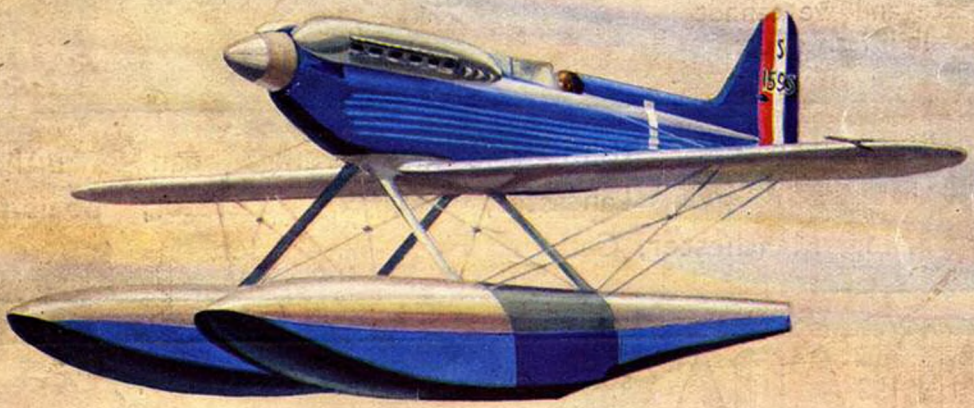
VOL. 8. No. 88 ONE SHILLING MARCH 1943

AERO MODELLER



AERO MODELLER

(INCORPORATING "THE MODEL AEROPLANE CONSTRUCTOR")
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THE MODEL AERONAUTICAL JOURNAL OF THE BRITISH EMPIRE

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

Editor :
C. S. Rushbrooke.

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EDITORIAL

TO the several thousands of readers who gave us their co-operation by completing the ballot form published in our Xmas, 1942, issue we offer our sincere thanks.

The fact that so many of them, in addition to completing the form, took the trouble to add quite lengthy and most interesting letters containing additional items, criticisms, and suggestions, is an indication of the interest shown in the make-up of THE AERO-MODELLER.

Following a careful survey of the ballot forms we are able to present the result in the undernoted form, in which the most popular item—General Duration Models—is taken at 100.

General Duration Models	100
Glider Models	99
Unorthodox Models	88
Fiction and Humour	85
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Petrol Model Features	75
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Examination of the results reveals several interesting features, the most outstanding being that, broadly speaking, we do satisfy *most* of our readers *most* of the time ! !

It is interesting to see how popular Gliders have become. The reasons are well known, and it will be interesting to see whether this popularity, ranking at practically level demand with General Duration Models, will be maintained when the balsa situation has been restored after the War.

The position occupied by the "Unorthodox" Models is higher than might have been expected, and may be taken as an indication of the wide interest taken by readers in models of *all* types. "Fiction and Humour" indicate that the morale of our readers is in little need of support ! Certainly it would seem that "Freddie's" sketches are as popular as ever, and we think the figure is higher for the recent addition of McGillicuddy . . . . Technical articles rank quite low in the list, probably due to the number of specialised technical books now available through the Harborough range of publications.

. . . We serve

"We put this down to our considered policy of passing on every bit of fresh knowledge that we can, and if any member, from the recognised experts down to the newest or youngest member, felt that he had a good idea, he was listened to with care and attention and the idea was discussed and analysed and tried out in a practical way on the flying field. In this way we have, as can be seen by some of our members' published work, contributed to the general advance of model aero activities throughout the country."

The above paragraph is abstracted from a short history of the development of the Northern Heights Model Flying Club, since its inception in 1931, and sent to us by the President for 1943, Mr. C. A. Rippon. In the 12 years which this club has been in existence close on 800 members have passed through its books, and at the present time the membership is well over the 200 mark, nearly doubling itself during the present year.

For this one reason alone—that during the third year of the War, the membership of this club has so greatly *increased*—we feel justified in drawing attention to it on these pages. A perusal of the balance sheet for the year ended December 30th, 1942, reveals a balance-in-hand of over £100 and an income of nearly £100 from subscriptions.

No doubt in many other parts of the country there are clubs smaller than the Northern Heights which have, under war-time conditions, achieved as much ; and we refer to the North London Club for two reasons : firstly, as an example that "By effort we achieve," which is the motto of the club ; and secondly, as a reply to the argument advanced by certain pessimists who in the early days of the War suggested that clubs should be closed down for the duration, as they were not likely to obtain sufficient support to justify their continued existence ! !

D. A. R.

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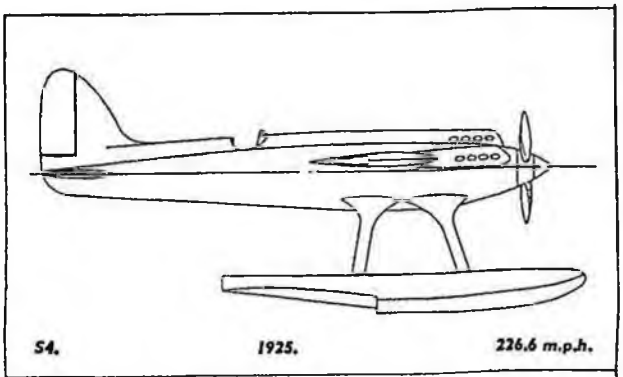
THE SUPERMARINE RACING SEAPLANES

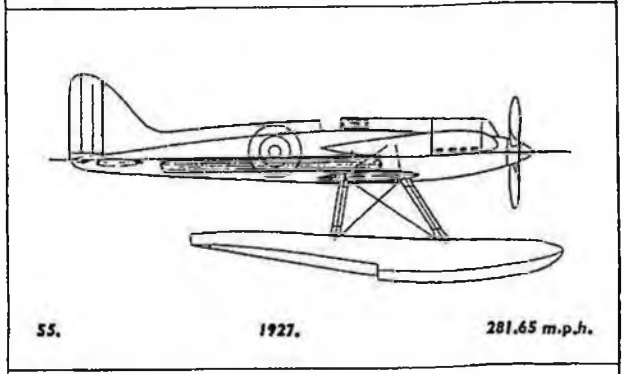
By H. J. Cooper

The Supermarine S6B—1931 Schneider Trophy Winner—407.5 m.p.h.

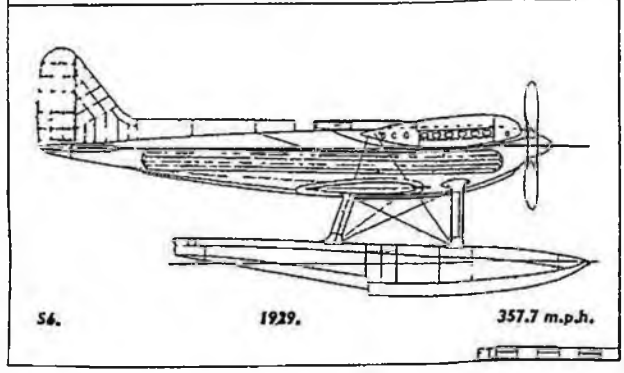
Photo. by courtesy of "Flight."



S4. *1925.* *226.6 m.p.h.*



S5. *1927.* *281.65 m.p.h.*



S6. *1929.* *357.7 m.p.h.*

THE publicity given by a recent film misproduction to the fact that the Spitfire fighter was developed from the Supermarine racing seaplanes of Schneider Trophy fame has resulted in a surprising number of our readers requesting information on these early types. General arrangement drawings of the four types have been completed and herewith is published that of the Supermarine S6B which finally brought the Trophy permanently into the possession of Great Britain. Drawings of the others, the S4, S5 and S6, together with photographs, are available through the AERO-MODELLER Plans Service.

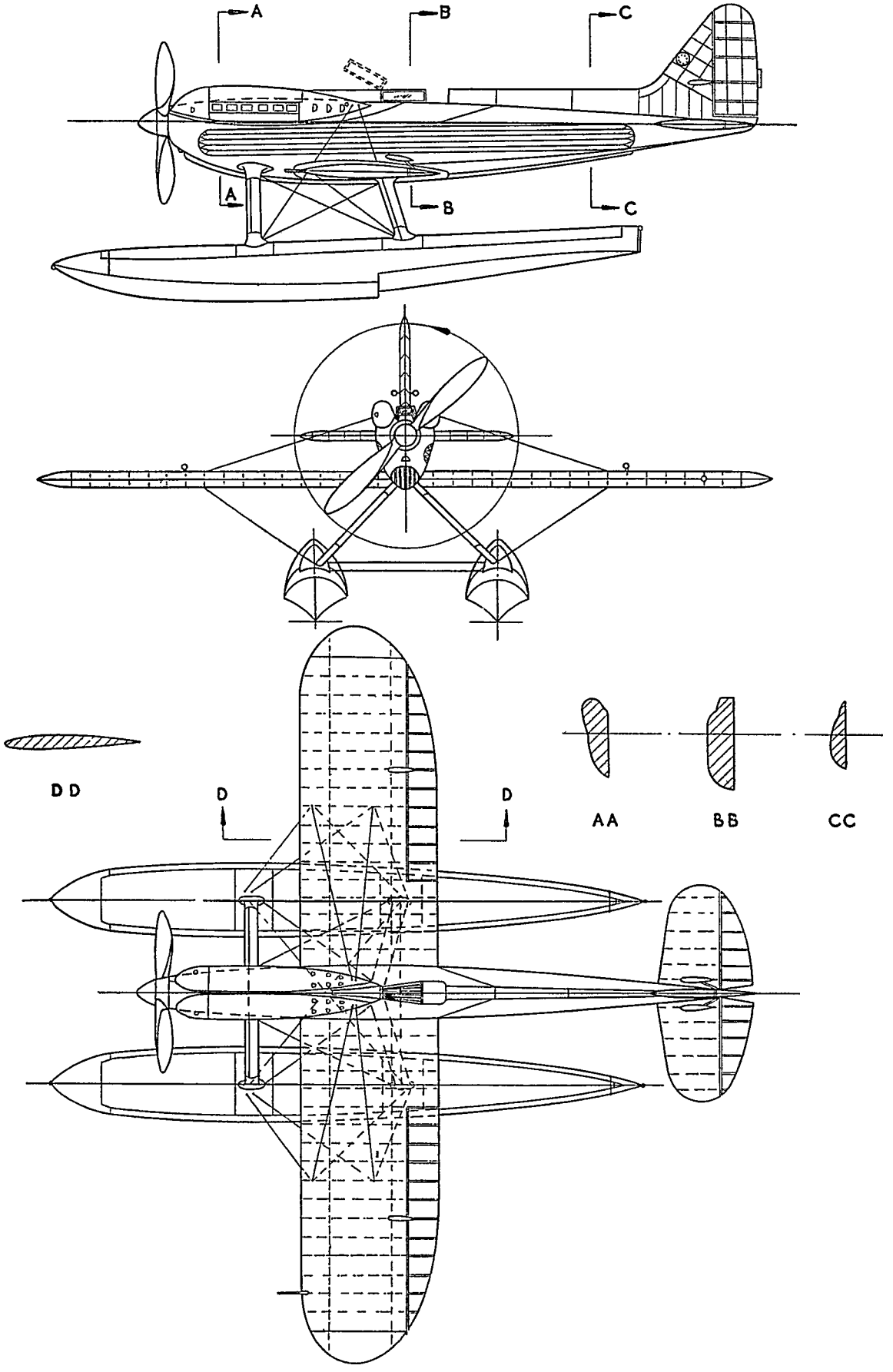
All of these aeroplanes were designed by the late Mr. R. J. Mitchell, and the first of them, the mid-wing S4, was produced in 1925. It was a complete departure from prior design, and even to-day looks extremely clean. It was unique in having no external bracing. The fuselage was of mixed steel tube and wood construction and was plywood covered. The floats were of duralumin. The S4 first flew in August, 1925, only five months after construction was begun. The power unit was a 700 h.p. Napier Lion.

