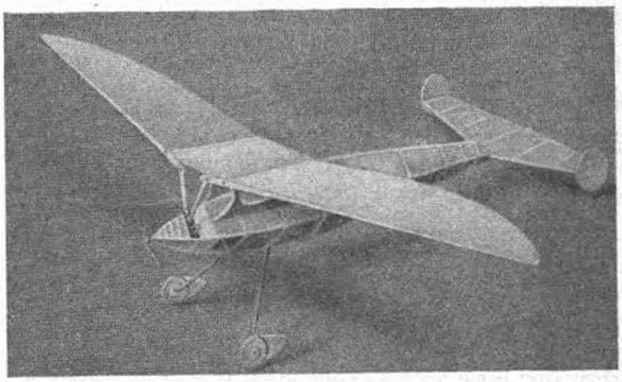
A further improvement can be effected by placing the flappers amidships behind the wing, while the theoretical ideal is to put them at the extreme rear and fly the ornithopter as a canard. No successful flights by this latter type are on record but durations of up to eleven minutes have been recorded for both front and amidships mounted flappers, driven by the usual rubber motor.

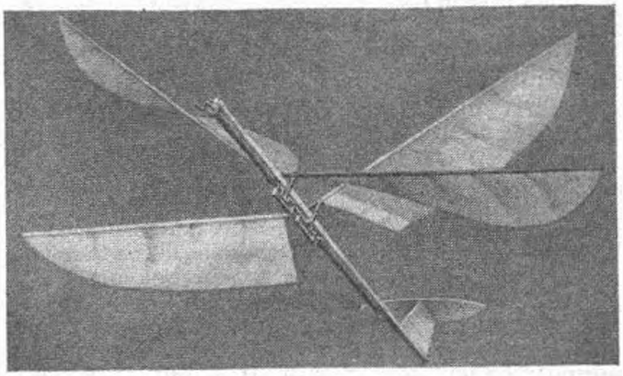
The ultimate aim is, of course, to build a petrol or diesel engined flapper, and very successful experiments took place under the guidance of Alexander Lippisch—designer of the Me 163—just prior to and during the early part of the war. The best recorded flight was made in 1943 with a 10 c.c. engine and exceeded thirty minutes. The power run was not stated, but in view of the height reached, estimated at about three hundred feet, could not have been less than twenty-five minutes at the most conservative estimate—without the aid of thermals, alleged to have been absent on this occasion. Other experiments at Rothenburg included the use of steam-driven ornithopters—though technical difficulties arose that rendered flights mediocre compared with those achieved by Lippisch's petrol models.

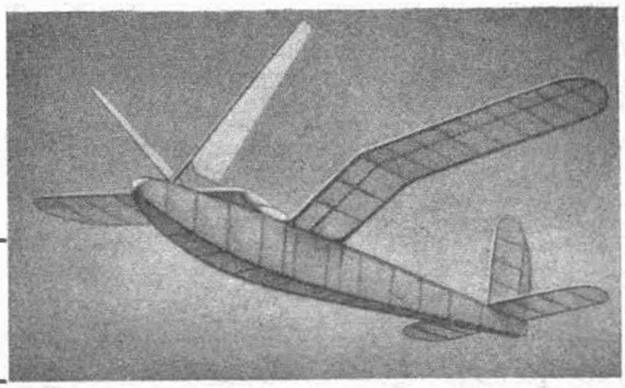
Rate of Flap.

Whatever the power unit the rate of flap necessary to maintain flight should be between 200 to 250 strokes per minute for average models. This should be the nett flapping speed after transmission losses and drag have been allowed for. In the case of petrol or diesel-driven models it will be necessary to fit a reduction gear of about 20 : 1—which gives comparatively slow but immensely powerful beats.









Top: "Slinn" flapper—an American commercial design introduced into this country by Mr. F. C. Camm. A good primary type. Upper centre: An indoor flapper that is unusual in possessing an undercarriage. R.O.G. is possible if weight is kept down to 1 oz. Lower centre: A remarkable effort with two pairs of wings in tandem, similar to those designed by Dr. Holst, though employing conventional drive. Bottom: "Libelle" by Alexander Lippisch, well-known German full-size designer. Probably the most successful rubber-driven ornithopter.

Apart from the power, the rate of beat is governed by the area of the wings and their elasticity. Generally, large models fly better with slow powerful beats of 200-220 per minute, while slow indoor models may require as much as 400 strokes per minute. Taking a bird analogy we can compare the slow wing beats of a stork with those of the tiny humming bird, which move faster than the eye can follow.

Design of Flapping Pinions.

Flapping wings should be approximately one quarter the area of the fixed lifting surfaces, and built as lightly as possible, as increased weight means more power and greater difficulty in control.

A successful flapping pinion is the one essential of a good ornithopter and requires special care. It is necessary for the leading edge spar to be rigid both in an up and down direction and fore and aft. If it bends under load it will lose propulsive efficiency. The surface of the pinion on the other hand must be capable of being warped, that is to say the trailing edge must be flexible rather like the wing of an early Wright biplane. The wing must be sufficiently elastic to reverse the direction of warping, when changing from the downstroke to the upstroke. The slower the rate of flapping the greater flexibility is required, while for faster wing beats it must be correspondingly stiffer. Speed of flight and incidence of the wing also govern flexibility.

Suitable materials for use in flapping pinions include bamboo, cane and spruce. They should be of half round section, hollowed out to give the required torsional flexibility. For petrol-driven models dural sections stiffened by dowelling might be employed. Larger models require wing ribs for which bamboo is most suitable. Covering may be bamboo paper, silk, or in the case of very light models ordinary tissue. A non-shrinking dope such as banana oil should be used. At all times bear in mind that given sufficient strength the lightest possible material should be used. Blue draughtsman's linen in its natural state has also been utilised.

Transmission of Power.

A direct drive is usual in the case of rubber-driven models, though models have been built with geared drive. This adds to the weight and is not generally necessary. If it is desired to secure an unusually long power run it may be embodied. The location of motors is as in normal rubber-powered models. Size for size the amount of strands should be the same as for a high performance contest duration model.

Where a petrol engine is installed, as stated above, reduction gears of up to 20 : 1 will be necessary. It will also probably be found desirable to install some supplementary cooling device such as a fan to prevent overheating. As yet there have been no reports of a diesel engined ornithopter, but this would seem to be the ideal motive power, as in addition to light weight and trouble free operation, it would require no special cooling arrangements.

Having decided on the power unit the next problem is that of transmitting it to the flapping pinions. For this purpose a two-throw crankshaft is employed, from which extend connecting rods to the flapping pinions. The greatest possible accuracy is necessary in making these components, and it is worth while constructing a simple jig. For rubber-driven models 18 s.w.g. is a suitable material, bent from straight lengths.

Where petrol or diesel-engined power units are involved weight will allow for machining really accurate crankshafts and con-rods from dural—in which case none of this trouble need be experienced.

Unusual Approach.

So far the ornithopter has been discussed from the more usual angles—that is if so unconventional a type can ever be so approached. A number of experimenters have tackled it by forgetting everything they knew about normal drives and starting right from the very beginning. Hargrave, for example, had the pioneer advantage that there was little to forget, and his drive is of interest to us to-day in that it embodied *stretched* rubber band instead of *twisted* strands. His method was to stretch his rubber and in the stretched state wind it on to a wooden roller, tethering the last end to a point on the fuselage. This caused the roller to unwind furiously, thus flapping the wings which were attached to an eye piece at each end of the roller. This roller, it should be added, was attached at right angles to the fuselage, and so avoided any necessity for changing the direction of the unwinding, or the need for any crank motion. Furthermore, this gave his wings that forwards and backwards sweep more nearly approximating bird flight than later designs. A similar method was used forty years later by the German Dr. Von Holst. His method consisted of two conical spools, driven by an elastic motor, on which thin cord was wound. As the motor unwound it reeled back the cord on to an eccentrically-mounted " tumbler plate," coupled to the wings, flapping them regularly as it rotated about its own longitudinal axis.

Some of the petrol-engined ornithopters are marvels of ingenuity, with cunning bevel-geared drives to the flapping pinions. One such example has the pinion leading edge swept back at 45 degrees, a simple open worm gear drive connected to the engine crankshaft by a stout rubber tube, and having starter engaging dogs in front to facilitate swinging over on starting. The seepback of the leading edge enables an eccentric forward and backwards flight path to be taken by the pinion, and resulted in heights of several hundred feet being obtained on a number of occasions. Bevel and worm gears have also been used on rubber-driven models, but generally the need for precision work rules them out unless the experimeter is lucky enough to possess a lathe or excellent workshop facilities.

Another curious design made use of the fixed centre section of the wing to house the rubber motor driving the flappers, disposed outboard of the centre section. This again made use of the old Hargrave principle of drive in line with the motion, that is at right angles to the flight path of the model. Apart from placing an undesirably large proportion of the weight away from the centre of the model, leading to difficulty in controlling the pitching moment, this seems one of the most practical and least " gadget-y " of the ornithopter solutions.

Continuing Research.

It is hoped this brief summary of ornithopter research will set readers thinking and perhaps produce one or two oddities in time for exhibition at Dorland Hall this year. Contrary to our usual custom we have not concluded with plans of a successful ornithopter built and tested by our Research Staff because at the moment the models built are still in the development stage. Do not be despondent —they do fly—and fly quite well, but they remain very much the spoilt children of their designers, they will not do their tricks without coaxing. When we have developed a trouble-free flapper that can be confidently expected to perform even with a trifle of careless building then it will be presented to our readers.

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CIVIL AIRCRAFT No. 35

THE MILES M.65 GEMINI

E · J · RIDING

ONE of the four post-war designs offered by the Miles Company, the Gemini is perhaps the most outstanding aeroplane of the year. It is being produced to meet the demands of the small charter or feeder line firms, training schools and the private owner-cum-family man.

The M.65 is a four-seater and retains all the niceties and flying capabilities of the Messenger, to which it bears a structural similarity.

One was able to appreciate to the full the excellent take-off and landing qualities during a practical demonstration in the hands of Sq. Ldr. James Nelson, of Miles Aircraft, Ltd.

On the day previous to our visit, there had been a gale warning in force for 24 hours, and a wind of about 35 m.p.h. was still blowing when we taxied out to the eastern end of Woodley Aerodrome. Picking a clump of grass about one hundred yards distant from where we turned into wind, and winding on 15 degrees of flap, Sq. Ldr. Nelson had the Gemini airborne and climbing strongly before we had reached it. One engine flying presents no difficulties and the exhibition at Eastleigh last month showed how easily one can do all those things that one oughtn't to do near the ground.

Throttling back into wind dead over the aerodrome until the A.S.I. registered 38 m.p.h., with flaps fully down, one swears that we moved backwards, and the stall, if it came at all, was unnoticeable.

The landing run from point of touching down was about fifty yards—we measured it!

The cabin comfort leaves nothing to be desired, and one must comment on the magnificent forward view through the moulded one-piece windscreen.

