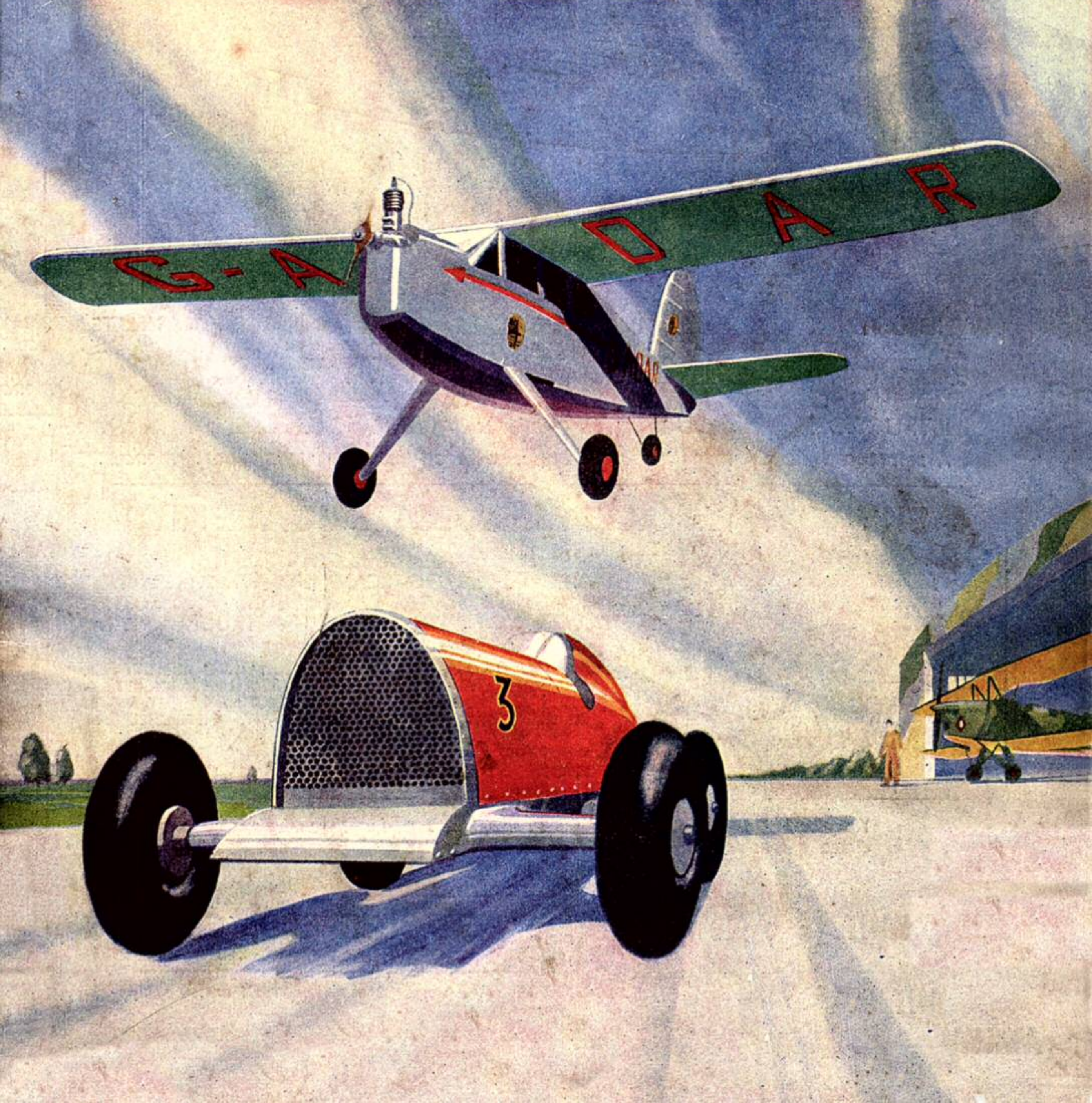
AERO MODELLER

SEPT - 1942
VOL 7 No 82
ONE SHILLING

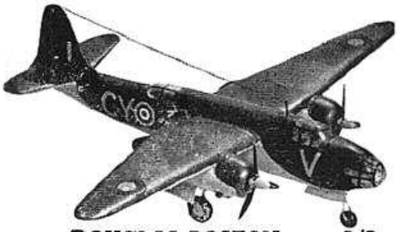


MODELS OF THE MOMENT

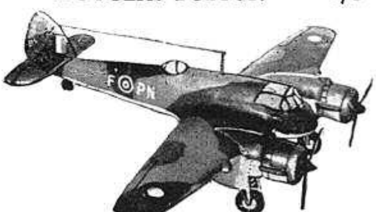
C.M.A. SOLID SCALE MODEL KITS

SCALE ¼ in.—1 ft.

Kits contain all parts cut to shape, seats, cement, correct transfer insignia, three bottles of dope, sandpaper, fully detailed blue-print, and complete instructions.



DOUGLAS BOSTON 8/3

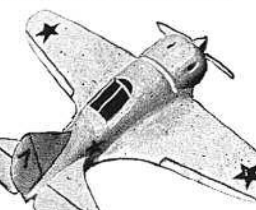


BEAUFIGHTER. 7/11

LOCKHEED P.38. 8/9

CAPRONI RE. 2000 6/-

WESTLAND LYSANDER. 6/-



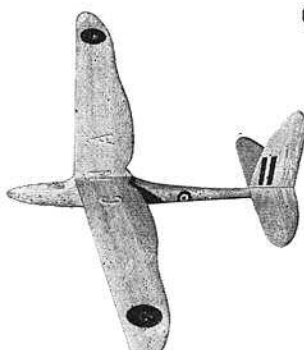
RATA I—16 5/3

SUPERMARINE SPITFIRE. 5/3

MODELS NOT ILLUSTRATED

S.E.5	4/11
PFALZ D.12	4/11
MESSERSCHMITT B.F.109	4/11
MORANE SAULNIER 405	5/3
BRISTOL FIGHTER	5/3
HAWKER HURRICANE	5/3
D.H. DRAGONFLY	5/6
FAIREY BATTLE	5/6
CURTISS P.37	6/3
BELL AIRACOBRA	6/3
BLACKBURN SKUA	6/9

THE C.M.A. GLIDER



COMPLETE KIT OF PARTS

2/6

20" Wingspan

Kit contains all parts cut to shape, cement, transfer insignia, banana oil and complete instructions.

WHOLESALE ONLY

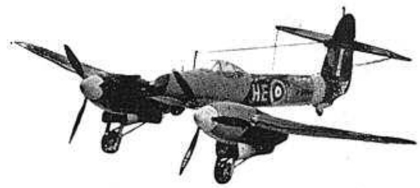
See your dealer first. If he cannot supply send direct to us, enclosing dealer's name and address and 6d. extra for postage and packing.

Manufactured by

CHINGFORD MODEL AERODROME LTD.

155, Station Rd., LONDON, E.4.

Works — SPRINGFIELD ROAD, E.4.



WESTLAND WHIRLWIND 6/6

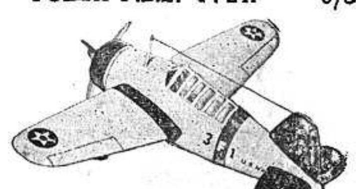
FOKKER G.1. (DUTCH) 8/11

BRISTOL BLENHEIM. 6/11

MESSERSCHMITT M.E.110. 6/11

BOULTON PAUL DEFIANT. 6/9

POLISH P.Z.L. P. 24. 5/3

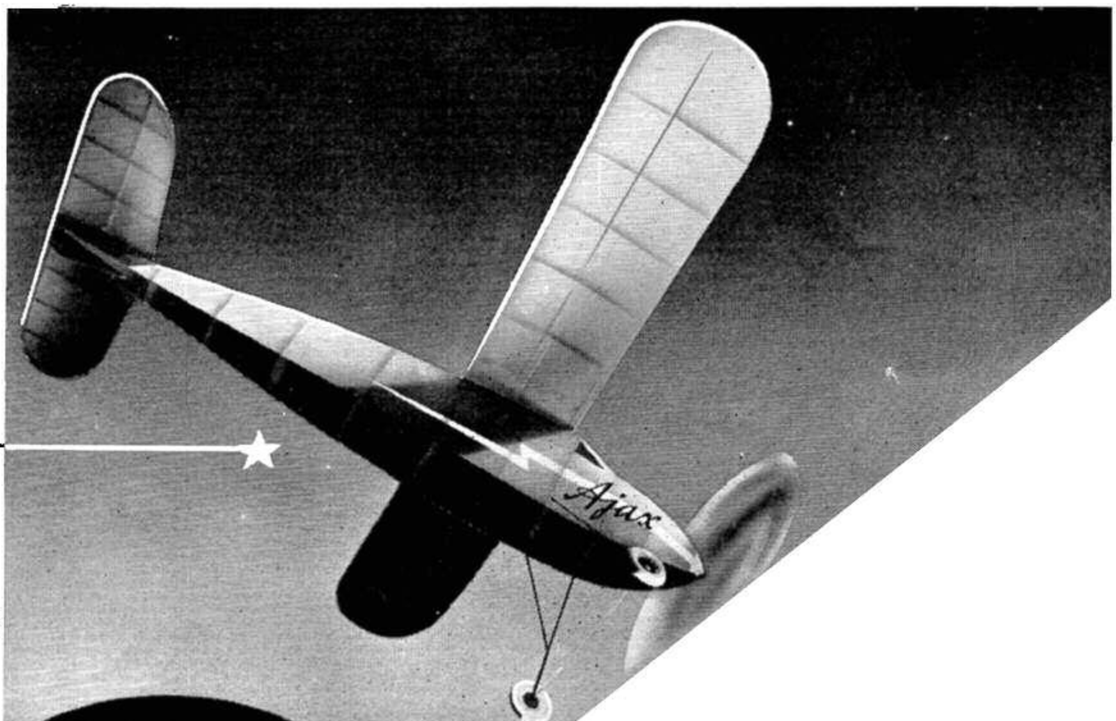


BREWSTER BUFFALO. 6/9

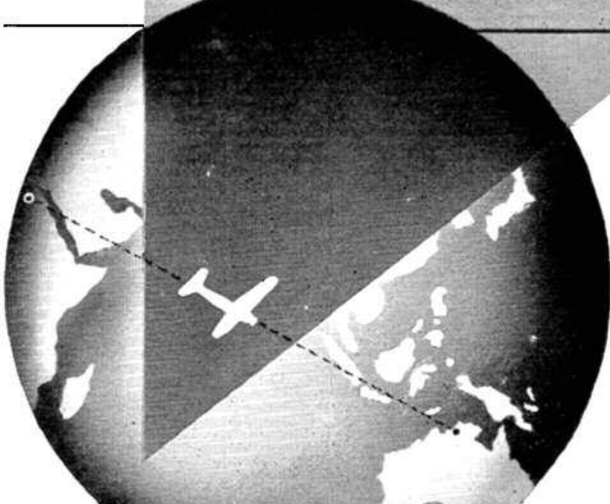
WORLD'S BEST *Model* AIRCRAFT

It is not only in the high altitudes that Spitfires and Hurricanes are supreme. In the more peaceful sphere of model aircraft, Keil Kraft Flying Scale Models of these famous aircraft hold undisputed sway.

All model designers know that it is the production of Flying Scale Models which calls for the highest degree of skill. That is the reason why it pays to buy Keil Kraft Kits when you build Scale Models. Behind every one stands the Keil Kraft reputation for superlative design. For best results with least trouble, always ask for Keil Kraft Kits.



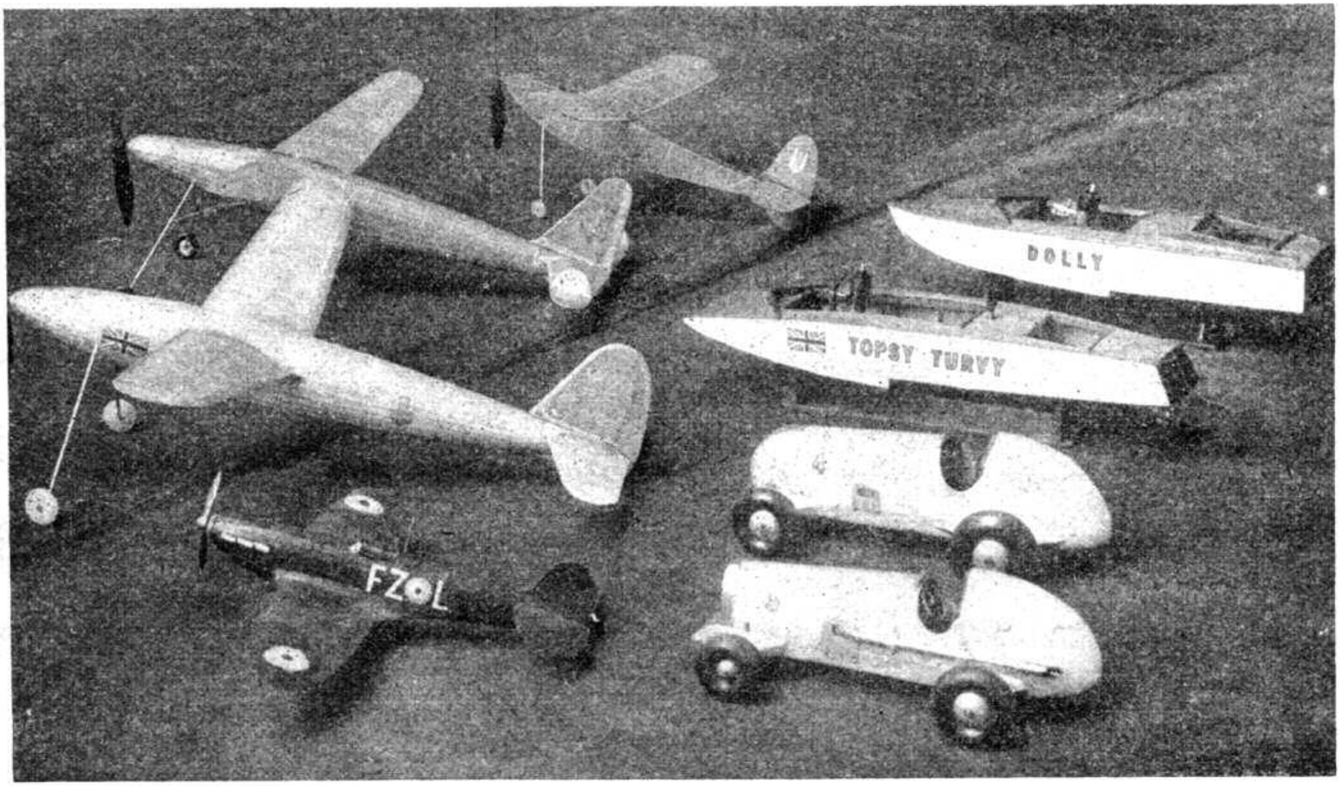
Vickers -stop!



Whether it is the "real thing" or a model it is experience in design which gives long duration of flight. In the Keil Kraft "AJAX" and "ACHILLES" you have the concentrated experience of the best model aircraft designers in the country. All these finer points of their art . . . all the best factors of their craft are combined in Keil Kraft Models to make them fly longest in poor conditions as well as good.

A formation of Wellesleys flew 7,162 miles, non-stop, from Ismāilia, Egypt, to Port Darwin, Australia, in November, 1938.

"MODELS I HAVE BUILT........."



This interesting collection of models represents the products of A. Galeota, the designer of the model race car described on pages 391–4 of this issue. The first-class finish and the high quality of the general workmanship is clearly apparent.

CONTENTS OF THIS ISSUE

THE AERO MODELLER

(INCORPORATING "THE MODEL AEROPLANE CONSTRUCTOR") Established in 1936

(Proprietors: Model Aeronautical Press, Ltd.)

THE MODEL AERONAUTICAL JOURNAL OF THE BRITISH EMPIRE

Managing Editor: D. A. Russell, A.M.I.Mech.E. *Editor:* C. S. Rushbrooke

Vol. VII - No. 82 SEPTEMBER, 1942

ALLEN HOUSE, NEWARKE ST., LEICESTER

EDITORIAL

On pages 391–4 of this issue of The Aero-Modeller we describe a model racing car, powered with a 2·5 c.c. petrol engine, designed and built by Mr. Galeota. Full size scale plans of the model, which can be built easily and quickly, are available through the Aero-Modeller Plans Service, price 2s. post free. In introducing this model to readers of The Aero-Modeller we open up considerable possibilities for the coming winter months in view of the fact that there must be several thousand petrol engines laid up on account of the Air Ministry's ban on the flying of petrol 'planes. At the same time we wish to make it clear that by introducing this alternative use for model petrol engines into The Aero-Modeller we have no intention of making it a permanent feature, less still of extending the scope of the journal to incorporate other uses of model petrol engines. As many readers will know, miniature petrol engines have been used in model power boats, and excellent journals such as the "Model Engineer" and "English Mechanics" have catered for this aspect of modelling. However, access to a suitable stretch of water is not available to very many folk whereas access to a large hall or level space, such as a courtyard or lawn, is open to nearly every aero-modeller; and, therefore, it would seem that a model racing car is a suitable medium for the aero modeller to keep his engine in use. We propose organizing a competition for petrol driven model racing cars full particulars of which are incorporated in the present article.

Model Building in the Schools.

Once again we think it worth while to publish a letter from a schoolmaster describing the keenness of his pupils for model building, and expressing appreciation of the hobby of aero-modelling. At the Warrington School, Stoke-on-Trent, mass production methods are used by which several hundred models have been built during the past three years.

We shall be interested to hear from schoolmasters in other parts of the country who are supporting and extending the movement in a similar way.

Dear Sir,

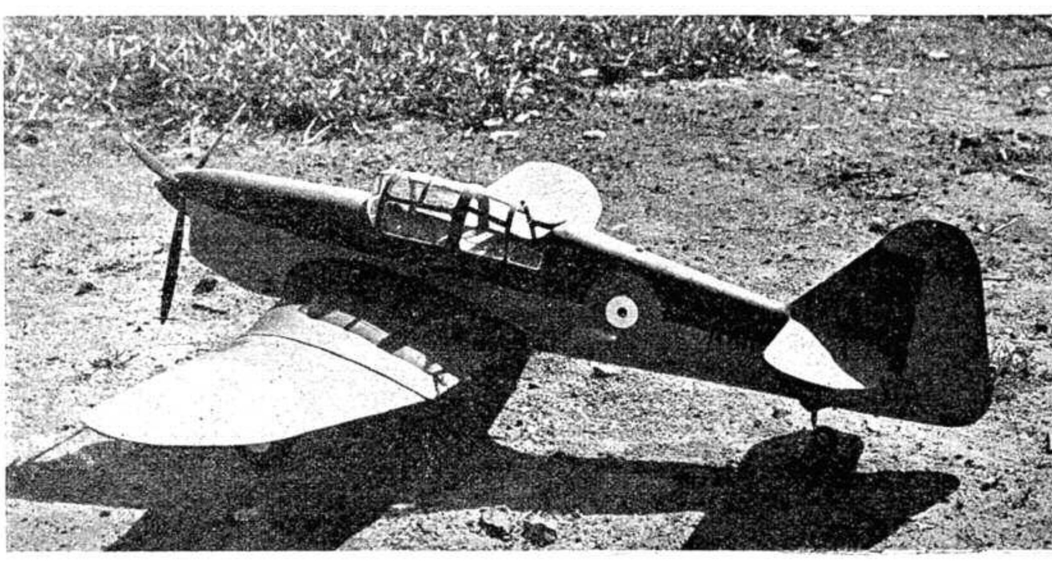
After several years of "Solid Scale Modelling" I have at last been "egged on" to try my luck in your competition.

The "eggers on" are the boys at the school in which I teach Handicrafts. They are very keen modellers themselves, and to encourage their keenness I have developed a system of using metal templates for cutting outline shapes.

I have in circulation twenty or more sets of these templates. The boys obtain suitable pieces of softwood, (not Balsa) and mark out the shape by drawing round the template. All the carving they do with the knife. Sandpaper, paint, glue, etc., I keep, and dole out on application. Airscrews, wheels and insignia, are all home produced, one boy usually making a quantity.

During the last three years several hundreds of models have been made by this method, and, at the present time, I have many entries in a modelling competition we are holding among ourselves.

The real kernel of all this is that this modelling is done by the boys in their own time, outside school hours, without any help other than that afforded by example,



The accompanying photograph shows the completed model of the prototype Miles Master, built by Mr. D. M. Roberts, a close-up of the cockpit of which was published on the opposite page in last month's Aeromodeller.

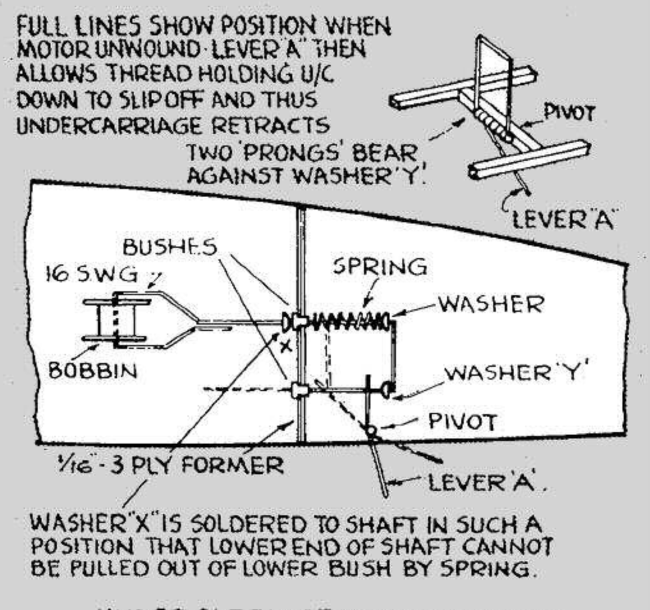
and your excellent plans from which I make the templates. We gather photographs from everywhere.

Any thoughtful person will appreciate just what this means in times like the present when so many outlets for boyish enthusiasms are closed.

The system I have developed could, I imagine, be used to advantage by organisations such as the A.T.C., or Spotter's Clubs, or wherever knowledge of aircraft is necessary.

Of the many hobbies that boys pursue I do not recall one that has had such a large and constant following; it has room for boys from seven to seventy, and can be pursued at home and from observation and experience it has a lasting appeal. Good luck to you and your excellent journal.

Yours truly,
H. Mayer.



ALTERNATIVE RETRACTING MECHANISM FOR "PERCY V."

The Westland "Whirlwind."

The competition for 1/72 in. scale models of the Westland "Whirlwind" has brought us several hundreds of entries: none startlingly good, but many of them worthy efforts, particularly in view of present-day conditions; and in many cases, the youth of the entrants.

The Prize of £2. 2s. 0d. goes to Eric Allerton, of Selby, Yorks, who, incidentally, is both deaf and dumb; and all the more to be congratulated on winning this competition.

In view of the large number of entries received for this competition, additional prizes have been awarded as follows: £1. 1s. 0d. each to D. O. Jones, Bournemouth; I. H. Warren, Osgathorpe, Leics.; B. O'Connor, Hull; 10s. 6d. each to B. Payne, Wendover; R. Penfold, Neasden, N.W.10; D. Kitching, Newcastle-on-Tyne; H. Mayer (see letter above); M. Johnson, Leicester; G. A. G. Cox, Wolverhampton; G. W. Rose, Coventry; H. T. Howard, Blaby, Leics.

Consolation prizes, each of a "Harborough" book, have also been awarded to R. G. Stone, Newcastle; Cpl. D. Carter, 276, Squadron, A.T.C., Chelmsford; R. Dickinson, Lytham St. Annes; D. Harrison, Loughborough; and L. A. C. Grant, D.R.T., Boscombe.

Nomographs for the Aeromodeller.

On page 423 we introduce a novel form of book, being the latest addition to the Harborough range. This "introduction" takes the original line of printing a nomograph and describing how use is made of it in the form of an article, study of which will reveal what a truly wonderful labour-saving device a nomograph can be.

A Successful Duration Model.

The article on the series of "Percy" models is concluded on pages 411, 412 and 413 of this issue, and gives full building and flying instructions and the general layout of the advanced type with retractable undercarriage. The illustration shows a simple, improved type of retracting mechanism which is practically infallible and involves but the minimum of mechanical complications. The forward retraction of the undercarriage at the termination of the power run balances the centre of gravity shift of the folding airscrew, thus maintaining a true balance throughout flight.

Plans of this model, which can be flown either as a seaplane or landplane with equal success, are available through the Aero-Modeller Plans Service, price 3s., post free.

Hotspur II.

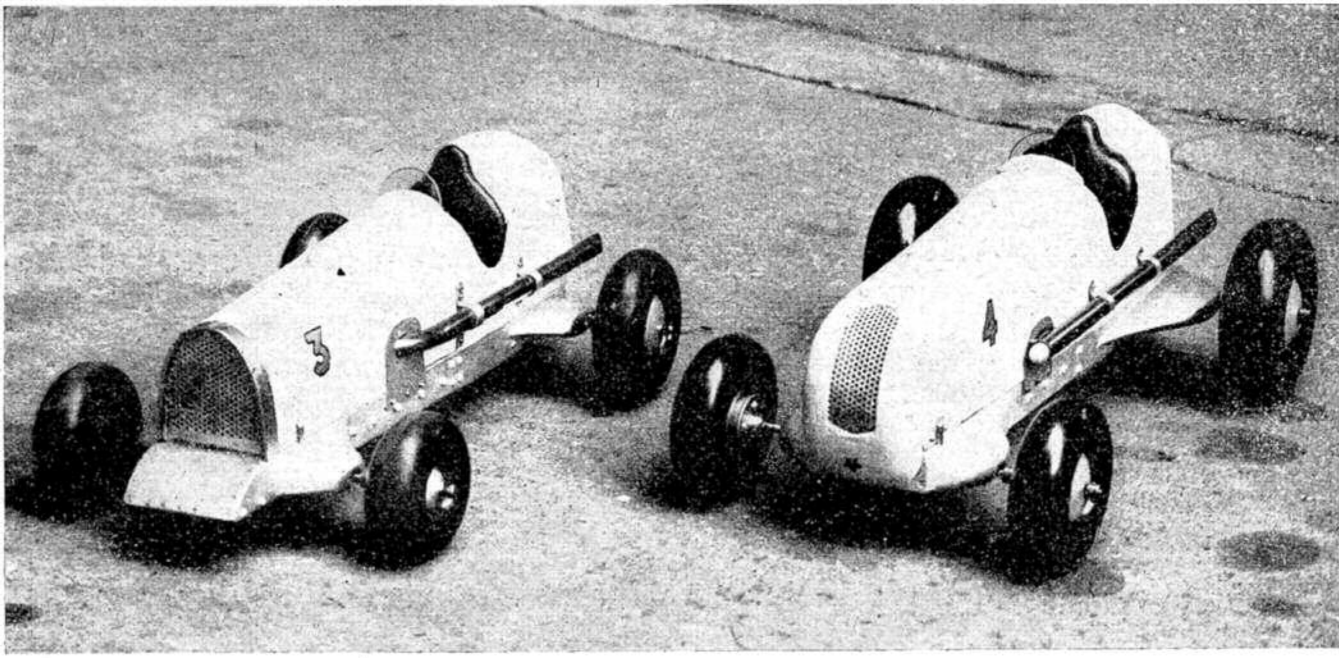
On pages 400–1 are a number of photos of a 1 in. scale model of the Hotspur II, the first British Glider for use in this present war, and of which particulars have been released by the Air Ministry. This model has been designed by R. H. Warring, and built by W. A. Dean, both of THE AERO-MODELLER Staff; and whilst not in the "Competition" class, as regards duration seeking, will give a very good all-round performance.

As will be seen from the photographs of the uncovered airframe, this is of very strong design and construction. A full list of material required for this model is published in this issue, and detailed building instructions will be published in our next issue. Full size plans are available through the Aero-Modeller Plans Service, price 4s., post free.

(*continued on page* 436).

£10:10:0

FOR THE LONGEST DURATION FLIGHT (LAUNCH IN ACCORDANCE WITH F.A.I. GLIDER RULES) BY A "HOTSPUR II" GLIDER BUILT FROM AEROMODELLER PLANS. CLOSING DATE NOV. 30th. ENTRIES TO BE SIGNED BY THE ENTRANT AND TWO TIMEKEEPERS WHO MUST BE OVER 25 YEARS OLD, AND WHO MUST TOGETHER TIME THE FLIGHT.



A MODEL PETROL CAR

By A. GALEOTA

THE "A.G." MODEL RACING CAR—POWER UNIT 2·5 C.C. "SPITFIRE"

Above are shown two of the cars from Mr. Galeota's "stable." No. 3 is the "A.G." car described in this article. One-third full-size plans are printed on page 394, and full-size plans are obtainable through The Aeromodeller Plans Service, price 2/- each, post free. On the following two pages are printed rules for a competition for two sizes of race cars, and for which two £10 : 10 : 0 prizes are offered. Simplicity in design and construction is the keynote of success, and petrol plane enthusiasts should have no difficulty in working out their designs.

THE chassis is strongly built of hard wood strip of about ⅞ in. by 3/16 in. and all reinforcements and cross members are glued and screwed together. Slots are cut for the front and rear axles, which are protected by four fairings, screwed, cemented and shaped to fit the line of the chassis with plastic wood; the fairings are made of a block of hard wood for the front and three layers of 3/16 ply for the rear. All four are slotted to allow the axles through, the rear axle is steerable. The body work, of thin plywood, is built up over formers cut from 3/16 in. ply, except the central (D), which is of about ⅜ in.

The tail of the car consists of two horizontal formers; the lower forms a floor for the battery compartment with access to the back axle, and the upper one supports the balsa cover or lid. Both these formers are connected at the rear by a rounded stem shaped to streamline.