On 13th September, 1925, Mr. H. C. Biard flew the S4 at 226·6 m.p.h. and gained a World's Speed Record.

The machine went to Baltimore to participate in the Schneider Trophy contest, but it crashed during a test flight and could not compete.

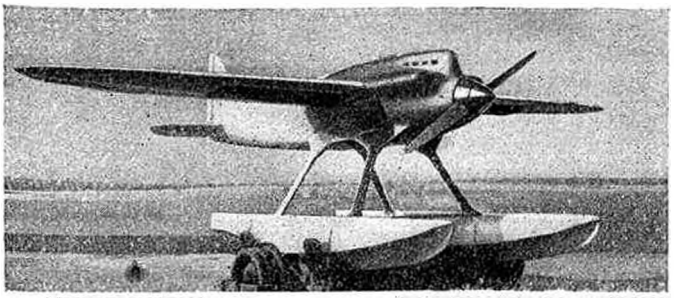
The S4 had a wing span of 30 ft. 6 in. and was 26 ft. 3 in. long.

For the next race—1927—the Air Ministry ordered from the Supermarine Aviation Works, three new machines to be officially flown by the Royal Air Force. These monoplanes, closely resembling the earlier machines, were of the S5 type. They were low-wing machines with all-metal wings and floats, and the wings and tail unit were of wooden construction with plywood covering. Two S5s, N220 with a 875 h.p. geared Napier Lion VIIB motor, and N219, fitted with a direct-drive Lion of similar power, flew in the race, which was that year held at Venice on 26th September. The former machine piloted by Flt./Lt. Webster won at 281·65 m.p.h., and the other came in second at 273·07 m.p.h., flown by Flt./Lt. Worsley.



SUPERMARINE S 6. B

FT.



The Supermarine S4. *Reproduced from "The Aeroplane."*

Both machines were coloured alike. The fuselage and fin and the lower half of the floats were royal blue. The streamlined motor fairings, wings, tail, radiators (on fuselage), undercarriage struts and the upper half of the floats were silver. Vertical red, white and blue stripes were carried on the rudder, with the blue foremost. The serial numbers were painted in black and edged with white across the colours at the top. N219 carried the racing number 6 on each side of the fuselage midway between the cockpit and the fin. N220 bore the number 4 in a similar position with a silver disc just behind. N219 formed part of the team in 1929. It then carried the racing number 5, with a red, white and blue roundel thinly edged with silver in front. The number was also carried in black below the wing-tips, with the top towards the leading-edge.

The dimensions of the S5 were: span, 26 ft. 9 in.; length, 24 ft. 2 in.

In 1929 were built two S6s. They were slightly larger than the S5s, and were entirely of metal construction. They were fitted with Rolls-Royce racing motors of 1,900 h.p.

N247 won the race at Ryde, Isle of Wight, on 7th September, being flown by Flg./Off. Waghorn at 328·63 m.p.h.

Three days later it made a World's Speed Record of 355·8 m.p.h. and again on 12th September raised it to 357·7 m.p.h. Both times it was flown by Sqdn./Ldr. Orlebar.

N248, the other machine, flown by Flg./Off. Atcherly, was disqualified in the race. It carried the racing number 8; N247 was number 2. Both were coloured in royal blue and silver as were the S5s.

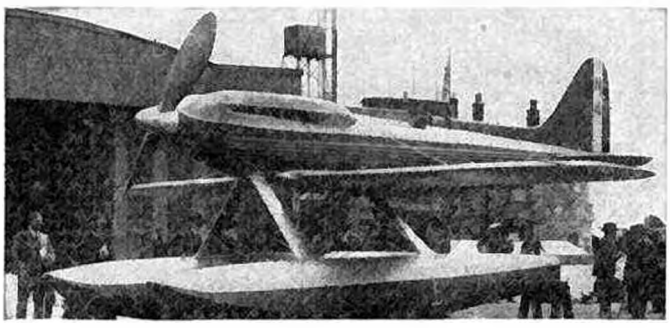
The 1929 team also included the two Gloster-Napier VI floatplanes, N249 and N250.

The S6s were of 30 ft. span and 27 ft. long.

Two new machines, of the S6B class, were built for 1931. They were S1595, which on 13th September won the trophy at 340·08 m.p.h., piloted by Flt./Lt. Boothman, and S1596, both with 2,300 h.p. Rolls-Royce motors. S1595 had the racing number 1, and S1596 was number 7.

Later on the same day the latter machine was flown by Flt./Lt. Stainforth, and established a World's Speed Record of 370·05 m.p.h. On 29th September, Stainforth took up S1595 and created another record, this time of 407·5 m.p.h., he thus being the first man to travel at over 400 m.p.h.

The Supermarine S6. *Photo by courtesy of "Flight."*



Both machines were coloured as their predecessors, except for the reversal of the positions of the rudder stripes. The wing span was 30 ft. and the length 28 ft. 10 in.

The two S6s used in 1929 were modified to take part in the 1931 contest. They were fitted with larger floats and incorporated other minor improvements, and were re-designated S6As. N248 bore the racing number 4; N247 was not flown.

The First Spitfire.

From experience gained with the floatplanes, the Supermarine Aviation Works produced in 1934 a fighter which was constructed on generally the same lines as its predecessors. It was a monoplane with a low wing cranked from the roots to obviate the use of a long undercarriage, which an airscrew of suitable size would otherwise have necessitated. The fighter was built to Air Ministry specification F.7/30 and consequently its performance was somewhat restricted by military requirements. It was not altogether successful, though

The Supermarine S5 *Photo by courtesy of "Flight."*

it attained a speed of somewhere around 230 m.p.h. It was interesting in that it was powered by a 600 h.p. Rolls Royce Goshawk II evaporatively-cooled motor, which was then unproven. The condensers were fitted in the leading-edge of the wing to reduce drag. In view of the low power of the motor, compared with the high power of the present-day Spitfire, and also the large size of the F.7/30 (its wing-span was 45 ft. 10 in.), it is surprising that the maximum speed was as high as 230 m.p.h.

The F.7/30 first publicly appeared in the New Types Park at Hendon in 1934, and was coloured a light silvery-grey. It bore the serial number K 2890, and carried roundels on the wings and on each side of the fuselage. The rudder bore vertical red, white and blue stripes, with the red foremost.

In 1936 the first Spitfire more-or-less as we know it to-day made its appearance. It differed considerably from the older machine and was much nicer to look at. The big faired undercarriage of the F.7/30 had disappeared and instead a neat pair of retractable legs was fitted. The new machine was much smaller, with a span of 36 ft. 10 in., and a maximum speed of 346 m.p.h., nearly 120 m.p.h. faster than the F.7/30.

The Spitfire has been continuously developed and equipped with various armament combinations, and the latest version, the Mk. IX, now has a maximum speed of well over 400 m.p.h.

SOCIETY OF MODEL AERONAUTICAL ENGINEERS

1943 SEASON 1943

OFFICIALS

Vice Presidents : Lt.-Col. C. E. Bowden.
Capt. Pritchard.
Perrin, Esq.

Chairman and Technical Secretary : Mr. A. F. Houlberg.

Vice Chairman : Mr. C. A. Rippon.

Hon. Secretary : Mr. A. G. Bell.

Hon. Treasurer : Mr. L. J. Hawkins.

Hon. Auditors : Messrs. E. H. Keil and D. A. Russell.

Hon. Comp. Secretary : Mr. H. J. Towner.

Records Officer : Mr. L. F. Temple.

Journal Editor : Mr. A. A. Courtney.

Press Secretary : Mr. H. Hills.

Trustees : Messrs. Houlberg, Bell and Hawkins.

Committee : Miss Green, Messrs. Costenbarder, Rushbrooke and White.

COMPETITIONS

Gamage Cup. April 18th. Open Duration.

Weston Cup. May 9th. Open Glider.

M.E. No. 2 Cup. May 30th. Open Duration.