At the moment only two Geminis have been registered —G-AGUS on October 29th, 1945, and G-AHKL on April 17th, 1946. A production batch of 50 machines has been contemplated.

Construction.

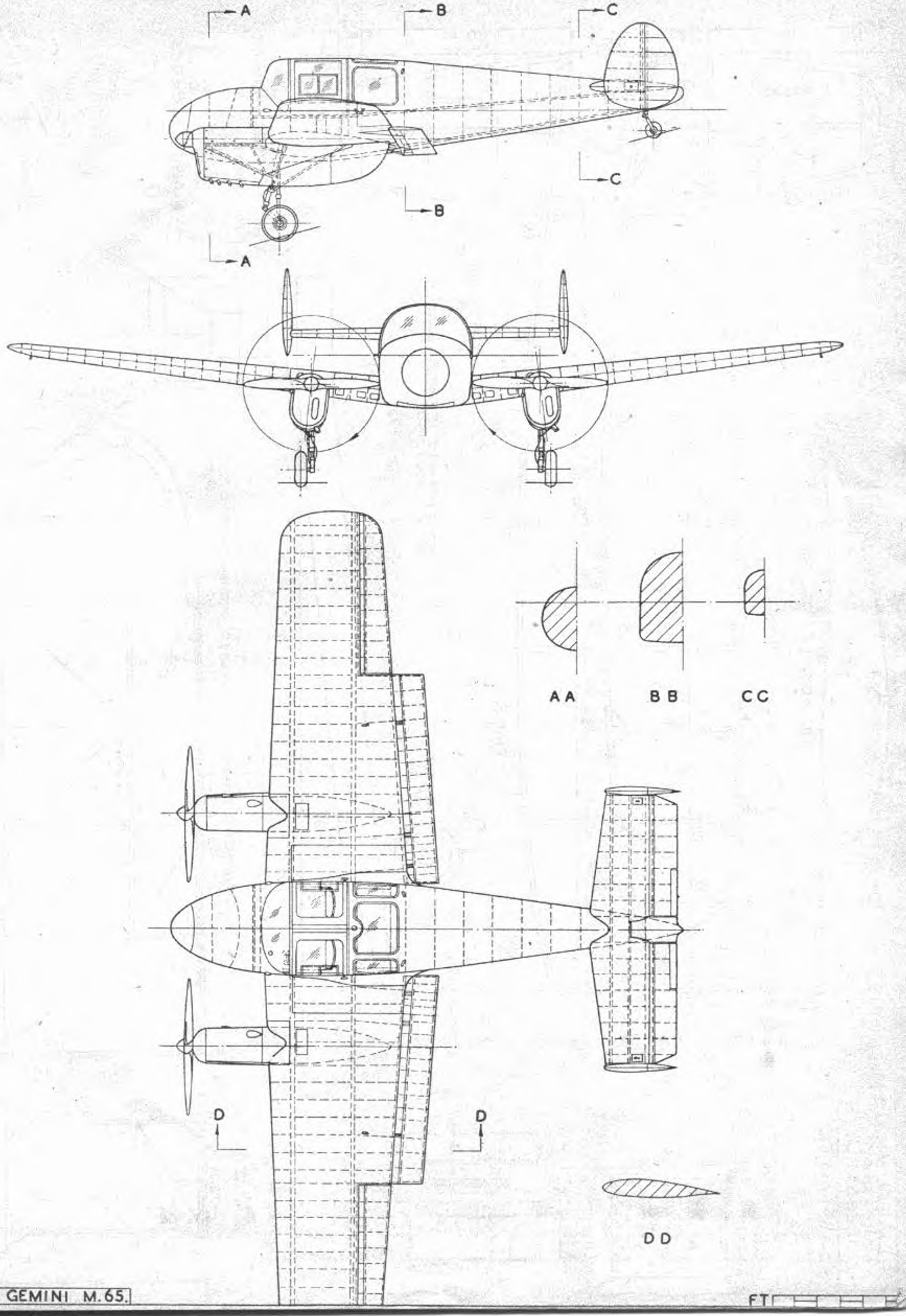
Similar to M.38/48. Fuselage has four spruce longerons carrying inverted "U" hoops covered with a plywood skin. The cantilever wing and tail unit have spruce and ply box spars with a plywood covering. The undercarriage is of fixed design at the moment, but we understand that subsequent machines will have electrically-operated retractable units. Independent wheel brakes are operated by a hand lever on the throttle quadrant used in conjunction with the rudder pedals.

Colour.

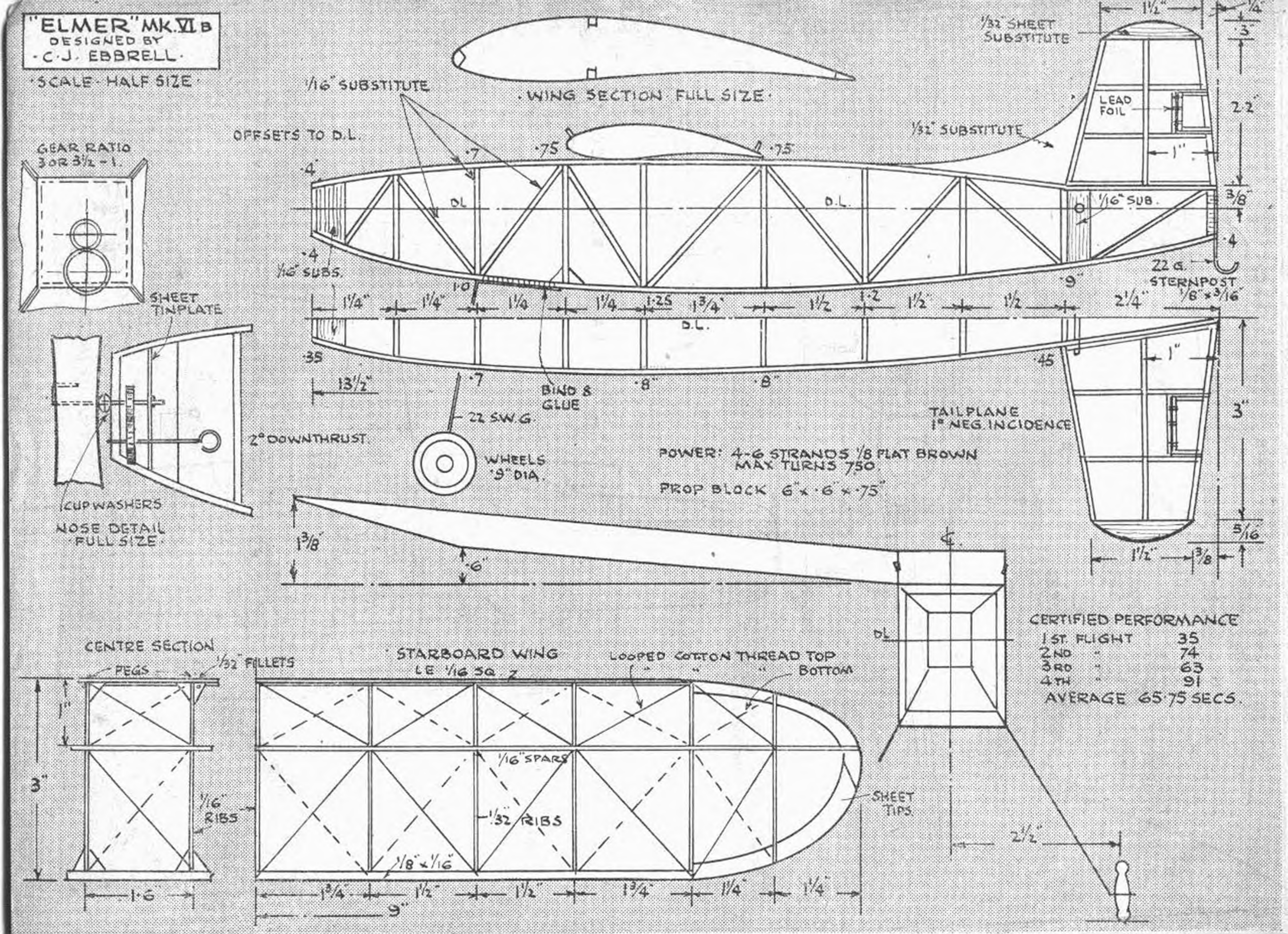
The cover painting by Mr. C. R. Moore, A.R.C.A., shows the typical "Milesian" house colours worn by the Gemini, and as will be seen from our photographs, the registration letters are painted on the upper surface of the port wing and on the lower surface of the starboard wing only instead of right across the span of the wing.

Specification : Span : 36 ft. 2 ins. Length : 22 ft. 3 ins. Height : 7 ft. 6 ins. Wing area : 191 sq. ft. Weight : empty, 1,773 lbs., loaded, 2,800 lbs. Fuel : 60 gallons in wings giving 820 miles range. Speed (max.): 150 m.p.h., cruise, 135 m.p.h. Landing : 35 m.p.h. Power : 2 100 h.p. Blackburn Cirrus Minor II.

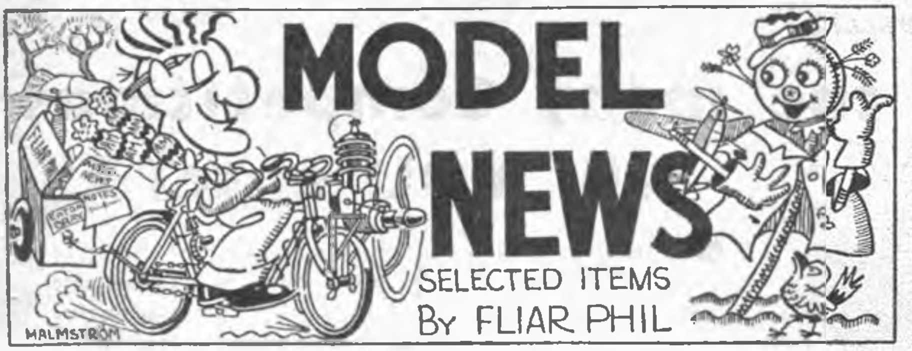
Aeromodeller Photos.



MILES GEMINI M.65.