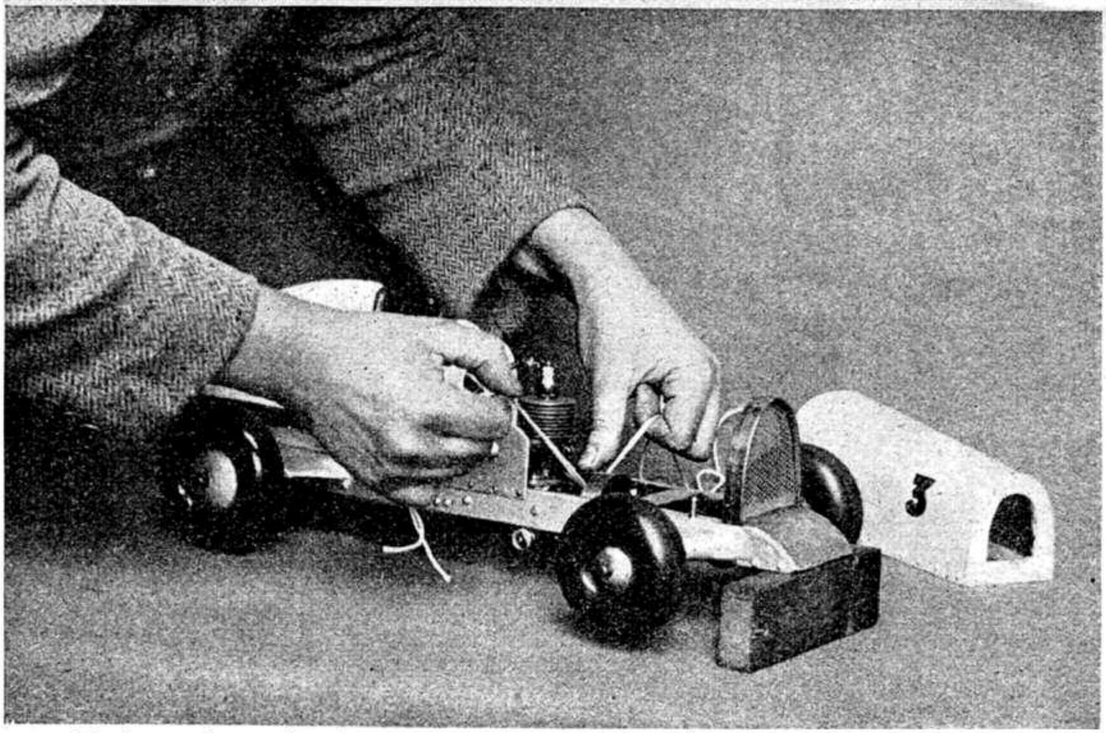
The bonnet is a separate unit, completely detachable, consisting of two formers connected by two strips of hard wood at the bottom and one on top, covered round by thin ply also, steamed, of course, to the required shape and cemented. The rear former of the bonnet is flush with former (D) when in place and overlaps ⅛ in. over the latter, while at the front it rests flush against the dummy metal radiator. The radiator itself is made of ½ in. wide chromium plated brass strip filled with wire netting and screwed to the front cross members of the chassis.

The rear axle (Meccano rod) is adjustable for steering, held in position by a double angle Meccano strip of 1½ in. bolted to the centre of the flat cross member with a central nut and bolt, with two washers to allow it to swivel for steering.

The axle is retained in position by two Meccano collars, with set screws at each end of the angle strip. Both rear airwheels turn independently and are also kept in place by two Meccano flanged wheels N.20b imitating brake drums and two collars.

TWO CLASSES: CLASS "A" FOR ENGINES UP TO 6 C.C. CLASS "B" FOR ENGINES OVER 6 C.C. UP TO 10 C.C. £10 : 10 : 0 PRIZES FOR FASTEST TIMES OVER 10 CONSECUTIVE LAPS, OVER A CIRCUIT BETWEEN 50 AND 70 FEET IN DIAMETER, CLOSING DATE DECEMBER 31st. CARS MUST BE OF "RACING" OR "SPORTS" TYPE. REPLICAS OF FULL-SIZE CARS, OR OF "FREE LANCE" DESIGN.

£21



Mr. Galeota shows how he starts up his model. Note the realistic radiator honeycomb.

The front axle, a 10 in. Meccano rod, turns in two bearings consisting of two Meccano double arm cranks N.62b fixed into the slots of the chassis with two screws each.

The large Meccano bevel gear, N.30c, is locked in position by its two set screws and, with the axle, is kept in position by two collars within the bearings, as shown on the plan.

The driving shaft, a short Meccano rod, is bushed through the wide cross member of the chassis, with its bevel gear N.30a in mesh with N.30c, and at the engine end is made in T shape, engaged by the flywheel dogs.

Both front airwheels are locked to axle by two flanged wheels N.20c, which are screwed to their wooden rims.

The engine is a two-stroke 2·5 cc. Spitfire, and the flywheel was made for me by a friend. It is of bronze with groove and weighs 5½ ozs.

The exhaust is ½ in. copper tube bent to shape, and when polished looks very effective against the cream colour of the body work, the silver and the red of tyres and upholstery.

The driving seat and back are of ¼ in. balsa covered with red rexine, and coil and condenser are under the seat.

There is a dashboard with dummy instruments, a Meccano steering wheel, and a wind shield cut to shape

COMPETITION

To introduce this new sport the proprietors of THE AERO-

£10 10s. 0d. FOR THE TWO FASTEST TETHERED

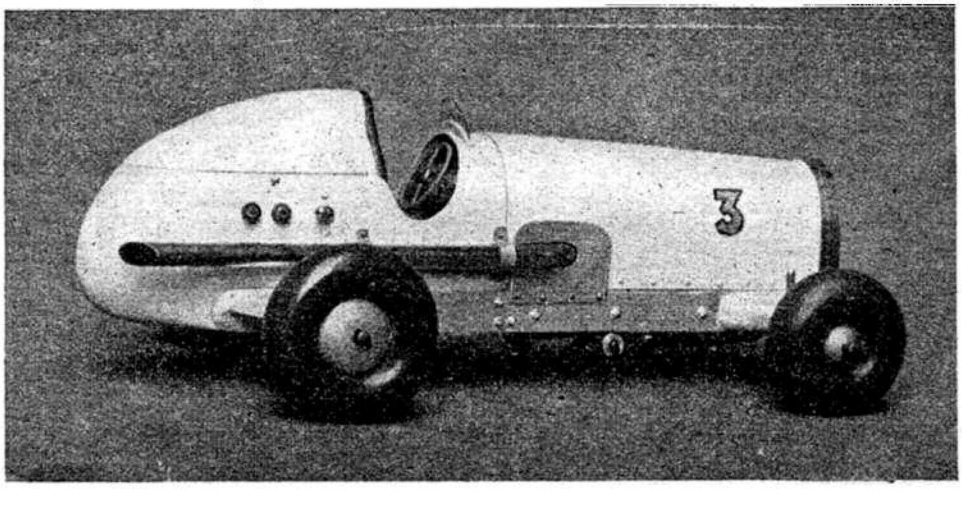
THERE WILL BE TWO COMPETITIONS

CLASS A.—Engines up to 6 c.c. capacity. Wheel base not to

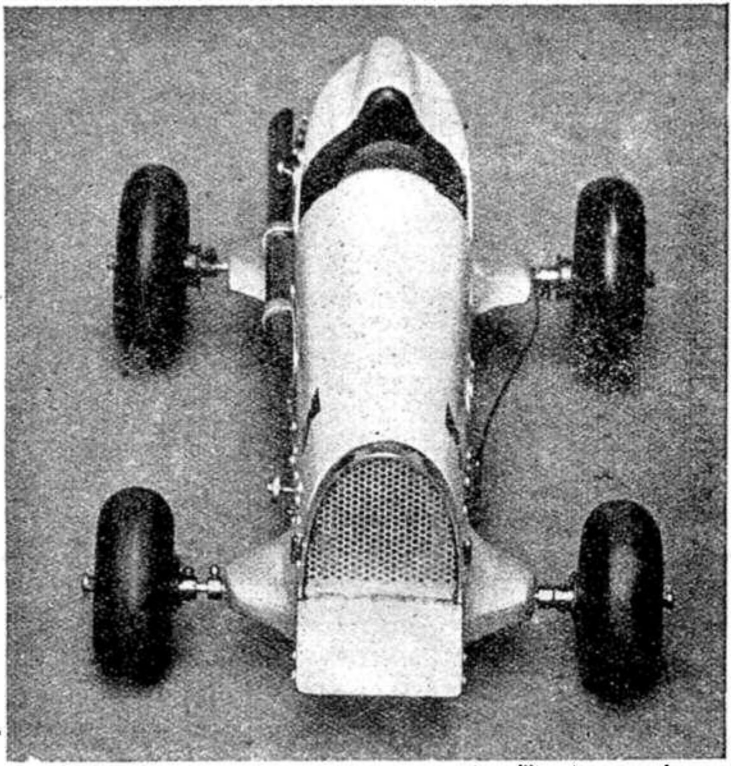
CLASS B.—Engines between 6 c.c. and 10 c.c. capacity. Wheel

THE RULES FOR EACH COMPETITION ARE AS

1. All models must be replicas of full size racing cars or free lance designs of
2. The model is to be run over a circular course and tethered by means of a to the car in the manner generally as described in the text.
3. The length of this line must not be less than 25 feet nor greater than
4. A flying start is allowed, but the model must complete ten consecutive laps
5. During this run the model must be timed by two independent timekeepers, S.M.A.E. timekeepers.
6. The winner will be adjudged as the builder of the model which records the above.
7. All entries must state clearly the exact length of line employed, as measured time taken to complete ten consecutive laps. The two timekeepers and the Aero-Modeller office) and return same not later than December 31st, 1942.
8. Entries will only be accepted made out on the official form as supplied
9. The Managing Editor's decision in all matters affecting this competition must ledgement of this condition.



Here is shown the complete car. Note the switch above the rear tyre and, to the left of it, two sockets for the connection of a booster battery.



This head-on view shows the wide track, as compared with the wheelbase; note the worn appearance of the front tyres, consequent on front-wheel drive.

RULES.

MODELLER announce the following competition :—

RUNS ACHIEVED BY MODEL RACE CARS.

exceed 15 ins. ; track not to exceed 9 ins. ; and
base not to exceed 20 ins. ; track not to exceed 11 ins.

FOLLOWS :—

racing car types, i.e. must bear a distinct resemblance to the full size machines.
line, one end of which is fastened to the centre of the circle and the other end

35 feet, i.e. the diameter of the circle must lie between 50 and 70 feet.
under its own power.
each using a stopwatch, and both must be over 21 years of age and preferably

greatest AVERAGE speed over ten consecutive laps as timed under the rules

from the centre of the circle to the point of attachment to the model, and the owner of the model must complete the ENTRY FORM (obtainable from the

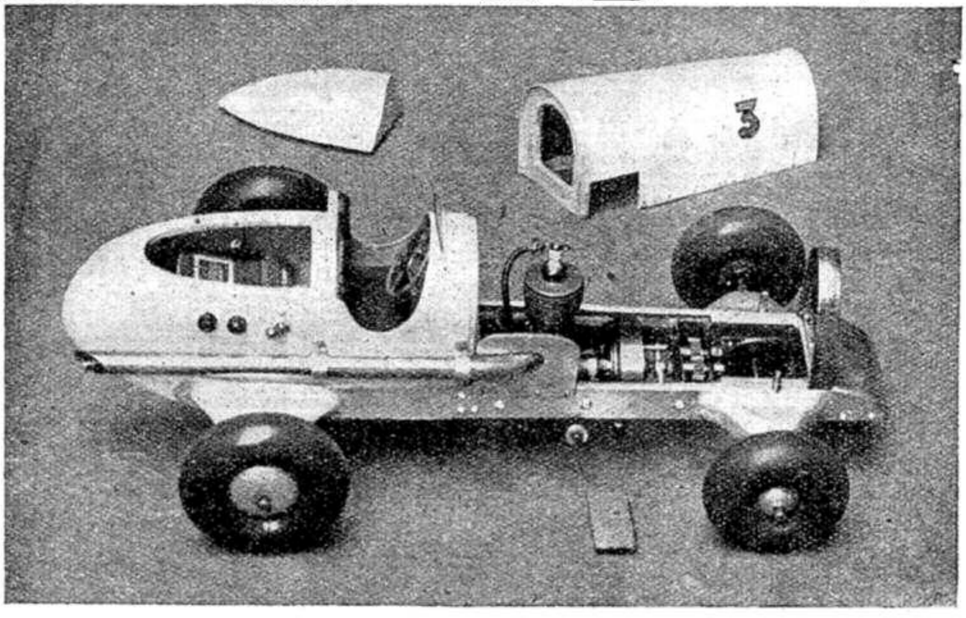
from the Aero-Modeller office.
be accepted as final and entry into the competition will constitute an acknow-

from the celluloid of a pocket watch. The battery is housed in the tail of the car wired in the usual way, with booster and ignition switch also in the tail. The steering device is clearly shown in the drawing.

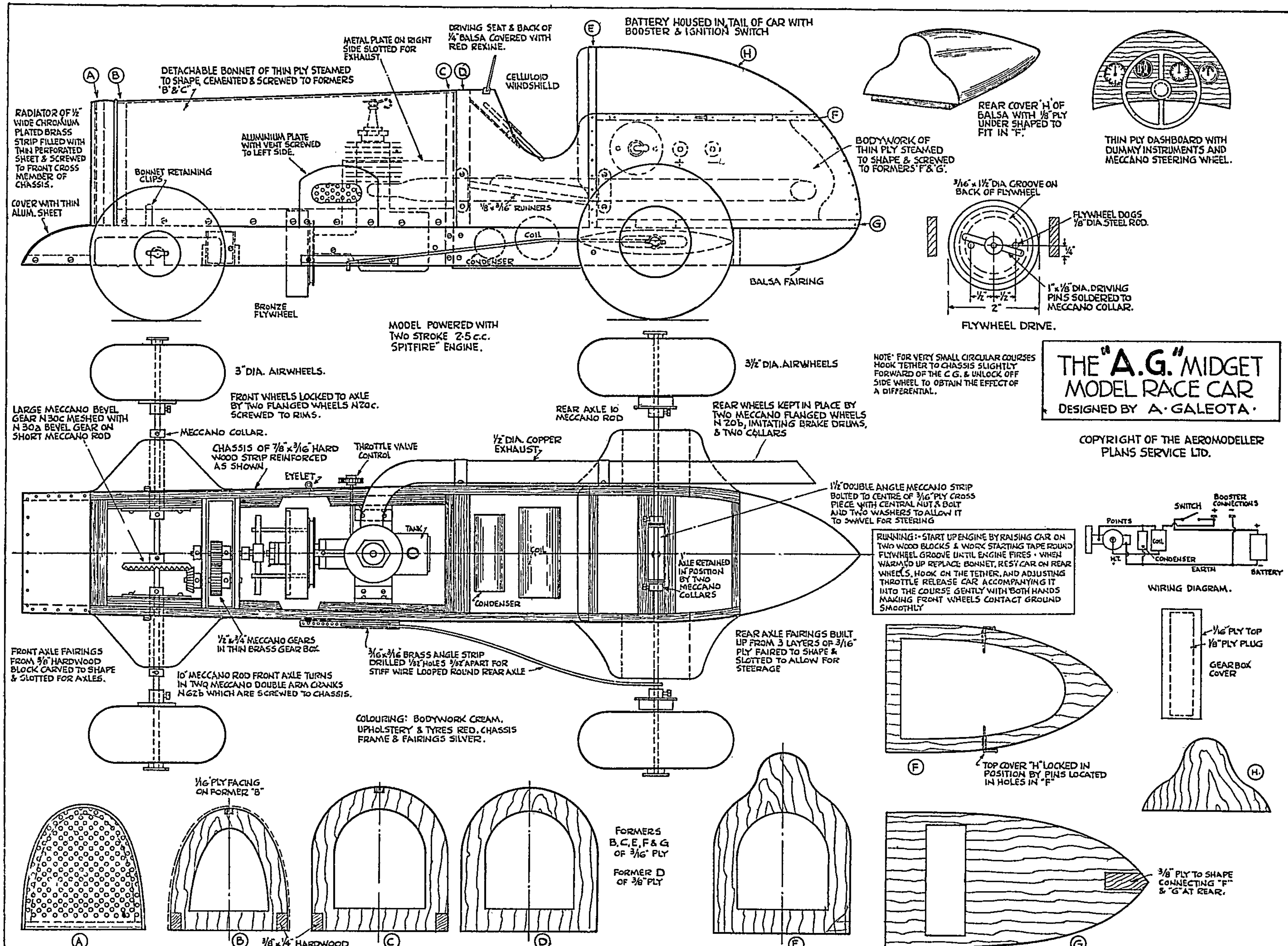
There is no clutch, of course, and I start up the engine by raising the car on two blocks of wood and work the starting tape in the usual way till the engine fires. When warmed up I replace the bonnet, take the car to the ground, resting her on the rear wheels, I hook on the tether and finally adjusting the throttle, release the car, accompanying her into the course gently with both hands, making the front wheels come in contact with the ground smoothly.

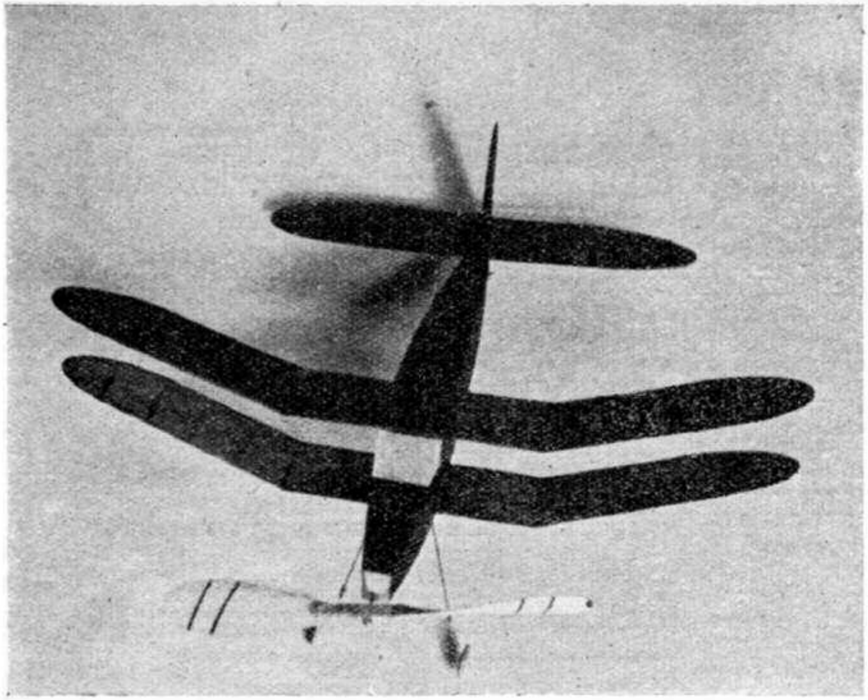
For very small circular courses I hook the tether to the chassis at a point slightly forward of the C.G. and unlock the off-side wheel, obtaining in such a way the effect of a differential.

For very wide circles, the car is let loose and on various occasions 24 m.p.h. have been exceeded.



The "works" uncovered. All gears are standard "Meccano" products, mounted on "Meccano" shafts. Note position of the battery (coil is in the cubby hole, too) to provide correct weight distribution.


THE "A.G." MIDGET
MODEL RACE CAR
DESIGNED BY A·GALEOTA·
COPYRIGHT OF THE AEROMODELLER PLANS SERVICE LTD.
BATTERY HOUSED IN TAIL OF CAR WITH BOOSTER & IGNITION SWITCH
DRIVING SEAT & BACK OF 1/4" BALSA COVERED WITH RED REXINE.
METAL PLATE ON RIGHT SIDE SLOTTED FOR EXHAUST.
CELLULOID WINDSHIELD
DETACHABLE BONNET OF THIN PLY STEAMED TO SHAPE, CEMENTED & SCREWED TO FORMERS 'B' & 'C'
RADIATOR OF 1/2" WIDE CHROMIUM PLATED BRASS STRIP FILLED WITH THIN PERFORATED SHEET & SCREWED TO FRONT CROSS MEMBER OF CHASSIS.
ALUMINIUM PLATE WITH VENT SCREWED TO LEFT SIDE.
BONNET RETAINING CLIPS
COVER WITH THIN ALUM. SHEET
1/8" x 3/16" RUNNERS
COIL
CONDENSER
BRONZE FLYWHEEL
BALSA FAIRING
BODYWORK OF THIN PLY STEAMED TO SHAPE & SCREWED TO FORMERS 'F' & 'G'.
REAR COVER 'H' OF BALSA WITH 1/8" PLY UNDER SHAPED TO FIT IN 'F'.
THIN PLY DASHBOARD WITH DUMMY INSTRUMENTS AND MECCANO STEERING WHEEL.
3/16" x 1 1/2" DIA GROOVE ON BACK OF FLYWHEEL
FLYWHEEL DOGS 1/8" DIA STEEL ROD.
1" x 1/8" DIA. DRIVING PINS SOLDERED TO MECCANO COLLAR.
1/4"
1/2"
2"
FLYWHEEL DRIVE.
MODEL POWERED WITH TWO STROKE 2·5 c.c. "SPITFIRE" ENGINE.
3" DIA. AIRWHEELS.
3 1/2" DIA. AIRWHEELS
NOTE: FOR VERY SMALL CIRCULAR COURSES HOOK TETHER TO CHASSIS SLIGHTLY FORWARD OF THE C.G. & UNLOCK OFF SIDE WHEEL TO OBTAIN THE EFFECT OF A DIFFERENTIAL.
FRONT WHEELS LOCKED TO AXLE BY TWO FLANGED WHEELS N20c. SCREWED TO RIMS.
LARGE MECCANO BEVEL GEAR N30c MESHED WITH N30a BEVEL GEAR ON SHORT MECCANO ROD
MECCANO COLLAR.
CHASSIS OF 7/8" x 3/16" HARD WOOD STRIP REINFORCED AS SHOWN
THROTTLE VALVE CONTROL
EYELET
1/2" DIA. COPPER EXHAUST
REAR AXLE 10" MECCANO ROD
REAR WHEELS KEPT IN PLACE BY TWO MECCANO FLANGED WHEELS N20b, IMITATING BRAKE DRUMS, & TWO COLLARS
1 1/2" DOUBLE ANGLE MECCANO STRIP BOLTED TO CENTRE OF 3/16" PLY CROSS PIECE WITH CENTRAL NUT & BOLT AND TWO WASHERS TO ALLOW IT TO SWIVEL FOR STEERING
TANK
AXLE RETAINED IN POSITION BY TWO MECCANO COLLARS
RUNNING:- START UP ENGINE BY RAISING CAR ON TWO WOOD BLOCKS & WORK STARTING TAPE ROUND FLYWHEEL GROOVE UNTIL ENGINE FIRES. WHEN WARMED UP REPLACE BONNET, REST CAR ON REAR WHEELS, HOOK ON THE TETHER, AND ADJUSTING THROTTLE RELEASE CAR ACCOMPANYING IT INTO THE COURSE GENTLY WITH BOTH HANDS MAKING FRONT WHEELS CONTACT GROUND SMOOTHLY
POINTS
SWITCH
BOOSTER CONNECTIONS
H.T.
CONDENSER
EARTH
BATTERY
WIRING DIAGRAM.
1/2" x 3/4" MECCANO GEARS IN THIN BRASS GEAR BOX
FRONT AXLE FAIRINGS FROM 5/8" HARDWOOD BLOCK CARVED TO SHAPE & SLOTTED FOR AXLES.
10" MECCANO ROD FRONT AXLE TURNS IN TWO MECCANO DOUBLE ARM CRANKS N62b WHICH ARE SCREWED TO CHASSIS.
3/16" x 3/16" BRASS ANGLE STRIP DRILLED 1/32" HOLES 3/32" APART FOR STIFF WIRE LOOPED ROUND REAR AXLE
REAR AXLE FAIRINGS BUILT UP FROM 3 LAYERS OF 3/16" PLY FAIRED TO SHAPE & SLOTTED TO ALLOW FOR STEERAGE
1/16" PLY TOP
1/8" PLY PLUG
GEARBOX COVER
COLOURING: BODYWORK CREAM. UPHOLSTERY & TYRES RED. CHASSIS FRAME & FAIRINGS SILVER.
TOP COVER "H" LOCKED IN POSITION BY PINS LOCATED IN HOLES IN "F"
1/16" PLY FACING ON FORMER "B"
FORMERS B, C, E, F & G OF 3/16" PLY
FORMER D OF 3/8" PLY
3/16" x 1/4" HARDWOOD
3/8" PLY TO SHAPE CONNECTING "F" & "G" AT REAR.
A
B
C
D
E
F
G
H
DRAWN BY A. H. SMITH



DAEDELUS

BY R. M. SEARLE

Biplanes possess a peculiar attraction of their own, and it is to be regretted that this type is so often neglected by the average builder. However, we hope that this model will induce many modellers to the type, The performance is particularly good, the average duration of flight being of the order of two minutes in still air, thus comparing quite favourably with many of the conventional monoplanes. That it will readily take advantage of thermal currents is shown by its 7 min. 37 sec. flight in the 1941 Biplane competition and thus it should appeal to the duration fans.

THIS model was designed in the Summer of 1941, with the object of its being entered in the K. & M.A.A. Cup Competition for Biplane Models. The initial tests on completion showed it to be full of promise. It possessed a very flat glide and would turn in flights of 120 seconds on the coldest and dampest of summer evenings. In the K. & M.A.A. Cup Competition, the model, on its first flight, taking advantage of the only sunny period of the day, clocked 7 minutes 37 seconds. This, followed by two further flights of 2 minutes each, was sufficient to win it second place, eclipsed only by Mr. Piggott's record-breaking flight of 18 minutes.

The photograph of the model shows it with a two-bladed folding propeller with which it has recently been fitted. In the contest it was flown with the single-bladed folding propeller shown in the drawings. No tests have as yet been made with the two-bladed propeller, which involves a great deal more difficulty in construction and operation, and the builder is advised to use the simpler propeller shown in the drawings. The model should be kept as light as possible and it should not weigh more than 4½ ounces all up. The air frame alone should not weigh more than 3 ounces, allowing for 1½ ounces of rubber.

General Assembly and Flying.

The original model was covered with red and black tissue. Give the model two thin coats of dope. The lower wing is set at 0 degrees incidence and the upper is packed up with 1/16 in. sheet. The wings are attached by means of "S" hooks. A rubber band is passed over the tail-plane and the fin is also secured with these. The motor is made up of 8 strands of ¼ in. by 1/24 in. rubber, 36 in. long. The model is first adjusted for glide by varying the position of the wings, which may be done without altering their angles of incidence. They should be set relative to each other with approximately ½ in. forward stagger, and to avoid upsetting the lateral area their position should be approximately that shown in the plan. The model climbs and glides most efficiently in right-hand circles of about 100 feet diameter. It should have a ceiling of about 150 feet in still air. The thrust line for best results must lie along the datum line—due to the weight of propeller blade moving backwards when it folds.

The Fuselage.

Make the two sides first and build the second over the first to ensure accuracy. The longerons should be steamed to shape and left to set pinned to the plan. While the cement from these is drying cut the tail-post from 3/32 in. sheet. The nose is filled in with 1/16 in. sheet balsa and a 1/16 in. plywood nose former is then fitted.

The Undercarriage.

The undercarriage legs comprise two pieces of bamboo, 9 in. long, of streamlined section and tapering from 3/16 in. by 3/32 in. at the top, to ⅛ in. by 3/32 at the bottom. To these, the wheel axles, made to the shape shown on the drawing from 20 s.w.g. piano wire, are bound and cemented. Use 1½ in. diameter streamlined celluloid wheels.

The Propeller and Noseblock.

The propeller is carved from a balsa block of size 8⅜ in. by 2 in. by 1½ in. Mark off the block as shown in the drawing, then shape the blade by carving from edge to edge. It should be very thin with 3/32 in. undercamber. The blade is next cut squarely from the hub, ⅜ in. from the propeller shaft hole. The hinge is made from 20 gauge wire and brass tubing as in the drawing. It is bound to the blade and hub with cotton and, to save it pulling, plywood washers are employed. The hub is also faced back and front with plywood. The counter-balance arm is made from 20 gauge wire and the weight from rolled empty cement tube.

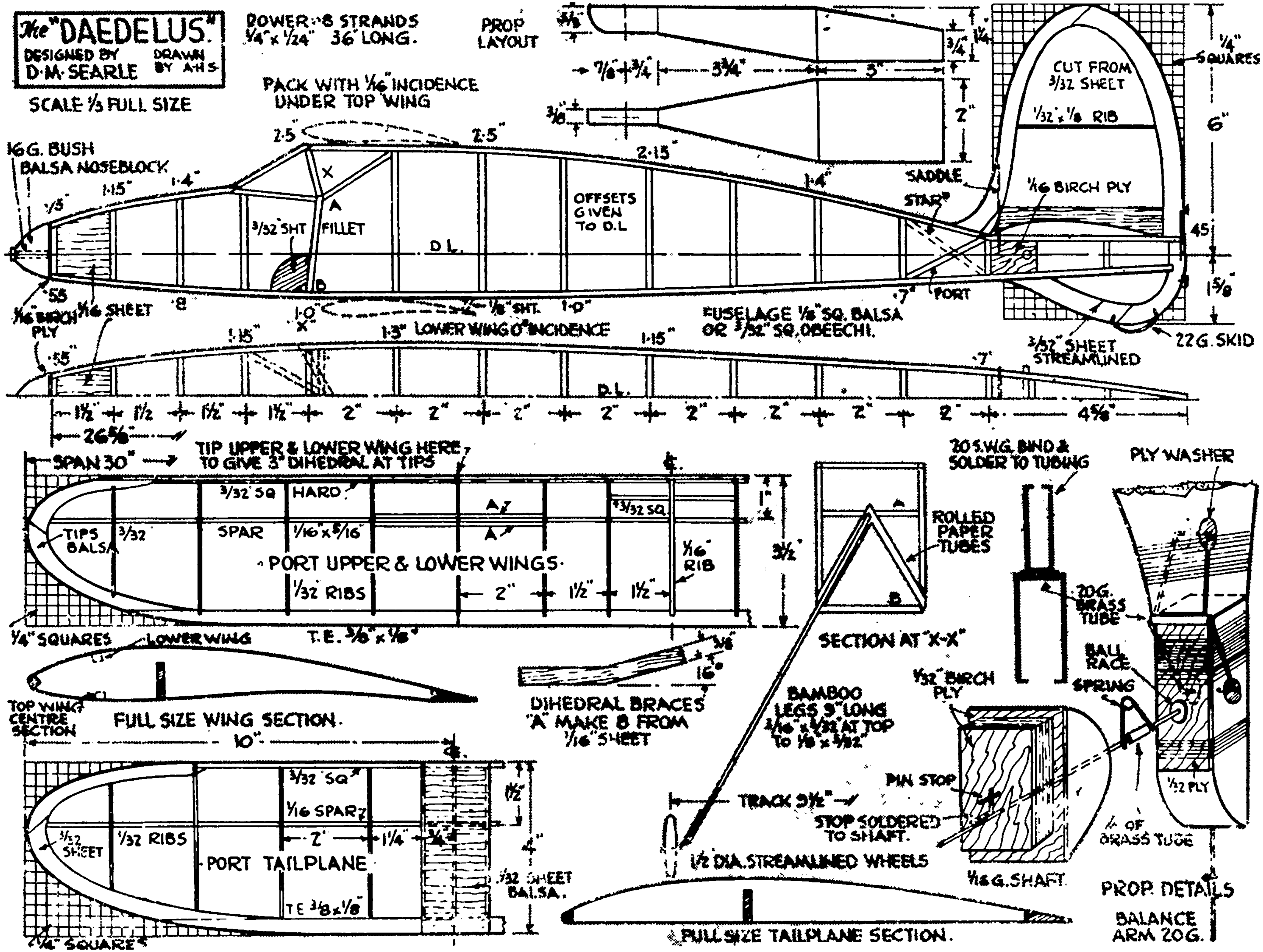
The noseblock is made from balsa and is also faced with plywood. The noseblock is bushed to take a 16 s.w.g. shaft. The propeller stop spring is made from 22 gauge wire. The stop arm is made from 20 s.w.g. wire spiralled round the shaft and soldered so that the blade comes to rest flat on top of the fuselage.