National Cup. June 13th. Team (Duration).

Pilcher Cup. June 27th. Open Glider.

Flight Cup. July 11th. As previously.

Gutteridge Trophy. July 25th. Wakefield.

M.E. No. 1 Cup. August 8th. Team (Glider) Duration.

Women's Challenge and K. & M.A.A. Cups. August 22nd. Biplane.

Thurston Cup. September 5th. Glider.

Hon. Secretary's Report for 1942

Mr. Chairman, Ladies and Gentlemen,

My Annual Report for the year 1942 carries me through a period which is marked with the progress of our Society. It is indeed remarkable that during the fourth year of this tragic war—a war that is becoming increasingly total in every respect—that mankind can still give his thoughts to the future. The call of our members to His Majesty's Forces has, of course, thinned our ranks considerably, but the seniors remaining with the clubs are doing a grand job, and are deserving of the highest praise from us all. It is my opinion that our clubs show greater strength and purpose now than during the year 1941. Twenty-one clubs have become affiliated to the Society during the year, despite worsened conditions, but as I do not propose to encroach on our Treasurer's Report, I will turn towards the activities of the Council.

Weakened by absence through illness of two of its members, Mr. C. R. Clarke and Mr. H. York, who, I sincerely hope are now recovering, and Sqr./Ldr. P. R. S. Gutteridge, who we congratulate on his promotion, because of duty calls, the Council has, nevertheless, completed a fine year of service to the Society. They are now negotiating for a large supply of Plastic S.M.A.E. Badges that will in no way be inferior to the old metal type, this has come about through the good services of Mr. W. T. Chandler, Secretary of the Chingford M.A.C.

The Brochure has occupied the last period of the Council's year, and has now reached its final stage. The Council propose that the Brochure shall take the form of a folded booklet. The cover has been designed by Mr. A. F. Dare, who has once again rendered us service in this direction. The Council urges the use of this booklet for the "Wings for Victory" Exhibitions.

This brings me to the late October period when Mr. A. F. Houlberg and myself, acting on behalf of the Society, welcomed participation in these National Displays. The Council has to a very great extent delegated to me the task of organising our side of these Exhibitions, their confidence in me has been a source of encouragement, but I have realised from the outset what a tremendous job I had undertaken. I have worked hours on end developing different stages of a scheme—dictated hundreds of letters—answered untold numbers of enquiries *re* Country and Associated Memberships, which run parallel with the Wings for Victory organising, and all the time ordinary business of the Society had to be attended to.

There remains now only one thing to be done, and only you can do it. Give all possible support to your own Society by exhibiting your models in the "Wings for Victory" Exhibitions. Do so, and you will round off the greatest event in the history of the S.M.A.E.

A humble word of warning, the S.M.A.E. still does not realise the value of publicity.

As I reach the end of this report there are one or two suggestions I would like you all to consider. The highest honour that our Society can bestow upon its members is that of "Fellow of the Society." Surely the new Council should be instructed to draw up a Fellowship diploma. Again, there are many grand members in different parts of the country doing great work for aeromodelling who are worthy of this honour. Please give them consideration and spread your wings.

May I conclude my report by expressing thanks to all of our members who have assisted me during the year, and the hope that when next we gather together for our Annual General Meeting, the bells of peace will have sounded their glad tidings.

Hon. Treasurer's Report for 1942

Mr. Chairman, Ladies and Gentlemen,

This is my fourth wartime report on the finances of the Society, and I am pleased to say that we are certainly keeping our end up. The position at the end of the 1942 financial year shows a slight improvement on that for the previous year, and although I have included two years prizes (1941 and 1942), expenditure only increased by £9 whilst income increased by £16. 12s. 2d.

I should explain here that it was considered by the Council that the cash prizes for the year should show in the current year's account, and I have therefore included in this account a reservation of £25. 10s. 0d. to cover the 1942 prizes, which are now in course of issue. This is a fairly big job and I am dealing with the matter as quickly as possible, as my spare time is limited nowadays.

The Council also instructed me to transfer the balance of the 1939 Wakefield Cup Fund, amounting to £04. 9s. 5d., from the Society's General Funds to a separate fund, to form a nucleus to be used when we next send a team to America to bring that Cup back.

After these deductions, therefore, we are able to carry forward to next year a balance of £183. 18s. 11½d

Competition Entrance Fees amounted this year to £29. 18s. 9d., an increase of £12. 4s. 0d. over last year, probably accounted for by the fact that 2 or 3 extra competitions were arranged, which undoubtedly proved popular.

Affiliation Fees showed a decrease of £5. 3s. 0d., but I think you will agree with me that the total received (£70. 10s. 6d.) is very satisfactory considering that most clubs are depleted in numbers and some have ceased to function altogether since the war started.

Postages have increased by £3 over last year and, whilst I am on this subject, I would urge that all club Secretaries enclose a stamped envelope, or at least a stamp when a reply is required, and so help to reduce this item of expenditure.

The expenses of the Society were reduced this year by £12, the chief reduction being that of travelling expenses of Council members.

I regret to say that the sale of badges has ceased owing to our stock having become exhausted. The Council have the matter in hand and are considering the advisability or otherwise of a plastic type of badge. There is still a debit entry to be made against the badge account for engraving which has not yet been rendered me by the gentleman concerned, and which I have therefore not been able to include in this account.

The S.M.A.E. transfers appear to be popular as the income from these has increased by £8 during the year.

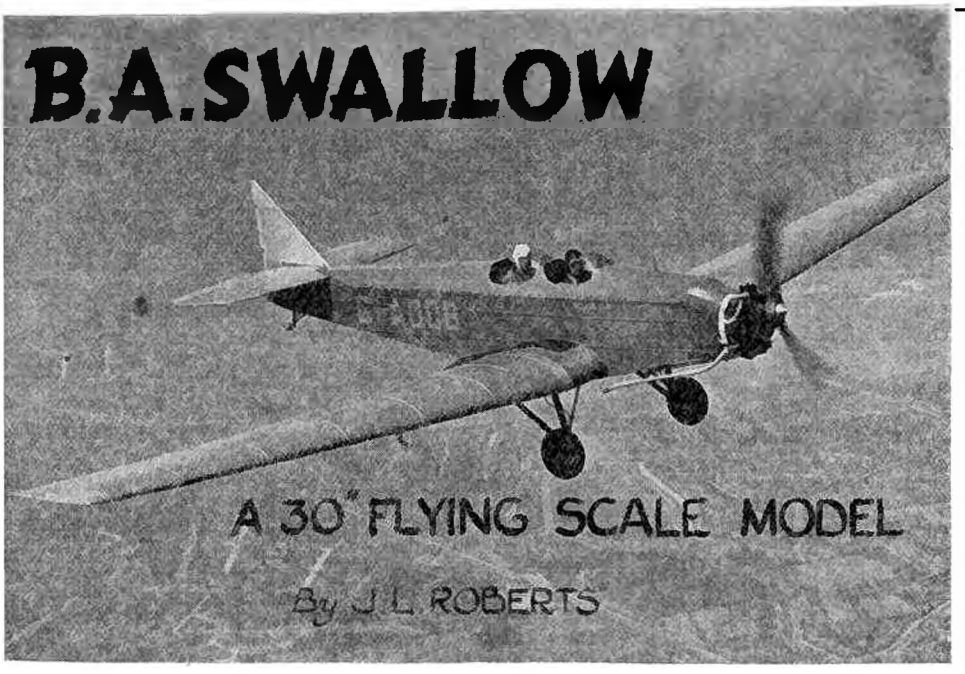
I do not think any other item on the account requires comment by me and as there is much business to be done I will make this report a short one.

I do, however, sincerely hope that by the time the next Annual General Meeting comes round we may all be in much happier circumstances and so be able to go forward with the many improvements which we have in mind. I am looking forward to a considerable increase in income for 1943 in view of the new type of membership introduced. The response from solid fans and individual country members, so far received, is encouraging.

I would like, once again, to thank my fellow officers for their wholehearted support and help in my work for the Society and wishing you all a happy and successful season for 1943.

L. J. HAWKINS, *Hon. Treasurer.*

B.A. SWALLOW



BUILD FROM AVAILABLE AT

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Aspect Ratio : 8·45.
Span : 30 in.
Area : 108·2 sq. in.
Wing Loading : 4·35 ozs./sq. ft.
Loaded Weight : 3·25 ozs.

Heading photo by courtesy of "Flight."

General.

This machine was in use extensively before the outbreak of war by flying clubs and private owners. It is a light 'plane, of spruce and ply construction, ply covered, with a 90 h.p. Cirrus engine. The large area of the main planes, and their disposition, and the ample tail surfaces all make for a successful flying scale model of the machine.

MODEL DETAILS

Weights :

Fuselage, centre-section, undercarriage	1·25 ozs.
Nose block, gearbox prop.	·75 oz.
Two rubber motors	·5 oz.
Tail plane, fin..	·125 oz.
L.H. main plane	·25 oz.
R.H. main plane	·25 oz.
A/C. in flying trim (theoretical) ..	3·125 ozs.
A/C. in flying trim (actual)	3·25 ozs.

Power : Two motors, each 4 strands ¼ in. by 1/30 in. rubber.

Gearbox : Two gears ½ in. diam. meshing, driving 1⅜ in. gear on prop. shaft. Mounted on brass plates, front and rear, ballthrust races. Ratio of step-up = 17—17—13 = 1·31—1 on prop.

Fuselage.