"ELMER" MK.VI B
DESIGNED BY
C.J. EBBRELL
SCALE HALF SIZE
WING SECTION FULL SIZE
1/16" SUBSTITUTE
OFFSETS TO D.L.
1/32" SHEET SUBSTITUTE
1/32" SUBSTITUTE
LEAD FOIL
1/16" SUB.
1/16" SUBS.
22 G. STERNPOST 1/8" x 3/16"
GEAR RATIO 3 OR 3½ - 1.
SHEET TINPLATE
2° DOWNTHRUST.
CUP WASHERS
NOSE DETAIL FULL SIZE
BIND & GLUE
22 S.W.G.
WHEELS ·9" DIA.
TAILPLANE 1° NEG. INCIDENCE
POWER: 4-6 STRANDS 1/8 FLAT BROWN MAX TURNS 750.
PROP BLOCK 6" x ·6 x ·75"
CERTIFIED PERFORMANCE
1ST. FLIGHT 35
2ND " 74
3RD " 63
4TH " 91
AVERAGE 65·75 SECS.
CENTRE SECTION
PEGS
1/32" FILLETS
1/16" RIBS
STARBOARD WING
LE 1/16 SQ.
LOOPED COTTON THREAD TOP
BOTTOM
1/16" SPARS
1/32" RIBS
1/8" x 1/16"
SHEET TIPS

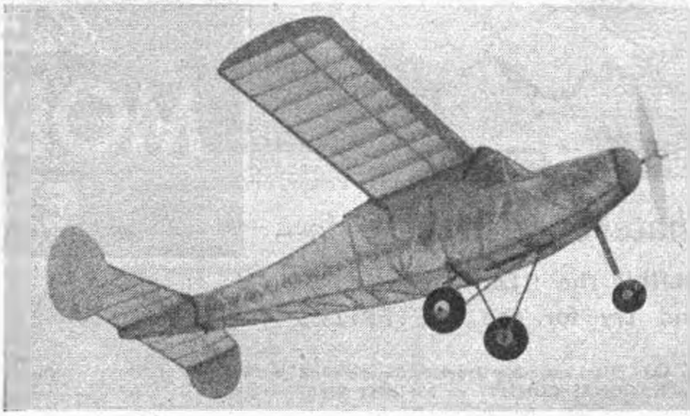


STILL a bachelor gay, if only just, Fliar Phil needs no " bicycle made for two " as yet, and until his juice runs out or someone gets in the way, life seems likely to continue uneventful . . . or at any rate to continue !

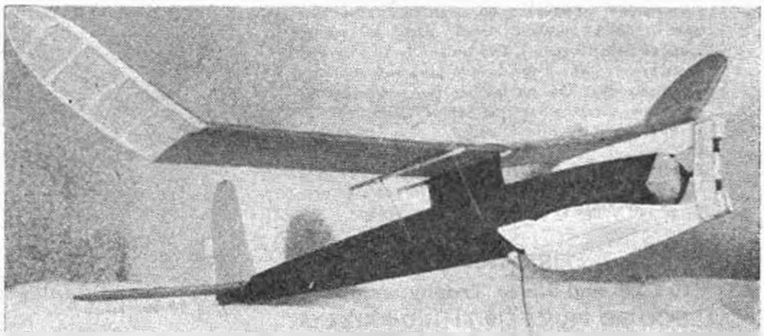
First to the Model of the Month—and well deserving its title is this tiny model built by E. White of Tolworth. Beautifully made, it is a miniature of the famous Gee Bee Super Sportster to 144th scale. Comparison with the penny in the photo gives a good idea of its minute proportions.

Over to Eaton Bray—at the top of the page is a take-off view of one of the two seaplane entrants in the Water Planes Contest on the A.B.A. Gala Day. A special canvas take-off tank was erected for the occasion.

Before we leave the Sportsdrome—here is another shot of the prototype " Dorland " on one of its test flights, just getting into its stride from a gentle hand launch.

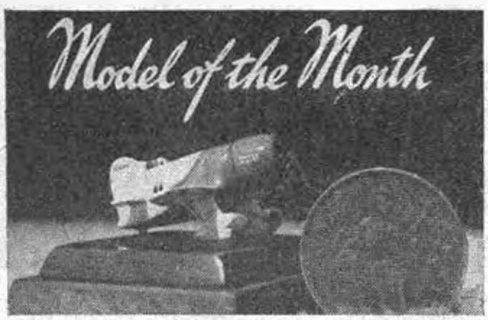


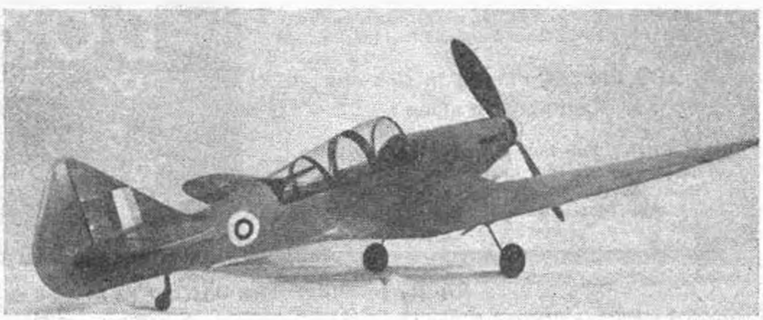
Photos from our old friends, J. Marett of Morden, have often graced our columns, and here is one again this month, the subject being an experimental stick model by A. A. Piggott of Blackheath. Note the two-bladed laminated folding prop., offset wing pylon, and peg leg undercarriage.

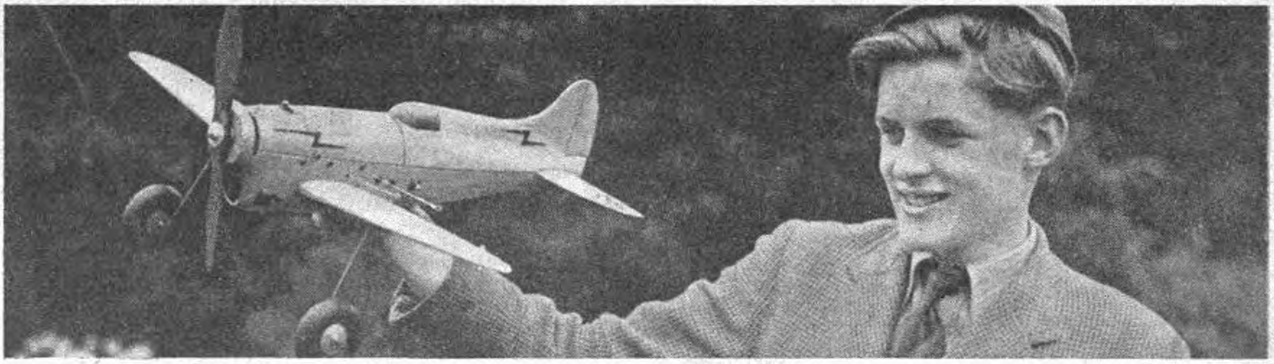


Flying scale fan D. Chapman, Secretary of the Aylestone M.A.C., gets regular flights of over a minute from this Miles " Kestrel " built from AEROMODELLER Plans Service plans, shown in the bottom photo on this page.

This control-line business is getting many adherents over here, and sixteen-year-old







Peter Rawlinson of the new Burnley Sky-Rangers Club takes his place in their ranks with this beautifully made "Bobcat," built from AEROMODELLER plans, the performance of the model being as good as its construction. Good work, Peter, me boy!

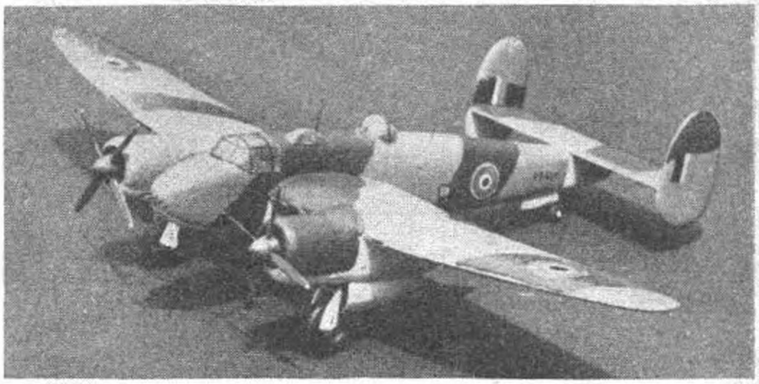
An up-to-date, yet uncommon subject for a solid, is the Bristol "Buckmaster," but here to 1/72nd scale is a model built by M. M. Gates of Teddington, and illustrated here. Congratulations on getting out of the rut with such good results.

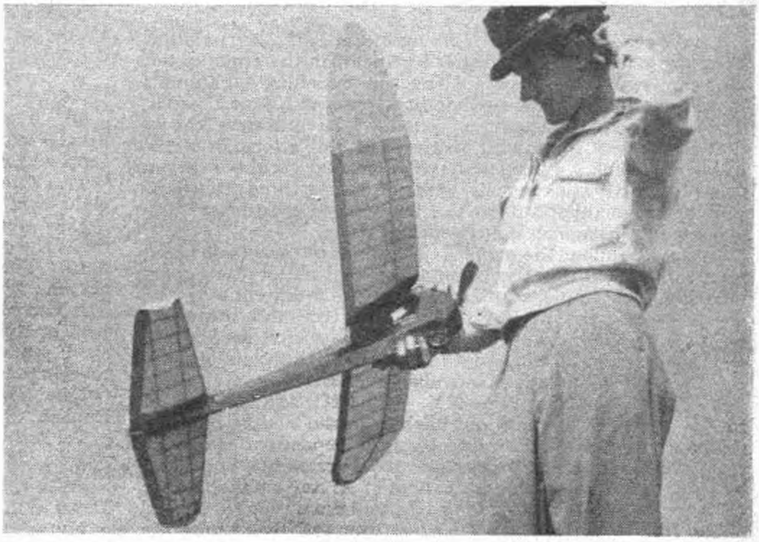
These are puzzling days—especially for W/O Booth of Wallasey—seen here a little mystified by the whys and wherefores of the peculiar Yankee abortion he is holding. Fliar Phil shares his wonder—wot! no undercart?

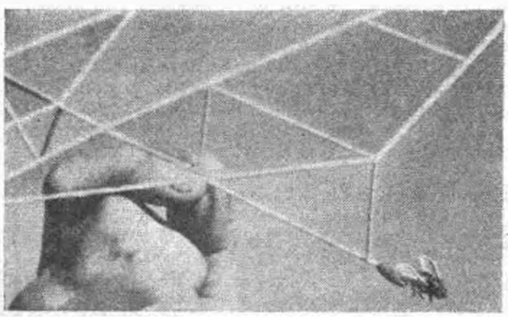
The quest for speed is a specialised branch of model aviation which has not held the interest of enthusiasts to the extent that might have been expected. The bottom right-hand photo, however, is of a neat little R.T.P. model designed by A. E. Hatfull of Edmonton, expressly for that purpose, and which has so far turned in speeds of over 32 m.p.h., the stopwatch—for the benefit of any doubting Thomas—being in the hands of the local Vicar!