Wings.

Fit the ribs into the slots in the trailing edge and then fit the leading edge of 3/32 in. square. The tips are cut from 3/32 in. sheet and sanded to a streamlined section. The tip rib is cut to shape and fitted last of all.

Tail and Fin.

The tail-plane is made similarly to the wing from the dimensions shown on the plan. The centre bay is covered with 1/32 in. sheet.


The "DAEDELUS"
DESIGNED BY D.M. SEARLE
DRAWN BY A.H.S.
SCALE 1/3 FULL SIZE
POWER: 8 STRANDS 1/4" x 1/24" 36" LONG.
PROP LAYOUT
PACK WITH 1/16" INCIDENCE UNDER TOP WING
16G. BUSH
BALSA NOSEBLOCK
3/32" SHT
FILLET
OFFSETS GIVEN TO D.L
D.L.
1/16 BIRCH PLY
1/16 SHEET
1/8" SHT.
LOWER WING 0° INCIDENCE
FUSELAGE 1/8" SQ. BALSA OR 3/32" SQ. OBEECHI.
SADDLE
STAR
PORT
CUT FROM 3/32 SHEET
1/32" x 1/8 RIB
1/16 BIRCH PLY
1/4" SQUARES
22 G. SKID
3/32" SHEET STREAMLINED
26 5/8"
SPAN 30"
TIP UPPER & LOWER WING HERE TO GIVE 3" DIHEDRAL AT TIPS
3/32 SQ
HARD
SPAR
1/16 x 5/16
TIPS BALSA
PORT UPPER & LOWER WINGS
1/32 RIBS
1/16" RIB
1/4" SQUARES
LOWER WING
T.E. 3/8" x 1/8"
TOP WING CENTRE SECTION
FULL SIZE WING SECTION.
DIHEDRAL BRACES "A" MAKE 8 FROM 1/16" SHEET
ROLLED PAPER TUBES
SECTION AT "X-X"
BAMBOO LEGS 5" LONG 3/16" x 3/32" AT TOP TO 1/8 x 3/32"
TRACK 9 1/2"
1/2 DIA. STREAMLINED WHEELS
10"
3/32 SQ
1/16 SPAR
1/32 RIBS
3/32 SHEET
PORT TAILPLANE
TE 3/8 x 1/8
1/32 SHEET BALSA.
1/4" SQUARE
FULL SIZE TAILPLANE SECTION.
20 S.W.G. BIND & SOLDER TO TUBING
20G. BRASS TUBE
PLY WASHER
BALL RACE
SPRING
1/32" BIRCH PLY
PIN STOP
STOP SOLDERED TO SHAFT.
1/16 G. SHAFT
1/32 PLY
1/4 OF BRASS TUBE
PROP. DETAILS
BALANCE ARM 20G.

The Daily

REGISTERED OFFICES BLITZED, PRESENT ADDRESS VARIES

(NOT TO BE

No. 1. APRIL 1st.

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We are proud to present this article extracted in its entirety from the front page of that very well-known newsrag the Daily Bauble. Readers are assured in all sincerity that we do this with their full permission and letters of appreciation of this tremendous scoop should be addressed to the Aeromodeller office.

I KNEW

EVER since my passing reference to the works of McGillicuddy in a previous article, I have been inundated with requests from serious-minded aeromodellers for more details about this strange, mystifying and almost legendary figure.

This is very gratifying to me, for, as the heading of this article states, I knew McGillicuddy ! I have been privileged to sit at the feet of the Master and have drunk deep at the fount of his wisdom.

It is gratifying, also, to think that the more erudite of the aeromodelling fraternity are at last coming to recognise the value of the teachings of this G.O.M. of our hobby. Hitherto, I had assumed that his fate had been worse than that of most prophets, for not only was he without honour in his own country, but was apparently regarded as a darn nuisance everywhere else; and to find this is not so, is very pleasing to me, for I was one of his earliest disciples.

It is not my purpose here, however, to go deeply into his teachings, but rather to touch upon a few personal incidents in his bright and varied career. For those who wish to undertake a more thorough study, I cannot do better than to recommend them to read "McGillicuddy, the Man and his work." This famous book (copies of the first edition published by Messrs. Sellquick and Run at 15/– are now almost priceless relics) is, of course, now out of print, but a copy can often be picked up at the kerbside barrows "slightly soiled" for twopence or so.

In writing of the man personally, however, one hardly knows where to start. There was, for instance, his epic hike to London in an enthusiastic but misguided effort to secure for himself some of the free wheels which, he had read, members of famous London Clubs were now fixing to their models, but more of this anon.

Hamish Boots McGillicuddy, founder and first president of the Auchengargle Model Aero Club at Auchengargle, N.B. I can close my eyes and see him now, stumping down the road to the flying field, dressed as always in his kilt and clogs, his tall hat at a jaunty angle and his winder, which he wore in place of a sporran, dangling in front, clanking musically as he walked, his ancient and venerable Wakefield model "Cutty Sark" tucked under his arm and his tame seagull, Drambuie, perched on his shoulder.

Ah, me ! The old days at Auchengargle, what memories of weird and wonderful models that sometimes flew, but mostly didn't. Little did we realise then that the little snippets of friendly advice and kindly encouragement, so freely proffered by our genial president and (alas) generally disregarded, would one day be regarded as pearls of pure wisdom by thousands of keen aeromodellers the world over. Little did we realise, I repeat, that we were assisting to make aeromodelling history.

Take, for example, his famous maxim for beginners. Imagine yourself as a beginner again (quite easy, if your models turn out anything like mine). Imagine yourself struggling with yards of complicated formulæ, trying vainly to co-ordinate the rate of Kinematic viscosity with the centre of new active lift, at the same time watching that the co-efficient of lift-drag does not pass the point where it would start interfering with the lactic gyro stability. Imagine yourself, struggling vainly in this mathematical morass, and then suddenly coming upon his famous maxim:

A fuselage built square to plan,
A sturdy wing of ample span,
Not too much torque, a lot of thrust,
Your plane will either fly or bust.

Could anything be more concisely lucid than this clarion call to action ? It cuts through the fog of formulæ like a bugle in the black-out.

Or again, the famous incident that happened on the flying field one visitors' day. An English visitor from the South was proudly proclaiming the merits of his model, which was a really beautiful piece of work. Our guest, however, was not content to let his work speak for itself, but insisted on explaining exactly *how* he had arrived at his conclusions, reeling off yards of figures with the fluency of a vacuum-cleaner salesman, explaining how he was right and we were wrong, and expressing complete confidence in his ability to sweep the board in the day's events.

Out of courtesy to our guest, our President had kept silent during the harangue, until, from the trend of our visitor's remarks, it became apparent that the plane had not been flight-tested at all, having only been completed that day. This was too much for McGillicuddy; fixing a basilisk eye upon the stranger, the Maestro intoned in a voice of thunder, these epic words (later to be inscribed in letters of glowing gold over the entrance to the McGillicuddy Memorial Club) :—

Bauble

LATE EXTRA

(VERY LATE)

★

TAKEN AWAY)

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and bear no resemblance to the truth.

PRICELESS

EVER CREDITORS PERMIT

OUR MOTTO: A LIE A LINE

On the other hand readers' opinions of a defamatory nature MUST be sent direct to the head offices of the Bauble. This address, we regret we cannot disclose, as we have deliberately mislaid it to avoid payment of the colossal fee required for reproduction.

McGILLICUDDY

An exclusive article by **ROBERT JAMIESON**

Special Correspondent to the Daily Bauble

The one whose chances are the strongest,
Is him whose plane stays up the longest,
By hook or crook.
The flying field will always teach you
More than the book!

From the foregoing, some idea of his profound wisdom can be obtained, but it must not be thought that he was a paragon of all the virtues, and that we worshipped him accordingly; on the contrary, he was human, he had his failings, and there were times when the Old Man actually became unpopular.

There was, for instance, his shameless attempt to pass off his tame seagull, "Drambuie," as a streamlined glider at our sailplane competition. He had set his heart on winning the principal prize, The Bronze Spittoon, and must have spent months training the bird to keep stiff and still, with its wings fully stretched out, feet tucked back and eyes closed, counting on the short-sighted checker to be deceived by this.

Well, he nearly got away with it. Displaying low cunning he made his first flight around lunch time (when he knew there would not be so many competitors about, for enthusiastic aeromodellers are usually equally enthusiastic about the nose-bag). Actually this was his undoing.

"Drambuie" was fixed to the tow-line, towed up, and was soaring away beautifully in a flight that would have won hands down, had it not been that one of our members was sitting on the edge of the flying field partaking of a tasty lunch—Sardines on Toast. Alas for McGillicuddy! Drambuie's natural instincts broke through the veneer of his training, quicker than you can break a rubber motor the bird "Stukaed" down and snatched the titbit from the hand of the astonished member and then soared away again with all the grace of his kind.

The fat was in the fire, of course, and our President was right in the middle of the conflagration, and, as if his disqualification and disgrace were not enough, the member who had lost his lunch tried to claim damages, on the ground that Drambuie's sudden descent had "given him quite a turn!"

We soon forgave the old man, however, the club would not have been the same without him; perhaps the best apology we could offer for his conduct were his own words:—

"Would you call them dishonest men
Who fill their wings with hydrogen,
And take the chance of yaw or drift,
Just to obtain that extra lift?"

Over the models we built or the material we used (for balsa was then, as now, practically unobtainable) it is best to draw a veil. Suffice it to say, umbrella ribs, barrel staves, old braces and brown paper, formed the greater part of our materials. What the old Maestro accomplished with such unpromising material makes one wish he could have been with us during the golden age, the days of "bounteous balsa on every bench."

Of the manner of his passing from our midst, it is impossible to speak without emotion. Is he dead? We do not know, he simply vanished from our ken.

It was a beautiful day, the tang of autumn was in the air, McGillicuddy was at the peak of his form, he wound up his Wakefield "Cutty Sark" and it took off in the lovely spiral climb we would all have given our back teeth to attain.

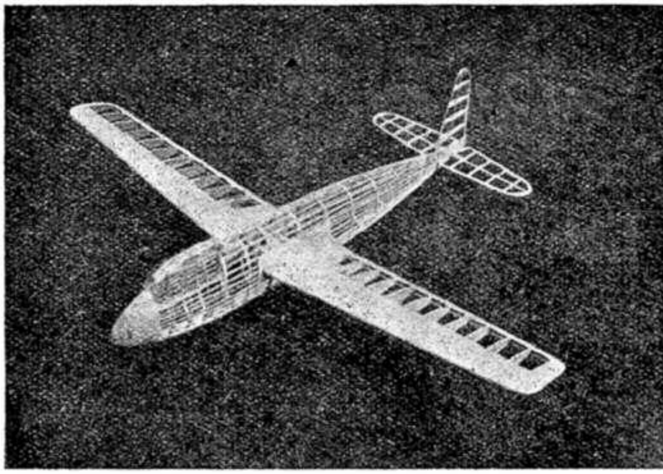
Up and up, on and on, until it was a mere speck in the blue. The Maestro pursued his model over hill and moor, occasionally leaping high in the air with delight, frequently pausing to let loose the shrill war cry of his clan, "Wahoo—look at it noo!" On and on, over river and mountain, the model vanished from sight—so did McGillicuddy!

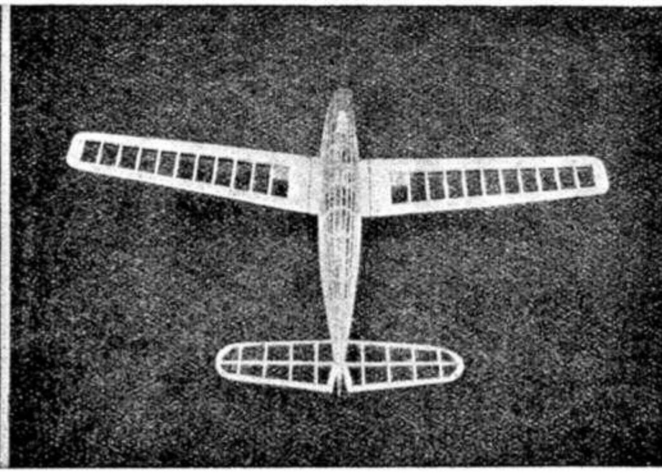
As soon as we realised that our President was really missing, search parties were organised to scour the moors around the flying field. Long into the night the search went on, our anxiety ever deepening, but at last we were forced to give up the hopeless task.

One party found his winder, whether he had dropped it accidentally or jettisoned it deliberately to assist his pursuit of his model, we shall never know. We reverently hung his winder above his usual corner seat in the clubroom. All that was left to us of our founder. And so passed from our ken McGillicuddy, the soothsayer and mystic, the Sage of Auchengargle.

R.I.P.

ROBERT JAMIESON.



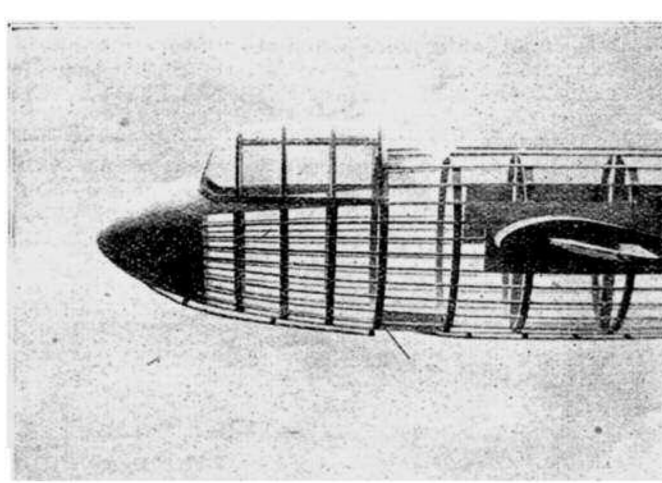


HOTSPUR II

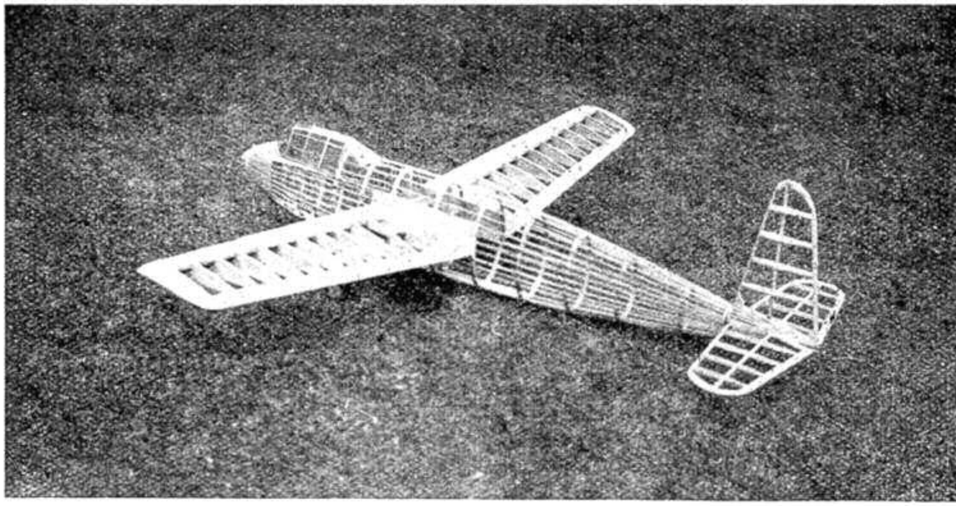
DESIGNED AND BUILT BY R. H. WARRING AND W. A. DEAN OF "THE AERO-MODELLER" STAFF.

FULL SIZE WORKING PLANS ARE AVAILABLE, PRICE 4/- POST FREE

The photographs at the bottom of these pages show the detailed construction and the "full-size" appearance of the model. The transparent cabin is a faithful reproduction of the prototype and a scale outline is preserved as far as possible. Wing fixing is by the familiar tongue and box fitting, which is standard practice for all types of glider models, and allows each wing panel to knock off without damage in the event of a crash landing. Fuselage construction is mainly hardwood, balsa being employed for the wings.

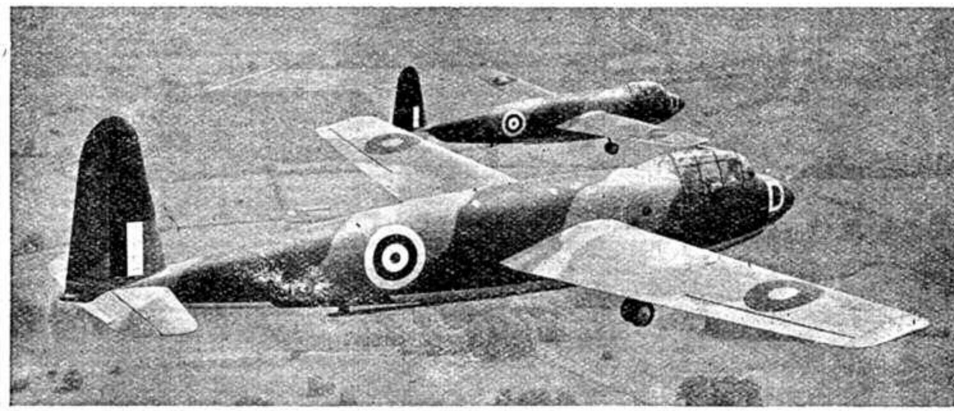


The photographs at the top of this and the opposite page show the uncovered airframe of the one inch to the foot scale model Hotspur. The model has undergone extensive flight tests, which have indicated a fine performance. Full size working plans are now available and a material list is given below. This will be followed by a complete description of the model and the method of construction in the next issue. The experienced modeller will be able to start his machine right away. Those with less experience are advised to collect the materials, get a plan and have everything in readiness for the October "Aero-Modeller," where each stage of the building will be clearly explained.



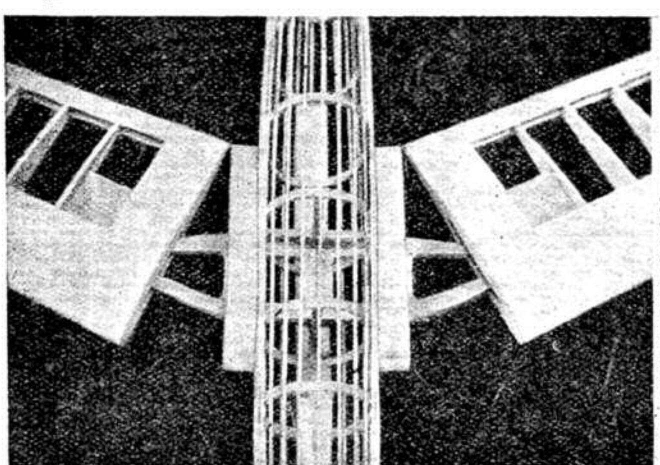
£10.10.0
COMPETITION

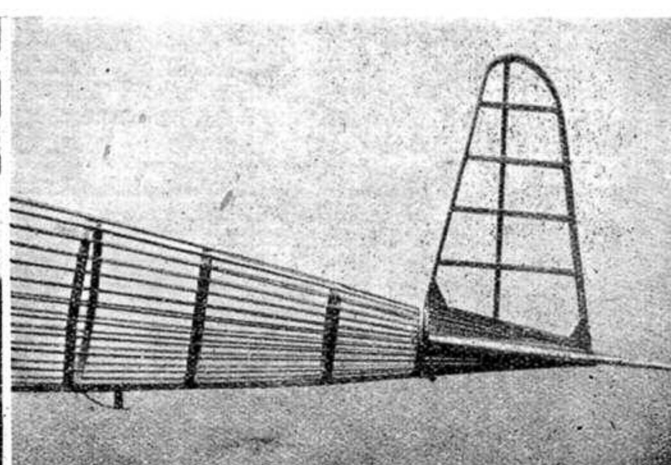
As announced on page 390 a prize of £10.10.0 is to be awarded to the modeller obtaining the best flight with a Hotspur II built from "Aero-Modeller" plans. We anticipate a very large entry—so make a good start by ordering your plan right away.



THE HOTSPUR II. LIST OF MATERIALS.

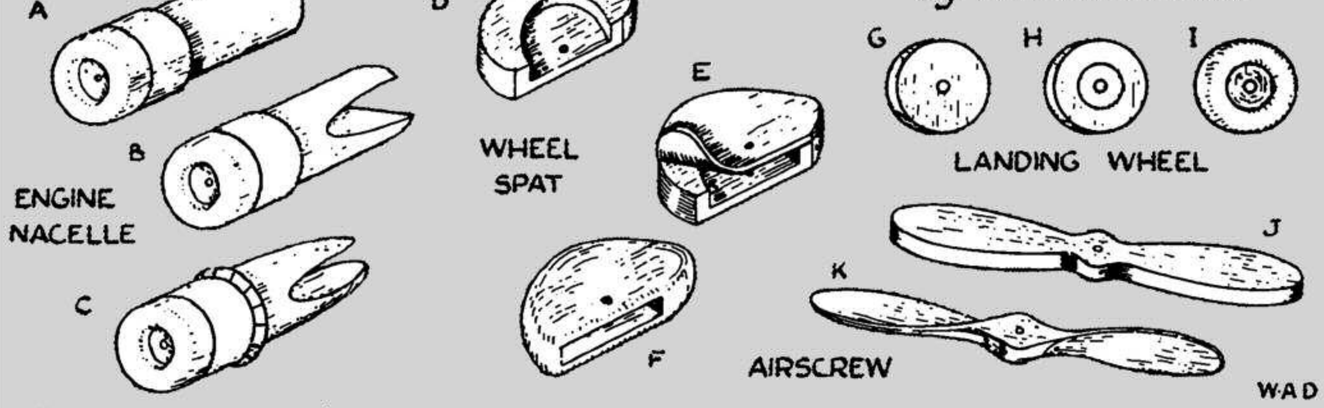
Amount.	*Specifications.*	*Required for.*
Fuselage.		
4 lengths	36″ × 1/4″ × 1/8″ birch	Fuselage formers.
28 ,,	36″ × 1/16″ × 1/16″ spruce or 3/32″ × 3/32″ bass	Fuselage stringers.
2 ,,	18″ × 1/16″ × 1/16″ bamboo	Fuselage skids.
1 length	48″ × 1/2″ birch dowel	Fuselage jig.
1 ,,	36″ × 1/2″ × 1/4″ hard balsa	Fuselage bracing.
1 ,,	12″ × 3″ × 1/16″ birch ply or 36″ × 1/8″ × 1/16″ birch	Cabin formers.
2 sheets	36″ × 3″ × 1/4″ balsa	False formers, etc.
1 sheet	36″ × 3″ × 1/8″ balsa	Wing boxes, sheeting, etc.
1 piece	12″ × 2″ × 1/16″ ply	Keel.
Wings.		
4 lengths	36″ × 1/8″ × 1/4″ birch	Wing spars.
4 ,,	36″ × 3/4″ × 3/32″ balsa	Trailing edge.
2 ,,	36″ × 1/2″ × 1/4″ balsa	Leading edge.
4 ,,	36″ × 1/8″ × 1/32″ balsa	Capping strips.
1 sheet	36″ × 4″ × 1/16″ balsa or 2 sheets 36″ × 2″	Wing ribs.
4 sheets	36″ × 1/16″ balsa	Leading edge sheeting.
Wings—cont.		
1 piece	12″ × 12″ approx. 1 mm. ply	Wing boxes.
1 ,,	12″ × 3″ × 1/8″ ply	Wing tongue.
Tail Unit.		
1 length	36″ × 3/8″ × 1/8″ balsa	Tailplane and fin, T.E.
1 ,,	36″ × 3/16″ × 1/8″ balsa	Tailplane and fin, L.E.
3 lengths	36″ × 1/8″ × 1/16″ balsa	Tailplane ribs.
1 length	36″ × 1/8″ × 1/8″ birch	Tailplane mainspar.
1 ,,	18″ × 3/16″ diam. dowel	Fin spar and undercart legs.
2 lengths	36″ × 3/16″ × 1/16″ balsa	Fin ribs.
Miscellaneous.		
12″ 16 s.w.g. piano wire.		
4 balloon type wheels, 1 1/2″ diam.		
2 tubes balsa cement.		
2 tubes slow drying cellulose cement, e.g. Le Pagé, Duroflx, etc.		
1/16″ × 1/32″ approx., sheet celluloid.		
Tissue paste.		
3 sheets bamboo paper or silk.		
Small tins of red, white and blue dopes.		
Large tins of yellow, black, green (camouflage) and earth (camouflage).		





A NEW MATERIAL FOR SOLID MODELLERS

By P. R. WICKHAM.



MAKERS of solid-scale model aircraft must often have felt the need for some easily modelled plastic material, capable of setting really hard, for producing the many small shaped parts which are so much trouble to make in wood.

Certain brands of putty fire cement would appear to offer a solution to the problem. These can be shaped in the hands, cut with a penknife, scored, or modelled in any way desired. It is then hardened, preferably by baking in a "slow" oven; or by gradual drying in the air. It is then stone-hard, and can be filed (with a fine file) or sandpapered; and painted with poster paints, watercolours or enamels.

In addition to sticking to itself, the putty will adhere to any damped surface, so it is possible to mould it round a wood core, thus, in a large piece of work, saving putty and giving greater strength.

Unlike many plastic materials, this putty will not shrink in drying, so the work will keep its shape.

Sections of the putty, when baked, can be joined with cement, which is spread thinly on each part. The parts are then held together and heated slightly.

The main points to note in using the putty are: that there are no cracks in the work when modelling is completed; and that baking is done gradually. If the oven is too hot, cracking will result.

Many ways of using this material in "solid-scale" modelling will, no doubt, occur to readers, but the following ideas, illustrated by the sketches, may serve to give some ideas of the scope of the material and methods of using it.

Engine Nacelle.

Engine nacelles for multi-engined 'planes are easily modelled by the method shown in the first panel of sketches. A full-size drawing, in plan and elevation, is first made. The wing section, at the point where the nacelle goes, is drawn out on cartridge paper, and cut out.

A suitable quantity of putty is removed from the tin, worked in the hands for a few seconds to soften, then rolled in a cylinder the approximate length and diameter of the nacelle. The front end is then modelled as at A, using the point of the penknife to score the line and cut out the front (to take the engine). The hole for the propeller pin should also be made.

The rear part can now be reduced in diameter (by rolling) if the prototype demands it. The part to fit over the wing is then cut out, as at B, using the template already cut. It is a good idea to have a piece of wood handy, shaped to the section of the leadin egdge of the wing, to slip in this slot and prevent its losing shape during subsequent modelling and baking.

The trailing end of the nacelle can now be shaped and the exhaust collector ring added, as at C, the whole then being baked.

Wheel "Spat."

The modelling of wheel spats, as for the Westland "Lysander," etc., is sketched in the next panel. A full-size drawing, in elevation, should be made and cut out to serve as a template. A piece of putty is flattened out (to the thickness of the spat, minus the thickness of one side) on a flat sheet of metal (a tin lid will serve), using the blade of an old tableknife.

The hollow for the wheel is cut out with the penknife, and a hole made for the axle. The outline is then cut with the knife, to the template, as at D. A piece of wood, the size and thickness of the hollow, is slipped into the hollow to keep it in shape. A further piece of putty is then flattened (to the thickness of the side), cut to shape and pressed on top of the first part (E).

Finally, the edges are rounded off as required by the prototype, as at F.

Landing Wheel.

Landing wheels are easily modelled by cutting a disc from a flat slab of putty (G). The line of the disc (H) is then scored and the whole shaped, as at I.

Propeller.

The final panel of sketches shows the modelling of a propeller. A "blank" is first cut from flat putty (J). The correct shape of the propeller is then "carved" with the penknife, as at K.

The process is rather like carving in wood, but easier.

Bombs and Torpedoes.

Bombs and torpedoes are easily shaped by rolling the putty in the fingers, cutting to length, and shaping the nose and fins.

Fillets.

The use of the putty for the streamline fillets between wings and fuselage, etc., is an obvious one. If the wood is damped before applying the putty it should stick quite well. It will, however, have to be left some time to dry, as in this case baking is not possible.

Finally, if you should have the bad luck to break a baked section, it can be rejoined with cement, heating again to harden.