First build two flat sides right on top of the plan, identical to each other, by laying down the longerons and the wing base former and, starting at the nose cutting and cementing in the diagonal bracing pieces Do *not* fit the patch plates around the wing base formers, or the rear motor anchorage plates, yet. Erect the fuselage by assembling the two sides with the *straight across* crossmembers, and C.B.B.1, C.B.B.2 and C.B.B.3 at the bottom, and frames 5, 6, 7, 8, 9, 10 at the top. True up and cement firmly. Next draw the tail-ends together and cement to the sternpost, holding with pins whilst the cement dries hard. Cut and insert all the diagonal cross-bracings from the rear cockpit to the sternpost, true up, and cement firmly. Cut the cross pieces for the nose, cement, and hold in by rubber bands until dry. Now cut and insert all the remaining diagonal braces, true up the whole fuselage finally, and put aside to set. Now fit remaining decking frames, all stringers, patch plates *inside* fuselage at wing base formers, rear motor anchorages, tail skid, dowel tube for the tail unit, dashboards ; sheet in the nose with 1/16 in. sheet up to frame 4, and add the cowling formers, finally cementing on top and side cowlings of 1/64 in. sheet.

Centre-section.

Block up the fuselage with the top longerons level fore and aft and across. Slide in the twin spars through the holes in the W.B.F., packing them apart ⅛ in. and 1/16 in. respectively. Check for alignment and cross level, and before cementing firmly in place finally, cement on spar stiffeners ; then cement spars to W.B.F. Now slot on the centre-section ribs on each side, check for 3 degree incidence and cement in place. Adding the L.E., T.E., undercarriage supports and plywood facing ribs completes the assembly. Cover centre-section in 1/64 in. sheet.

RACE-CAR ANNOUNCEMENT
please see page 762.

N.G.A. ANNOUNCEMENT
please see page 752.

FULL SIZE PLANS 2/6 POST FREE

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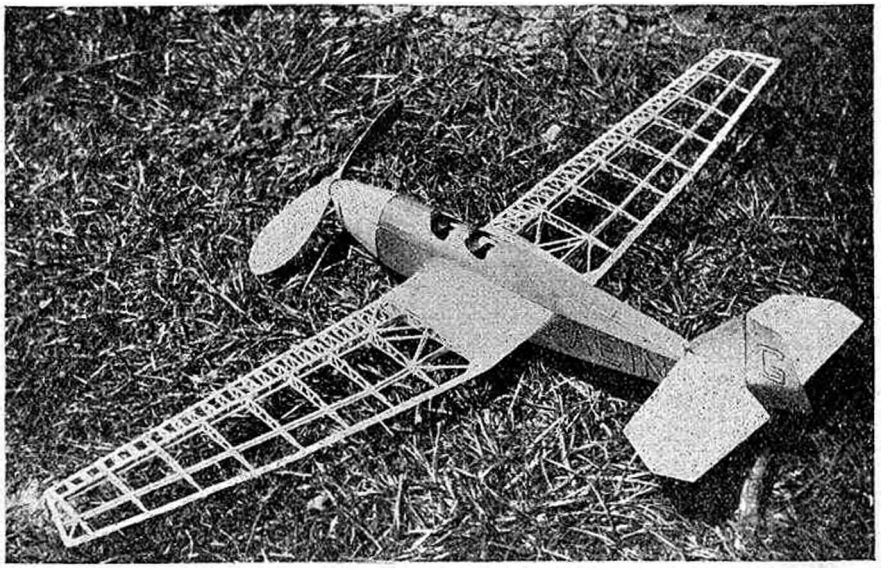


Undercarriage.

Bend the various wires to the shapes shown in the drawing. Bind them together with fuse wire, and sweat together for a clean joint. Now push the tops of the legs into their various supports on the airframe, sew tightly with thread, and cover amply in cement to ensure a firm fixing. This method will be found simple and strong, and should give no trouble in service.

Tail Unit.

Cut out all ribs from 1/32 in. sheet. Pin down fin post and L.E. and cement in F1, F2 and F3. Cement together pieces to form T.E., pin down and insert R1, R2 and R3. Take up from drawing, true up and cement firmly. Add the two dowels, being sure to get a good fixing; cement on the hooks. Sandpaper L.E. and T.E. to complete. For the tail plane, pin down the two spars, and cement on all the ribs. Add L.E. and T.E. after taking up from the drawing, sandpapering to correct shape when dry. Insert and cement firmly the sheet balsa in the centre-section.

Main Planes.

On the original, these weighed ¼ oz. each, with three coats dope. Cut out all the ribs, and using directions on the drawing make the riblets. Then lighten them all by cutting out their centres as shown. They are now braced with strips 1/16 in. by 1/32 in., on one side only, *inboard*. The top and bottom of all ribs and riblets are now rounded slightly with 00 sandpaper. To erect a wing, slide the *ribs only* on to the front bottom spar, pin on to drawing, true up and cement. Now slide in bottom rear spar, true up again, and cement. The wing can now be taken up, the top spars being slid in and cemented firmly in place, taking care to keep the ribs upright. Add L.E., T.E. and tips. Fit in riblets, line up, and cement in place. The addition of gussets, 1/16 in. by 1/16 in. bracing, ply facing rib, and spruce spar reinforcement completes the assembly. Sandpaper L.E., T.E. and tips, and fill in between the rear spars with hard balsa. Repeat for other wing.

Gearbox.

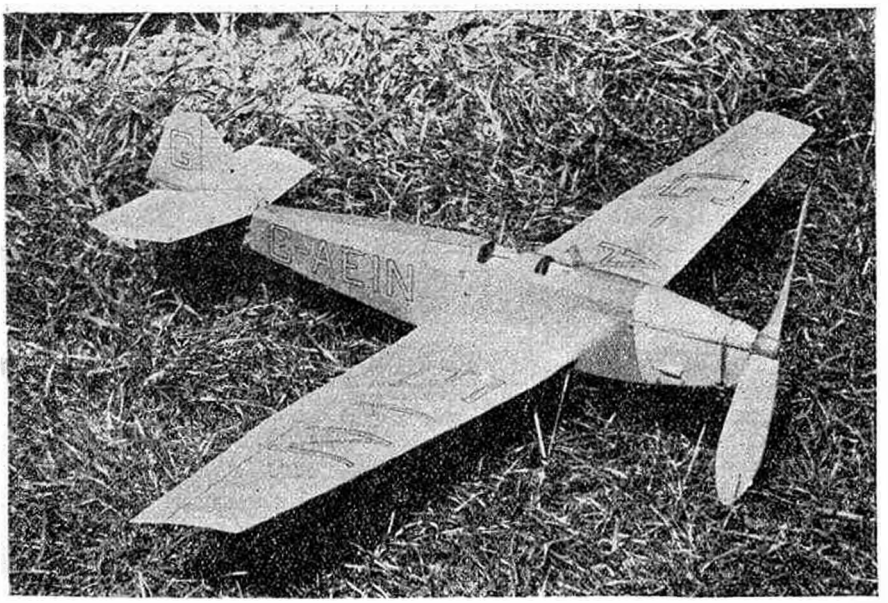
The detailed drawing and notes make everything clear. On no account use any oil on the gears or bearings, as this soaks into the noseblock. Pack the gearbox with thick grease before screwing on the back.

Covering.

Cover the entire model with superfine jap tissue, and waterspray. When completely dry, give one coat of shrinking dope, and two coats of coloured dope. The original model had yellow fuselage and tail fin, with silver wings and tail plane.

Power.

Two loops of 3/16 in. flat rubber on each hook will make the model fly quite steadily for 25-30 seconds, but if you want a really snappy climb at the expense of a long flight, use ¼ in. rubber. The glide is amazingly flat, as the max. L/D for Gött. 436 is 2·0 degrees, and incidence of model is 3 degrees.



As with most flying scale types the performance is not high, but by careful construction and saving of weight wherever possible the duration figures given above should easily be exceeded in good weather conditions.

Reduced scale plans are given on page 742.

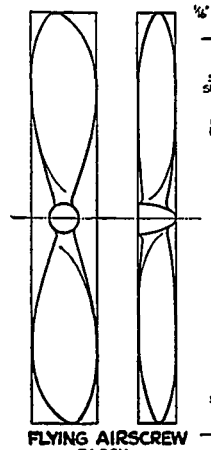
THE B.A. SWALLOW

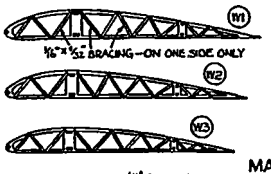
30" WING SPAN FLYING SCALE MODEL

2/6

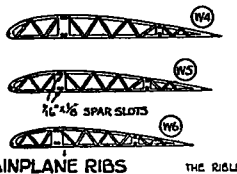
DESIGNED BY J. L. ROBERTS

COVERING. ENGINE COWLING TO FRAME 4 & COWLING FORMER — ½ oz SOFT SHEET BALSA. FRAMES 6 TO 9 (TOP DECKING ONLY) — STIFF CARTRIDGE PAPER. REMAINDER — TISSUE.

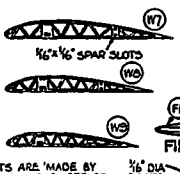


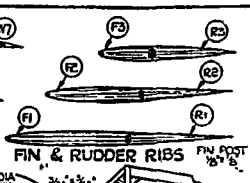


RIB W1 MADE FROM 1/16" SHEET AND FACED WITH 1/32" 3 PLY



MAINPLANE RIBS
W2 — W9 1/32" SHEET





FIN & RUDDER RIBS

FIN POST 1/8" x 1/2"

THE RIBLETS ARE MADE BY SANDWICHING TWO PIECES OF 1/32" SHEET BETWEEN ADJACENT RIBS AND SANDING TO SHAPE. LIGHTEN AND BRACE AS ABOVE

1/16" DIA DOWEL

3/32" x 3/32"

HOOKS FOR TAILPLANE ATTACHMENT

1/16" DIA DOWEL

CELLULOID WINDSCREENS

1/16" SHEET

SCALE SPINNER

1/32" SHT.

3/32" x 3/32"

FAIRING STRIP TO FIN POST

EXHAUST — 1/8" DIA BAMBOO

CROSS BRACES

3/32" HARD SHEET

1 1/8" DIA. CELLULOID WHEELS

MOTOR ANCHORAGE — 1/32" PLY LET IN FLUSH WITH LONGERONS WELL CEMENTED.