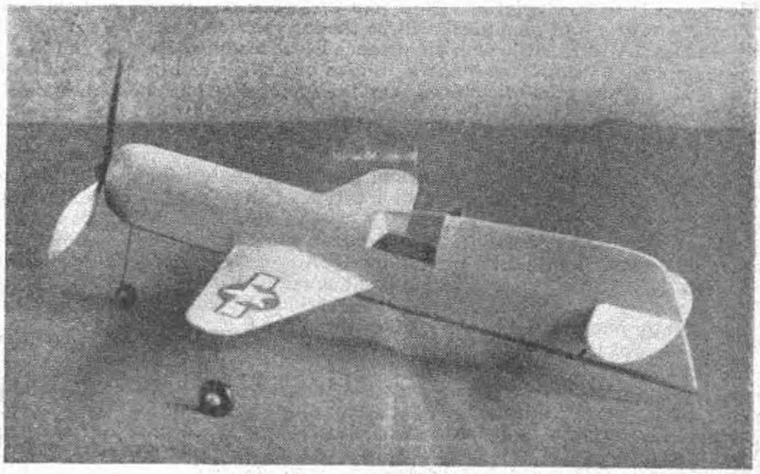
America first again—according to the original caption we received with the bottom left-hand photo—but fly-powered models such as these were flown by Fliar Phil and his schoolmates many a long year ago—*in this country too*. Sorry, brother Yank!

On that international flavour Fliar Phil grabs his handlebars, tops up his tank, and travels blissfully onward till November.



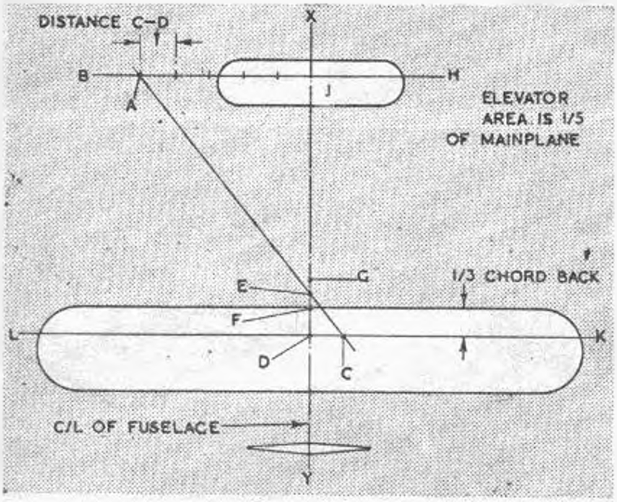






Readers' . . . . . . Letters

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



SIR,

I have read the article "Talking of Canards," by Laidlaw-Dickson, with great interest. I remember the time, about 25 years ago, when most of the aeromodelling fans and I myself built canards from bamboo, pine and Japan paper, doped with zapon lacquer or cellon. I have always known that the time of the canard, as the most stable form of plane, will come back. I myself have built many rubber-driven canards, mostly stick models, with one, two or three propellers, ranging in weight from 100 to 1,000 grs., in span from 60 to 200 cm., with single or double surface wings.

In my opinion the canard is the most successful and interesting plane for the beginner as well as for the expert modeller. A simple graphical method for determining the nearly exact position of C.G. and C.P. (the absolute exact position of these points depends on the airfoil sections of elevator and main wing, naturally) when the plan of both elevator and mainplane is already decided is :—

First draw the centre line XY. Erect HB and KL normal to XY one-third of the chord back from the leading edges of elevator and mainplane respectively. Dependant upon the ratio of elevator area to mainplane area (normally around 1 : 5 to 1 : 6, in our example here 1 : 5) step off any small distance DC from point D on XY along KL, and from point J on XY along HB *in the opposite direction* step off five times the distance CD to give point A. Now join CA, when the mean C.P. of elevator and mainplane will be the intersection point of CA and XY, point E. Step off distance EF to leading edge of mainplane F back from point E to give point G, which is the C.G. of the whole machine. On this point the model must be balanced. Naturally the exact balance of the model will be obtained in test flights through changing the angle of incidence of the elevator.

Conversely, when only the plan and position of main wing and C.G. is established, the correct location of the elevator may be found as follows :—

The C.P. being half the distance between the L.E. of the mainplane and the C.G., draw the line CEA and then mark the line AJ normal to XY, where AJ will equal five times the distance CD. This line AJ marks the position of points on the elevator one-third of the chord back from the L.E.

The area of the main wing known, you can determine the area of the elevator and wing chord and span.

1. Main wing must have washout in the tips to delay the stall. Airfoil section preferable Clark Y or Clark YH.
2. Elevator : high-lifting airfoil section with under-camber. Gottingen 602.
3. Dihedral for elevator only with one propeller and then this dihedral must be greater than that of the main wing, for directional stability. It is almost impossible to get a straight flight from a canard with one propeller without dihedral of the elevator and fins at the tips of the main wings. A fin in the centre of the main wing or only a short distance behind is almost useless, because of lack of sufficient moment arm. A fin on the elevator is dangerous without fins at the wing tips because of complete lack of directional stability.
4. With two propellers the elevator can be flat.
5. With models the span-chord ratio of the elevator can also be high for lifting efficiency, but it should never have washout at the tips. The elevator should have a span of one-quarter to one-third of the main wing.
6. For R.O.G. flights the undercarriage must be so designed that at the start the elevator will have an angle from zero to 1 degree to the ground. With a greater angle the canard will lift immediately in the air without the necessary flying speed.
7. Prop. protection : always one wheel or skid in the front and two in the rear, especially with two props.
8. For long distance, straight line flight canards : two props. with high pitch and powerful motors. Thrustline through C.P. of main wing and elevator. For fast climbing canards : thrustline under C.P. of main wing and elevator. Props. of high pitch and powerful motors. For duration canards : props. with low pitch and weak motors.
9. Angle of incidence : main wing 0–1 degrees, elevator 2½–3 degrees.
10. Form of fuselage : streamlined body with a long and narrow neck, like the body of a duck (after research work of Lippisch).
11. Canard gliders correctly designed have a very flat glide even at heavy weight.
12. Moment arm : stick models 6–8, fuselage models 3–6 times the chord of the main wing.
13. The canard is the ideal form for petrol-driven water planes.

A correctly designed and built canard model will never stall or dive and crash. I never lost a canard model by a crash, and I had never broken prop. or wing in spite of that the wings and elevators have always been fixed to the fuselage.

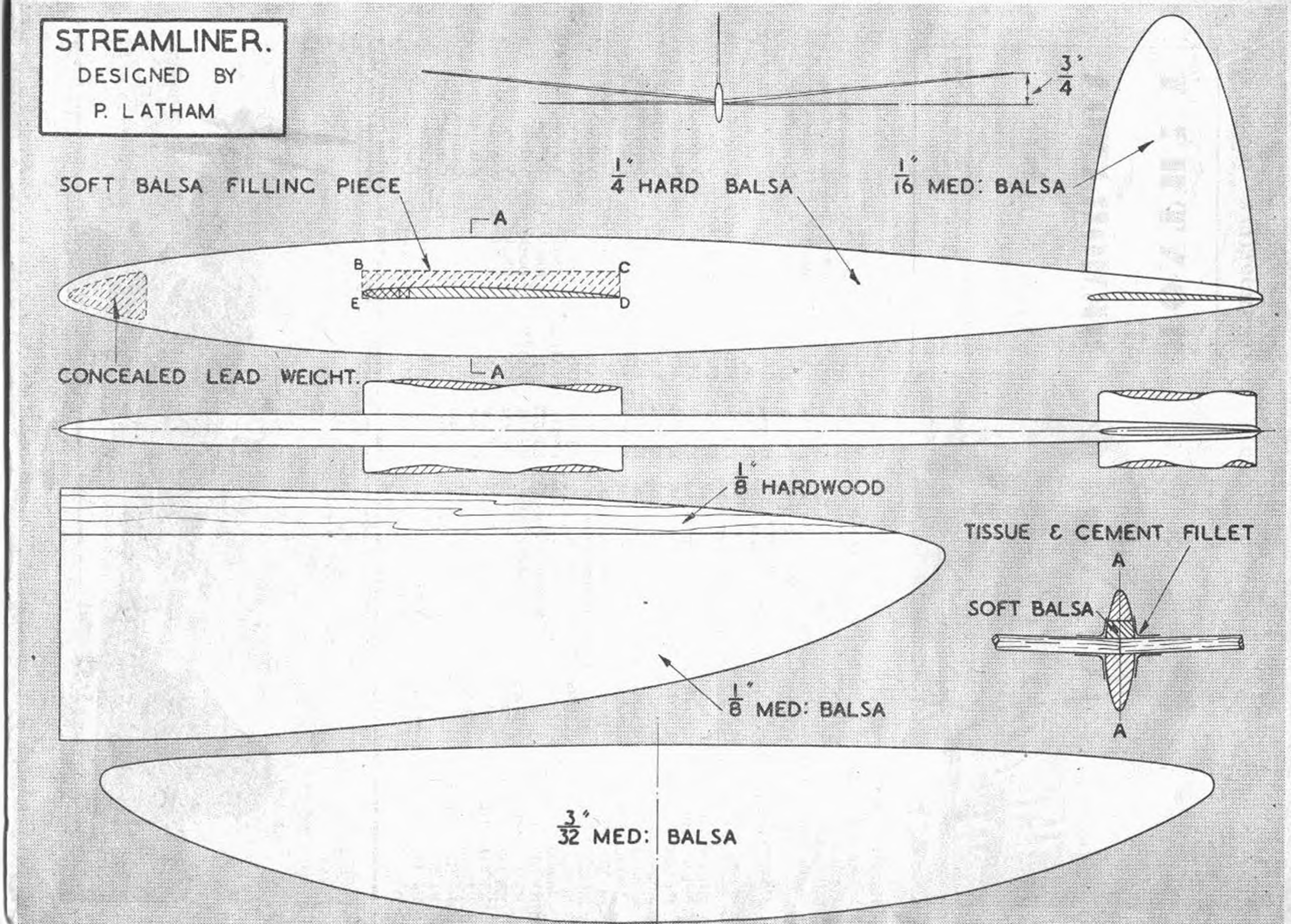
I hope you will understand my explanations in my poor English.

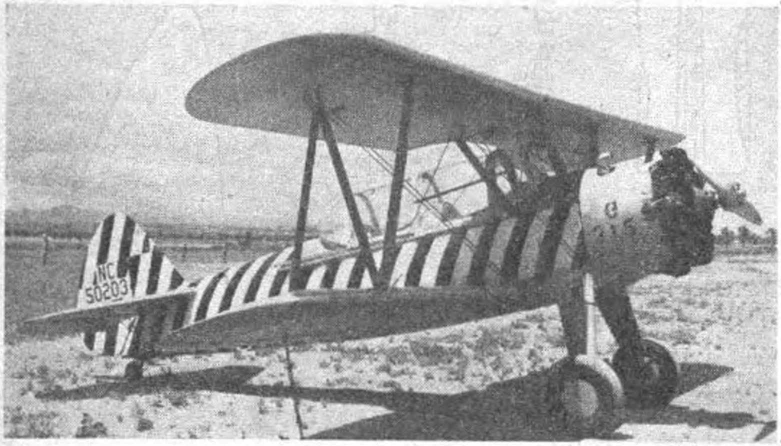
Tel Aviv, Palestine. DR. MARTIN SULTAN.