A MID-WING WAKEFIELD

By

ARNOLD WATHEW

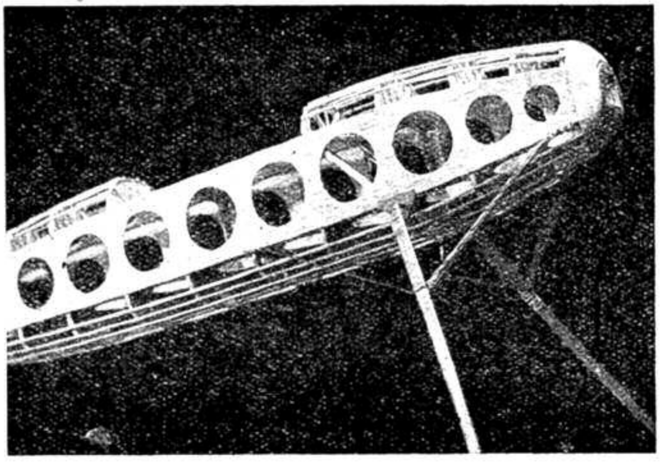
This model might almost be described as "A Wakefield from 1/32 sheet," but due to the extreme scarcity of this commodity, it is of interest as regards the METHOD, whatever the material employed at the time of building.

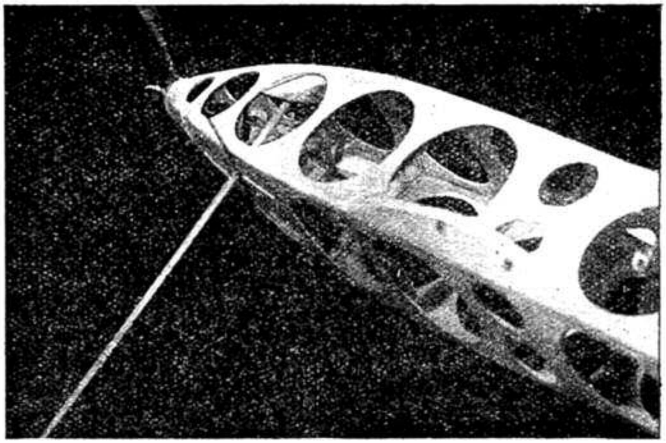
IT was some two years and more ago that I set myself to find something different in the way of a Wakefield design. I wanted the strength and smoothness of surface of the all-balsa monocoque body—but not its weight or the difficulty of building which the round or oval section monocoque body entails. I wanted a wing which would not warp on the dampest evening. A chassis which was sprung in such a manner that it would return to its original position after EVERY landing, yet without external rubber bands. Fairing of wings and tail into fuselage must be good, yet easy and light. Ambitious? Yes. But that's the fun of it all. Any mug can do the easy job.

For my ideas *re* the construction, I went back to the methods used during the early part of last war on full-sized 'planes. As you know, they were mostly of simple spruce and plywood construction and made use of lath and stringer fairings upon a square section fuselage.

My first effort was upon these lines with a basic, square-section fuselage built up from 1/32 in. sheet balsa. This basic fuselage weighed only 1 ounce uncovered, was very strong and pleased me very much.

Building the fairings to streamline this fuselage was a long and tiresome job. As you will see from the photo, this machine was a shoulder wing monoplane with not unpleasing lines. Indeed, she flew very well, but could not be said to have more than ordinary performance. You see, that fuselage, which was so light in basic form, now weighed over 3 ounces. The stringers on the fuselage formers, so nice before covering, were now buckling inwards with the pull of the dope, so that the flow of air over the fuselage must have been very poor indeed. As regards the wings of this machine, more later. They were all-balsa and a great success. An all-balsa tail unit had to be discarded on account of excessive weight. A new tail unit was built according to conventional lines, but, although only just over half-an-ounce in weight, was useless owing to warping. It just refused to accept or keep any definite adjustment.





A third tail unit, using I-section spars and ribs, weighed about ¾ ounce and gave no trouble at any time.

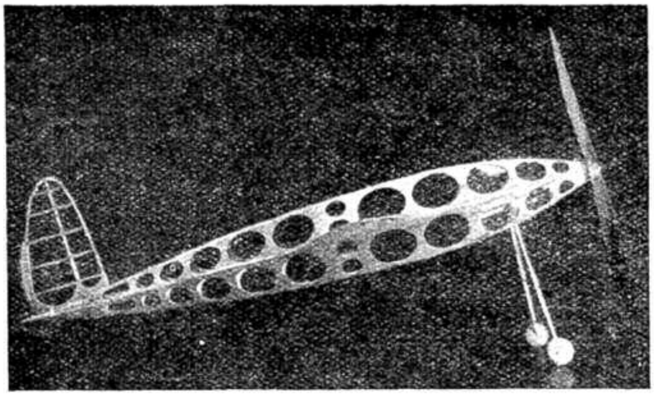
At about this period, I read in THE AERO-MODELLER of the success of two diamond-shaped fuselage parasol monoplane models. All at once it occurred to me that in my basic fuselage construction I had the ideal diamond fuselage—light, strong and simple, with no frills of any sort.

Now it has always seemed to me that the parasol monoplane must suffer seriously in efficiency from interference between the wing and the fuselage. This is most serious in the case of the rectangular fuselage, of course, but even the diamond or round fuselage is handicapped in this way because some form of bracing is always needed to get a firm wing fixing. This led me to consider the possibilities of the mid-wing type, using a diamond-shaped fuselage. I found them unexpectedly good.

For instance. With a suitably large fuselage cross section such as was needed to conform to Wakefield fuselage formula, perfectly rigid fixings for wing roots, with ¼ in. square plywood dowels plugging into balsa boxes could be made, using 1 m/m. plywood fuselage formers of good section. Fairing the wing roots, tail plane and fin into the body was so simple as to be almost laughable.

Getting down to brass tacks in the matter of practical design, I found that a 35 in. overall fuselage, of maximum cross section, 3·5 in. by 3·5 in., could be constructed out of four sheets of 1/32 in. by 4 in. by 36 in. hard balsa, with quite a lot of useful balsa left over! Please note that in the construction of this fuselage there are NO longerons. All is from 1/32 in. sheet balsa with 48 in. of 1/16 in. square strip and a little 1 m/m. plywood.

As actually constructed in the original model, lightness holes were very freely used and the whole covered with tissue and doped. I have since thought that it might have been even better to omit these holes and dope with No. 1 banana oil, using no tissue at all. Weight would have been about the same and the surface would have been smoother in general. You see how one model gives you the ideas for a better one even before it has been completed? What is saved in weight by the lightness holes is probably all lost in the weight of the tissue, paste and dope. How many of you know that you can increase the weight of a Wakefield model by over TWO OUNCES by just covering in the ordinary way and doping rather too well? *I* like a smart model, well doped and varnished as well to make it waterproof. It makes them look really *good!* Since turning an 8-ounce model into a nine-and-a-bit model overnight with the use of a varnish brush, I have kept to spraying and dope or banana oil—and not too much of that.



The two photographs on the previous page show the original basic fuselage and the development in the shape of a diamond fuselage and cleaner lines. The photograph opposite shows a side elevation of the new machine with its mid-wing fixing and sprung, cantilever undercarriage. The wing jig employed for the construction of a sheet covered wing is shown below.

Tail plane and fin—as reconstructed the third time—were very neat and required a minimum of fairing into the fuselage, thus reducing weight where it is least wanted.

The chassis problem turned out to be very simple, the shape of the fuselage again being a great help. In principle it is the same idea as that used by Mr. D. A. Russell on his petrol model of the Lysander, but was developed before I saw this. It always works, is very light and strong and can be removed in a few moments for transport. All of which brings me to the important subject of WINGS.

As I mentioned earlier, these were, in my opinion, a great success. The construction is, again, all-balsa, and principally 1/32 in. sheet at that. They are really geodetic in construction, depending upon the difference in radius of curvature of the top and bottom camber for their great strength. With wing roots, they weigh 1·75 oz. the pair. The section is my own. The nearest to it is the McBride B7. Performance of the machine with these wings is about the same as using a pair of R.A.F. 32 section wings of the same outline and size. To my mind, the great advantage about this type of wing construction, apart altogether from its strength, is that it allows of the use of built-in wing slots, which, as Major Bowden has said, are infallible for preventing a stall. This form of slot weighs nothing at all and adds very little to the wing drag. I find that disrupter wires or rods do the job but completely spoil the lift of the wing, probably because of the added drag.

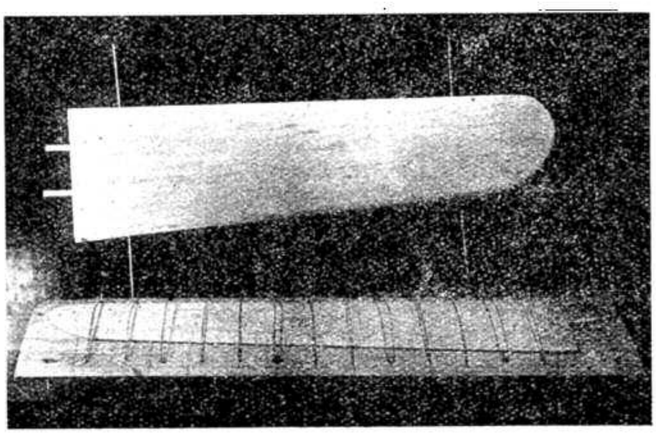
These wings are very simply made upon a jig built up from a sheet of three-ply, a thick board, two sticks and some screws. The photo and sketch should make all clear. First draw wing outline upon the three-ply. Then screw down the plywood until the desired section is obtained, taking care that the supporting stick is approximately 33 per cent. from the leading edge all the way along. Place a sheet of 1/32 in. balsa on the jig to cover the outline drawn thereon (you may have to widen your balsa by jointing), and hold down by drawing pins placed in balsa OUTSIDE the wing outline. Do NOT trim, but re-mark wing outline upon balsa sheet.

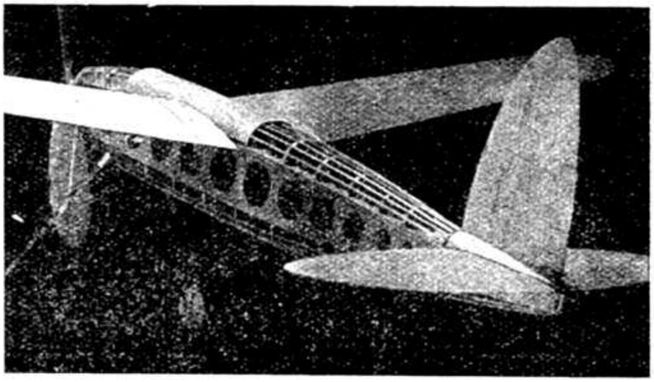
Cement leading and trailing edges in position. These should be cut from 1/16 in. sheet, ½ in. wide, hard balsa. Cement ribs in position and sand leading and trailing edges to a vee section so that the upper camber of the rib is continued to meet the lower camber exactly at the outline of the wing. Use 1/16 in. sheet for wing tip outline as well. Fit wing roots and put on top surface of 1/32 in. sheet, using a slow-setting cement and plenty of it. Use elastic bands from screwhead to screwhead to hold top surface in place until all is well set. After all has set hard (overnight is best) remove from jig and cut wing slots with balsa knife. Sand everything smooth, but beware of trying to reduce thickness of balsa covering by this means. The balsa bends in between the ribs and you just sand all the balsa off where the rib supports it and break the skin. Another warning. 1/64 in. balsa will NOT do. It is far too thin and cockles under strain.

Having made one wing, DO NOT DISTURB your jig, but draw the outline of the other wing, which will, of course, be of the opposite hand, upon it. Proceed as before and you will have an exact pair of wings. They will keep their shape for years and survive many a crash. In these days of balsa famine, I should say that wings made on these lines from stiff cartridge paper would be quite O.K. Old stuff with a drawing on one side would be quite all right, as it could be kept to the inside.

Whilst on the subject of wings, I would like to mention another set of wings which I have used with success on this model. They were of ordinary tissue and balsa construction, of the same size and outline as the all-balsa one, but built to a section which I fondly thought to be original! The idea was to try out a section of very deep under-camber similar to that produced upon a full-sized machine when the flaps are down for landing.

Actually, I found that I had produced a wing of NACA 6512 Section almost exactly. At first sight this section does not seem to have much under-camber. (See page 40 of "Airfoil Sections," by Mr. R. H. Warring, 2s.) This, however, is because it is drawn with the datum line passing through the centre of the leading edge and not underneath the whole outline, as is more usual. If a line is drawn from the tip of the trailing edge to just touch the underside of the section, it will be seen that it is very deeply cambered indeed. With these wings the model climbs better and has a better glide than with the all-balsa wings, but its freedom from stall and all-weather stability is no longer there. She stalls easily and can only be flown in calm weather. Disrupters on these wings cure the stall but make them inferior to the all-balsa ones.



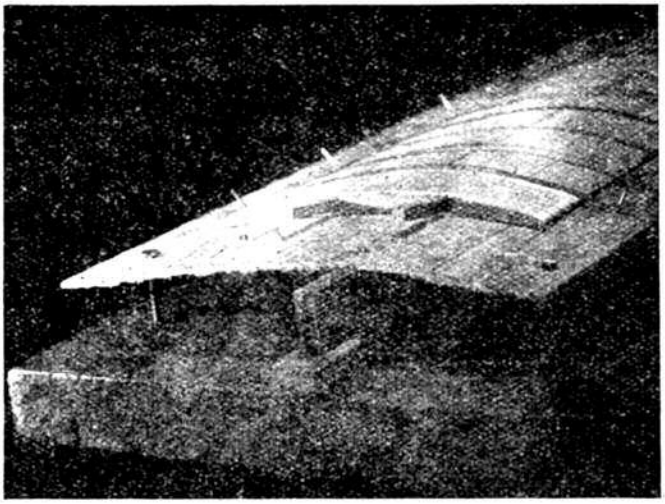


The original shoulder-wing model with semi-cantilever undercarriage, sheet-covered wings and tail unit. This latter feature was found too heavy for optimum results and has therefore been modified.
A close-up of the wing jig with one half wing in position is illustrated below. Rubber bands are employed to hold the structure to the jig.

Pressure of work has prevented any trial of this machine with a folding propeller, but I feel that it would be a definite improvement. One word *re* the fuselage. It need not be a true square. But if it is NOT, then the sides will no longer be identical in outline, etc. If made as my drawing and all four sides cut at once, it is almost impossible to get a warped fuselage.

Chassis assembly is simple. Just push legs, with rubber bands ready attached, into the slots in the fuselage and up into the pivotal block above. Hook rubber bands on to prepared hooks in the nose of the fuselage with a buttonhook. Hooks should be sewn and cemented in place upon small balsa blocks.

Little or no down-thrust is required, but considerable offset of nose block to the right will be needed. Machine should fly in right-handed circles against the torque. Power used was three ounces of $\frac{1}{4}$ in. strip arranged in 14 strands and roped in Mr. White's best manner.



This machine has made dozens of flights on moderately calm days from an ordinary hockey pitch surrounded by houses and has rarely landed outside the pitch. Of course, only about 400 turns maximum were used, but some very enjoyable controlled flying was had. My point is that only a machine under perfect control can be flown from such a ground without troublesome repairs. Owing to the war it has not been possible to fly it in any competitions, but perhaps readers will be able to do that for me.

When I look back over the various stages in the design of this model I am reminded of a statement made, I think, by Ralph Bullock in one of his earlier writings, in which he states that a really successful ORIGINAL Wakefield design can only be evolved as the result of continuous experiment and development with several models, each directly descended from, and better than, its predecessor. I have found this very true.

It is hoped, therefore, that the reader will benefit from the notes outlined here, gleaned from the development of this particular type, and although present conditions may not permit the building of an exact duplicate of the machine described here the method may well be utilised using other materials.

Careful and scientific use of hardwoods, or even paper, might solve the immediate problem without an undue increase in weight, but this I leave to the unfathomable ingenuity of the vast field of aero-modellers.

REDUCED SCALE FULLY DETAILED WORKING DRAWINGS ARE GIVEN ON PAGES 408 AND 409 OF THIS ISSUE.

TECHNICAL TOPICS *(concluded from page 406)*

The prospect of adopting one large single float with two smaller wing-tip floats is inviting, but unfortunately in model work automatic stability of a high order is essential, and *wing-tip floats are definitely unreliable and are not recommended.* The fault lies in the fact that should one touch the water when under way the model will taxi in circles and the float will fail to lift again; thus making take-off impossible, or—at the worst—causing a cartwheel.

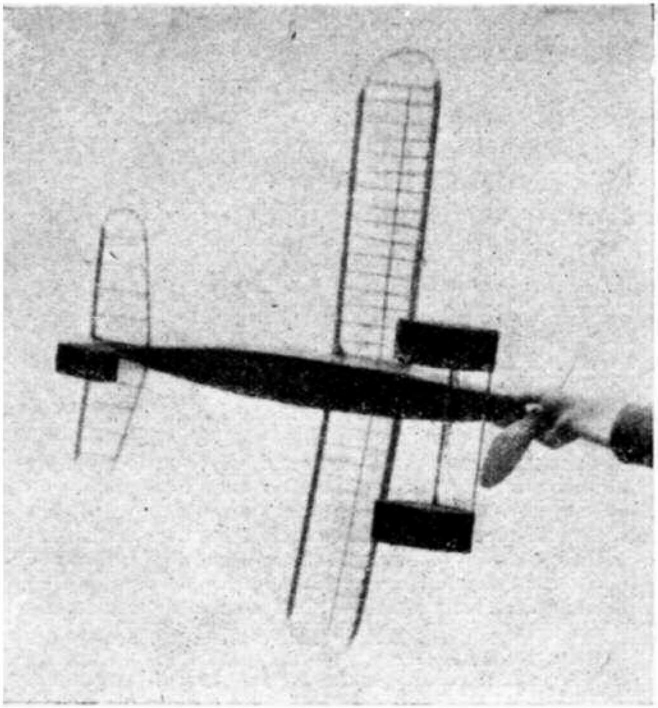
A better layout is to enlarge the central float and fit the two smaller floats close in, then should they touch the water the turning effect is not so great and may be overcome by a powerful engine. In both layouts the main float supports the model on the water, the auxiliary floats are merely transverse water stabilisers.

This leads up to a further layout which, in my opinion (and, I believe Dr. Forster's, and he has had more practical experience with large seaplane models than I) is the present solution to water stability for large seaplane models. This is to employ a *sponson*—a lateral projection added to a planing surface increasing the effective beam.

The type of sponsons fitted to the few successful flying-boat models so far produced have taken the form of a stub wing attached to the main hull. Other types that may quite well be equally effective and have less drag are the "*frying pan*" type, in which the beam is decreased but the length increased, fairing into the general lines of the float or hull; and the *tadpole* type, in which the front fairs into the nose of the float or hull and the rear terminates in a transverse straight edge.

These sponsons may be fitted with a step if so desired and should be effective on both the single-float seaplane and the flying-boat. It would appear from past experience that their most useful employment is confined to flying-boat design.

That, I am afraid, must be the end of this month's discussion. I shall be pleased to hear views of interested readers on the subject of seaplane design, and hope, in a future issue, to enlarge upon the general procedure.



TECHNICAL TOPICS

By R. H. WARRING

The photograph opposite shows the seaplane version of Percy featured in last month's Aeromodeller. The three float layout is typical of the rubber-driven floatplane models.

THE featuring of a seaplane model, Percy, in last month's issue has brought in a number of queries as regards the special problems associated with float 'plane design. A full answer would necessitate a complete volume, but I will attempt, on this page, to discuss some of the main features. The problem of float shape and the layout of planing surface is more readily appreciated in connection with the design of petrol-driven seaplanes and flying-boats—a type which is provoking considerable interest and should encourage development after the war. Certainly the British flying-boat records are low enough (see page 374 of the last issue), and Dr. Forster has shown that the petrol model figure can be handsomely beaten, although his times are unofficial.

The first consideration is the general layout of the flotation system to give adequate stability with the least expense of drag. This has resulted in the almost universal adoption of the three-float design for rubber-driven seaplanes—two main floats well in front of the centre of gravity and a third float at the rear as illustrated in the heading photographs. Experience with small types has indicated that steps are unnecessary (a step is a line of discontinuity in the surface, usually the lower surface), except, possibly, for the tail float. The function of the step is to provide a "break-away" of the water flow around the float and thus help the unit to unstick. A poorly designed float may defeat its own object by allowing the formation of an inverted waterfall, which further increases the tendency to "hug" the water.

In the case of the small rubber-driven model there is usually a sufficient reserve of power to ensure a rapid take-off without a step and, since this latter feature does add considerably to the drag of the unit, it may be dispensed with. A normal type of float without a step has a drag coefficient of ·00018 at a Vl. of 60; with a single step the drag coefficient, K, is increased to ·00036; and with two steps and similar layout K = ·00058.

It would appear, then, that for the types of rubber models usually employed for seaplane work the layout for Percy (see pages 340–343 of the last issue) should be adopted. It may be better to sacrifice take-off performance in this case by further omitting the step in the rear float.

As to the actual shape of the floats in such a layout, simplicity is the main point. The plan form of each float should be approximately rectangular. It is never advisable to taper either fore or aft to any great extent as this reduces the water stability in a triple float layout. The elevation chosen in the particular case in point was of streamlined form giving a reasonably low drag value. In this, absolute water stability has been sacrificed for pure airborne performance, for such a type is liable to "porpoise." ("Porpoising" is the pitching tendency prominent in certain types of floats moving through water.) The very layout, however, i.e. three floats forming a triangular supporting base, combats this and justifies the design.

For open water, or for those fliers who would prefer a relatively long take-off with a stable float combination, the three-float system should be retained but the floats themselves made of the *scow* type. This is, in effect, a rectangular box with the front elevation swept up in the arc of a circle and the rear elevation swept down in a similar manner. The plan form should be strictly rectangular. Any tapering of the fore-body may lead to the float digging into the water, whilst after-body taper will often delay the take-off.

Advancing to the relatively unexplored realm of petrol model seaplanes and flying-boats the problem of detailed float design becomes more acute, and it is worth while investigating the other possible float layouts. This if only to escape from the somewhat natural tendency to fit three scow-type floats scaled up from the rubber jobs.

The twin-float layout is attractive, although the air drag is relatively high, and by proper design may be made extremely water stable. The minimum length of a seaplane float for adequate (water) longitudinal stability is given by an empirical formula of the form :—

$$L_{\text{(in feet)}} = \sqrt[3]{\frac{\cdot 67 W^{4/3}}{nB}}$$

Where n = number of floats

B = beam of each float in feet

W = total weight of machine in lbs.

For model work this should be increased when the formula becomes :—

$$L = \sqrt[3]{\frac{W^{4/3}}{nB}} \quad \ldots \quad (1)$$

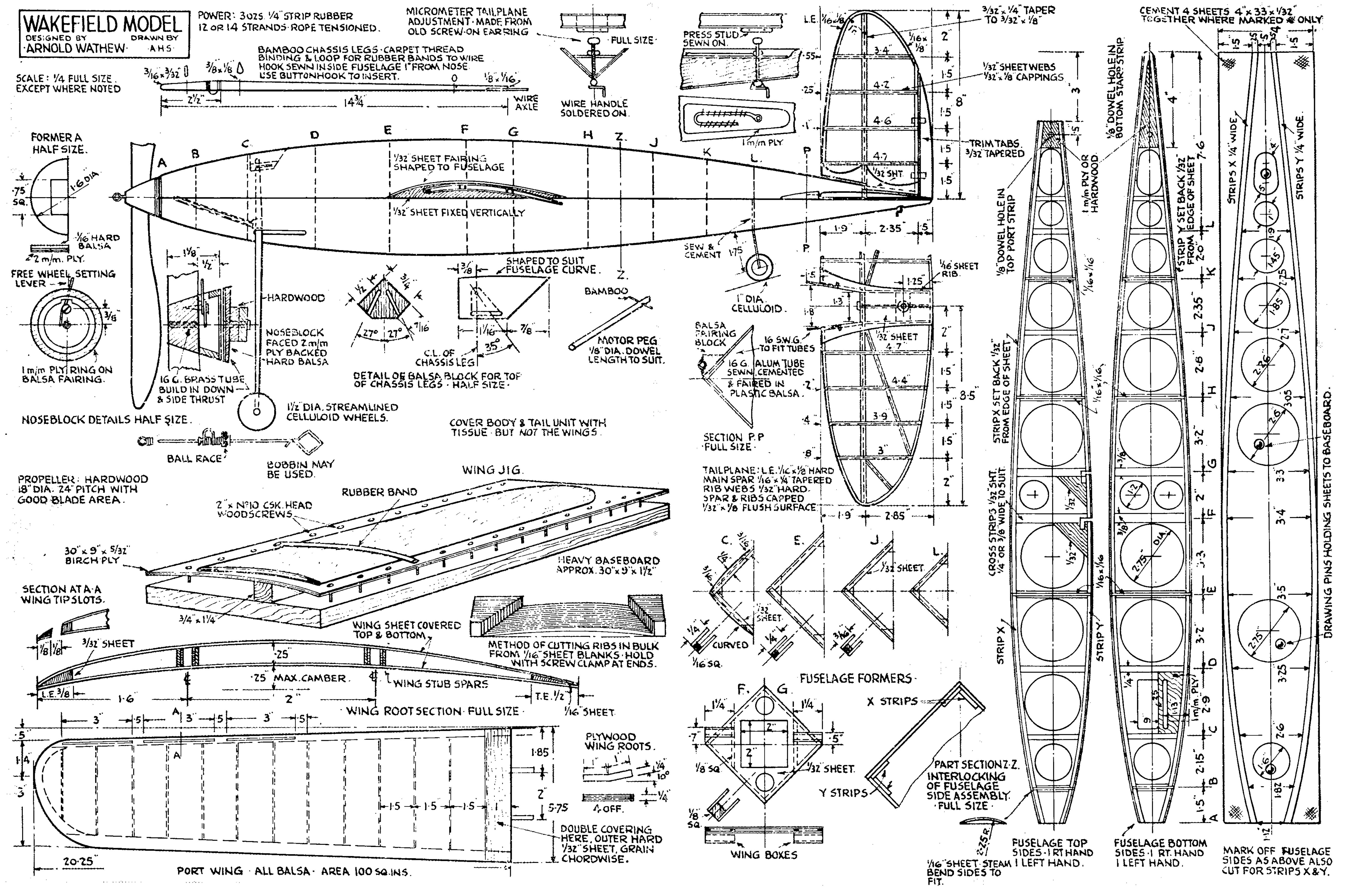
The minimum track (t), in feet centre line to centre line of the twin-float layout is given by :—

$$t = \frac{\cdot 3W^{2/3}}{\sqrt{LB}} \quad \ldots \quad (2)$$

Formulæ (1) and (2), then, give *minimum* values; there is no true maximum for model work, this is governed entirely by drag considerations. Working from these formulæ the intelligent model designer should be able to introduce a coefficient giving the *optimum* values for particular models. Should the demand be sufficient it is hoped at some future date to produce a handbook of low-speed design data, but for the present it is recommended that previous successful designs be analysed.

(*concluded on page* 405.)


FROG
SCALE MODEL AIRCRAFT
FROG
TRADE MARK REGD.
MADE IN ENGLAND BY
INTERNATIONAL MODEL AIRCRAFT LTD
For the sole Concessionaires
LINES BROTHERS LTD · TRI-ANG WORKS · MORDEN ROAD · MERTON · LONDON · S·W·19 · ENG



WAKEFIELD MODEL
DESIGNED BY ARNOLD WATHEW
DRAWN BY A.H.S.
POWER: 3 OZS. 1/4" STRIP RUBBER 12 OR 14 STRANDS ROPE TENSIONED.
MICROMETER TAILPLANE ADJUSTMENT MADE FROM OLD SCREW-ON EARRING
FULL SIZE
WIRE HANDLE SOLDERED ON.
PRESS STUD SEWN ON.
1 m/m PLY
SCALE: 1/4 FULL SIZE. EXCEPT WHERE NOTED
BAMBOO CHASSIS LEGS CARPET THREAD BINDING & LOOP FOR RUBBER BANDS TO WIRE HOOK SEWN INSIDE FUSELAGE 1" FROM NOSE. USE BUTTONHOOK TO INSERT.
WIRE AXLE
FORMER A HALF SIZE.
1/16 HARD BALSA
2 m/m. PLY.
1/32" SHEET FAIRING SHAPED TO FUSELAGE
1/32" SHEET FIXED VERTICALLY
FREE WHEEL SETTING LEVER
1 m/m PLY RING ON BALSA FAIRING.
HARDWOOD
NOSEBLOCK FACED 2 m/m PLY BACKED HARD BALSA
16 G. BRASS TUBE BUILD IN DOWN & SIDE THRUST
NOSEBLOCK DETAILS HALF SIZE.
1 1/2" DIA. STREAMLINED CELLULOID WHEELS.
BALL RACE
BOBBIN MAY BE USED.
SHAPED TO SUIT FUSELAGE CURVE.
C.L. OF CHASSIS LEG
DETAIL OF BALSA BLOCK FOR TOP OF CHASSIS LEGS. HALF SIZE.
BAMBOO
MOTOR PEG 1/8" DIA. DOWEL LENGTH TO SUIT.
COVER BODY & TAIL UNIT WITH TISSUE BUT NOT THE WINGS.
SEW & CEMENT
1" DIA. CELLULOID.
3/32" x 1/4" TAPER TO 3/32" x 1/8"
1/32" SHEET WEBS
1/32" x 1/8" CAPPINGS
TRIM TABS. 3/32" TAPERED
1/16" SHEET RIB.
BALSA FAIRING BLOCK
16 S.W.G. TO FIT TUBES
16 G. ALUM TUBE SEWN, CEMENTED & FAIRED IN PLASTIC BALSA.
SECTION P.P FULL SIZE
TAILPLANE: L.E. 1/16 x 1/8 HARD MAIN SPAR 1/16 x 1/4 TAPERED RIB WEBS 1/32 HARD. SPAR & RIBS CAPPED 1/32 x 1/8 FLUSH SURFACE.
PROPELLER: HARDWOOD 18" DIA. 24" PITCH WITH GOOD BLADE AREA.
WING JIG.
RUBBER BAND
2" x No 10 CSK. HEAD WOODSCREWS
30" x 9" x 5/32" BIRCH PLY
HEAVY BASEBOARD APPROX. 30" x 9" x 1 1/2"
SECTION AT A-A WING TIP SLOTS.
METHOD OF CUTTING RIBS IN BULK FROM 1/16" SHEET BLANKS. HOLD WITH SCREW CLAMP AT ENDS.
WING SHEET COVERED TOP & BOTTOM
3/32" SHEET
.25 MAX. CAMBER
WING STUB SPARS
WING ROOT SECTION. FULL SIZE
1/16" SHEET
PLYWOOD WING ROOTS.
4 OFF.
DOUBLE COVERING HERE. OUTER HARD 1/32" SHEET, GRAIN CHORDWISE.
PORT WING. ALL BALSA. AREA 100 SQ. INS.
FUSELAGE FORMERS
X STRIPS
Y STRIPS
1/32" SHEET
WING BOXES
PART SECTION Z.Z. INTERLOCKING OF FUSELAGE SIDE ASSEMBLY. FULL SIZE
1/16" SHEET STEAM BEND SIDES TO FIT.
CEMENT 4 SHEETS 4" x 33" x 1/32" TOGETHER WHERE MARKED ✱ ONLY
1/8" DOWEL HOLE IN TOP PORT STRIP
1/8" DOWEL HOLE IN BOTTOM STARB STRIP
1 m/m PLY OR HARDWOOD.
STRIP X SET BACK 1/32" FROM EDGE OF SHEET
STRIP Y SET BACK 1/32" FROM EDGE OF SHEET
CROSS STRIPS 1/32" SHT. 1/4" OR 3/8" WIDE TO SUIT.
STRIPS X 1/4" WIDE
STRIPS Y 1/4" WIDE
STRIP X
STRIP Y
DRAWING PINS HOLDING SHEETS TO BASEBOARD.
FUSELAGE TOP SIDES. 1 RT HAND 1 LEFT HAND.
FUSELAGE BOTTOM SIDES. 1 RT. HAND 1 LEFT HAND.
MARK OFF FUSELAGE SIDES AS ABOVE ALSO CUT FOR STRIPS X & Y.