SPRUCE TAIL SKID

PAPER TUBE

HOOK — 24 S.W.G.

BALSA FAIRINGS 1/16" SHEET

GEARBOX ASSEMBLY

3 PLY COVER PLATE
20 S.W.G. BRASS BACK PLATE
CUP WASHERS
BALL THRUST WASHER
16 S.W.G. SHAFTS
3/16" GEAR WHEEL
1/2" GEAR WHEEL
1/2" GEAR WHEEL
20 S.W.G. BACK PLATE
HARD BALSA BLOCK

BIND WITH FUSE WIRE & SOLDER
3 PLY FACING PLATE
HARD BALSA NOSE BLOCK
20 S.W.G. BRASS FRONT PLATE
CUP WASHERS IN FRONT OF ALL 3 GEARS

NOTE. IN PLAN & ELEVATION OF THE FUSELAGE ALL STRINGERS IN FRONT OF FRAME 9, ARE SHOWN BY A SINGLE LINE FOR CLEARNESS. THEY ARE 1/16" x 1/16"

1/32" SHEET RIBS

T1
T2
T3
T4
T5
T6

TAIL UNIT RIBS

DATA

WEIGHTS

FUSELAGE, CENTRE SECTION & U/C	1·25 oz.
NOSE BLOCK, GEARBOX & AIRSCREW	·75 oz.
WING PANELS	·5 oz.
TAIL PLANE & FIN	·125 oz.
RUBBER MOTORS	·5 oz.
TOTAL:	3·125 oz.

WING LOADING
4·35 OUNCES/SQ. FOOT

GEARBOX
2 GEARS — 1/2" DIA., MESHING, DRIVING 3/16" GEAR ON AIRSCREW SHAFT, MOUNTED ON BRASS PLATES FRONT AND REAR, BALL THRUST RACES. RATIO OF STEP UP = 17-17-13-131 ON AIRSCREW

NOTE. ALL BRASS SCREWS USED ON GEARBOX SHOULD BE SMALL AND C/S HEAD TYPE.

1. SECURE BRASS FRONT PLATE TO NOSE BLOCK WITH 4 BRASS SCREWS
2. INSERT GEARS & CUP WASHERS FRONT & REAR. USE THICK GREASE
3. SECURE BRASS BACK PLATE TO 3-PLY COVER PLATE WITH 4 1/8" ALUM RIVETS
4. SECURE COVER PLATE TO NOSE BLOCK WITH BRASS SCREWS & CEMENT
5. BEND HOOKS & ASSEMBLE AIRSCREW WITH ANY SMALL FREE WHEEL DEVICE

FLYING AIRSCREW BLOCK

HARD BALSA BLOCK — 7 1/2" / 1/4" x 3/4"
COVER WITH TISSUE AND GIVE FOUR COATS OF DOPE.

3/32" SHEET

3/32" x 3/32" LONGERONS

STERN POST — 1/8" x 3/16"

WARREN BRACING FULL LINES SHOW BRACING BETWEEN TOP LONGERONS. DOTTED LINES SHOW BRACING BETWEEN LOWER LONGERONS

POWER:
2 MOTORS — EACH 4 STRANDS OF 1/4" x 1/2" RUBBER

TOP DECKING FRAMES
CUT FROM 1/16" SHEET BALSA (NOTE GRAIN)

TAILPLANE

3/16" x 1/16"

3/32" x 3/32"

INNER STUB SPAR — 1/16" SPRUCE

PORT WING PANEL

TWIN SPARS — 1/16" x 1/16" HARD BALSA

1° DIHEDRAL UNDER EACH TIP

1/16" BRACING TOP & BOTTOM

T.E. — 3/16" x 1/16"

STARBOARD UNDERCARRIAGE COMPONENTS

TO L.E. CENTRE SECTION
TO P/C SUPPORT BETWEEN BOTTOM LONGERONS
TO T.E. CENTRE SECTION
CROSS STRUT 20 S.W.G.
REAR STRUT 24 S.W.G.
MAIN U/C LEG 18 S.W.G.
SOLDER TOGETHER HERE
DO NOT BEND AT THIS POINT UNTIL WHEEL IS FITTED
L.E. 1/16" x 1/16"
U/C STRUT SUPPORT 1/16" x 1/16" HARD BALSA

DASHBOARDS
TRACE OR CUT OUT AND THEN CEMENT TO FORMERS 6 & 8

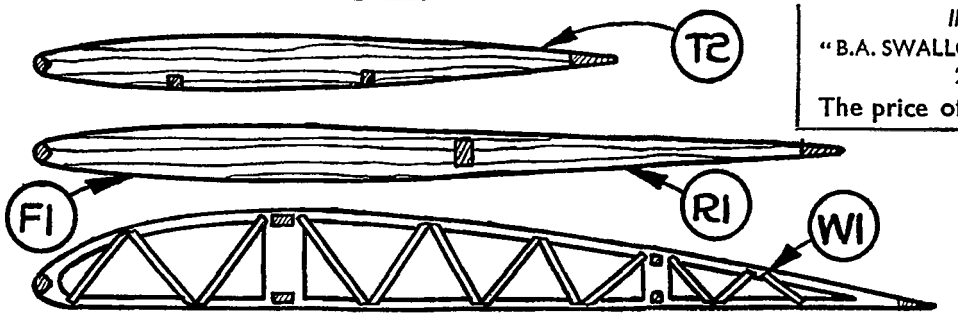
CENTRE SECTION

BOTTOM LONGERONS (REP. ONLY)
U/C LEG SUPPORT 1/16" x 1/16" HARD BALSA
X, Y & Z CUT FROM 1/16" SHEET (HARD)
FILL IN BETWEEN SPARS WITH 1/16" SHEET
U/C STRUT SUPPORT 1/16" x 1/8" BALSA
FACED WITH 1/32" PLY
T.E. — 1/16" x 1/16"
C1, C2 & C3 CUT FROM 1/16" SHEET BALSA

STARBOARD WING PANEL

TWIN SPARS — 1/16" x 1/16"
L.E. 3/32" x 3/32" HARD BALSA
1/16" SHEET GUSSETS
AILERON LINE MARKED IN INDIAN INK

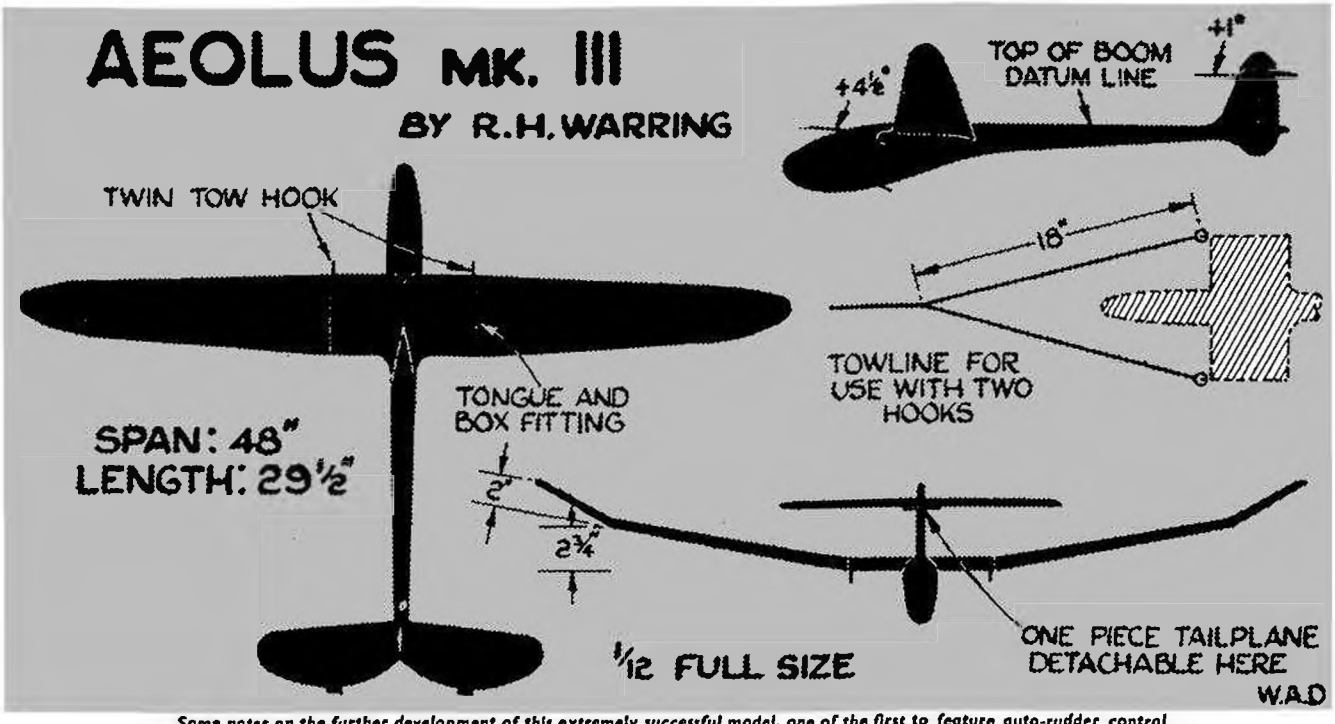
Illustrated above is the
"B.A. SWALLOW PLANS SERVICE DRAWING,"
2/7th ACTUAL SIZE.
The price of these drawings is **2/6** each.



EXAMPLE OF FULL SIZE DRAWINGS.

AEOLUS MK. III

BY R.H. WARRING



Some notes on the further development of this extremely successful model, one of the first to feature auto-rudder control and now the first to feature twin tow hooks.

FULL SIZE (revised) WORKING DRAWINGS ARE AVAILABLE. PRICE 3/-. Post free.