DEAR SIR,

My advice to all aeromodellers who wish to place high in national contests is to fit a dethermaliser to their models. That is, of course, if they wish to increase their aggregate. I must admit it sounds a contrary statement, but there is no doubt about its truth, and for a proof I would draw attention to the aggregate of R. H. Warring in the Gamage Cup this year, a total time of over 46 minutes for three flights, and a model to show for it. If Warring hadn't used a dethermaliser his aggregate would have been in the region of 20 minutes or so. I know—I was timing the flights and could not have kept the model in sight for much longer than that time on the first flight of 22 min. 48 secs. if the model had continued to rise, as it certainly would have done had there been no dethermaliser at work. When the spoiler came into action the model started to descend and therefore remained within sight until it finally disappeared below the immediate horizon. This happened on every flight and the model was recovered on each occasion. If this isn't proof of the "ADVANCE" (please note, Mr. Bentley) that the dethermaliser has brought about in Model Contest flying then I should like to hear the views of those who disagree.

Lewisham. C. H. SAUNDERS.


STREAMLINER.
DESIGNED BY
P. LATHAM
3/4"
SOFT BALSA FILLING PIECE
1/4" HARD BALSA
1/16" MED: BALSA
A
B
C
E
D
A
CONCEALED LEAD WEIGHT.
1/8" HARDWOOD
TISSUE & CEMENT FILLET
A
SOFT BALSA
A
1/8" MED: BALSA
3/32" MED: BALSA



(Martin and Kelman Photo.)

MONTHLY MEMORANDA

BY O·G·THETFORD

Special Attraction : *Striped zebra-fashion to attract the crowds at the U.S. Nation Air Races, this commercial Boeing Caydet was formerly a Navy N2S-4 primary trainer. Coupe hood is a civil modification.*

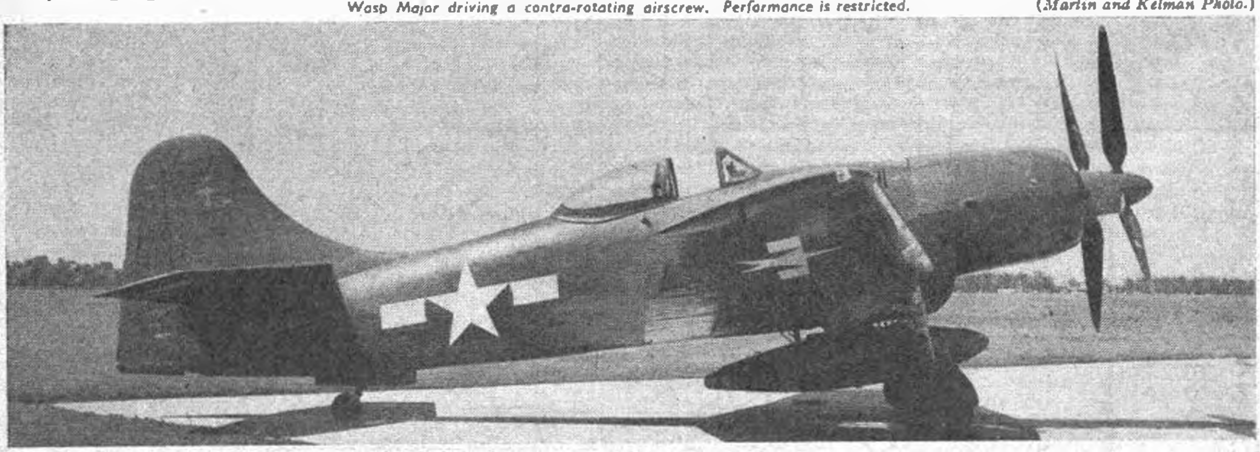
Harvards at Cranwell.

Typical of peacetime Royal Air Force Service Flying Training Schools is No. 19 S.F.T.S. at Cranwell, Lincolnshire. The standard equipment at this station is the North American Harvard II, and the aircraft are at present operating with three varying colour schemes. The majority are training yellow on all surfaces, but some retain the upper surface camouflage (green and brown) with yellow undersurfaces and a few have the front half of the fuselage camouflaged (to the rear cockpit) and the rear half, including the tail assembly, all yellow. These latter aircraft have the upper surface of the wing camouflaged and the undersurfaces yellow. All aircraft have red, white and blue roundels and the serial number reproduced in black below the wings. Code identification letters appear on the rear fuselage. A list of No. 19 S.F.T.S. Harvards, with serial numbers, identification letters and colour scheme appears below.

Service Number.	*Code Letters.*	*Colour of Letters.*	*Finish.*
KF 359	ADG-F	Black	Yellow
KF 415	ABA-F	Black	Yellow
KF 140	HM	Black	Yellow
KF 241	GD	Blue-Grey	Camouflaged
KF 910	FAC-Y	Black	Yellow
FS 815	FAC-Z	Black	Yellow
FT 378	FAC-F	Black	Yellow
KF 448	FAA-A	Black	Yellow
KF 464	HB	Black	Yellow

Service Number.	*Code Letters.*	*Colour of Letters.*	*Finish.*
KF 303	HC	P.R.U. Blue	Camouflaged
KF 160	HF	P.R.U. Blue	Camouflaged
FT 378	FAC-E	Black	Yellow
FT 388	ED	Grey	Camouflaged
FT 443	EB	Grey	Camouflaged
FS 755	ACW-F	Black	Half camouflaged
FX 470	FH	Blue-Grey	Camouflaged
FT 337	FB	Light Grey	Camouflaged
FS 886	FE	Black	Yellow
KF 457	ACG-F	Black	Half camouflaged
KF 472	FA	Grey	Camouflaged
KF 459	FG	Blue-Grey	Camouflaged
FS 773	ACU-F	Black	Half camouflaged
FS 759	GC	Light Grey	Camouflaged
FT 302	ADH-F	Black	Yellow
KF 207	GB	Black	Yellow
FS 816	FAD-X	Black	Yellow
KF 572	CJ	Black	Yellow
FS 855	FAD-V	Black	Yellow
FT 224	GN	Black	Yellow
FT 259	DN	Black	Yellow
FT 284	GF	Blue-Grey	Camouflaged
KF 436	CD	Blue-Grey	Camouflaged
KF 215	HD	P.R.U. Blue	Camouflaged
KF 476	HA	Black	Yellow
KF 596	HH	Duck-egg	Camouflaged

Navy Boeings Again : *First Boeing fighter for the U.S. Navy for some years is this XF8B-1, now being tested, which has a 4,000 h.p. 28-cylinder Pratt and Whitney Wasp Major driving a contra-rotating airscrew. Performance is restricted.* (Martin and Kelman Photo.)



(*Air Review Photo.*)

Anson Belgique : *A Belgian Avro XIX photographed recently at Croydon Airport.*

VIIIth Air Force B-24 Coding.

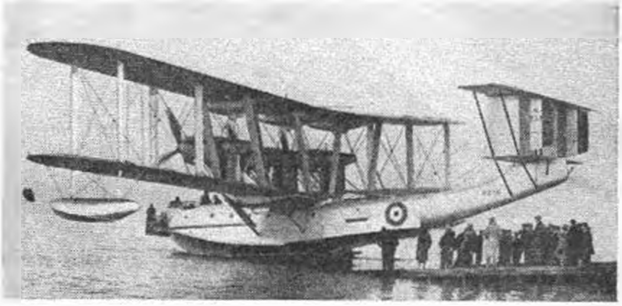
Information is now available on the tactical recognition markings of VIIIth Air Force bombers in the recent war. Details of Liberator markings of the Second Air Division are listed below and will be followed in the next issue by the First and Third Air Division Fortresses.

All the 2 A.D. Liberators carried their group letter in white against a black disc above the starboard wing. The colouring of the fins and rudders is also indicated.

Bombardment Group.	*Station.*	*Group Letter.*	*Tail Markings.*
389 Bomb Group	Hethel	"C"	Black with vertical white stripe
445 Bomb Group	Tibenham	"F"	Black, with horizontal white stripe
453 Bomb Group	Old Buckenham	"J"	Black, with diagonal white stripe
44 Bomb Group	Shipdham	"A"	White, with black vertical stripe
392 Bomb Group	Wendling	"D"	White, with black horizontal stripe
491 Bomb Group	Pickenham	"Z"	White, with black diagonal stripe
458 Bomb Group	Horsham St. Faith	"K"	Red, with white vertical stripe
467 Bomb Group	Rackheath	"P"	Red, with white diagonal stripe
466 Bomb Group	Attlebridge	"L"	Red, with white horizontal stripe
93 Bomb Group	Hardwick	"B"	Yellow, with black vertical stripe
446 Bomb Group	Bungay	"H"	Yellow, with black horizontal stripe
448 Bomb Group	Seething	"I"	Yellow, with black diagonal stripe
489 Bomb Group	Halesworth	"W"	All yellow

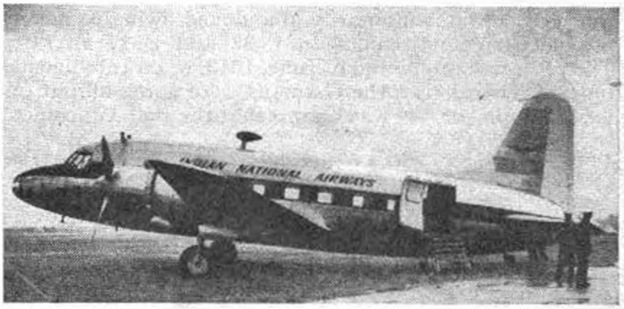
(*Air Review Photo.*)

Fruit Freighter : *One of the Halifax VIII freighters of London Aero and Motor Services Ltd., now engaged on fruit haulage between Paris and London Airport. Note L.A.M.S. insignia on the nose.*



(*Fox Photo.*)

Marine Flashback : *A Blackburn Iris III flying-boat, of the type used by one R.A.F. Squadron in the early 'thirties.*

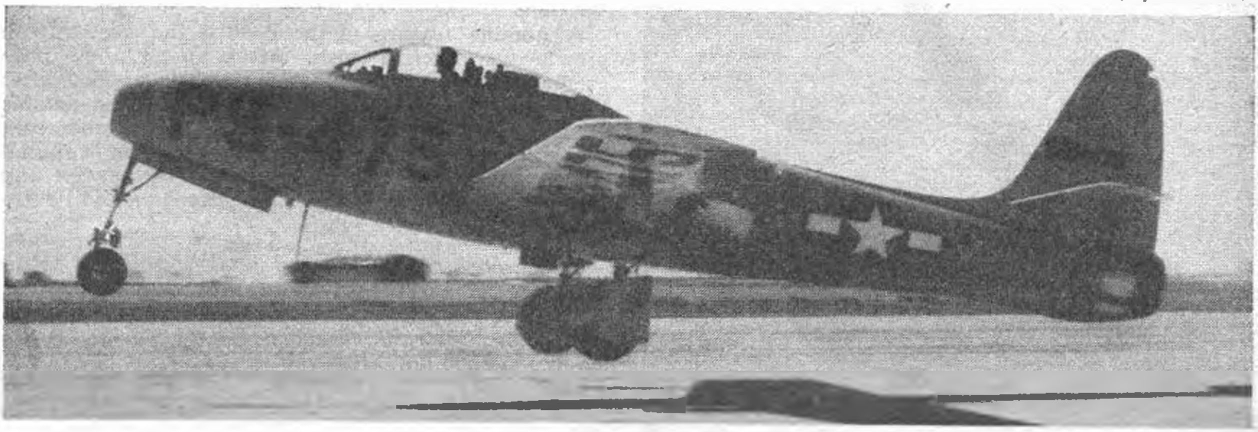


(*Central Press Photo.*)

Viking for India : *First of the fleet of six Vickers Viking airliners for Indian National Airways, VT-AZA.*

A Hot Ship : *Latest American "hot ship" is the Republic P-84 Thunderjet jet-propelled fighter. Similar to Shooting Star, it does better than 590 m.p.h. according to the manufacturers.*

(*Republic Photo.*)



AEROPLANES DESCRIBED XLIV

THE LOCKHEED P-80 SHOOTING STAR

Lockheed Photos.