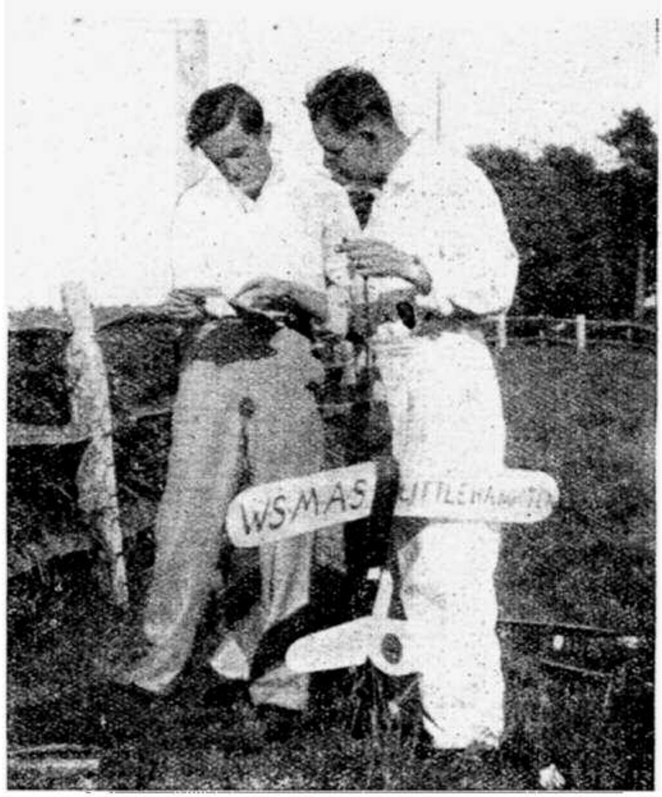

BRITISH MODEL AIRCRAFT MANFG CO MITCHAM SURREY—
SKYROVA
FMOS

PERCY — By R. H. WARRING

(*concluded from last month*)

This month we conclude the description of " Percy " with detailed building instructions and a reduced scale drawing of the layout of Mark V, with retractable monowheel undercarriage. Reduced scale plans were given on page 340 of last month's issue and full-size working drawings are obtainable through the Aeromodeller Plans Service, price 3/- post free.

The photograph opposite shows R. H. Warring (left) with F. W. Gates and one of the West Sussex Club " Percies."



Construction.

Fuselage. Select two pairs of ⅛ in. sq. medium hard balsa for the longerons and steam to the correct curves. Note that the top longerons are parallel to the datum line where the wings and tailplane rest. Both fuselage halves should be built together on the plan to ensure accuracy. All verticals are of ⅛ in. sq. medium balsa and should be securely cemented in position by giving one coat of cement to both of the surfaces to be joined, allowing to dry, cementing again and then placing in position. Pins spaced around the longerons help to maintain an accurate shape and also allow a tight fit for the verticals which is desirable as it increases the strength of the cemented joint. Do not push the longerons out of true, though, by forcing oversize verticals in position.

When dry the two halves may be removed from the plan, separated and cleaned up slightly with sandpaper. The four widest spacers can then be cemented into position by double cementing as before. During this operation some sort of jig is desirable to ensure accuracy. Some people prefer to block up each fuselage side in a vertical position, others use a cardboard false former for holding the halves square—the latter method is probably the best.

When dry the tail may be pulled in and cemented together and also the nose spacers inserted. If everything is quite true the remainder of the spacers may be cemented in and left to dry.

The undercarriage tubes are made from gummed paper strip. These should be formed around the legs themselves to ensure a good tight fit. Cement these securely in the position shown on the plan and add the ⅛ in. sq. braces. These give perfect rigidity to the whole and I have never had any trouble with them breaking loose. The bracing employed is a minimum but is extremely effective.

The front bay of the fuselage may then be filled in with 1/16 in. sheet fitted flush with the longerons. The grain in this should run in the direction of the spacers, i.e. *not* fore and aft with the fuselage. The underside of the rear bay is covered with 1/32 in. sheet to which the under fin is secured. A small paper tube is cemented in to take the fin spar. The rear rubber anchorage consists of a piece of 3/16 in. by 1/16 in. birch 3-ply fitting between the longerons up against the spacer and flush with it and the longerons. The main grain of the ply should run vertically or preferably at 45 degrees to the datum line. This fitting is drilled to take the rear peg of ⅛ in. diameter bamboo of cone.

To finish the fuselage the nose should be sanded down to give 1/16 in. right thrust and then capped with a former of 1 mm. 3-ply. The whole may then be rubbed down lightly with fine sandpaper to remove any lumps that would spoil the covering such as surplus cement, etc. Complete with under fin (of 1/16 in. sheet balsa), but uncovered, the fuselage should weigh about ⅜ oz.

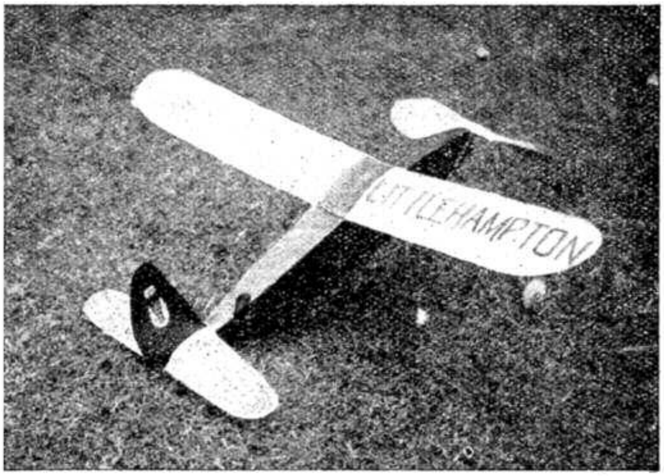
Covering should be applied in the usual manner fixing to spacers as well as longerons if desired to give greater rigidity. One coat of slightly thinned glider dope or two coats of ordinary dope applied after the tissue has been tautened by water spraying should suffice.

Tailplane and fin. Both are of very simple form—the ribs are butt-jointed to both leading and trailing edges and may be further secured by small triangular gussets if desired. The centre section is covered with 1/32 in. sheet balsa to take the pressure of the elastic band which retains the tailplane in position. It is covered top and bottom with lightweight tissue, shrunk and given one coat of banana oil.

The fin is built of 1/16 in. balsa around a 3/32 in. diameter bamboo mainspar which tapers to 1/16 in. diameter at the top. The outline pieces are cut from 1/16 in. sheet with the exception of the bottom which is ⅛ in. sheet and the ribs made of ⅛ in. by 1/16 in. balsa sanded to a streamlined section when the structure is completed. Cover both sides with tissue and give one coat of banana oil.

The fin plugs through the tailplane (a small paper tube should be cemented in the centre section of the latter to locate this), and into the paper tube in the fuselage. A rubber band passing under the fuselage, over the tailplane and into a pin at the extreme rear underside of the fuselage holds the tailplane down. Another band around the fuselage is looped over a pin stuck into the fin leading edge and holds that member secure and at the same time allowing easy adjustment. This arrangement is shown on the drawings.

Prop. and noseblock. The standard prop. is carved from a block 15 in. by 2 in. by 1¾ in., giving about ⅛ in. undercamber. The blades should be sanded down, tapering from a maximum thickness of about 3/16 in. at the roots to 1/16 in. at the tips, still keeping a good



Percy Mark II, top left, as flown in the West Sussex National Cup team and, below, the Mark III, which has an average duration of 2½ to 3 minutes in still air. The straightforward construction and relatively large airscrew are shown up to advantage.

airfoil section. The prop. is bushed with 18 s.w.g. brass tube or a brass bush.

The noseblock is made from *hard* balsa. That fitting inside the front former is from ¼ in. sheet whilst the rest is two "plies" of ⅛ in. sheet cross grained. This is sanded down to fair into the fuselage and an 18 s.w.g. bush fitted.

The prop. shaft is bent as shown and holds a bobbin to take the motor. A thrust race between the prop. and noseblock greatly reduces friction and should be fitted if obtainable.

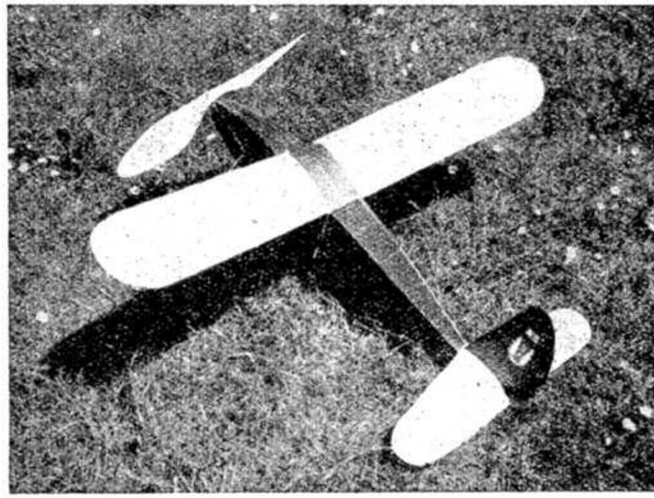
For a nose incorporating a spring tensioner, plywood is used. The part fitting inside the front former is of ⅛ in. birch 3-ply and the other from 1/16 in. birch 3-ply. The spring is part of a governor spring from a gramophone motor. The slot carries the prop. shaft and allows movement of the spring without binding whilst the hole carries the screw fixing the spring to the noseblock. Make sure that it is fixed so that sufficient tension is given when the shaft is pulled in and "bowing" the spring. It may be necessary to drill the spring for the screw hole and, since the metal is extremely brittle, a sharp, high-speed drill gives the best results. A 20 s.w.g. clutch bent to the shape shown is soldered on to the shaft and engages with a screw screwed into the back of the noseblock when the spring is "released."

Undercarriage. A simple strut of ⅛ in. by 3/32 in. bamboo rounded and tapered to about 1/16 in. diameter at one end, carries a 20 s.w.g. axle at the smaller end to which the wheels are attached. The section should actually be oval as this minimises drag and also prevents the leg turning round in the tube.

Wheels are 2 in. diameter and may be made from three laminations of 1/16 in. balsa bushed with a metal or fibre bush. They are retained on the shaft by a washer soldered in position. Hubless wheels may be built as in the diagram from ⅛ in. and 1/16 in. balsa. These are more pleasing in appearance and have less drag but are rather harder to make.

Floats. Four main float sides are cut from 1/32 in. balsa to the shape shown and lightened by cutting holes in as shown. (A sharpened metal tube is excellent for this purpose.) Two formers are then built up of ⅛ in. square balsa and the sides cemented to these. The "leading" and "trailing" edges of shaped balsa can then be added. The two cross members of bamboo are then secured, the front one is simply pushed into the leading edge and cemented but the main member is bound to the ⅛ in. square, together with the 20 s.w.g. wire fixing for the undercarriage leg.

The floats may then be covered top and bottom with 1/64 in. balsa, then the whole with tissue and given three coats of banana oil to make completely waterproof. The undercarriage legs of 3/32 in. by 1/16 in. bamboo sanded to an oval section can then be bound in place and the additional "struts" of 22 s.w.g. wire bound on also. The wire fittings at the top of the legs are orthodox as is the wire spring legs. Since there is little or no sideways



movement of the legs, except by flexure of the bamboo the wire "plugs" should be very short otherwise difficulty in attaching and removing will be experienced. The main float unit, should *not weigh more* than 1 oz.; mine weighed ⅞ oz. complete.

Tailfloat construction is very similar except that 20 s.w.g. wire fittings are attached and it has a "step." The attachment of the wire is shown in the drawings and this must be secure. It plugs into two small aluminium tubes in the fuselage. Note the angle at which they are set as this greatly reduces take off run and the liability to tip over on its nose.

If it is thought that the main float unit is too cumbersome, the reader may be inclined to use plug-in legs in which case the leg size should be increased somewhat. *Do not* eliminate the forward bracing wire, however, as this is very necessary and prevents the floats from coming adrift in sticky landings.

Wings. The wing described below is extremely strong and at the same time quite light. The main strength lies in the ¼ in. by ⅛ in. mainspar with the 1 m.m. ply backing at the centre section and of the dozen or so Percies I have seen, none ever suffered from wing failure even in the roughest of landings.

The ribs are cut by means of a template from 1/32 in. sheet balsa using light grade if obtainable. These are slotted to take the mainspar. The large leading edge of balsa is hollowed out for lightness and the ribs slotted into it. The trailing edge is cut from ⅛ in. sheet and the ribs again slotted in. Prop the front edge of the latter up whilst building to ensure that the correct undercamber is obtained. Tips are of 1/16 in. square bamboo or birch, rounded and steamed to shape and secured to the leading and trailing edges. It is a good plan to fit two small gussets where the mainspar meets the tip for additional strength.

Six pieces of tissue are used to cover—two for each wing half and two for the centre section, top and bottom in each case. It must be fixed to the underside of each rib to get the correct undercamber. No wash-in or wash-out is used so the wing half may be pinned flat when drying. Finish with two coats of dope or banana oil.

Attachment to the fuselage is by rubber bands looped over small birch pegs cemented into the leading and trailing edges and passing under the fuselage.

Power. With the 15 in. prop. specified the power is obtained from 2 oz., approximately 10 yards, of $\frac{1}{4}$ in. by 1/30 in. rubber made up into 10 strands each about a yard long. If the motor is to be "corded" about 200 turns are necessary to get the correct tension.

Flying trim. The model should balance horizontally when supported by the fingers under the wing by the fuselage, about 3 in. back from the leading edge.

Flights should be attempted with about 300 turns until you are satisfied that the C.G. position is correct, moving the wing if necessary for slight adjustment, and that a right circle of about 150 ft. diameter is obtained.

The number of turns should then be gradually increased and the turn tightened if any signs of a stall then appear. By this method optimum trim should easily be obtained, but beware of getting too tight a circle as this is not only dangerous under full power but wasteful.

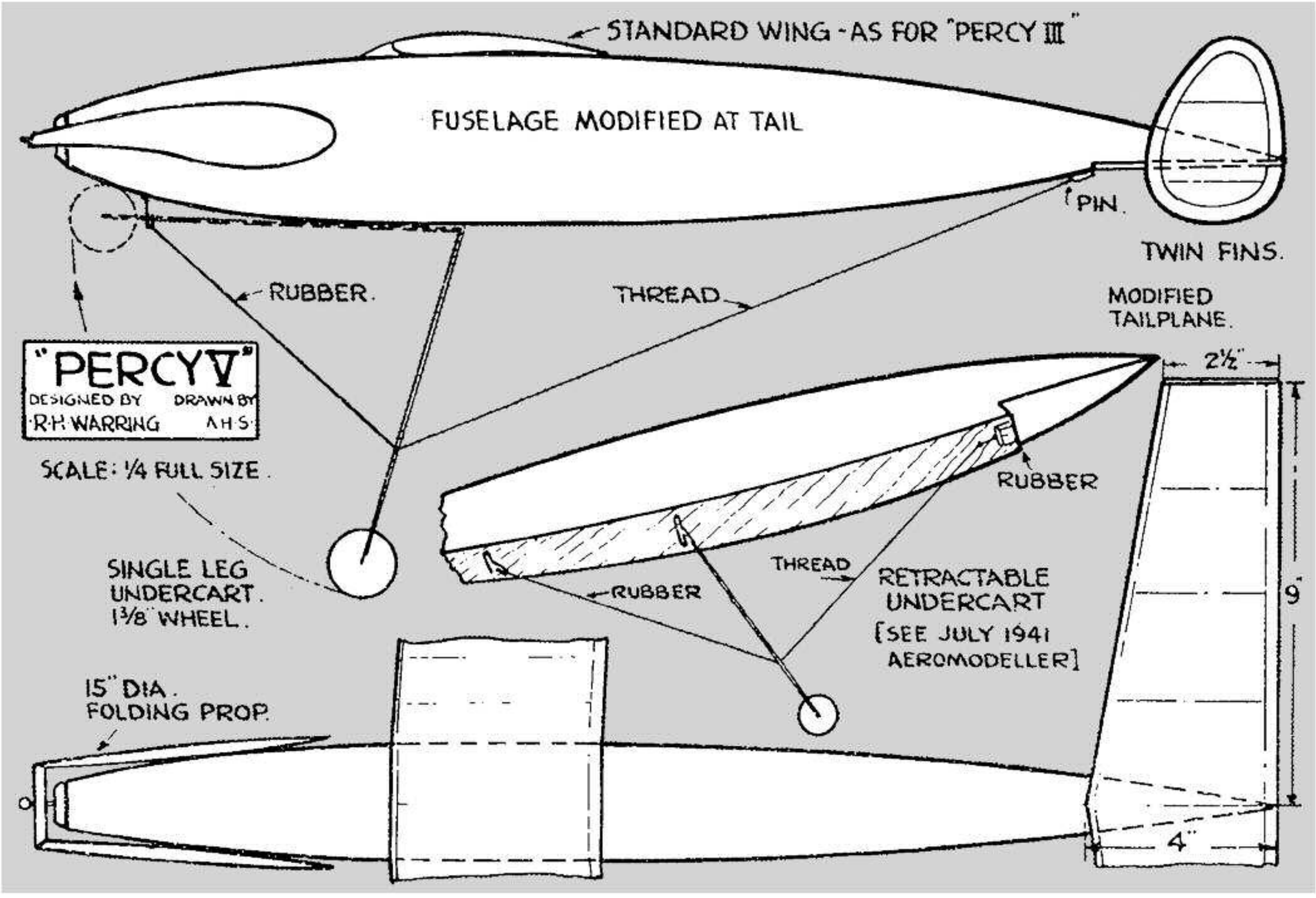
In good trim Percy should take off straight on full turns and climb steeply in a wide circle gradually settling down into a constant right circle so as to stay in any thermals around. With proper trimming it should not stall when taking off in windy weather as the tailplane is sufficiently powerful to master this.

Do not fly the model at too high an angle of attack. I have seen some flown at climbing altitude but without gaining altitude just because the power was being absorbed by the extra drag of the wing. Admittedly I fly my own models very near the stalling point, i.e. at rigging for minimum sinking speed, but the prop. is not stalled.

Special Notes.

Percy has been flown with a 14 in. diameter prop., 10 strands of $\frac{1}{4}$ in. or 11 strands of $\frac{1}{4}$ in. in true American style. The climb in this case is really terrific—a power run of about 45–50 secs. taking the model up to about 300 feet, giving an average duration of $2\frac{1}{2}$ mins. Several flyaways have been obtained by this method, but a slow climb of nearly 2 mins. duration to about 200 feet altitude or more, such as obtained with the standard arrangement, gives a more consistent performance.

A folding prop. was fitted to Percy III and a number of tests carried out which seemed to indicate a definite advantage as regards soaring. However, it is extremely difficult to judge the various types, with the limited amount of time that I was able to spend on Percy just prior to the war, because all the versions showed great aptitude in picking up thermals and flying away. Out-of-sight flights were the rule rather than the exception, for at almost every club meeting a Percy was amongst the flyaways !



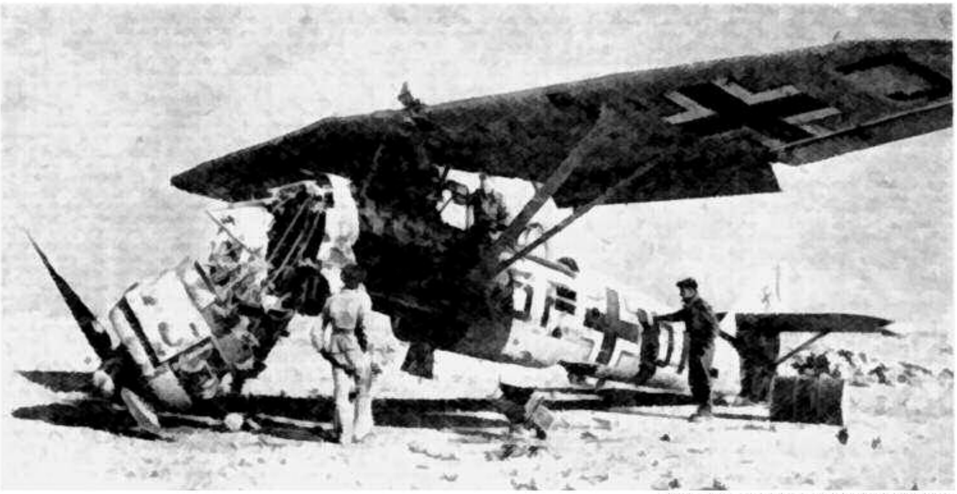


Photo by courtesy of the Air Ministry

DOWNTHRUST

We present a semi-technical survey on that very controversial subject that has recently brought in much correspondence. The mathematical solution is involved—too involved for the average reader to follow, and so we hope that this general article will meet the demand. As our heading photograph shows, downthrust is not solely applied to models—but the designer of the Hs 126 illustrated would not recommend its use to such an excess! The other model at the foot of the opposite page complicates the problem by virtue of the high thrust line. It is a flexible drive flying boat built by A. K. E. Gyford.

AS we anticipated, this old, controversial subject has brought in a shoal of letters from readers, some backing B. R. Aldridge (February AERO-MODELLER, page 78), some F. Petri (May AERO-MODELLER, page 204) and still others agreeing and disagreeing with both. The issue, then, would appear most confused ! Thus it is too much to hope that we shall get away with this survey scot-free—so we will commence by quoting from readers' letters.

Firstly A. Leadbetter. "I agree with Mr. Aldridge that the C.G. can and should be regarded as the point about which the whole machine pivots. It is the only fixed point in the machine (?) and therefore the logical place to design from. [*In practice the C.G. position is most elusive and frequently differs from its designed place. It should be brought back by adding weight in the right place, but, as often as not, is corrected by some other method without really appreciating what has happened.*—Ed.] I also agree that downthrust is undesirable and should be dispensed with, but not his method of doing it, which, as Mr. Petri points out, does not appear quite 'water-tight.'

"The stability of a model is governed by those forces which have a turning moment about the C.G.; those passing through it, *e.g.* weight, will have no effect. If we make the thrust line pass longitudinally through the C.G., as would seem desirable, the longitudinal stability must be obtained by the remaining two forces, lift and drag. This they will do if their turning moments about the C.G. are equal and opposite. The model will then fly along the thrust line, which in this case will be parallel to the centre line of the fuselage."

Well, in the main that seems to *agree* with B. R. Aldridge, in spite of his statement to the contrary. In fact, that is a typical view and represents the rather general confusion on this topic.

To summarise the two original views. B. R. Aldridge maintains that if the thrust line passes through the centre of gravity then there is no divergence between engine on and engine off flight. F. Petri, on the other hand, takes the view that if the thrust line passes through the centre of resistance of the whole machine then the "no divergence" condition is satisfied. This latter view is also common amongst the purely practical aero-modellers who may get wonderful results but are rather at a loss when it comes to detailing the exact theoretical reasoning behind their actions.

For the benefit of the latter school we can do no better than quote E. J. Townsend : "The object of downthrust is to make the thrust line pass just (and only just) below the centre of resistance of the whole model, so that only a small couple is exerted, tending to raise the nose of the machine under full power and thus preventing a stall.

"The object of having the thrust line just *below* the centre of resistance instead of passing through it, as advocated by some people, is to create a *very slight* nosing-up force which pulls the nose up into a steep climb. This must be arranged so that the power and climbing angle give the maximum altitude without stalling on full power."

If we accept this, then the *only* solution to trimming is, and ever will be, practical tests to determine optimum performance. Particularly as we are very badly off as regards accurate low speed data, there is no doubt that this is the method that is the most reliable, but it has got us little farther forward as regards the solution of the immediate problem.

Reverting to the original statements that have caused this argument and taking B. R. Aldridge's theory first, we can elaborate this and state that if the thrust line passes through the C.G. *and the centre of resistance* lies on a horizontal line passing through the C.G., then there cannot be any divergence between engine on and engine off trim. This is, in effect, a combination of the two views and represents the ideal.

Aldridge's hypothesis holds good *provided that the drag is constant throughout flight range*, which, unfortunately, it is not. Petri's statement holds good if the couple caused by the increased drag during flight is balanced by the couple exerted by the thrust, both being distant from the C.G. This, again, is not true. A further point that must be appreciated is that the attitude of a model is not constant during flight and it is difficult to generalise and lay down the exact performance of a model without considering the design as a whole. Should the attitude of the model vary, it follows naturally that the angle of attack will vary and thus *the line of action of the resultant aerodynamic force will also vary*, this being one of the reasons why a tailplane is required to maintain stability.

Digressing for a moment, let us consider yet another factor—slipstream effect. This was mentioned by both E. J. Townsend and R. Burns, but they tended, rather, to over-estimate its effect. To quote Townsend : "A lifting tailplane generates more lift when the main airflow is increased by the slipstream velocity, *i.e.* under full power. Thus there is a force tending to lift the tail and depress the nose, thus preventing a stall. This anti-stalling moment dies away as the power diminishes." This, of course, has ignored the fact that the wing is also partly under the influence of the slipstream and thus also generates more lift. R. Burns concerns himself more with the effect of the slipstream on the direction of the airflow at the tailplane, since it tends to flatten out the downwash behind the wing. The air, after passing over the wing, is deflected downwards slightly (equivalent at the tail to a flow making a negative angle with the original airflow equal to approximately one-half of the angle of attack of the wing) and thus a tailplane set at 0° to the fuselage *datum* line may be at —2° angle of attack to the *airflow* with airscrew running. The slipstream will tend to reduce this downwash and if the thrust line is inclined downwards, *i.e.* downthrust employed, the downwash may even be reversed. Add to this the spiral element of the slipstream, which can, however, be ignored in longitudinal stability calculations, it will be appreciated that the problem is most complex !

The component velocity of the slipstream is given by the following formula :—

$$v = \frac{T}{\rho A V}$$ (*R. H. Warring "Airscrews."*)

where T = airscrew thrust in lbs.
A = area of slipstream in sq. ft.
V = forward velocity of machine in ft./sec.

The area of the slipstream is given by :—

$$A = \frac{\pi}{4}\left(D^2 - \left(\frac{D}{5}\right)^2\right)$$

By substituting model values it will be found that the component slipstream velocity is relatively small and, for the sake of simplicity, may be ignored, although its effect on the direction of the airflow at the tail may be more apparent. Assuming a thrust value of 1 oz. as typical of an "average" model flying at 20 ft./sec. with an airscrew of 18 in. diameter, the slipstream velocity component becomes :—

$$v = \frac{1}{16 \times \cdot 00238 \times 1\cdot 7 \times 20}$$
$$= .775 \text{ ft./sec.}$$

Quite negligible as regards both airflow effect and "extra lift," but at the beginning of the power run it may reach a value as high as 4 ft./sec. when its influence is more readily felt.

Readers may care to make their own calculations along these lines, using actual figures verified by practice.

Returning to our original problem, the question is to turn a glider into a power machine, and a machine in which the power output is not constant. For any particular rigging there is only one attitude in which a machine will glide—that is when all the forces acting about the centre of gravity are in equilibrium. In full size practice, and particularly preliminary calculations, the effect of the drag of the parasite is neglected and equilibrium assured when the wing moment is balanced by the tail moment. Full details would necessitate a volume, so we must generalise.

Consider separately three types of models which are balanced for gliding flight and let us investigate the result of applying power, or thrust.

(1) *The Parasol.* Applying the thrust so that its line of action passes through the C.G., the original equation of equilibrium is unaltered but the tendency is now for the model to fly faster with a consequent increase in drag values all round. Any power available over and above that necessary to maintain level flight causes the model to climb, since the main increase in drag is due to the wings. This tends to increase the angle of attack of the wings still further, this action being more powerful than the tailplane correcting moment and so with excess power we must expect a positive pitching moment, *i.e.* a stalling tendency. Unfortunately, the C.P. of a wing moves forward with increasing angle of attack and this, too, adds a further pitching moment.

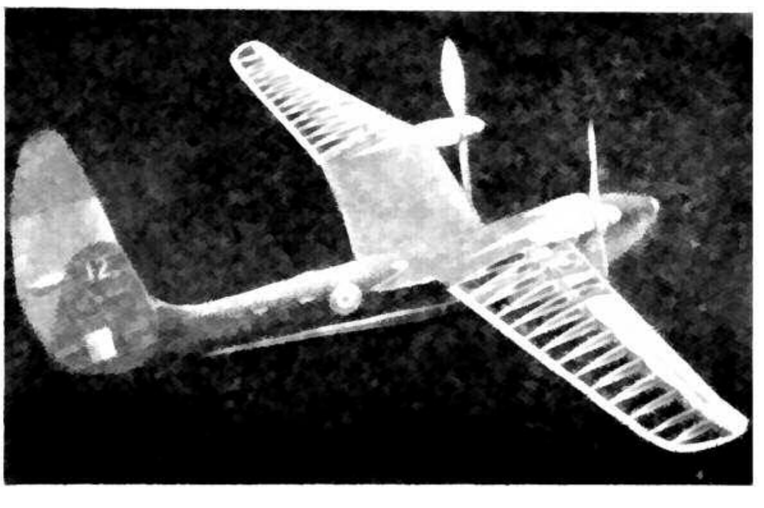
It would appear, then, that it is desirable that the thrust exert a slight negative pitching moment, *i.e.* diving tendency, in a parasol model, although this is wasteful once the initial burst of power has run out.