LIKE most machines intended for competition work, the original design of Aeolus has been subjected to considerable modification during which a whole series of closely related models have been produced. The original machine, although unorthodox in layout, followed the usual trimming practice, i.e., C.P. above C.G., with a non-lifting tailplane and was intended for circular "thermal hunting" flight. This was the Mk. I. Mk. IA had a modified tailplane fixing plugging vertically into the fin, but the final solution of "crash-proofing" was found in Mk. IB on which the tailplane was simply held in place by a rubber band—a small platform on top of the main fin ensuring rigidity in flight.

Mk. II was rigged to modern practice with a lifting tailplane set at about 1 degree angle of attack and the wings at 4½ degrees angle of attack; the C.G. now being at 60 per cent. of the main wing chord back from the leading-edge. This machine was particularly used for slope soaring, but it was found that a greater factor of lateral stability was required. This resulted in Mk. IIA being fitted with letter-box slots (see page 470 October AERO-MODELLER)—later abandoned in favour of fixed slots on the Mk. IIB.

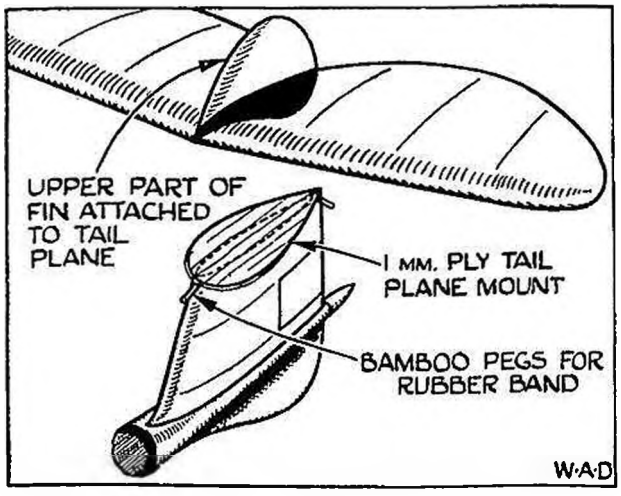
At about this time I recommenced experimenting with twin tow hooks—incorporated on Mk. IIC which proved an immediate success. This remained a standard fitting on all subsequent marks along with the knock-off tailplane.

The final contest development of the design, produced towards the end of last year, again dispensed with slots, but featured tip dihedral for "super" stability in all weathers, with an increase in fin area to balance side areas. Thus Mk. III should, through thorough "breeding" prove a most sound and reliable small contest model for both hand and tow-line launching. The wing, with exaggerated dihedral angles, is not as efficient as possible, but the amazing reserve of stability more than compensates for this. The fitting of twin tow hooks was, again, influenced by further modern practices—namely, that instead of attempting to flying circles the machine is allowed to wander—the possibilities of true soaring flight thereby being greatly increased.

A three-view General Arrangement drawing of the Mk. III is given on this page, together with a sketch of the revised tail fixing, from which it should be easily possible to modify existing models should the reader so desire. But the original model is not necessarily superseded by the new machine. Mk. I was designed for tow-launching and circular, thermal-hunting flights—Mk III is more versatile and incorporates new developments, such as the twin tow hooks, which have not yet been fully proven.

Any machine of the series may be constructed equally well of hardwood or balsa, although it is always advisable to build the tail surfaces of the lighter material.

Further developments now under construction include Mk. IV with a high aspect ratio tailplane and smaller "pod" and Mk. V with aileron control. This latter feature has been found far more efficient and favourable than rudder control, having less tendency to spin on tight turns. Its principle may also be extended to rubber-driven machines.



MODEL

CONSIDERABLE prominence has recently been given in the technical and non-technical press to " Gremlins " and their association with full-size aircraft. But the influence has been far more widespread and a long suspected idea that they have also been connected with model aircraft, and flying models in particular, has, at last, been definitely proved. It is difficult to photograph such a creature but one particularly talkative specimen has recently been captured, and, pampered and well fed, has " spilled the beans " or, rather, " blown open the woicks ! "

From such a first-hand report, it would appear that their activities are widespread, their mischievous activities being the plague and sorrow of the whole body of aero-modellers.

For a start there is the *Stowaway Gremlin* whose home is in any model box. This in itself is not too bad, if only he would confine his activities to a quiet unassuming life—but this he does not ! This little fellow hates being cramped and so, when the flier is packing his box, he is continually pushing wings, fuselages, etc., up towards the lid, making it appear that the space available is far smaller than it really is and reducing the modeller to a state of hopelessness at the feeling that it is just impossible to get all the parts that he requires into the box. In despair the modeller usually straps a wing or fuselage to the outside of the box—but even this does not beat the *Stowaway Gremlin*. His other practice is to deliberately remove and hide small components such as fins, tailplanes or airscrews—such items not being missed until the flying field is reached.

Then on the way to the flying field he invites all and sundry Gremlins on the route to come and join him—with the result that the box gets heavier and heavier as the journey proceeds. It is just too bad if any of these newcomers happen to be *A.I.D. Gremlins*, for, accompanied by a *Master Gremlin* or not, they must inspect every model or part, sticking their heads and feet through the tissue as youngsters are often wont.

At the flying field itself we meet many old-established Gremlins in great numbers—always in full force on Sundays. They are continually active from dawn to dusk whenever a model is being flown.

There are the *Siren Gremlins*, whole families of which live in trees. All their powers, and indeed some are extremely skilful, are directed towards enticing models into the tops of the trees where they dwell. To this end they use every trick, even a form of fishing line, net, or boathook to ensure a capture. Once the model has stuck, they proceed to nail it to the branch by sticking the twigs through the tissue or winding small leaves round the airscrew shaft. They always favour the most inaccessible part of each tree and generally, it has been established, lop off all the branches and other footholds on the trunk from ground level to a height of at least 10 feet.

GREMLINS

The unfortunate modeller is thus reduced to attempting to throw a line over the branch on which the model rests (in which case the Gremlins either wind the line around a branch well remote from their scene of activity, or deliberately throw it down again), or endeavouring to poke the model out with a long pole (in which latter case the Gremlins direct the pole through the model, or push it away altogether; sometimes even sawing off the top of the pole, so that it is just a little bit too short).

Meanwhile, other Gremlins are busy on the flying field. The *Razor Gremlin* sits astride any rubber motor which is being wound and, suddenly, slashes through the rubber! This Gremlin, however, appears now in danger of unemployment and his family have become *Glider Parasites*. These are particularly active during the launching period. The *Rudder Waggler* turns the rudder during a tow launch whilst others clamber on to one wing in an attempt to sideslip the model down into the ground. Others sit astride the fuselage and endeavour to unhook the line before the peak of the climb has been reached. If this fails they often slide down the line and cut it through—in fact, anything to spoil the launch.

Others remain more or less at ground level, tangling the line up with tufts of grass, and in one instance I have even seen them wind the line around an anti-invasion pole—with equally disastrous effects to the glider concerned!

The *Winder Hider* is another precocious little beast who, as soon as a winder is placed on the ground, picks it up and staggers away with it to dump it in the midst of the thickest clump of grass he can find. His brother is far more destructive. He sits astride the winder and loosens the hook, particularly when a motor is being stretch wound.

Closely related to the Sexton Gremlin, whose existence was noted in a recent issue of "The Aeroplane," the *Gravedigger*, working in close co-operation with the Stowaway who has now recovered from his journey, proceeds to bury, or otherwise hide razor blades, cement, pins, rubber bands and other similar and very necessary articles of repair. Sometimes his activities even extend to burying the complete repair outfit!

The *Caber Gremlin's* ancestry was founded north of the Tweed and this hardy specimen of the brood picks up anti-invasion posts or small trees and runs to place them in front of a model coming in to land. Should this fail the *Gremlin Groundsmen* set to work, some grasping the model's wheels as soon as they touch down, toppling it over on its back and then kicking it around the flying field—always downwind, for this is easier for them. Their destructive tendencies are aided by the efforts of the *Sawyer Gremlin* who seizes every opportunity to saw half-way through airscrews and/or undercarriage legs so that they will break on the least shock.

Before the war, petrol modellers had their own Gremlins; notable amongst them being the *Sparks Gremlin* who drained batteries, oiled up spark plugs, nibbled the insulation off wires, broke soldered joints or oiled up the contact breaker. Closely allied to him was the *Fiddler Gremlin*—for ever fiddling with the needle valve adjustment and altering the mixture setting. Others, with similar destructive intent, clogged up fuel pipes, drank the petrol and otherwise made themselves a perpetual nuisance.

Every model, at one time in its life has carried its load of *Hobo Gremlins* out for a free ride. Sometimes so many of these little creatures clamber aboard that the additional weight completely ruins the performance, the climb is sluggish, the glide poor and the duration of flight low. They have also been accused, but without evidence, of putting a brake on the airscrew shaft so that the rubber cannot develop its full power.

A more intelligent Gremlin, but with a similar nature, is the *C.G. Shifter*, whose whole time is spent in altering the trim of a model. This little fellow is particularly active at competition times.

The Meteorological Gremlins are so well known as to require but little description. The *O.O.S. Gremlin* is one of the few of the family that are ever thought of in kindly light, but even he is not without his pranks. For one thing he is very shy of timekeepers—generally being his busiest on "unofficial flights." And, talking of timekeepers, there is the little fellow who sits on the stop watch and deliberately holds back the second hand and his cousin who does his best to block the time-keeper's view and obscure his vision. The *Windy Gremlins*, the last we have space to list, are blustering, swaggering chaps, always blowing and snorting at nearly every flying meeting. So great are their efforts that they generally collapse somewhere around dusk—but usually manage to last out as long as there is a model left to fly—and wreck! They have very few holidays; only about two or three Sundays a year, and are, perhaps, the most unkind Gremlins of the whole species!