THE P–80 Shooting Star is notable as the first American jet-propelled aircraft to be accepted for service with first-line fighter squadrons, though it appeared too late to see combat service either in Europe or the Pacific.

Lockheeds first projected a jet fighter in 1941, but the project was temporarily abandoned owing to heavy production commitments on P–38 and B–17 aircraft. The project was renewed in June, 1943, when Intelligence reports showed that the Germans were going all-out on jet development. It was known that the Bell Airacomet, America's first jet fighter, was below par for combat conditions, so the Lockheed jet received top priority.

The prototype XP–80, fitted with a British D.H. Goblin jet unit, first flew at Muroc Dry Lake on 9th January, 1944. The XP–80 was followed by two XP–80A's, which substituted the American G.E.C. jet unit for the British Goblin. After the XP–80A's came thirteen limited procurement YP–80A's for a service test squadron, one of them being re-worked as the prototype XF–14 photographic aircraft, later cancelled. Production Shooting Stars commenced delivery early in 1945, and 917 had been built by VJ-day. With the Japanese surrender, P–80 contracts were cut back, 3,083 of the Lockheed contract and 1,000 of the North American-Dallas contract being cancelled. Two Shooting Stars were delivered for U.S. Navy testing.

A series of unfortunate snags led to the P-80 being grounded for a period, and these delays prevented it from getting into action before the end of the war, though at least two Shooting Stars had been tested under battle conditions on the Italian front. Small numbers of Shooting Stars were also shipped to the United Kingdom, where they arrived in April, 1945. They did extensive test flying with the U.S.A.A.F. in this country but did not go into operational service. Further overseas deliveries ceased when Germany folded up.

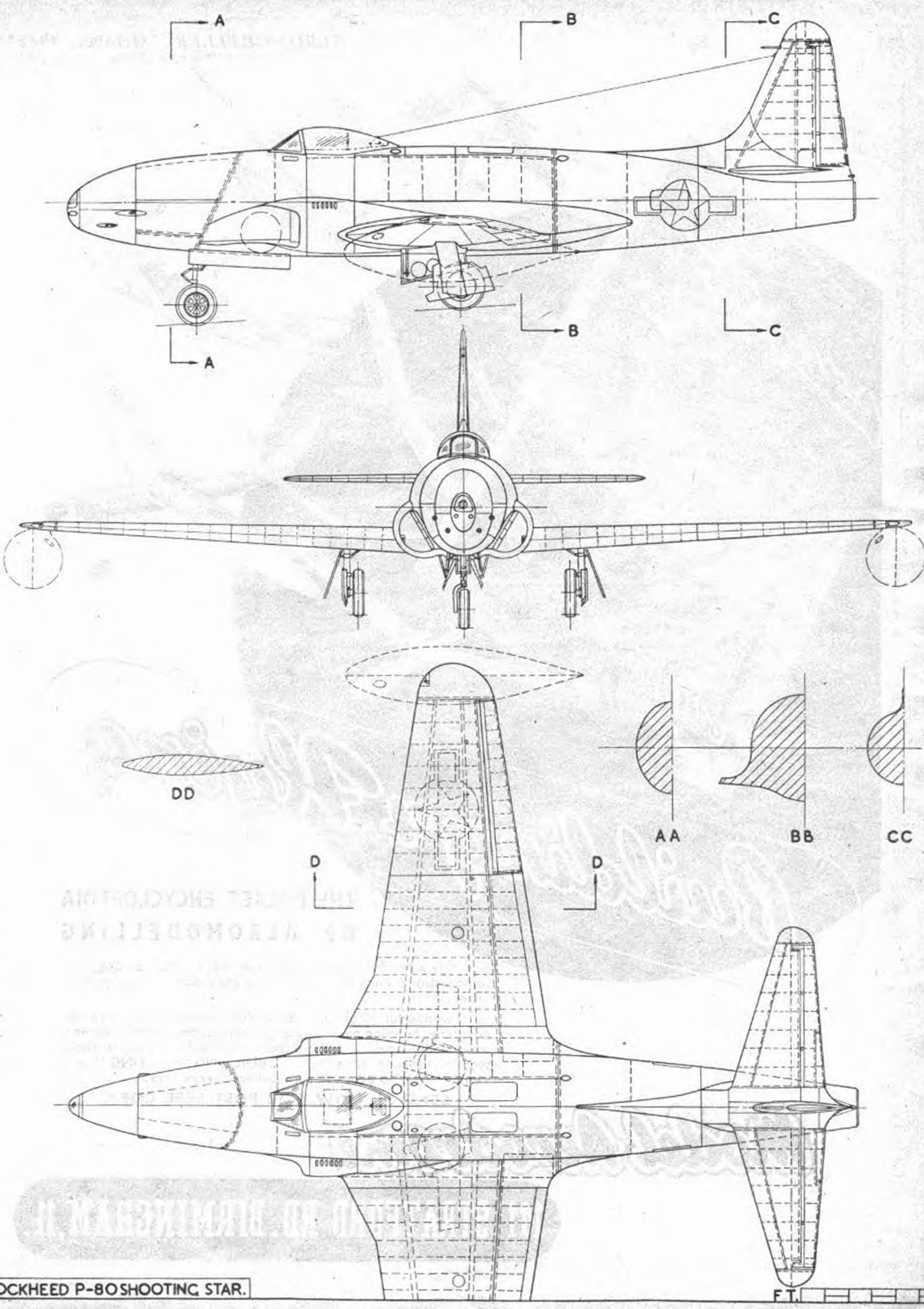
The capabilities of the P-80 were well demonstrated on 26th January, 1946, when Col. W. H. Councill of the U.S. Army, flew the 2,470 miles from California to New York non-stop in 4 hours 13¼ minutes, giving an average speed of 584·82 m.p.h. Wing-tip fuel tanks improve the range and rocket-assisted take-off pulls the take-off run down by more than half.

It was originally intended to manufacture the P-80 at four Lockheed plants and also under sub-contract at the Kansas City plant of North American Inc. Deliveries at a reduced rate continued during 1946, about 40 Shooting Stars reaching the Army each month.

A notable feature of the P–80 is the glass-smooth grey lacquer external finish. Rivets are cut and surface ground, and a zinc-chromate primer is applied after butt-joints have been filled with cement, and flexible joints covered with organdie mesh tape. An undercoat is then applied and the final coat is baked on in special ovens, after which the surface is lightly sanded and buffed. Finally, a special wax is sprayed on and lightly polished.

Specification : Single-seat all-metal jet-propelled fighter with a G.E.C. I-40 centrifugal-flow jet unit. Span : 38 ft. 10½ ins. Length : 34 ft. 6 ins. Height : 11 ft. 4 ins. Wing area : 237 sq. ft. Empty weight : 8,000 lb. Loaded weight : 14,000 lb. Maximum speed : Over 550 m.p.h. Service ceiling : Over 45,000 ft. Armament : Six fixed ·50 in. calibre machine-guns firing forward.

A P-80 climbing rapidly after a rocket-assisted take-off. The clean lines of the P-80 may be gathered from the photograph above.



LOCKHEED P-80 SHOOTING STAR.

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Model Aerodrome

141. STRATFORD RD. BIRMINGHAM, 11.

CLUB NEWS

BY CLUBMAN

The Cambridge M.A.C. photographed during a meeting at Marshalls' aerodrome in April of this year.

Cambridge Daily News Photo.

MY main discourse this month is on the subject of International aeromodelling generally, ending with some observations and suggestions for home consumption in particular. I am impelled by recent observations during the International Rally held at Eaton Bray, and appreciation of a situation that is rapidly gaining embarrassing proportions.

My duties at Eaton Bray on the 18th and 25th August last consisted of a measure of control of events, with a privileged opportunity to appreciate the tendency of events noted from the flying that took place. What I am about to say must have been evident to all who attended, but I had the opportunity of seeing and hearing things apart from the field events.

As stated elsewhere in this issue, the response to the invitations sent to our Continental friends was extraordinary, and highly complimentary to the organisers. The apparent ease with which these chaps came from all over the Continent without major difficulty was surprising, and more so in view of the extreme difficulties that a small party of English modellers came up against when trying to arrange a short trip to France earlier this year. Any obvious anxiety on the part of our home authorities to see British aeromodelling in the limelight was conspicuous by its absence!

Anyway, getting on for one hundred keen modellers visited these shores, yet, in spite of repeated open invitations to come along and meet and compete against these fellows, a mere handful of our own chaps took the trouble to enter the contests.

What was the reason? I have heard charges that no British champs. were "invited"—but I think it would be obvious to all who trouble to read announcements correctly that *anyone* could compete, and it would have been an invidious situation for certain individuals to be especially invited to come forward as upholders of British prestige.

Another reason that suggests itself is "windiness" of being shown up in contests where undoubtedly our Continental friends wiped the floor with the opposition! To the chaps who did come forward our thanks are due, but the number was surprisingly small from the large crowds who turned up.

Reviewing the contests, in my opinion we are still behind the Continentals when it comes to model sailplanes, in spite of our undoubted progress in this sphere during and since the war. I know we have a number of excellent models that put up remarkable durations, but, anyone who had the opportunity of witnessing the *consistent* high durations put up by the visitors' models throughout the week will agree that we still have a long way to go to match the out-and-out efficiency of the models brought from across the water.