(2) *The Mid-wing Model.* Applying the thrust through the centre of gravity as before, the positive pitching moment brought about by the increased wing drag is quite small, may even be non-existent if the C.R. lies on a horizontal line through the C.G., and this would appear to be the ideal layout. It would actually appear preferable to have the drag centre of the wings slightly above the C.G., but in such a layout some downthrust should be necessary.

(3) *The Low-wing Model.* The reverse of (1) is true, but a high tailplane position may lead to some surprising results. Upthrust, if used in such a case, may be difficult to control on account of the unstable centre of pressure movement of the wings.

Until such time as we can test a variety of models thoroughly in a wind tunnel, it is rather useless to quote certain mathematical formulæ in the hope that it will bear some resemblance to the actual model facts. Thus this survey has been, deliberately, both general and practical, the latter method being the only reliable method of trimming a model for optimum performance. Just what this performance is, of course, depends entirely upon the design, and readers are referred to the various text books available.

The effect of changing altitude upon wing drag, and thus upon the stability of a model as a whole, is most marked on streamlined designs. These are particularly sensitive to thrust line positioning, the slabsider seemingly allowing greater latitude on account of its relatively high parasitic drag. The final solution does not come under the heading of downthrust alone, neither is it confined to longitudinal stability. Downthrust and its companion *sidethrust* are the final deciding factors. It is almost true to say that for the majority of models it should be possible to dispense entirely with downthrust controlling the stalling tendency on the first burst of power by *correct* use of sidethrust. It can be done, but there is always the danger of a vicious spiral dive under full power which the comparative novice cannot readily correct. This subject, however, is beyond the scope of the present article.



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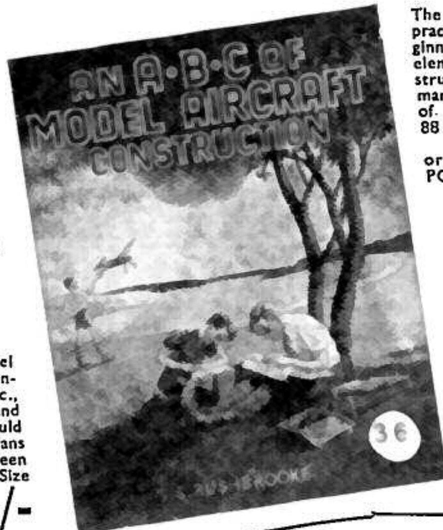

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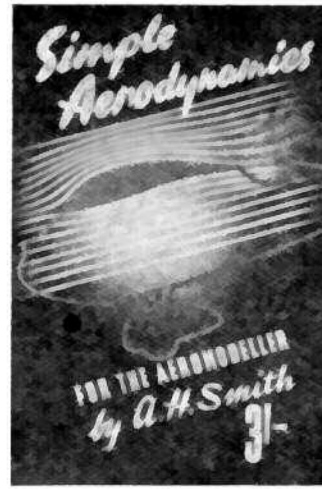

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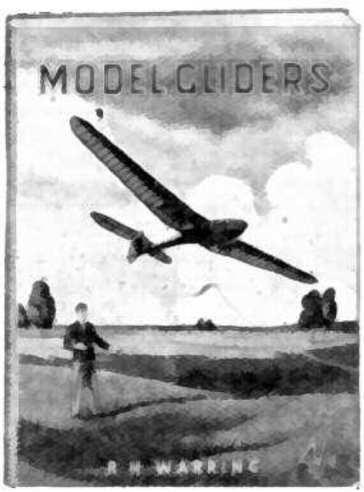

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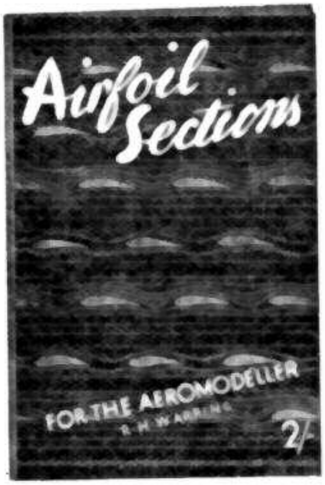

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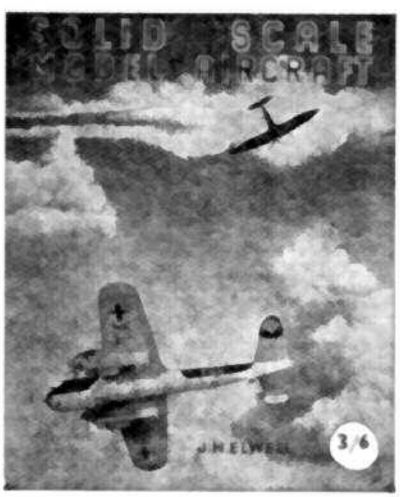

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A NEW AIRFOIL THEORY NOTATION

by N. K. WALKER

This article will appeal to the more technically inclined aeromodellers and, despite its apparently complex, mathematical nature is relatively easy to follow and is the first time that an attempt has been made in model aeronautics to dispense to a large extent with graphs of airfoil characteristics. Practical aeromodellers will find that the most useful equation is No. 12 as no theory is required to apply it, only practical tests. It does not afford a means of comparing airfoils, though, only of obtaining the wing incidence for minimum sinking speed. A graphical method of doing this was given in the June Technical Topics. The photograph shows the author and his Canard model.

THE concluding articles and letters of the Jones-Maxwell controversy and many subsequent articles agreed on the principles to be adopted for comparing airfoils. Most people, however, will agree that the methods used when including aspect ratio correction and the like are extremely lengthy and laborious.

For example, to select the best angles of attack for my 1941 Wakefield model including aspect ratio corrections required two hours' work (using normal method as explained by Mr. Powdrill in December, 1940, issue).

By using the formulæ deduced later I have been enabled to repeat this work in about six minutes. It is, therefore, possible to compare ten different airfoils in half the time taken originally to consider only one airfoil.

The first assumption is that the graph of the lift coefficient against angle of attack is a straight line *over our working range.*

(1) $C_L = M\,(a - a_0)$

where " M " is the slope of the lift curve and " a_0 " is the angle of no-lift.

The second assumption is that the C_D curve is of parabolic form and can be represented by :—

(2) $C_D = C_{D_{MIN}} + k(\theta - \theta_{MIN})^2$

where " θ " is the angle of attack as measured from the no-lift line, θ_M is angle of minimum drag as measured from the no-lift line, " K " is a constant, and $C_{D_{MIN}}$ is the minimum value of the drag coefficient.

Furthermore, if the extra-to-wing drag of a machine be denoted by C_B, which coefficient is based on wing area.

Total Drag Coefficient $= C_D + C_B$

(3) $= C_{D_{MIN}} + C_B + k\,(\theta - \theta_m)^2$

or $C_{D_{TOTAL}} = D + k\,(\theta - \theta_m)^2$

where $D_T = C_{D_{MIN}} + C_B$

Hence to allow for drag of rest of model add C_B to $C_{D_{MIN}}$ in the formulæ you use.

To deduce the angle of incidence for best L/D ratio and also the value of L/D max.

In the following treatment it is assumed that the coefficient of extra-to-wing drag, C_B (based on wing area) is constant and the sum of C_B and $C_{D_{MIN}}$ is denoted by " D ".

$$C_L = M\theta \qquad C_D = D_T + k\,(\theta - \theta m)^2$$

$$\text{Drag/Lift} = C_D/C_L = \frac{D_T + k\theta^2 m}{M\,\theta} - \frac{2k\,\theta m}{M} + \frac{k\,\theta}{M}$$

Differentiating with respect to " θ " and putting the result =0 for minimum value of D/L

$$\frac{d(D/L)}{d\theta} = -\frac{D_T + k\,\theta^2 m}{M\theta^2} + \frac{k}{M} = 0$$

$$\text{or } \theta^2 = D_T/k + \theta^2 m \quad \text{for maximum L/D}$$

(4) or $\underline{\theta_{L/D} = \sqrt{D/k + \theta^2 m}}$ where " $\theta_{L/D}$ " is angle of incidence of wing for maximum L/D ratio.

$$\text{but } D/L = \frac{D + k\theta^2 m}{M\theta} - \frac{2k\theta m}{M} + \frac{k\theta}{M}$$

and $D + k\theta^2 m = k\theta^2_{L/D}$ for maximum L/D ratio.

$$D/L_{MIN} = \frac{k\theta_{L/D}}{M} - \frac{2\,k\theta m}{M} + \frac{k\theta_{L/D}}{M}$$

$$= \frac{2\,k\,(\theta_{L/D} - \theta m)}{M}$$

(5) or $L/D_{MAX} = \dfrac{M}{2\,k\,(\theta_{L/D} - \theta\,m)}$

For some airfoils " θm " is negligible, then

(6) $\theta_{L/D} = \sqrt{D/k}$ (9) $L/D_{MAX} = \dfrac{M}{2k\theta_{L/D}} = \dfrac{M}{2\sqrt{Dk}}$

To determine the angle of attack for minimum sinking speed, and to find $L^{1\cdot5}/D$ max., the power ratio.

It is agreed that the sinking speed is least when the wing is set at an angle " θs " such that the power ratio $L^{1\cdot5}/D$ is a maximum. This is also the setting for maximum rate of climb from potential energy considerations.

By a similar process to that adopted to find " $\theta_{L/D}$ "

(7) $\theta s = \sqrt{3D_T/k + 4\theta^2 m} - \theta m$

(8) $= \sqrt{3\theta^2_{L/D} - \theta m} - \theta m$

or approximately (error about—17 $\left(\dfrac{\theta m}{\theta_{L/D}}\right)^2$ % and is 1% if $\theta_{L/D} = 4\ \theta m$).

(9) $= \sqrt{3}\,\theta_{L/D} - \theta m$

The Power Ratio has no simple general form such as we found for L/D max. and is best found for accurate work when $\theta m = \frac{1}{4}\sqrt{D/K}$ or more by substituting for θs in the following equation :—

$$(10) \qquad \frac{L^{1\cdot5}}{D}\max = \frac{M^{1\cdot5}\theta s^{1\cdot5}}{C_{D_T}+k(\theta s - \theta m)^2}$$

If θm is less than $\frac{1}{10}\sqrt{\frac{C_{D_T}}{k}}$ then equation (10) may be rewritten $\theta s = \sqrt{\frac{3D_T}{k}}$ and equation (13) simplifies to :—

$$(11) \qquad \frac{L^{1\cdot5}}{D\max} = \cdot57\sqrt[4]{\frac{M^6}{D_T\ K^3}}$$

$$= \frac{\cdot57\ M^{1\cdot5}}{4\sqrt{D}\ k^3}$$

Equation (13) may also be used for $\theta m = \frac{1}{4}\sqrt{C_{D_T}/K}$ or less, but "θs" must be found from equation (11) in its original form using "θm". It will be seen from equations (6) and (10) that the angles of incidence for best glide and for minimum sinking speed are proportional approx. to $\sqrt{D}$. In other words, a model of high drag requires a larger angle on incidence than a streamlined model.

This is in agreement with the conclusions reached during the Jones-Maxwell controversy.

Equation (12) also gives a practical way of finding the correct wing setting for minimum sinking speed.

$$\theta s = \sqrt{3}\theta_{L/D} - \theta m$$

Now any angle measured from the no-lift line can be converted to normal measure by adding the angle of no-lift.

$$(12) \quad \therefore a_s = 1\cdot73 a_{L/D} - am + \cdot27 a_o$$

where a_s =angle of incidence for minimum sinking speed.

a_m =angle of minimum drag. (Normally negative.)

$a_{L/D}$ =angle of incidence for best glide.

a_o =angle of no-lift. (Normally negative.)

thence if we find the angular setting which gives the longest glide, we can, from this, calculate the setting for minimum sinking speed if we know "am" and "a_o".

Example :—

If a model using an R.A.F. 32-section wing glides furthest from a given height when the wing is at 0° angle of incidence the angle for minimum sinking speed is given by :—

$$as = 1\cdot73 \times 0 + \cdot27\,(-6\cdot5) - (-7\cdot4)$$
$$= +\,6\cdot5° - 2\cdot0° = 4\cdot5°$$

(Values as given by Cruikshanks.)

ASPECT RATIO CORRECTION

Lift Curve.

It is well known that aspect ratio changes have no effect on the angle of no-lift. The only other variable is "M", and it is fairly simple to correct "M" for aspect ratio change as follows :—

At constant "C_L" an increase in aspect ratio from A_1 to A_2 leads to a reduction in angle of attack of $\theta_1 - \theta_2$ which equals :—

$$C_L \times 18\cdot24\left(\frac{1}{A_1} - \frac{1}{A_2}\right)$$

$$\text{but } \theta_1 = \frac{C_L}{M_1} \qquad \theta_2 = \frac{C_L}{M_2}$$

$$\therefore \frac{1}{M_1} - \frac{1}{M_2} = 18\cdot24\left(\frac{1}{A_1} - \frac{1}{A_2}\right)$$

$$(13) \text{ or } \quad \frac{1}{M_2} = \frac{1}{M_1} - 18\cdot24\left(\frac{1}{A_1} - \frac{1}{A_2}\right)$$

e.g. if $M_1 = \cdot071$ for aspect ratio 6
M_2 for aspect ratio 10

$$= \frac{1}{\frac{1}{\cdot071} - 18\cdot24\,(\cdot1667 - \cdot1000)}$$

$$= \frac{1}{14\cdot08 - 1\cdot22}$$

$$\doteq \frac{1}{12\cdot86}$$

$= \cdot0775$. Hence "M" increases with aspect ratio.

NOTE.—$C_{L_{MAX}}$ is also increased by an increase of aspect ratio, but for model work we are not interested in $C_{L_{MAX}}$ as our aircraft fly at much lower angles of attack. $C_{L_{MAX}}$ is only useful as a check on longitudinal stability, but more of that later.

Drag Curve.

$C_{D_{MIN}}$ is slightly affected by aspect ratio changes and "k" and "θm" much more so.

For Elliptical loading.

Reduction in drag.

$$(14) \quad = C_{D_1} - C_{D_2} = \frac{C_L^2}{\pi}\left(\frac{1}{A_1} - \frac{1}{A_2}\right)$$

Also change in "C_D" is nil if "C_L" $= 0$
i.e. if $\theta = 0$

$$(15) \quad C_{DM_1} + k_1\theta^2 m_1 = C_{DM_2} + k_2\theta^2 m_2$$

Hence change in "C_D" $= C_{D_1} - C_{D_2}$

$= (C_{DM_1} + k_1\theta m_1^2) - 2k\theta_1\theta m_1 + k_1\theta_1^2 - (C_{DM_2} - k_2\theta^2 m_2) + 2k_2\theta_2\theta^2 m - k_2\theta_2^2$

$= k_1\theta_1^2 - k_2{}^2\theta_2{}^2 + 2k_2\theta_2\theta m_2 - 2k_1\theta_1\theta m_1$

Substituting for $\theta_1 = C_L/M_1 \qquad \theta_2 = C_L/M_2$

$$(16) \quad \triangle C_D = \frac{C_L^2}{\pi}\left(\frac{1}{A_1} - \frac{1}{A_2}\right) = k_1\frac{C_L^2}{M_1^2} - k_2\frac{C_L^2}{M_2^2} - 2k_1\frac{C_L}{M_1}\theta m_1 + 2k_2\frac{C_L}{M_2}\theta m_2$$

for all values of "C_L".

Hence last two terms must be zero, or

$$(17) \quad \frac{k_1\,\theta m_1}{M_1} = \frac{k_2\,\theta m_2}{M_2}$$

$$\text{and also } \quad \frac{1}{\pi}\left(\frac{1}{A_1} - \frac{1}{A_2}\right) = \frac{k_1}{M_1^2} - \frac{k_2}{M_2^2}$$

Equations 15, 16 and 17 give :—

$$(18) \quad k_2 = M_2^2\left(\frac{k_1}{M_1^2} - \frac{1}{\pi}\left(\frac{1}{A_1} - \frac{1}{A_2}\right)\right)$$

$$(19) \quad \theta m_2 = \theta m_1\left(\frac{M_2}{M_1} \times \frac{k_1}{k_2}\right)$$

$$(20) \quad C_{DM_2} = C_{DM_1} + k_1\,\theta^2 m_1 - k_2\,\theta^2 m_2$$

e.g. if $k_6 = \cdot0004$, $C_{DM_6} = \cdot018$, $\theta m_6 = 2\cdot2°$, $M_6 = \cdot071$, $M_{10} = \cdot07775$.

find k_{10}, $C_{DM_{10}}$, θm_{10}.

$$K_{10} = M_{10}^2\left(\frac{k_6}{M_6^2} - \frac{1}{\pi}\left(\frac{1}{6} - \frac{1}{10}\right)\right)$$

$$= \left(\frac{\cdot07775}{\cdot071}\right)^2 \times \cdot0004 - \frac{\cdot07775^2}{\pi} \times \cdot06667$$

$= \cdot0004796 - \cdot0001281$

$= \cdot0003515$ or $\cdot00035$ approx.

$$\theta m_{10} = 2{\cdot}2^\circ \times \left(\frac{{\cdot}07775}{{\cdot}071} \times \frac{{\cdot}0004}{{\cdot}00035}\right)$$
$$= 2{\cdot}75^\circ$$
$$C_{DM_{10}} = {\cdot}018 + {\cdot}0004 \times 2{\cdot}2^2 - {\cdot}00035 \times 2{\cdot}75^2$$
$$= {\cdot}018 + {\cdot}00194 - {\cdot}00264$$
$$= {\cdot}0173$$

"K" is decreased by 12½%.
θm is increased by 25½%.
CDM is decreased by 4%.

EFFECT OF CHANGE OF ASPECT RATIO ON L/D RATIO AND $L^{1\cdot5}/D$ RATIO

If we neglect the small change in "D" with aspect ratio, and assume "θm" is negligible :—

$$(L/D)_1 = \frac{M_1}{\sqrt{Dk_1}} \qquad (L/D)_1^2 = \frac{M_1^2}{Dk_1}$$
$$(L/D)_2 = \frac{M_2}{\sqrt{Dk_2}} \qquad (L/D)_2^2 = \frac{M_2^2}{Dk_2}$$

but from equation (19) :—

$$\frac{k_1}{M_1^2} - \frac{k_2}{M_2^2} = \frac{1}{\pi}\left(\frac{1}{A_1} - \frac{1}{A_2}\right)$$
$$\text{or} \quad \frac{1}{(L/D_1)^2} - \frac{1}{(L/D)_2^2} = \frac{D}{\pi}\left(\frac{1}{A_1} - \frac{1}{A_2}\right)$$

Hence L/D_{MAX} is approx. proportional to $\sqrt{A}$

Check. For Warring's values for R.A.F. 32.

$$(L/D\max)_6 = 15{\cdot}0$$
$$(L/D\max)_{10} = 18{\cdot}0\sqrt{\frac{10}{6}}$$
$$= 23{\cdot}2 \ \textit{(almost correct).}$$

Similarly :—
$L^{1\cdot5}/D$ varies as $(A)^{3/4}$

It is, of course, impossible to give the complete mathematical.

THEOREM OF TANDEM AIRFOILS

Consider two airfoils of characteristic constants M_1, a_{o1}, k_1, D_1, θm_1, and M_2, a_{o2}, k_2, D_2, θm_2, then if these are rigidly connected together so that their difference of angle of incidence as measured from their no-lift lines is "ϕ" such that the leading plane has the greater incidence and their areas be as $A_1 : pA_1$ where "p" $= \frac{A_2}{A_1}$ and is less than unity.

Then they behave as an airfoil of area A_1, whose characteristic constants as measured from *no-lift line of larger airfoil* are :—

(21) $M = M_1 + pM_2$

(22) $a_o = \frac{pM_2\phi}{M_1 + pM_2}$ where "ϕ" is angle of incidence of mainplane when stabilizer has no lift and is +ve if mainplane in front, —ve for CANARDS or tail-first machines.

(23) $D = D_1 + pD_2 + \frac{pk_1 k_2}{k_1 + pk_2}(\theta m_1 - \theta m_2 - \phi)^2$

(24) $\theta m = \left\{\frac{k_1\theta m_1 + pk_2(\theta m_2 + \phi)}{k + pk_2}\right\} - a_o$

(25) $k = k_1 + pk_2$

The proof of this theorem is extremely laborious, as it occupies about four pages of foolscap, so I shall give only a brief outline for the benefit of the mathematical sceptics.

Equation (25). Find total CL, and equate to zero. "a_o" is value of incidence of mainplane for no total lift. (23). Substitute for "a_o" in $C_L = M^1 (a - a_o)$ and compare with sum of the two lift coefficients.

Drag Curve. Write down sum of two equations for CD and by differentiating find value of angle of attack of mainplane for which total drag is a minimum, this is "θm". Then substitute and find CD at "θm". This is obviously $C_{D_{MIN}}$. Substitute these values in equation $C_D = C_{D_{MIN}} + k(\theta - \theta m)^2$ and compare coefficients of constant term, θ and θ^2 with total of C_{D_1} and C_{D_2}. All three give equation (28).

Values of the Basic Constants for various well-known Airfoil Sections at Fairly Low Speeds.

Wing Section	Authority	a_o	M	CD	K	θm	b	e	(a_o)	$C_{L_{MAX}}$	Stalling Angle	VC	A.R.
R.A.F. 15	1	— 1·6°	·0833	·0052	·000286	0·08°	— ·666	·25	— 1·6°	1·04	12.70	120	6
R.A.F. 28	1	— 1·5°	·0883	·0120	·00041	0·5°	— ·490	·24	— 1·5°	·942	10·5°	120	6
R.A.F. 32	2	— 7·9°	·0774	·048	·000663	3·0°	—1·61	·25	— 5·7°	1·0	10·5°	108·5	9
R.A.F. 32	3	— 7·4°	·0746	·0167	·000324	1°	—1·86	·239	— 5·7°	1·308	14·7°	480	6
R.A.F. 38	4	— 2·2°	·0735	·013	·00034	0·9°	— ·66	·23	— 2·2°	1·02	16·8°	585	6
GOTTINGEN 497	5	— 8·0°	·0717	·0125	·000393	1°	—1·92	·245	— 8·0°	1·36	15·5°	748	5
GOTTINGEN 652	4	—13·25°	·0707	·027	·000414	3·25°	—2·83	·27	—11·25°	1·8	17·45°	770	5
GOTTINGEN 387	4	— 6·6°	·0751	·0133	·000367	1°	—1·32	·238	— 6·6°	1·38	14·1°	8,300	6
GOTTINGEN 358	4	— 8·0°	·0687	·0162	·000387	1·3°	— ·9	·25	— 6·1°	1·32	13·0°	770	5
GOTTINGEN 532	4	— 6·0°	·072	·018	·000448	2·2°	—1·22	·247	— 6·4°	1·40	17·5°	770	5
CLARK YH	4	— 2·9°	·0745	·012	·00032	—0·1°	— ·45	·235	— 3·1°	1·12	15·3°	585	6
CLARK Y	6	— 5·6°	·0706	·018	·000407	2·0°	—1·09	·235	— 5·6°	1·23	14·5°	480	6
M 6	5	— 0·3°	·0717	·008	·0004	0·3°	+ ·170	·233	— 0·3°	1·23	18·5°	375	6
M 6	2	0·0°	·0365	·0260	·000346	4·0°	+ ·170	·238	0·0°	·64	16·0°	117·5	6
NACA 6512	2	— 6·7°	·0587	·045	·000225	5·0°	—1·5	·25	— 5·7°	·89	12°	117·5	8
NACA 6412	5	— 5·5°	·0965	·0305	·000843	3·2°	—1·35	·25	— 5·5°	1·35	12°	80	6
NACA 6412	5	— 6·0°	·0961	·0282	·000687	1·5°	—1·35	·25	— 6·0°	1·36	12°	157	6
NACA 0012	4	0°	·0783	·007	·000352	0·0°	— ·182	·246	0·0°	1·48	21°	10,500	6
U.S.A. 27	3	— 4·7°	·0702	·0098	·00031	0·3°	— ·742	·170	— 4·7°	1·41	20°	—	6
S.T.A.E. 27A	3	—10·2°	·0694	·0137	·000264	—0·17°	—2·34	·275	—10·2	1·87	14·5°	—	6
EIFFEL 400	5	— 7·1°	·0767	·0135	·000388	1·6°	—0·96	·297	— 7·1°	1·14	12·0°	543	6
EIFFEL 431	5	— 6·7°	·0736	·013	·000303	0·0°	—1·19	·265	— 6·7°	1·27	14·8°	362	6
RUSSELL'S AIRFOIL	7	— 4·4°	·1145	·0565	·000525	2·3°	—2·5	·27	— 4·4°	1·8	16°	200	6
McBRIDE B7	5	— 5·5°	·0249	·0080	·00117	4·0°	—1·4	·25	— 3·2°	·5	13·5°	14	3·44
R.A.F. 19	1	— 8·4°	·084	—	—	—	— ·9	·365	— 4·0°	1·78	21·0°	425	6

VC =Velocity (ft./sec.) × chord (inches)
=Reynolds Number ÷ 524.
A.R. =Aspect Ratio.
b and e =stability coefficients.
(a_o) =true value of no-lift angle.

AUTHORITY
1—Whitlock.
2—Powdrill & Macbean.
3—J. W. Cruickshanks.
4—Handbook of Aeronautics.
5—Frank Zaic 1938.
6—S. B. Stubbs.
7—D. A. Russell

The above equations give revised values of the constants M, D and K for the *mainplane area.* (For constants based on total area divide by " 1 + p ".)

The angle " ϕ " is called the " longitudinal dihedral angle " and should for maximum efficiency be the difference between the angles of minimum drag of the wing and tailplane, i.e. when the wing is at its minimum drag incidence the tailplane should be also, except that for stability the forward plane must have the larger incidence.

EXTRA-TO-WING DRAG COEFFICIENT—" C_B "

The drag coefficient of most fuselages, undercarriages, etc., are given based on their respective cross-sections. They must, for use in the above formulæ be based on the wing area, and must therefore be multiplied by

$$\frac{\text{AREA OF COMPONENT}}{\text{,, ,, WING.}}$$

Representative values as below.

COMPONENT	C_D	Authority
Flat Topped Slab-sided Fuselage	.353	D. A. Russell
Oval Section Fuselage Blunt Tail and Round Nose	.180	D. A. Russell
Pear Section Fuselage Pointed Nose and Finely Pointed Tail	.098	D. A Russell
Rounded Flat-sided Fuselage. Blunt Nose and Tail	.196	S. B. Stubbs
Circular Fuselage Finely Pointed Tail and Nose and Folding Propellor	.053	E. J. Powdrill
Monostrut Undercarriage with Streamline Wheel	.0087 for each leg	E. J. Powdrill
Reduction of C_D due to folding propellor	.0617	E. J. Powdrill
Slab-sided Fuselage Round Nosed with twin Rudders and Tailplane	.0624	E. J. Powdrill
Freewheeling Propellor P=16 in. D=16 in. Width=1.75 in.	.0154	E. J. Powdrill

Fuselage drag coefficient are based on fuselage cross-sectional area.

Undercarriage drag coefficients are based on length of undercarriage leg in inches.

Freewheeling propellor drag coefficients based on diameter times blade width.

The above values are in rather wild disagreement. Experiment alone will show which are the more correct. (The technical staff are endeavouring to compile a set of representative low speed figures and we hope to publish certain of these results in a future issue. Ed.)

DETERMINATION OF CONSTANTS

To find constants " M " and " a_0 ", plot the lift curve on a large sheet of graph paper, select the working range and then find the slope of the line which lies along the lift curve for the range (this is " M ") and where it cuts the " X " axis (this is " a_0 ").

Drag curve.

Plot C_D against $(\theta - \theta m)^2$ for various values of θm thus obtaining a series of straight lines of slope " K " and intercept on the C_D axis of $C_{D_{MIN}}$. Choose the line which best fits the points you have plotted over the *working range.*

Check for low-lift and medium-lift airfoils.

Work out $\theta_{L/D}$ and L/D_{MAX} for the airfoil alone. The results should be correct to within 2%.

Example :—

The results for R.A.F. 32 given by Warring are used to determine the constants for R.A.F. 32 at a V C number of 480 and an aspect ratio of 6.

Plot C_L against " a ". (*Fig.* 1).

This gives " M " = ·0746 a_0 = —7·4°.

Plot C_D against $(\theta - \theta m)^2$ for θm = ·5°, ·8°, 1°, 1·2°, 1·5°. (Fig. 2.)

This gives $C_{D_{MIN}}$ = ·0167, K = ·000324, θm = 0·9°

Also $\theta_{L/D} = \sqrt{D/k + \theta^2 m} = \sqrt{51{\cdot}5 + {\cdot}81} = \sqrt{52{\cdot}3} = 7{\cdot}25°$

or $a_{L/D} = \theta_{L/D} + a_0 = 7{\cdot}25 - 7{\cdot}4 = -{\cdot}15°$

$$L/D_{MAX} = \frac{M}{2k\,(\theta_{L/D} - \theta m)} = 18{\cdot}15. \text{ (Fig. 3.)}$$

As a final check work out values of C_L and C_D and find the percentage error.

AIRCRAFT DESIGN—SIMPLIFIED

(*concluded from page* 423)

The solution by the NOMOGRAPH is as follows :— Connect the known value of the velocity, *i.e.*, 20 with the known weight, *i.e.*, 8, and project this line to the REFERENCE LINE. (This can quite easily be done by laying a straight-edge over the scales and reading off the REF. number direct.) This same value of the REF. SCALE is taken on the other section of the Nomograph and connected to the value of the wing area, *i.e.*, 216. Project across as before and the Lift Coefficient is immediately given on its appropriate scale.