R. H. W.

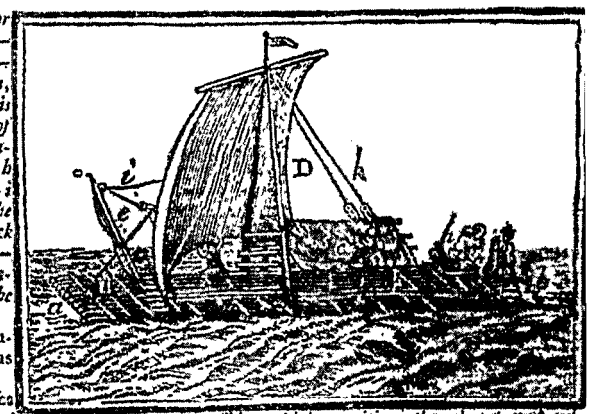
What about the good Gremlins? I have it on the authority of my brother, a pilot in the R.A.F., that just when a Me. 109 had been diving to attack his Catalina, a Gremlin who was sitting on his tail flew away and bit the Jerry so hard that he misfired! And only last week it was revealed that a Hurricane was riddled with flak, made a miraculous journey back across the sea and immediately on landing broke into a thousand pieces. Is it not obvious that a thousand tired little Gremlins had been holding it together all the way home and only let go when their pilot safely landed, perhaps collapsing and dying of exhaustion themselves?

P. D.

A BALSA MODEL A.D. 1758!

By LAWRENCE H. SPAREY

An interesting account of the uses of balsa wood, long before the introduction of flying models! The reproduction opposite shows a BALZA in full sail.



a The prow or head.—b The stern.—c The awning or tilt.—D The poles or sheers, on which the sail is hoisted.—e A kind of bowsprit.—g a guara, drawn up.—h The fire-hearth.—i The bowling of the sail.—k The back stays.—l The deck.—r, r, r. Other guarars for steering the balza.

The ingenious author's account is as follows.

"From the houses I shall proceed to give an account of the vessels, which, omiting the chaias and ca-

AS a relief from the turbulent present, I know of no better course than to browse in the tranquil atmosphere of the past, and the collecting of old and curious books has been one of my minor hobbies for many years. One of my recent acquisitions is a bound volume of "The London Magazine, or Gentleman's Monthly Intelligencer," for the year A.D. 1758, and whilst browsing, recently, in the somewhat stuffy days of George the Second, I encountered a reference that struck a chord across the intervening years. This was nothing less than a reference to *balsa wood*, and although, as may be imagined, this was not in connection with model aeroplanes, it will, no doubt, be of interest to we modern users of this curious wood.

The reference occurs in an account of a voyage to South America, and chiefly concerns a strange type of boat or raft commonly used by the Indians, both for river navigation and for short sea voyages, and named *Balzas*. As is to be expected of an age when education consisted of a thorough knowledge of the Classics and a total ignorance of hygiene, the account is liberally bespattered with references to Horace, and to the naturalist Pliny, who seems to have made some mention of the wood in his writings—prior to being killed in the eruption of Vesuvius in the year A.D. 79. We thus see that the balsa tree has quite a respectable ancestry, and is not, as is commonly believed by aero-modellers, a recent American invention.

After identifying the South American balsa tree with two species known to the Greeks, a somewhat scanty description of balsa wood follows. It would seem that to be known to the ancient Greeks was a sufficient recommendation for the notice of any Georgian gentleman. The Balza is, says our chronicler, "a whitish, soft wood, and so very light, that a boy can easily carry a log of it, three or four yards in length and a foot in diameter."

The rafts or "Balzas" were composed of logs, firmly lashed together with leather thongs, and equipped with a main and foresail mounted upon two poles, crossed to form sheers, of mangrove wood. Some of these craft, belonging to the wealthy native families, were elaborate affairs, being thirty feet long and having a breadth of twenty-four feet, and having upon them all the conveniences of the shore. The crews and families of the craft used for trading lived upon them, somewhat in the manner, I gather, of the modern bargee.

What chiefly concerns our narrator, however, is the manner in which the Balzas were steered. In spite of their clumsy appearance and construction they could, says he, "sail, tack, and work as well in contrary winds, as ships with a keel, and made very little lee-way." These advantages were derived by another method of steering than by a rudder, namely, by a number of boards, three or four yards in length and half a yard in width, which were placed vertically at the head and stern of the vessel. By thrusting some of these deep into the water, and by raising others, complete control of the craft was attained. But listen to our author's account. They can, says he, "bear away, luff up, tack, lay to, and perform all the motions of a regular ship." O! shades of "Treasure Island" and Long John Silver.

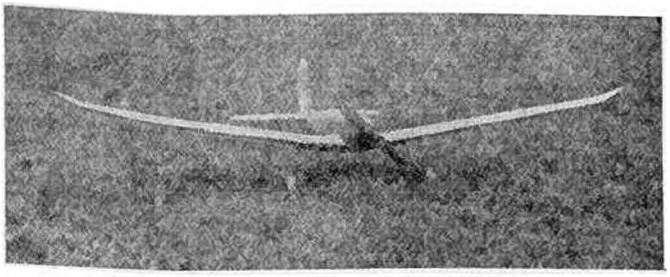
Now follows, in the account, some complicated nautical mathmatics, containing such things as "proportion of the superficies, and the squares of the signs of the angle of incidence, supposing their velocities equal"; all going to show, we hope, why the Balza will luff up, bear up, or keep nearer to the wind.

Quaintest of all, however, is the reason given by our author for presenting these particulars. This is what he says:—

"Had this method of steering been sooner known in Europe, it would have alleviated the distress of many a shipwreck, by saving many valuable lives; as in the year 1730, the 'Genovesa,' one of his majesty's frigates, being lost on the Vibora, the ship's company made a raft; but committing themselves to the waves, without any means of directing their course, they only added some melancholy minutes to the term of their existence. Such affecting instances move me to communicate to my readers, as it may hereafter contribute to save the lives of unfortunate sailors, who shall have the misfortune to be shipwrecked upon a desert shore."

The picture which we reproduce is taken from this most curious article, and shows a Balza in full sail. Is it not strange to reflect that our modern model aeroplanes may be thus allied to those romantic days of the past?

THE SCALE TYPE LOW WING MODEL



By J.P.F. FORSTER

PART III.

FOR the benefit of those interested in the making of the writer's "knock-off" extension drive described in Part II of this article, a brief description of the simple process of case-hardening the coupling will be given before passing on to the detachable nose-block carrying the airscrew shaft, and the alignment of the two shafts.

Case-hardening the Coupling.

This is necessary in order to prevent wear of the slots, and can be done very easily using either Kasenit or potassium ferro-cyanide. The coupling is heated to a bright red for one or two minutes and a few crystals of potassium ferro-cyanide sprinkled on to it. These fuse and spread all over the surface of the red-hot steel which takes up carbon. When the flaking has mostly burnt off, i.e., in another minute or two, it is plunged into cold water and quenched. After taking out and cleaning up with emery cloth the coupling is complete except for the insertion of a fibre lining. Actually the writer now finds little advantage in fitting this and a well fitting all-steel drive is just as silent as a fibre-lined drive. If fibre is fitted, it is best done by driving a solid $\frac{1}{4}$ in. diameter rod of red fibre firmly into the cup and after centring up in a 3-jaw chuck, drilling or boring out the fibre to an internal diameter which just admits the driving head of the airscrew shaft. The slots already filed in the steel cup act as templates for filing slots in the fibre and cannot be damaged by the file after case-hardening.

Extension Airscrew Shaft.

Owing to the $\frac{1}{4}$ in. Whitworth or B.S.F. standard crankshaft diameter now used on almost all engines, the writer decided to use this diameter for the threaded end of his extension shaft, thus making airscrews and washers, etc., interchangeable with all others. This thickness is, however, really unnecessarily heavy, especially as, owing to the shoulder required behind the new airscrew driving washer, the shaft behind this must be greater than $\frac{1}{4}$ in.

To overcome the disadvantages of so heavy a shaft, a bearing surface of $\frac{3}{8}$ in. diameter for $\frac{1}{2}$ in. only at front and rear of the shaft was left, the intervening shaft being turned down to about 5/32 in. which is ample for engines up to 10 c.c. A ball thrust race could be used with slight advantage, but the writer, having at the time of writing been unable to obtain one the right size has omitted this without any detrimental or noticeable affect on engine "revs."

The bush, taking but little strain, may be made with very thin walls—about 1/16 in.—just sufficient in fact to enable an external thread to be tapped on the front end. A convex flange is turned on its rear end to provide a thrust surface. It is passed through the nose-block from the rear and secured by a thin nut threaded on to the front and countersunk flush with the front surface of the block. Between the front and rear bearing surfaces it may be perforated with 3/16 in. holes if made of brass, still further reducing weight.

The most satisfactory method of fitting the new airscrew driving washer has been obtained by filing a slightly tapered square in front of the shoulder to within a few "thou" of the front of the bush, and filing a corresponding square in the airscrew driving washer. This method can be made completely free from backlash, and keeps the plane of the washer square with the shaft while it is dismantled or assembled instantly.

Incidentally, before final assembly, the thin part of the shaft can be packed with thin grease or graphite grease and, using this, the writer has found no trouble in lubricating the shaft, which has been allowed to run at full (4,000–6,000) r.p.m. for many minutes on end.

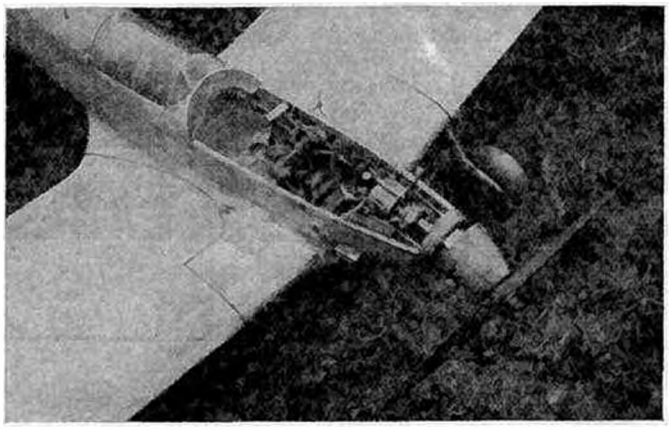
Correct Location of Nose-block.