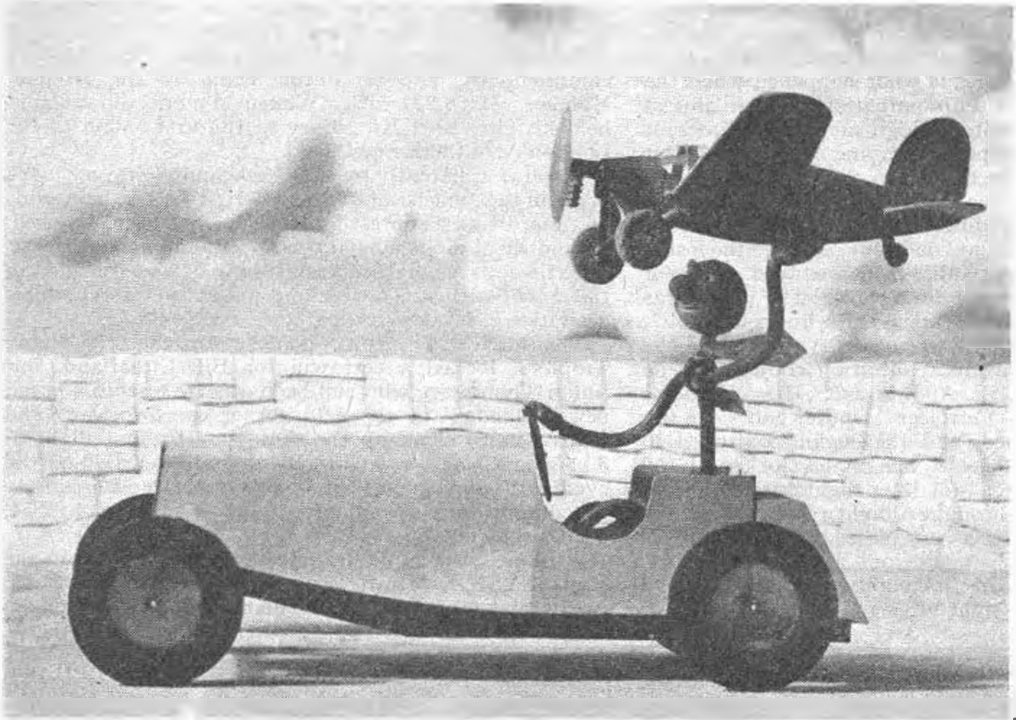
The rubber-driven events gave our chaps their one chance to shine, and they certainly did put up a good show. But—and I say this with full knowledge of rubber shortages over here—I think we should have had a much harder battle if the Continental chaps had been able to fly this type of model. Rubber has been absolutely unobtainable for them, and every Jean, Pierre and Emmanuel was hard at it buying up every bit of rubber strip they could get their hands on to take back with them!!

The Concours classes brought out some beautiful examples of workmanship from all countries, and I say without hesitation that the honours were very even, taking the average entry. Remember also, that it was not always the extra special model, got up especially for the occasion, that took the prizes—most of the winners flew their Concours jobs to good effect, thereby showing that good workmanship is useful as well as ornamental.

It was in the engine-powered class that we were well and truly shown the way home. Diesels were prominent, and the ease with which the vast majority of the visitors' engines started up, and the nonchalant manner in which the models were launched was an eye-opener to all. It was also a confirmation of the lesson learned at the Irish Nationals—we shall have to learn the ropes for the duration type of power contest. Too much attention to would-be precision flying has developed a type of model entirely unsuited to the class of contest staged on the Continent and in America.

In my estimation, Fillon was the outstanding modeller of the meeting. Fine workmanship and design was rewarded by a win in a Concours class, to be immediately followed by an over 9 mins. flight with the model to win the Sailplane event. His two diesel-engined models were marvels of "startability" and "flyability," bringing him high places each time he flew. But I think the crowning feature was his rubber-powered model, entered in the Open Rubber event. Starting work on the Friday evening, he worked right through the night to complete the model, and was out at 5 a.m. on the final Sunday morning test flying!! That this was to good purpose

BEN TWYRE • By J. H. MAXWELL



Large petrol models need a run-way,

But, failing that, there still is one way,

Used by Mr. D. A. R.

Launch them from a speeding car.

side, Wallasey, Liverpool, Bradford and Chester clubs attended, and in spite of dull conditions and a high wind, a considerable number of flights were recorded. All the prizes went to the Wallasey members, S. Hinds, with the best time of the day, 2 : 06·6, carrying off three events, and J. Baguley, flying his " King Falcon," bagged the remaining item.

Three well-known figures photographed during the Easter meeting at Eaton Bray. They are, left to right, Mr. Chandler, Mr. Rippon, and Mr. Knight. The latter is, of course, never without a low-wing model of some sort !

The CROYDON & D.M.A.C. competed for their " Clarke Trophy " in warm but windy weather, which abounded in thermals. N. Marcus (wot, again that name !) proved the winner, followed up by Standing and Bennett. All three models were lost. Lost models also meant taking second place to the N. Heights club in the London Challenge Cup round.

A Spring Rally held by the PORTSMOUTH GRAMMAR SCHOOL M.A.C. resulted in a win for A. Brooks with a flight of 5 : 05 o.o.s., next best being 3 : 02.

August 25th proved an excellent day for the ST. ALBANS M.A.C. All-Herts Rally, held at Radlett Aerodrome by permission of Sir Frederick Handley-Page. First event, the Concours, was won by Mr. Revett, of the Waltham club, with an extremely well-constructed duration model ; second being Prybyl, of Bushy Park, with a fine cabin petrol job.

The well supported open duration event provided a win for Anastasiou, of Croydon, time 10 : 9 o.o.s. Lofts, of Northern Heights, came next with 8 : 07, and Davey (all the way from Blackpool) placed third with 8 : 04.

The best times of the day came in the glider contest, in which all types and sizes of sailplanes were launched from a 300 ft. towline. Orthodox models proved the winners, Bushy again coming into the picture with a fine flight by S. A. Taylor's model of 17 : 02 o.o.s. Croydon held their own by a second place for Watkins with a time of 9 : 01, followed closely by Smith, of Bushy, 8 : 02.

The petrol event, while not producing anything spectacular, saw some fine examples of British modelling, and the comp. was very closely contested. Mr. Gunter, of Bushy, carried on his winning streak to take first place with a time of 2 : 01, followed by Tickner 1 : 06 and Paul, also of Bushy, 1 : 04. The only prize to go to the St. Albans "cement squeezers" was collared by E. J. Buxton, the best points scorer in the area to take the Herts Cup. Thus ended the first Rally of this newly-formed club, yet to complete its first year of operation. Congratulations all round.

Another newly-formed group, the ELIZABETHAN M.A.C., held a highly successful exhibition recently at Ashbourne, when a number of fine models were shown. Flying has enthusiastically taken hold now that a fine 45-acre field has been placed at the club's disposal.

Well, so much for general reports this month. Good times continue to be set up, and records have received a right walloping this year in most clubs. The "active" flying season will just about be over by the time you read this, but don't forget the opportunities afforded by indoor flying. Many a hand can keep its skill at trimming by a spot of concentration on r.t.p. work during the close season. Till next month, all the thermals you wish yourselves, and may your rubber never perish.

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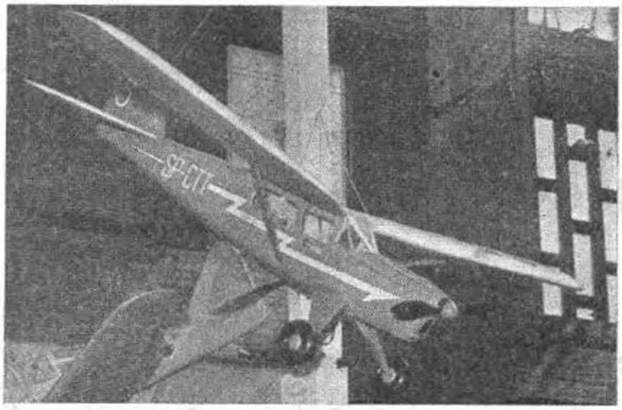
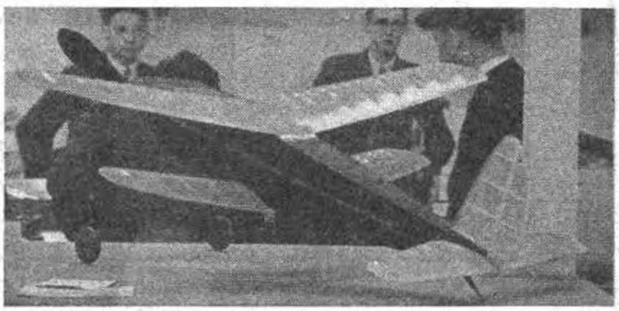


Here are a few examplesf rom the Model Aeroplane Section of the recent "Model Engineer" Exhibition. Above is a highly finished cabin petrol model by K. Raczak of Birmingham. Bottom left is an excellent example of a petrol-driven flying scale Miles Kestrel Trainer by C. Houthuesen of Hampstead. Bottom right is an interesting rubber-driven "Kadre" biplane by P. T. Capon of Burgh Heath



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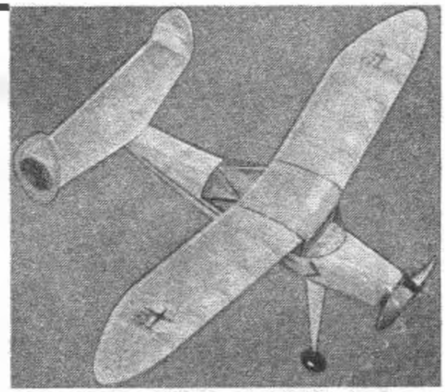

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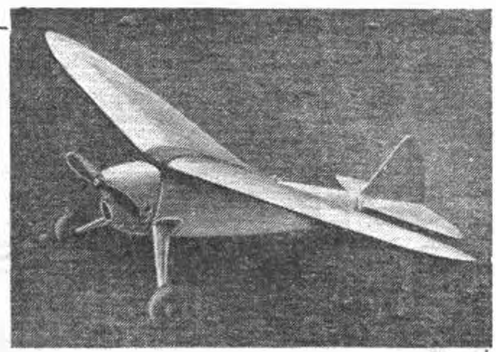

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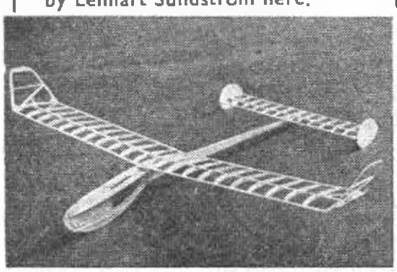