This operation takes far less time to carry out than to describe and there is absolutely NO CALCULATION. The whole process of working out intricate equations simply resolves itself into laying a ruler across a number of scales !

This simple example alone illustrates the amazing value of the Nomograph as a rapid calculator. No conversion of sq. ft. to sq. in. ; no changing ounces to pounds ; and no worrying about decimal points.

By now even the most sceptical reader should be converted, but there is, of course, one point. The Nomograph shown can only be used for Lift calculations. Thus each particular design equation needs a Nomograph of its own, and this is where THE AERO-MODELLER sweeps away all criticism as regards restriction of its use by announcing :—

A COMPLETE HANDBOOK OF NOMOGRAPHS SPECIALLY DESIGNED TO MEET THE NEEDS OF ALL AERO-MODELLERS HAS BEEN PREPARED AND IS NOW AVAILABLE AT THE PRICE OF 2/–, or 2/2 post free, from THE AERO-MODELLER, Allen House, Newarke Street, Leicester.

GEODETIC CONSTRUCTION *by* E. LIOFFEL

THE first time geodetic construction came to my notice was at the Albert Hall in 1939, when a member of the Woodford Club turned up with a geodetic microfilm model, built from a design by Roy Marquardt. Since then I have read an article in *Zaic's Year Book* on the subject, and after trying the idea out for myself I have found it very successful, with a few alterations.

I take it that most of you know the general idea of this type of construction, but for the newcomers I will explain that the idea is to make the 'plane stronger torsionally by overlapping sixteenth square ribs which have previously been cut out of sheet. (See Diagram 1.)

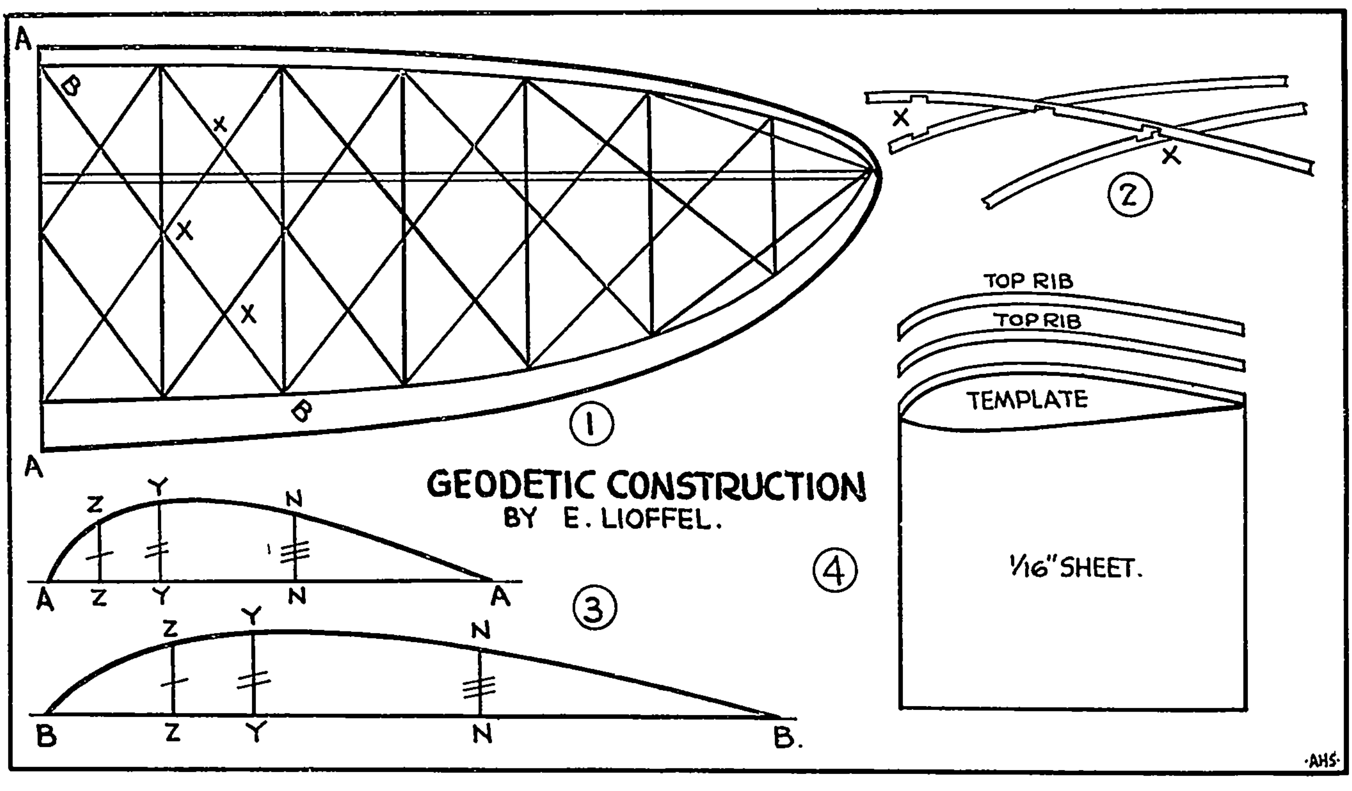
The article in the *Year Book* tells you that for out-door models all you have to do is the lay the ribs on—apparently with a set of diagonals on top—and then it is optional whether you cover with sheet balsa or not. Well, I can't say this appealed to me much, so I changed it slightly, and here is a description of my Wakefield wings.

Double ellipse wings have always held an appeal to me, if only for their beauty, so this was the outline I chose with a chord of 6 in. and a span of 44 in. The wood used throughout the job was medium hard (although these days you are lucky if you can get any). The leading edge was cut out of ¼ in. sheet, about ⅜ in. at the root tapering to ¼ in. at the tip, and the trailing edge was cut from ⅛ in. sheet, ⅝ in. at the root tapering to ¼ in. at the tip. The airfoil section used was R.A.F. 32 and the ribs were spaced every 2 in., and instead of having the diagonal ribs overlapping each other a 1/32 in. groove was cut out at the points of intersection so that they formed a nice flush job ready for covering. (See Diagram 2.) This may seem a lengthy procedure, but I am sure that the extra few hours are well worth expending.

Perhaps it is not clear as to how to make the diagonal ribs lie on the same plane as the vertical ones—well this is quite easy, especially for those who have drawn airfoil sections before. All one has to do is to measure chord "AA," say it is 6 in., and draw a section for that length in the normal way. Then measure "BB," say it is 7 in. long, and draw a section for that length, but keep the height the same as those used on the 6 in. chord, i.e. extend the base, but keep the co-ordinates the same. (See Diagram 3.) It will now be seen that when this rib is placed diagonally it will form a perfect airfoil section across the chord. Thus we have our sections, and the cutting of 1/16 in. square ribs is simplicity itself. This is done by sliding the template down the sheet and taking off strips. (See Diagram 4.)

Actually I built my wing on the plan until I finished the top surfaces, then I lifted it up and completed it off the board. A centre spar was necessary to keep the ribs rigid, so this was made full depth from a piece of 1/16 in. sheet.

In conclusion, I should like to say that for those who have patience this method of construction is well worth the trouble. My Wakefield wings weighed just over ¾ oz., including special "knock-off" tabs of ¼ in. sheet, whereas my previous set, built in the normal way, had weighed over 1¼ oz. Also, after it had been broken completely in half on one occasion and cut right back to the centre spar another time it was still possible to repair it (and think how little tissue you have to use when you get a split).



AIRCRAFT DESIGN — SIMPLIFIED

So you want to design a model? Well, it takes years of painstaking study to become a full-size designer of ability and the same basic principles apply to model flight, and so it is better to attempt the subject bit by bit.

You have only to glance at the list of current British records published on page 374 of last month's AERO-MODELLER and compare them with the records of, say, 1932 to see at once the amazing increase in performance that modern design methods and a fuller knowledge of basic aerodynamics has brought about. The streamlined Wakefield model of to-day is one of the most efficient machines of its size, and the durations obtained from many scale models are better than those of the best duration models of ten years ago.

How, then, do the experts do it? Well, in the first place, a certain amount of calculation is necessary. The first criteria that must be settled are the weight of the model, the wing area and the general layout. We will take for our example a model of 8 ounces total weight, the wing area of which is to be 216 sq. in. The question then arises, having settled the general design, at what angle of incidence is the wing to be set in order to get the required lift for a given forward speed; or, given a certain value of the lift coefficient, what speed must the model fly at to generate enough lift? It is the more general of the two to assume the flying speed and design around this factor.

Now everyone is familiar with the usual Lift formula:—

$$\text{Lift} = C_L \rho/2 \, S \, V^2$$

or, rewriting to give C_L

$$C_L = \frac{\text{Lift}}{\rho/2 \, S \, V^2}$$

Thus by solving this formula the required lift coefficient is found. But that formula is in "full-size" units. Lift is given in *pounds*, S, the wing area, in square *feet*, and it also introduces the quantity, *i.e.*, the air density = .002378 slugs/cu. ft.

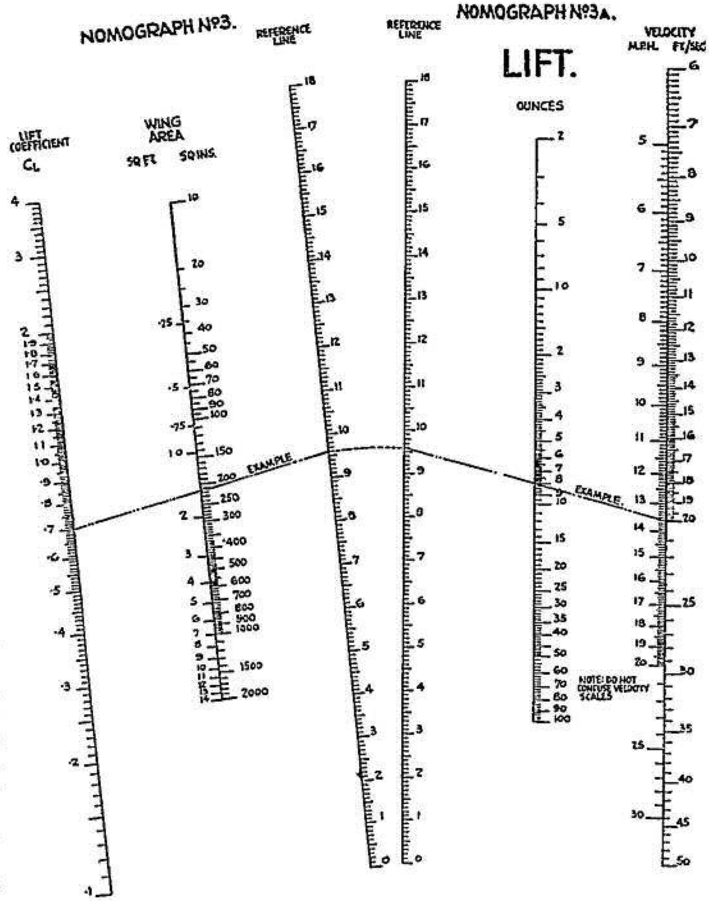
Not everyone likes playing around with figures and, even if they do, the time spent in solving these cumbersome equations could be spent on actual construction or flying—IF ONLY THERE WERE SOME QUICK AND EASY METHOD OF CALCULATION.

Happily there is. The NOMOGRAPH.

Now the Nomograph may be looked upon as a simplified version of the slide rule, BUT IT IS FAR SIMPLER TO OPERATE. Even with a slide rule errors are likely to creep in and a certain amount of time is spent in moving both the sliding scale and the cursor. This is where the Nomograph scores.

1. IT IS VIRTUALLY IMPOSSIBLE TO MAKE A MISTAKE.
2. IT IS THE QUICKEST METHOD OF CALCULATION AVAILABLE.
3. IT CAN BE GRADUATED IN THE UNITS NORMALLY EMPLOYED.
4. ITS USE ENTAILS NO SKILL.

Let us see, then, how this revolutionary calculator works. The diagram shows a Lift Nomograph. It will be noticed that there is a scale for each of the variables in the equation given above for Lift. Taking our previous example, we have a wing area of 216 sq. in., a total weight of 8 ounces, and we will assume that it is to fly at 20 feet per second. The required value of the Lift coefficient is given by normal mathematics by the following :—

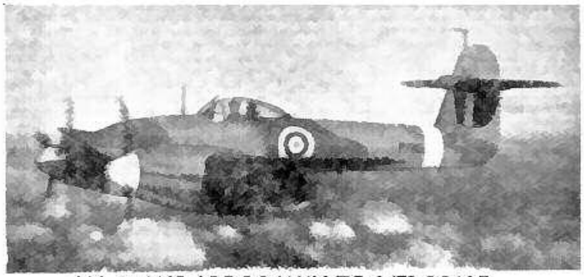


$$C_L = \frac{\frac{8}{16}}{\frac{\cdot 002378}{2} \times \frac{216}{144} \times 20 \times 20}$$

Enough to put anybody off!

(*concluded on page* 421.)

THE GREATEST RANGE OF SCALE PLANS IN THE WORLD!



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As information on new types is released they will be added to the ever-growing list, thus keeping the range right up-to-date.

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Armstrong Whitworth Whitley IV
Armstrong Whitworth Whitley V
Avro Anson I
Avro Manchester III
Blackburn Botha I
Blackburn Roc I
Blackburn Skua I
Boulton-Paul Defiant
Bristol Beaufighter I
Bristol Beaufortl
Bristol Beaufort II
Bristol Blenheim I
Bristol Blenheim IV
Bristol Bombay I
British Taylorcraft D.
D. H. Dominie I
D. H. Hertford I
D. H. Hornet Moth
D. H. Tiger Moth II
D. H. 86b
Fairey Albacore I
Fairey Battle I
Fairey Battle (T)
Fairey Fulmar I
Fairey Seafox I
Fairey Swordfish I
General Aircraft Owlet
Gloster Gladiator II
Handley Page Halifax II
Handley Page Hampden I & Hereford I
Hawker Henley I
Hawker Hind (T)
Hawker Hurricane I
Hawker Hurricane II
Miles Magister I
Miles Master I
Miles Master II
Miles Mentor I
Percival Proctor I
Percival Q.6 Petrel
Reid & Sigrist Snargasher
Saro Lerwick I
Saro London II
Short Stirling I
Short Sunderland II
Vickers Armstrongs Spitfire II
Vicker Armstrongs Spitfire III & V
Vickers Armstrongs Stranraer II
Vickers Armstrongs Walrus II
Vickers Armstrongs Wellesley I
Vickers Armstrongs Wellesley II
Vickers Armstrongs Wellington I
Vickers Armstrongs Wellington II & III
Westland Lysander II
Westland Whirlwind I

RUSSIAN :
I.-15 Chato
I.-16 Rata
I.-17
R.-10
S.B.-2
T.B.-3

AUSTRALIAN :
Commonwealth Wirraway
D. H. Moth Minor

CANADIAN :
D. H. 82c Tiger Moth
Fairchild M-62
Fleet Finch
Fleet Fort I
Noorduyn Norseman

AMERICAN :
Bell Airacobra
Bell Airacobra I
Boeing Fortress I
Brewster Buffalo I
Cessna Crane I
Consolidated Catalina I
Consolidated Liberator I
Consolidated 28-5
Curtiss Cleveland I
Curtiss Hawk 75a
Curtiss Kittyhawk II
Curtiss Mohawk IV
Curtiss Tomahawk I
Curtiss Tomahawk II
Douglas Boston II
Douglas Boston III
Douglas Havoc I
Douglas Digby I
Douglas (Northrop) 8a
Grumman Martlet I
Grumman Skyrocket
Lockheed Hudson I
Lockheed Hudson V
Lockheed Lightning
Martin Baltimore I
Martin Maryland II
North American Harvard I
North American Harvard II
North American Mustang I
North American Yale I
Northrop N-3 P.B.
Republic Lancer
Vought-Sikorsky Chesapeake
Vultee Vanguard I

GERMAN :
Arado Ar 95 See.
Arado Ar 96b
Arado Ar 196
Blohm & Voss Bv 142
Blohm & Voss Ha 139
Blohm & Voss Ha 140
Bucker Jungmann
Bucker Jungmeister
Dornier Do 17
Dornier Do 17z.
Dornier Do 18K.
Dornier Do 24
Dornier Do 26K.
Dornier Do 215
Fieseler Fi 156 Storch
Fieseler Fi 167
Focke-Wulf Fw 58 Weihe
Focke-Wulf Fw 187
Focke-Wulf Fw 189
Focke-Wulf Fw 190
Focke-Wulf Fw 200 Condor
Focke-Wulf Fw 200 Kurier
Gotha Go 149
Heinkel He 59
Heinkel He 60
Heinkel He III K. Mk. Va
Heinkel He 113
Heinkel He 114
Heinkel He 115
Henschel Hs 126
Junkers Ju 52/3m
Junkers Ju 86 K
Junkers Ju 87 B
Junkers Ju 88 K
Junkers Ju 89 K
Messerschmitt Me 109E.
Messerschmitt Me 109F.
Messerschmitt Me 110C.5

FRENCH :
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Dewoitine D520
Loire-et-Olivier-Le.O.48.B4
Morane-Saulnier Ms. 406c
Potez 63
Potez 63-11

POLISH :
P.Z.L. Los
P.Z.L. Mewa
P.Z.L. P.24
P.Z.L. Sum

DUTCH :
Fokker G-I
Fokker T-8-W
Koolhoven FK.52
Koolhoven FK.58

BELGIAN :
Fairey Firefly II
Fairey Fox VI

ITALIAN :
Breda 64
Breda 88
Caproni Ca 133
Caproni Ca 125 bis
Caproni Ca. 310
Caproni Ca. 311 bis
Caproni Ca. 312
Caproni Reggaine RE2001
Cant Z 501
Cant Z. 506b
Cant Z. 1007 bis
Fiat BR. 20
Fiat CR. 42
Fiat G. 50
Macchi 200
Piaggio P.32 bis
Savoia-Marchetti S.M.79
Savoia-Marchetti S.M.79B.
Savoia-Marchetti 81
Savoia-Marchetti 82

IRAQI :
D. H. 84a Dragon
Hawker Nisr

JUGOSLAV :
Hawker Fury
Ikarus IK2

GREEK :
Hawker Horsley

JAPANESE :
Mitsubishi Karigane II

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D.H.4
D.H.5
D.H.6
D.H.9
D.H.9a
D.H.10
Martinsyde G.100 Elephant
Martinsyde F 4 Buzzard
R.E.8
S.E.5a
Sopwith Camel F.1
Sopwith Dolphin
Sopwith 1½ Strutter
Sopwith Tabloid
Sopwith Triplane
Short N2B

FRENCH :
Breguet 14A.2
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Nieuport 28 C.1
Nieuport 7 C.1
Spad S.V.1

GERMAN :
Albatross C.III
Albatross D.I
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DF Aviatik C.V
Fokker Monoplane
Fokker D.VI
Fokker D.VII
Fokker Dr.I Triplane
Halberstadt D
Halberstadt C.L. IV
Hanoverana C.L.III
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ITALIAN :
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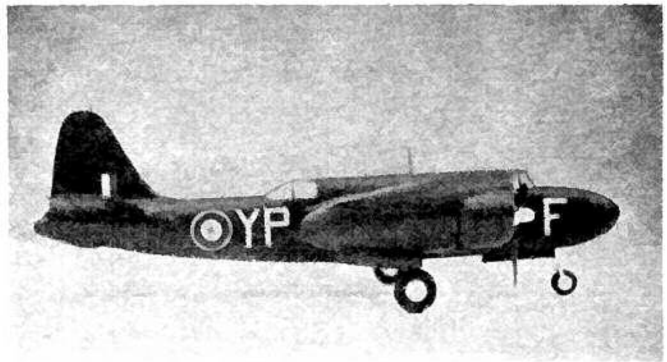
MONTHLY MEMORANDA No. 7 by O. G. THETFORD

The photograph opposite shows a fine model of the Douglas Havoc I, built by D. L. Venning, late of Magdalen College, Oxford.



H.M.S. Goshawk.

A Fleet Air Arm Training School for Air Observers and Navigators is now operating at Trinidad in the West Indies and is known to the Admiralty as "H.M.S. Goshawk." Equipment is comprised of Percival Proctor I light monoplanes for the initial stages and Fairey Albacore I T.S.R. biplanes for more advanced duties. The Proctors are camouflaged according to the Land Temporate Scheme on the upper surfaces and are training yellow underneath. One Proctor carrying the code letters "WJ" in white ahead of the cockade has a red tailplane to indicate a flight leader, whilst other machines carry their identification letters on the sides of the motor cowling. One flight of machines bear the letters "AB," "AE," "AM" and "AO" in this location.

The 16th Pursuit (now officially re-designated "fighter") Squadron of the U.S. Army Air Forces Combat Command is also situated on the Island and is equipped with Curtiss P–40Bs. These machines carry the marking "16P" across the rudder and fin, so that the "16" is on the rudder and the "P" on the fin on the starboard side and vice-versa. Above the squadron number is an individual machine-number such as "78" which is also painted in the nose of every aircraft.

From Burbank to Iceland.

The Lockheed Hudson III aeroplane which was presented to the British Government by the employees of the Lockheed factory last year (it was the 1,000th Hudson to be built) is now serving with a Coastal Command squadron stationed in Iceland. In addition to regulation Service markings this machine bore the inscription "Spirit of Lockheed Vega Employees" in white block capital letters on the sides of the fuselage just aft of the trailing edge beneath the cabin windows. Its operational markings consist of the code letters "UA" in grey ahead of the cockade and the individual identification letter "N" aft. It bears the serial number T 9465.

Stratoliners on the "Arnold Services."

Five Boeing 307B Stratoliners, 33-seater airliners, which were once resplendent in T.W.A. colours and civil markings are now employed on the U.S. Army Ferry Service (named after General Arnold, whose idea it was) across the North Atlantic and may be seen at certain British aerodromes bearing an ugly coat of greyish-green camouflage and the U.S. star insignia. Aft of the fuselage star is painted the insignia of the Ferry Command. The five Stratoliners are to be named after North American Indian tribes, and the first to be named has been christened "Apache," which name is painted in white capitals beneath the pilot's cabin.

U.S. Insignia—A Further Change.

In June, 1942, the U.S. insignia carried on both Army and Navy aeroplanes was amended as follows: the five-pointed white star is now painted on a dark blue ground ONLY and there is no red disc in the centre. This is to obviate confusion with Japanese aircraft during combat.

More "Tommies" Join the Army.

Photographic Reconnaissance Units of the Army Co-operation Command no longer rely on the slow old Lysanders, but instead are equipped with the Curtiss Tomahawk II single-seat fighter which has a high cruising speed and is sufficiently well armed to look after itself in the case of enemy interference. These machines differ from Fighter Command day fighters as regards markings in one particular—that of carrying red and blue cockades beneath the wingtips in place of the usual red, white and blue. The new fuselage cockade and fin "flash" with narrower white strip is standard. Two P. R.U. squadrons with "Tommies" carry the code letters "KH" and "RU."

Army Air Corps Gliders.

The markings scheme devised for the Army Air Corps troop-carrying training gliders of the General Aircraft Hotspur type is the same as that for the target-towing aircraft of Training Command—Land Temporate above, and yellow with black diagonal stripes below. They are normally towed behind either Lysanders or Hectors which are painted the same way. An identification letter is painted on the nose and a Service number carried in the same manner as a power driven aircraft. Glider "D" at one school is numbered BT 605.

The Lancaster.

Four-motor Avro Lancaster heavy bombers now equip a good many squadrons of Bomber Command and in some cases carry the squadron markings formerly familiar on Manchesters. A Manchester squadron bearing the code letters "OL" is now flying Lancasters with night bomber markings, although a few machines reserved for daylight raids have "sky" undersides like medium bombers. A Lancaster recently delivered was numbered R 5700.

Old Stagers in India.

A number of ancient Vickers Valentia troop-carrying biplanes, formerly used for almost a decade by Nos. 70 and 216 (Bomber Transport) Squadrons at Heliopolis, Egypt, have been transferred to India, where they are finishing their days as trainers for parachute-troops. Although originally silver they are now camouflaged of course, and one batch is serially-numbered K 3599, K 3600, K 3601 and K 3602.

Sub-Arctic "Anti-Camouflage."

Not since the days of the German Air Circuses has such a bizarre colour scheme been seen on a military aeroplane as that carried by a Beech F–2 of the U.S. Army Air Forces. Beech photographic reconnaissance aeroplanes based in Alaska are painted all over with bright orange and green squares to make them easily visible against the Alaskan snows in case of a forced landing.

FIGHTING AIRCRAFT OF THE PRESENT WAR—XXI

By H. J. Cooper

THE D. H. HORNET MOTH

NO apology is tendered for the inclusion in this series of Fighting Aircraft of an obsolete biplane: many one-time civil aircraft are now engaged on military duties, and the part they play in the promotion of the War is as necessary as that of operational aircraft. Between fifty and sixty Hornets are still flying and are used for communication purposes.

The Hornet Moth, the eighty-seventh De Havilland design, first flew early in 1934, and was entered for that year's King's Cup Air Race, flown from Hatfield, the home of the De Havilland Company, but was severely handicapped and failed to gain a position.

The Hornet was designed as a replacement for the old D.H.60 Moth of 1925, which became the standard light aeroplane in this country and was in production for ten years, during which time over four thousand were built. This type more than any other was responsible for advancing private flying to the position it ultimately reached before its cessation in September, 1939.

The original machine (D.H.87) registered G-ACTA, and the first production model (D.H.87A), differed from the later production model (D.H.87B) in having wings with sharply tapered tips. A few D.H.87As are still flying, but not many were built as it was found that this machine was not altogether satisfactory. Extensive experiments were made by the manufacturers and the 1936 model of the Hornet had square-tipped wings of larger area than the earlier ones, and the span was slightly decreased. This version was the one which became popular in private flying and at the outbreak of War about 100 held Certificates of Airworthiness.

The wide cabin of the Hornet and the excellent view therefrom made it readily popular with private owners who wanted to fly in comfort. It was fitted with dual controls and was issued to a number of flying schools and clubs for instruction purposes. The large doors on both sides made access easy.

The Hornet is a one-bay braced biplane with two seats side-by-side and cruises at 110 m.p.h. The wings are of equal chord and span and can be folded. They are of all-wood construction and are covered entirely with fabric. The fuselage is also of wood with fabric covering. The tail unit is constructed of wood, the fin being built integral with the fuselage and covered with plywood. Both the tail-plane and the movable surfaces are fabric-covered.

The undercarriage is of the usual divided type. An interesting feature of it is that the fairings to the shock-absorbers can be turned at right-angles to the slipstream to act as air-brakes when landing. This was also a feature of the D.H.80a Puss and D.H.85 Leopard Moths.

Communicatory Hornets are now camouflaged green and brown above and are yellow underneath. They have been allotted serial numbers and the usual roundels and fin marking are carried. The Hornet which formerly bore the civilian registration G-AETC is now W 5776. The number is painted in black on the fuselage and on some machines below the wings.

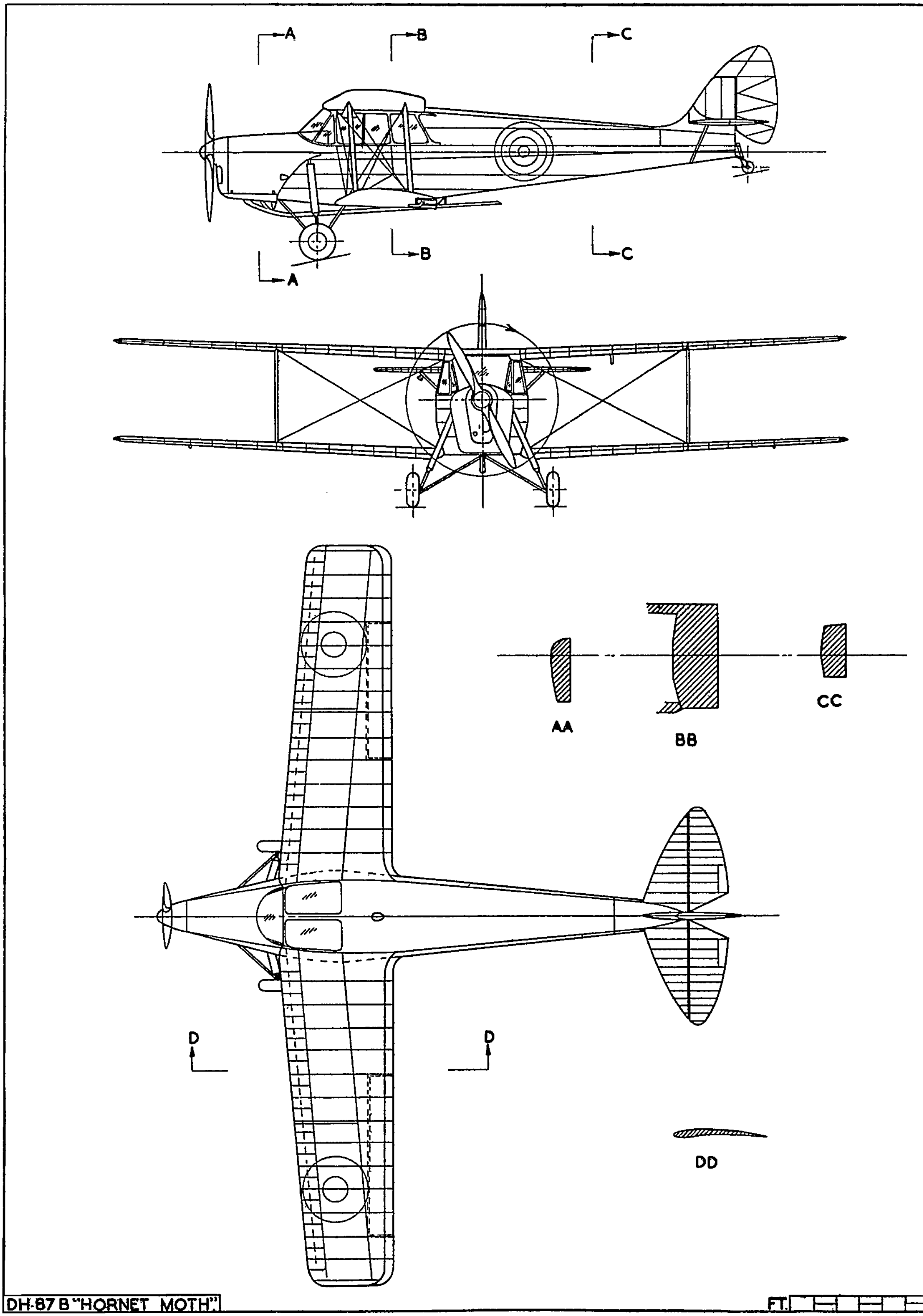
The Hornet G-AFDY shown in the photograph above is one which was owned by the Straight Corporation and used as a trainer at Ramsgate Airport by the Thanet Aero Club. It was coloured a dark turquoise known officially as "Whitney-Straight" green. The letters were in red outlined with silver and the horizontal bands on the rudder were red and silver. Two other Hornets used by the Club were G-AFDT, similarly coloured, and G-ADMM, which had a red fuselage with silver wings and tail-unit.

A number of Hornets were registered from G-ADKB to G-ADKW and from G-ADMJ to G-ADMT. One of the earlier "tapered" versions registered G-ADIS was used experimentally by the D.H. Company and later fitted with square-tipped wings.

Fitted with the 130 h.p. Gipsy Major four-cylinder inline air-cooled motor, the Hornet has a performance as under:—

Max. speed: 124 m.p.h.; cruising speed: 110 m.p.h.; landing speed: 40 m.p.h.; climb: 720 ft./min.; service ceiling: 14,800 ft.; range: 623 miles.
Dimensions: Span: 31 ft. 11½ in.; length: 24 ft. 11½ in.; height: 6 ft. 7 in.; wing area: 244·5 sq. ft.
Weights: Tare: 1,255 lbs.; loaded: 1,950 lbs.

Next Month: The Hawker "Hector" I.



DH-87 B "HORNET MOTH"

Club News By CLUBMAN

The London clubs seem to have taken a lesson from last year's competition results, and have put their shoulders to the wheel to much better purpose this season, as is evidenced by the recent decentralised contest results. Bushy Park have certainly crashed in on things this season, and A. H. Taylor looks like pulling off the Individual Championship for 1942, after just missing it last year.

PILCHER (Glider) CUP.		PLUGGE CUP.	
Taylor, A. H. (Bushy Park)	230.7	Bushy Park	1541.5
Boxall, R. J. (Brighton)	218.6	Birmingham	1448.5
Jeffs, H. R. (Streatham)	203.5	Bristol	1381.5
Jeffrey, F. (Blackheath)	193.45	Brighton	1345.5
Galbraith, R. E. (Blackheath)	185.9	Northern Heights	1338.5
Pribyl, L. (Streatham)	180	Blackheath	1321.5

(Plugge Cup positions up to and including Pilcher Cup.)

The results given on this page are the only details to date when going to press, and I feel inclined to protest at the sad lack of attention given to publicity by the S.M.A.E. In our last issue the results of the National Cup (June 7th) and the Weston Cup (June 21st) were given to the twelfth places, but to date (and I cannot hold up any longer awaiting further news) the only information sent for publication is as shown herewith.

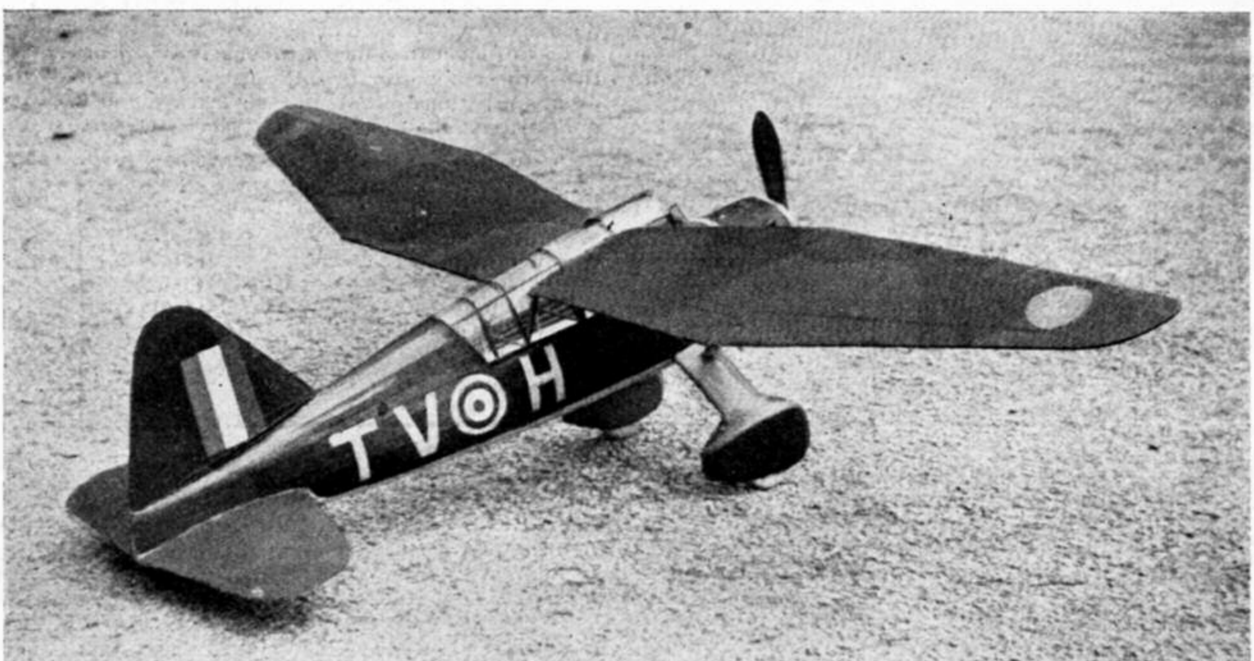
Now, the Pilcher Cup contest was held on the 5th July, so we miss altogether details of the Model Engineer Cup No. 2 contest, run on the 28th June. I am sure we could have given you the results of both the Flight Cup and Gutteridge Trophy contests, run on the 12th and 26th July respectively, but no details have been forwarded up to time of writing, namely, 8th August.

It is not often that I have to complain in this manner, but the present state of affairs leaves much to be desired, and I call upon the Council to remedy this deficiency at the earliest opportunity. Readers expect to find the results of national events in their magazine in the issue immediately following the contest, and rightly so. However, I cannot give what I haven't got, and I do feel that the movement loses prestige by not keeping such important matters under constant supervision. After all, the main outside activities of the S.M.A.E. today are directed to competitions, and immediate publication of results is an important factor.

I shall be pleased to give any reply to this criticism full publicity, but I know from the correspondence received at THE AERO-MODELLER offices that many readers are puzzled by the seeming lack of publicity awareness on the part of the Society.

Mention is made from time to time in these columns of American publications such as "Air Trails," "Model

Top: Members of the Healey & D.M.A.C. out for a battle with the wind on their exposed flying ground. Note the "Kirby Kite" Sailplane (centre) and "A.M. Cabin Monoplane" on the right.



Top: *Members of the Birmingham M.A.C. getting ready for flying. Note the tensioned motors, also the handy type of bike trailer, now being extensively used in some districts.*

Bottom: *A well-built "Westland Lysander" constructed from Aeromodeller plans by J. S. Mount of Sedburgh. This design is one of the most popular with our readers, there being plenty of scope for expert workmanship and a really good ooking job to show for the time spent on it. Flying qualities are also good.*

Airplane News," Zaic's Year Book, etc., and recently we have had innumerable enquiries from readers who wish to obtain these admirable contemporaries of ours. In order to save unnecessary correspondence will all readers please note that the best way to secure regular receipt of the American magazines is to take out a direct subscription via the appropriate companies, as follows :

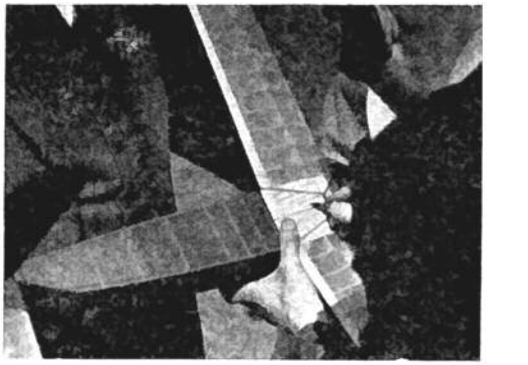
Air Trails.—79, Seventh Ave., New York City. $2.25 per annum.

Model Airplane News.—551, Fifth Ave., New York City. $2.50 per annum.

The Year Book published by Frank Zaic has not appeared since the 1938 edition, and I know of no supplies now left in this country, and doubt if copies are now obtainable in the States.

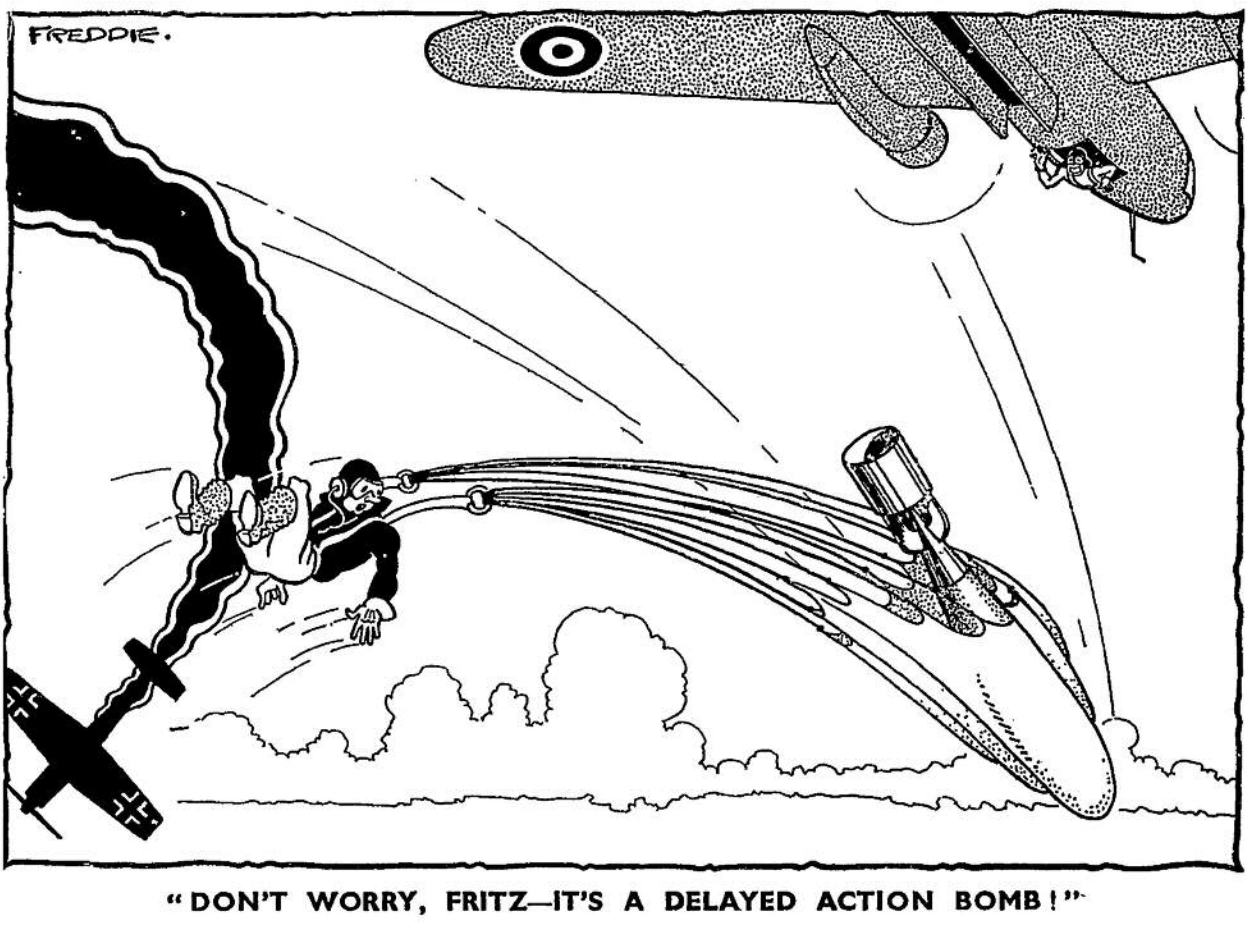
It should be noted that permission must be obtained to send money out of the country, and a form should be obtained from your local G.P.O., filled in, and the necessary instructions carried out.

High winds are having a " smashing " effect on contests and models all over the country, and many are the tales of woe and busted crates I receive monthly. Unfortunately, poor conditions very rarely coincide all over the place on the same date, and thus decentralised competitions come up against their one and only snag. It is the usual thing to hear that such-and-such a club put up times running into the 7, 8, 9 and 10 minute class, while at the other end of the country club so-and-so had to abandon all attempts at the comps. owing to high wind, rain, or a combination of both. However, that is one handicap that is unfortunately insuperable, and we must carry on making the best of things as they are.



THE OPTIMIST ! ! A hopeful flier puts his name and address on his model prior to launching. Quite a wise precaution at any time.

National contests, with all competitors making their efforts on the same field, under the same conditions, are naturally the ideal thing, but even under the best of peacetime conditions, many enthusiasts are still unable to partake of such facilities, so there is no gainsaying the fact that the decentralised events have come to stay and, in spite of their obvious shortcomings, have had a marked effect on the movement generally.



" DON'T WORRY, FRITZ—IT'S A DELAYED ACTION BOMB ! "

I have received a couple of letters from enthusiastic readers now residing at opposite ends of the African continent. G. W. Burmingham (formerly of the Croydon Club, and now at Port Sudan) writes :

" I arrived here in 1937, determined to carry on the good work and spread the 'doctrine.' The most conspicuous part of my baggage was a bundle consisting of a varied assortment of balsa, dopes, tissue, cement, etc.

" This is a very small town, and it was not long before rumour suggested that the sun had already 'got' me. However, I soon found a great flying ground—and what a paradise! A 400-yard walk found me out in a district entirely devoid of trees, chimney pots, cabbage patches, etc., in fact just miles on miles of sand.

"By the time that the interest in my activities had died down to a slight curiosity, an effort was made to interest the community in my dream—the Port Sudan M.A.C. However, the start of hostilities put paid to that for the time being . . . also my stock of rubber (which does not take kindly to this country) failed me, so things are somewhat in abeyance at the moment."

His final paragraph is worth noting, and coincides closely with my own view on model aeronautical matters in this country:

" Why the powers that be have not grasped the significance of aeromodelling and its potentialities I cannot understand. No one would like to see the regimenting that goes on in some countries, but valuable encouragement could be given financially through the S.M.A.E., or by setting up small-scale research centres which would be available to everyone. A wind tunnel could be the main feature, and the enthusiast could have his model tested, receive advice, and other facilities which do not exist at the moment. The Air Ministry knows the value of trained men, and it is to be hoped that a start can be made on these lines as soon as possible after the war."

The other letter is from L.A.C. Peter M. Blyth, who is at present stationed at Bulawayo. No model aircraft are to be seen in that remote spot at present, but a club is in course of formation amongst the boys. I am asked for addresses of aeromodellers in that part of the world, but unfortunately my " register " does not extend that far at the moment. However, if any far distant readers should be near these chaps, please get in touch with Mr. Blyth at Hillside Camp, Bulawayo.

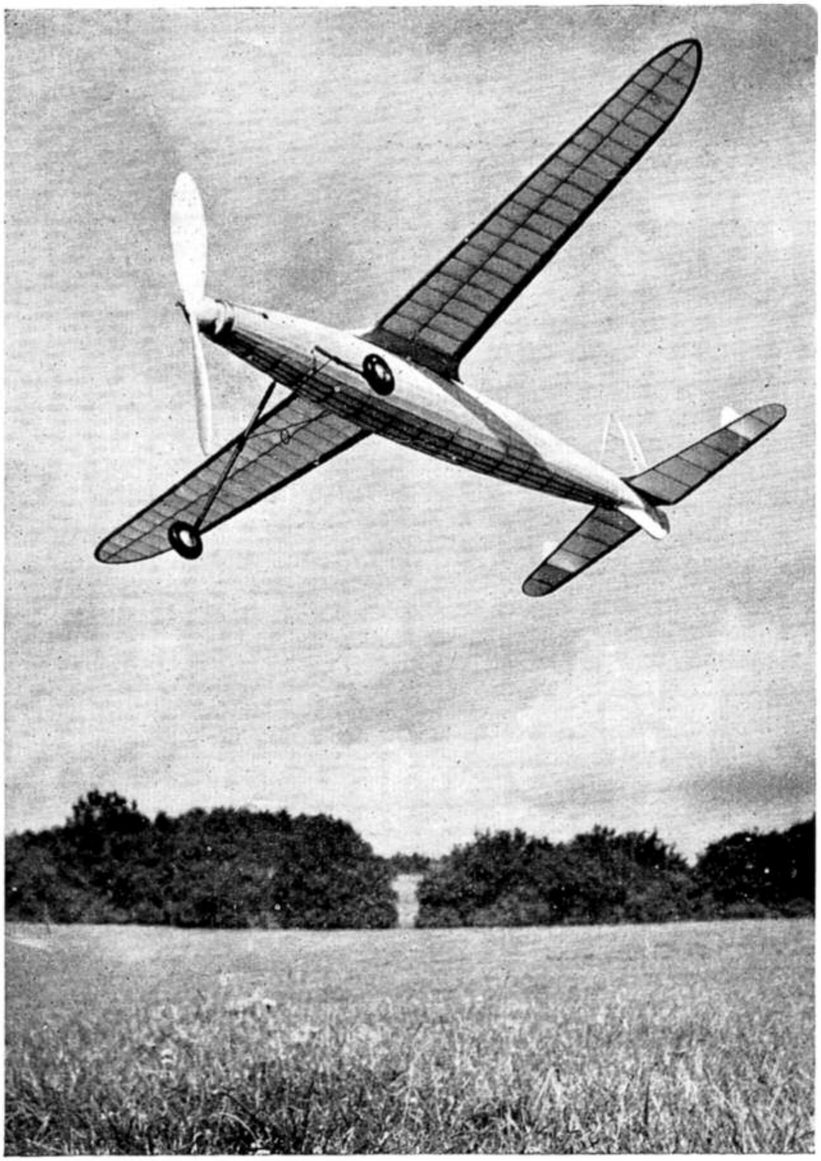
J. Finch, of the Eastbourne M.F.C., has raised the club H.L. Lightweight record to 4 : 21.75, while A. Burleton pushed up the larger class figure to 5 : 42·4. An interesting type of contest was run in conjunction with the Stewarton club, the rules requiring the members to fly three flights each, the total time to be divided by the number of flights made, this constituting the club average. Eastbourne averaged 55·17 secs. for 15 flights, while the Stewarton boys managed 35.7 secs. for 12 attempts.

The STEWARTON M.A.C. report that they had to contend with a 25-m.p.h. wind and, owing to the high crash rate experienced in trimming (including the efforts of an air-minded collie) only four members were able to do their stuff for the club. R. Burns twice broke the club record on Weston Cup day, his modified " Pete " model going o.o.s on its first flight at 8 : 03. The second attempt struck a hefty down-draught, but the final flight caught a hefty thermal and clocked 10 : 14·6 o.o.s., the model being retrieved from the opposite side of the town. This club would welcome an early indication of the sizes for gliders in next season's contests so that they can get ready! I doubt if there will be any change from the current 7 ft. maximum span, and F.A.I. loading.

The Rally staged by the EXETER M.A.C. proved very enjoyable, the Taunton club sending a team to provide the opposition. Two stars of the Exeter crowd lost their models early on, and thus considerably weakened the team. However, the home team won the day with an aggregate time of 3 : 37·8, Taunton scoring 2 : 51·8. C. H. Garraway, of Exeter, won the open H.L. contest with a total time of 6 : 14, breaking the club record on one flight at 3 : 32·8. D. M. Peters (Exeter) placed second with 4 : 07, and R. L. Blackmore (Taunton) third with

Members of the Heywood M.A.C. busy in the club room. It is not every club that is fortunate enough to have such accommodation, but it pays to instal such quarters if at all possible.

A well equipped workbench, stores, and expert instruction is one of the best means of encouraging new members, and retaining the interest of the existing enthusiasts.



The ever popular "G.B.3" mode lbuilt by our old friend A. E. Galeota af Great Missenden. Alas—how seldom do we get good construction allied with expert photography as in this instance.

2 : 46. Blackmore won the Nomination event with a ·25 second error, while Peters also won the "under 150 sq. inch" class with a time of 2 : 26·6.

N. Gregory won the HARROW M.A.C. "Major Cup," and W. Weight the "Pinora Cup," the latter winning every round in his efforts. In the last round of the "Major" Cup L. Middleton made a flight of 10 : 07 o.o.s. Unfortunately the model came back into view after being clocked off, and was timed for a further 7 : 53, and had the model been in sight for the full duration, a very nice duration of over 20 minutes would have been credited. N. Gregory made a fine flight of 9 : 17 in the "Model Engineer Cup" contest, his aggregate for the three flights being 12 : 30.

R. Higham, of the STRATFORD-ON-AVON M.A.C., raised the club H.L. Glider record to 1: 10, but high winds have prevented organised flying.

Mr. Jennings, of the EAST BIRMINGHAM M.A.C., won a Wakefield event with his "Isis," also an open event later in the month. This club now has a new clubroom at Cockshutt Hill School, Yardley.

F. Wilde, of the CHESTER M.F.C., has been experimenting with a "George" wing parasolled on an "Air Cadet" with good effect, clocking 52 secs. on one ounce of rubber. Mr. Moulton raised £52 with a model during the local War Weapons Week!

The club record of the GRANTHAM M.A.C. is now up to 1 : 18, the flier being Mr. Squires, and the model a "Macclesfield Marvel." Senior members are welcomed in this group.

C. Furse, of the LEEDS M.F.C., has broken his own H.L. record with his "Gutteridge Trophy Winner," the time being 1 : 30·6 H. Tubbs was only ·4 second out on a nomination event, H. Vauvelle placing second with a ·8 error. These times are good in view of there being no timing of trimming flights before the contest.

M. Farthing and M. Pitcher, of the CROYDON & D.M.A.C., made flights of 6:01 and 5; 58·4 respectively in the "Model Engineer" comp., the latter figure being a new club record for heavyweight models. Dissatisfaction is expressed with the poor attendance at club meetings since changing the flying ground, the usual regulars being mainly committee members. Better form a larger committee!!

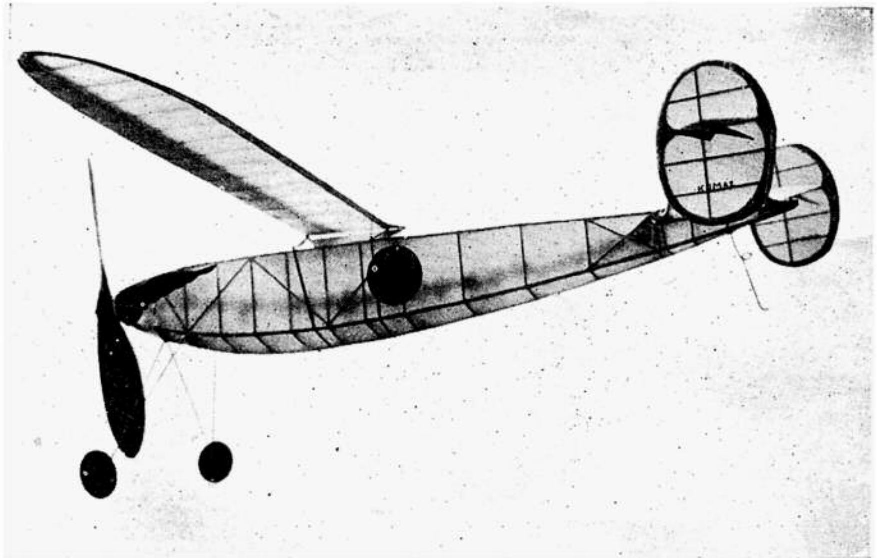
Bad weather during the previous week had its effect on the turn-up for the BLACKHEATH M.F.C. "Open Day." Times put up were not great, and crack-ups plentiful, while flyaways were few and far between.

Results :—

Open Glider :	J. Marshall (Hayes) 3 : 01·6 agg.
	N. Neal (Chingford) 1 : 21·2 agg.
Open Duration :	G. Harris (Farnborough) 5 : 49·5 agg.
	M. Farthing (Croydon) 5 : 42 agg.
Team Glider Contest :	Streatham M.A.C. 213·9 pts.
	Hayes & D.M.A.C. 177·9 pts.

I regret to announce the death on active service of K.E. Anning, of the ILKLEY M.A.C. One of the founder members of the club, he held the club championship for 1940 and 1941, and was runner-up in 1939. Bad weather has restricted competition flying lately, but the only contest held resulted in a win for J. Townsend with a total time of 4 : 01. The model used also made a flight of 9 : 50 in the Weston Cup event, and consistently averages 3–4 minutes in all weathers.

During the past month the LEICESTER M.A.C. have been entering the decentralised events, F. Wilkinson clocking 5 : 30·5 on his second flight in the "Flight Cup." G. E. Dunmore made a flight of just over 3 minutes.



Another worthy photograph is this shot of N. Shatford's "Victrace." This design is well known, and has many successes to its credit.

An inter-club contest between the HALSTEAD (ESSEX) & D.M.A.C. and the Yeldham club resulted as follows :—

Miss B. le Messurier. Halstead.
P. Hewitt. ,,
R. Ince. Yeldham.
J. Greenfield. Halstead.

Miss le Messurier had to repair her plane three times on the field before she could participate in the contest, each time through broken motors ! !

Master Ron Courtney, of the OXFORD M. A. C., has been consistently "putting it across" his pa, "Gamage" Courtney, lately, and won the Houlberg Cup. Papa lost his "Northern Arrow" after an untimed flight of over half an hour, but fortunately the model was later found. Certain ambitious members have been turning out a large number of new designs, among these being a "Havoc II" of 5 ft. span, a 6 ft." Consolidated 28–5a," a "Flying Fortress" and a petrol-driven tailless pusher.

Too many models are being lost in the NORTHERN HEIGHTS M.F.C. and efforts are being made to perfect a "dethermaliser," in order to get the models down and complete the requisite three flight contests ! The club's Open Day is fixed for September 13th with the following events :—

Nomination Contest. Open and Sealed.
Open Duration. Any type model. Senior and Junior.
Open Duration Team Contest.
,, ,, Glider Contest. Junior and Senior.

The secretary, Mr. S. Ryde, of 59, Exeter Road, Southgate, N.14, will be pleased to forward directions to intending competitors.

One of our most enthusiastic young readers, Robert Lang, of Cleland, sends this snap of his "Fortress I" built from Aeromodeller plans.

John Thompson, of 1, Drumbottie Road, Balornock, Glasgow, wishes to get in touch with a "pen pal" of about his own age (14 years), in England. Any takers ?

Will anyone interested in forming a club in Salford please get in touch with H. Leeming, of 188, Bolton Road, Salford, 6.

C. Christian, of 10, Mill Street, Guisborough, Yorks, is another who wishes to get a club going in his district. Rally round, Guisboroughites.

"Disposals" :—Back copies of "Flying" (prefer to exchange for back issues of the AERO-MODELLER, prior to February, 1941) ; J. Moon, 65, Edgeway Road, South Shore, Blackpool. Back issues of AERO-MODELLER, Flying Aces, Model Airplane News ; P. Guilmant, 41, Landquard Road, Shirley, Southampton.

That's the lot for this month, chaps, and I trust the wind dies down a bit during this next month. I'm due to make my annual appearance in the competitions list, and it would be just too bad if it saved it up for me !

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EDITORIAL (*concluded from page* 390).

"I knew McGillicuddy."

McGillicuddy has come to stay! Or rather, we hope he will come back . . . since on pages 398–9 of this issue our correspondent, Robert Jamieson, whilst revealing further incidents in the Maestro's life, discloses also that he disappeared in dramatic fashion, when following one of his record-breaking models. We may have a sensational report to publish in our next Xmas Issue ! ! !

Addresses, please . . . .

There is *still* a prevailing tendency towards anonymity, despite our remarks in previous Editorials, and once again we are left with a number of unclaimed cheques on our hands ! !

If the designer of the Travelaire Speedster (R. A. Brown) and of the Skyranger will forward their latest addresses, we will send along their cheques.

We still wish to hear from Messrs. R. L. Walker and T. C. Watson who have not claimed their cheques.

Finally, of course, we have one example of the classical type of omission. An order from K. Stevens for the plan of the Beaufighter and the Airacobra, but—that is all. We have the plans ready, Mr. Stevens—all we want now is your address !

D. A. R.

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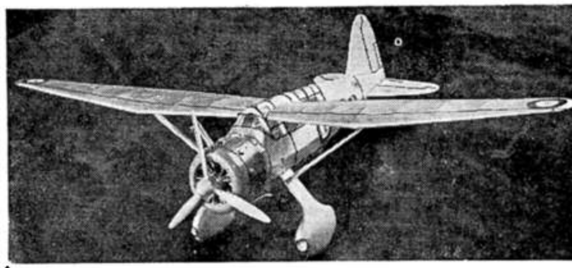

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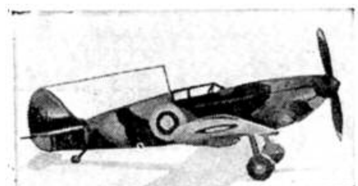

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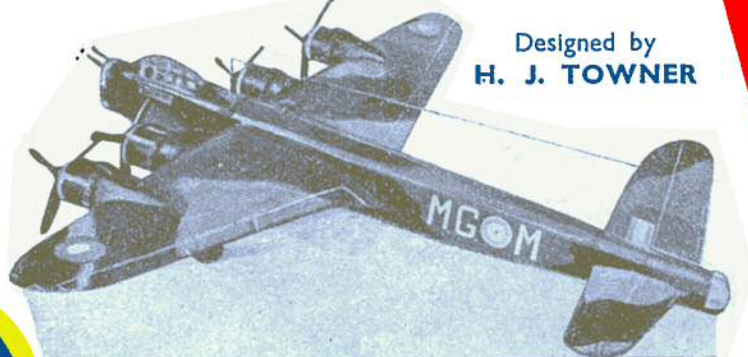

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