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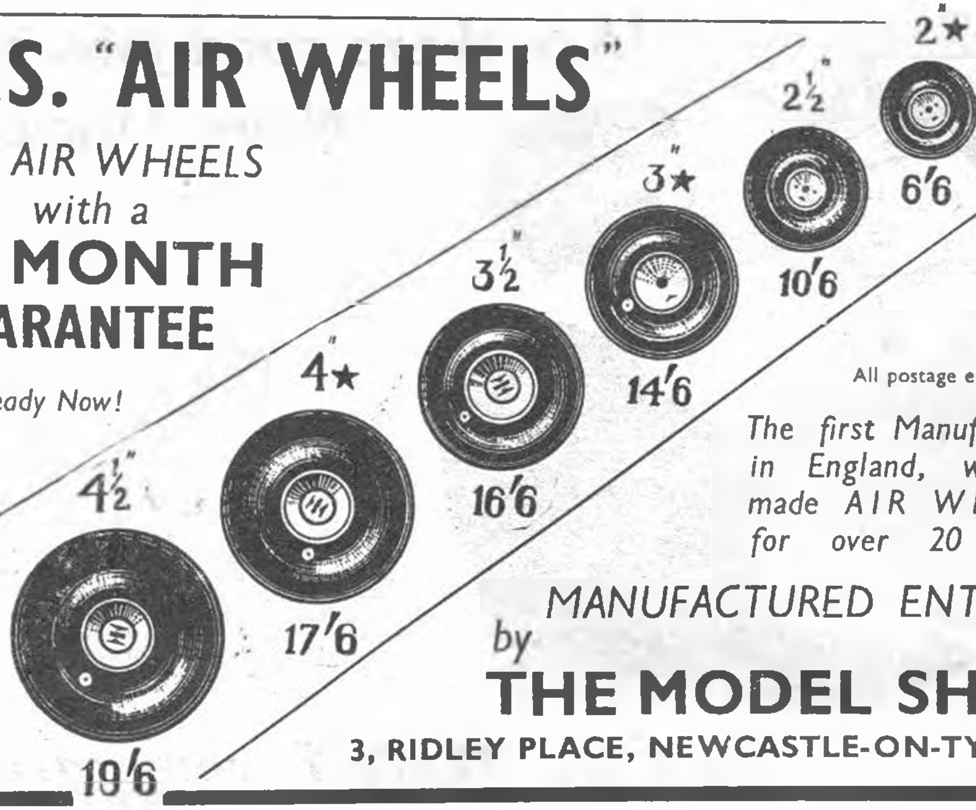

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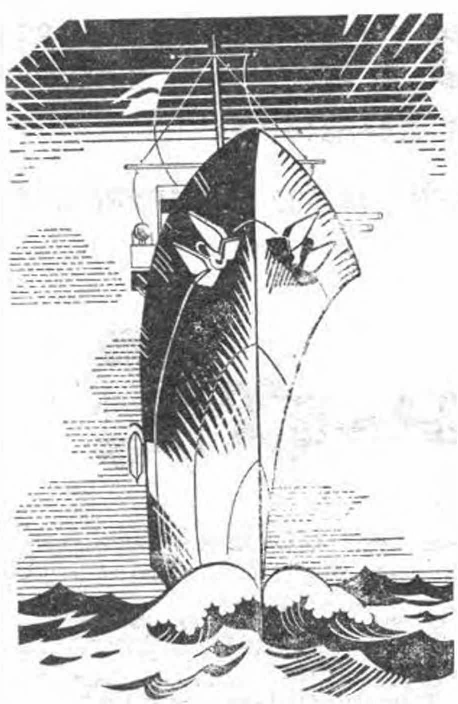

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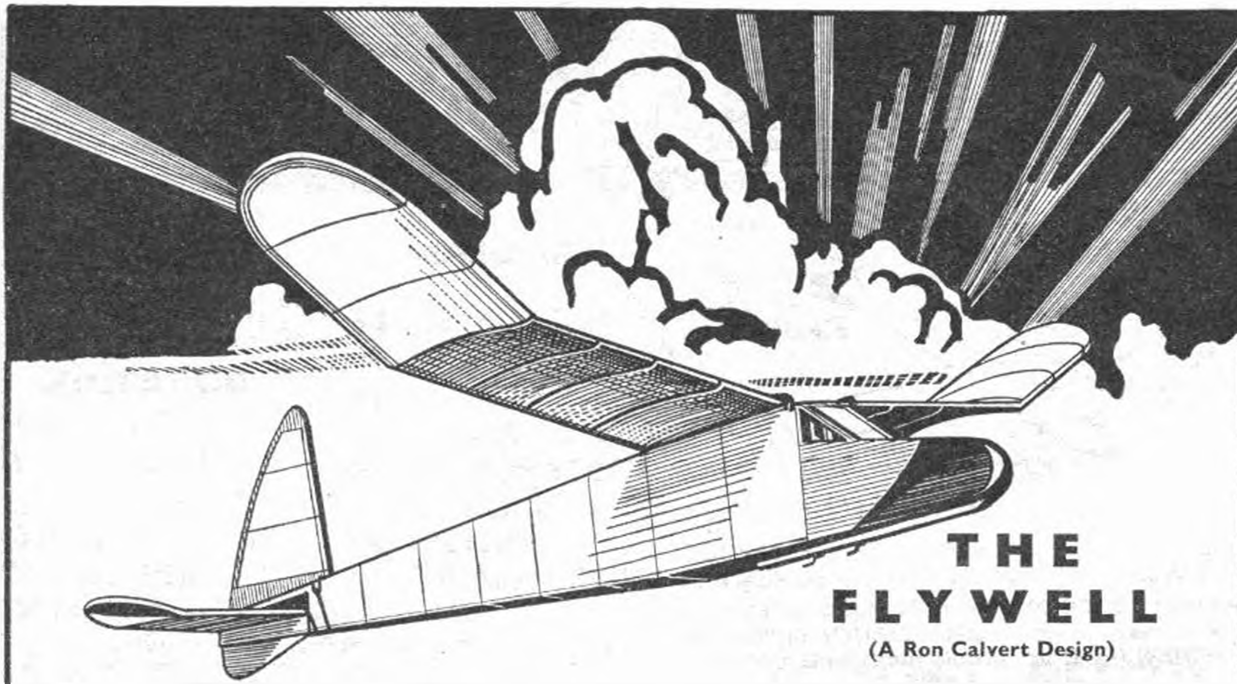

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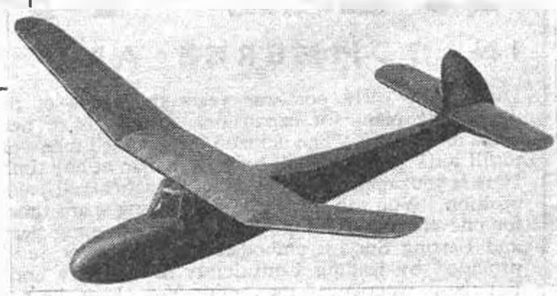

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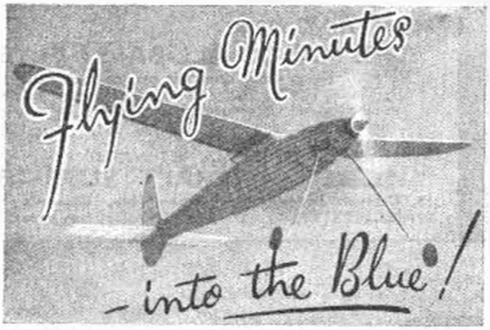

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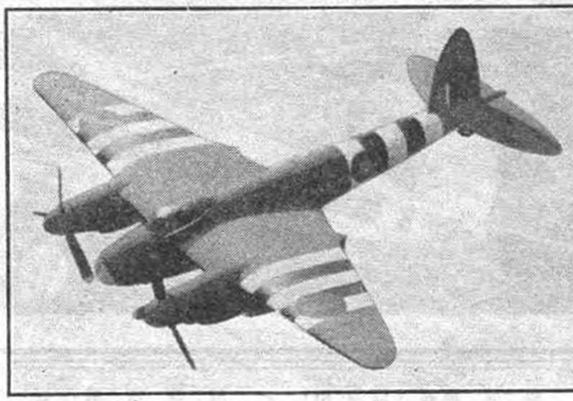

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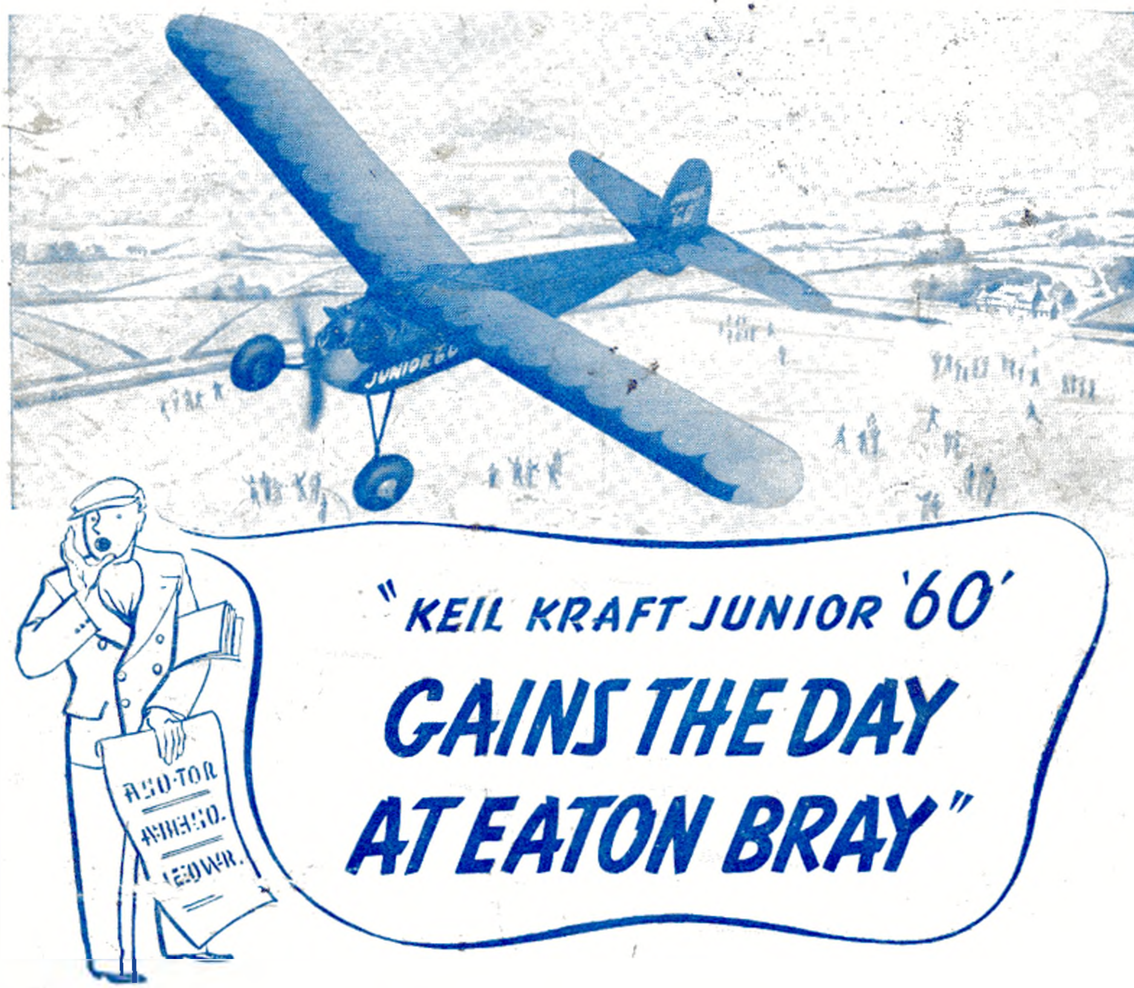

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