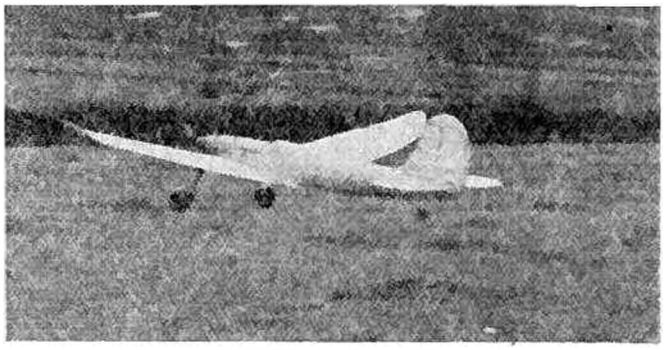
Experienced "petroleers" soon come to judge within a degree or so the angle of offset required with a given engine and wing span to produce more or less straight flight. The process of lining up the engine with the shaft is greatly simplified by building the front bulkhead with a definite offset to the right side, and if desired, half a degree or so of downthrust. The hole for the bush is then drilled square with the rear face of the nose-block, the sides of which at this stage are left rough and considerably oversize.

The nose-block is then brought into position with its rear face against the bulkhead, in which the locating square or oblong has already been cut. The hole is now placed in the centre of the locating square, and a sharp pencil is run round the inside of the square from behind the front bulkhead, marking the position of the square on the rear face of the nose-block.

The square projection for the nose-block is now shaped up from very hard wood or aluminium, bevelling the sides very slightly to assist easy knocking out. The

A very clear view of what lies "under that bonnet."





The unusually flat glide is well illustrated in this "action" shot of the model coming in to land. A stall is not imminent.

best way to hold it to the nose-block so that it cannot move in relation to the shaft is to retain it with the flange of the bush :—The bush is removed and the square block clamped against the rear surface of the nose-block in the position already marked in pencil. The drill used to drill the nose-block is then passed down the hole for the bush, thus guiding it through the locating block.

In order to keep the point of engagement of the coupling and extension shaft as nearly in line with the bulkhead as possible, it is advisable to counterbore the locating block so as to sink the flange of the bush as deeply as possible into this block (see Fig. 4). The diameter of the counterbore must therefore be big enough to enclose, with about 1/16 in. clearance, the cup of the coupling and driving pin. This was the reason for grinding the ends of this pin flush with the outside of the driving cup. It also prevents the block sliding sideways or upwards after displacement from the locating square until *after* the coupling is completely disengaged, avoiding all strain on the shaft.

SEE FIG. 4, FEBRUARY "AEROMODELLER."

The nose-block is held in position by countersunk rubber bands passing back through holes in the block itself and the front bulkhead, to hooks within the "engine room" (see photo 9). A pencil line is drawn round the front bulkhead on the oversize rear surface of the block. Finally it is rasped and sanded down to the correct contour leading up to the base of the airscrew spinner, and it is now complete.

Mounting and Alignment of the Engine.

The engine bearer block is now made to slide into position and is secured with pegs, turnbuckles or screws, and the engine is lowered on to this and brought forward so that the coupling engages with the driving head and pin of the airscrew shaft, taking care that the pins are just not quite "bottoming" in their slots. The engine is moved about until the crankshaft axis is as nearly as possible in line, laterally, with the offset airscrew shaft, and the bolt holes are marked on the bearers. Similar care is taken to pack up or shave down the bearers so as to align the shafts in a horizontal plane, the engine being then securely bolted to its bearers. It can now be removed for cleaning and adjustments *on its bearing block* in the knowledge that it will slide back into proper position again without re-alignment being necessary each time.

Exact geometrical alignment of the two shafts does not seem to be essential in practice and small alterations of the angle of offset by packing one side of the nose-block can be made without causing vibration when the engine is running.

The "engine-room" cover (slightly out of proper position and therefore clearly seen in photos 5 and 6), comprises a removable monococque upper part of the fuselage extending the whole distance from the rear of the front bulkhead to the windscreen, and is located by two short pegs into the rear of the bulkhead and secured by a turnbuckle operated by a countersunk screw on the upper surface of the "scuttle," immediately in front of the windscreen. One half turn of this screw with the thumb nail allows the cover to be lifted off, giving access to the engine, the battery, flight-timer, undercarriage shock-absorbing elastic and also to the rubber bands securing the wing.

By this method the whole nose of the machine and engine cowling can be made to conform exactly to the contours of *any* full-size aeroplane with a liquid-cooled in-line engine, while preserving the safety of a knock-off nose-block and advantages of a detachable engine, although the engine is, in fact, almost completely accessible when in position.

The controls for the needle valve, ignition timing and either a lever operating an air strangler or choke, or (as can be well seen in photo 7), an extension to the induction pipe, are brought to the surface through small holes in the cover, allowing all operation and starting with the cowling closed and ready for flight. The ignition-timer is operated through a bevel gear, by the fixed spindle (see photos 5–8), avoiding the long ugly slit required by the normal lever.

An easily detachable exhaust manifold is arranged so as not to interfere with easy lifting out of the engine. With an inverted engine the writer has found it unwise to attempt to lead this to correctly placed exhaust manifolds as on full-size Rolls-engined machines. These must be fitted on a true scale model, of course, but should be "sham." The actual exhaust is most easily led out straight through the side of the "engine room" or if even this is considered too conspicuous, discharged along with the cooling air.

The writer, being first and foremost a "practical flyer," realises the need for easy access and removal of the sparking plug, and on this first (not true scale) model has left the bottom of the "engine room" unplanked from the front bulkhead back to the L.E. of the wing (see photo 6). From above and the side, this is absolutely undetectable and is not noticeable during flight. It provides efficient cooling, clear drainage for spilt oil and fuel, and at the same time complete access to the plug and H.T. lead, and (using an Ohlsson 23) even allows the tank to be removed through the bottom for cleaning, after unscrewing the central securing bolt from above, with the engine still in position.

The photos show the completed model except for paint and starboard undercart fairing. Note the slight extra dihedral on extreme wing tips which are glued on as separate units and can be altered. The very flat gliding angle is noteworthy and the most clearly seen contents of the "engine room" from left to right are the flight-timer behind the main spar bulkhead; the undercart shock-absorbing elastics; the mini-accumulator with crocodile clips; the upturned induction pipe for easy choking and the Ohlsson "23" with flanged coupling. The nose-block is displaced showing the aluminium locating block. The photos referred to by numbers appeared in Part II of this article in the February AERO-MODELLER.

SPINNING has always been one of the greatest bugbears of model aeronautics, since models possess comparatively little momentum, and are easily upset by any gusts encountered during flight. Much can be done to prevent spinning, however, but before any methods are suggested it will be necessary to consider just what factors produce a spin, and the solution will then lie in preventing those factors from taking effect.

A stall is the first visible sign of a spin starting. This may be due to faulty trim, or to a sudden gust catching the model head on, but in either case, the nose goes up and the model seems to stop momentarily before one wing tip flicks over and a spin develops. This is what we wish to prevent, and to analyse what happens, let us return to the model just before it stalls.

Suppose the wings have a semi-span S and chord C, and the model is flying at a speed V when the incidence is α. If a gust now causes a roll to develop of angular velocity P, then one half of the wing will move up, and the other half down. Due to its downward motion that half of the wing will have its effective incidence increased, with an equal reduction on the other side due to the upward motion. For a pair of elements distant y from the longitudinal axis, the change of incidence is clearly

$$\frac{yP}{V} \text{(radians)}$$

This follows from the elementary idea of the triangle of velocities.

The effect of the change in incidence on lift is shown in Fig. 1. The increase $\Delta\alpha$ on the downward moving half of the wing produces considerably less lift, and there is only slightly less on the upward moving side. Consequently there is a rolling moment tending to increase the roll which already exists, and the value of this may be found as follows :—

Denote by αk_L the difference in lift coefficient between the elements previously chosen. Then the rolling moment M due to the elements alone will be

$\rho\, V^2\, C\, y\, dy\, \Delta k_L$ where ρ is the air density.

Hence for the whole wing

$$M = \int_0^S c\, \rho\, V^2\, \Delta\, k_L\, y\, dy$$

A form of this expression more convenient for our purpose can be obtained by changing the variable to

$$\frac{y\,P}{V}$$

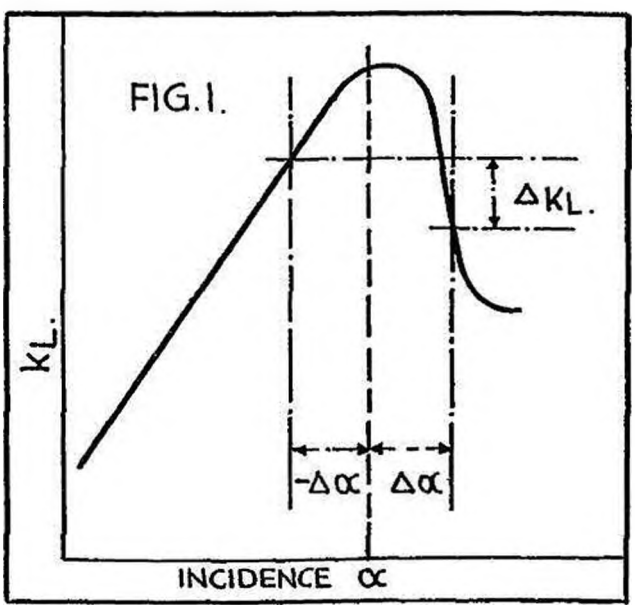
in which case

$$M = \frac{C\,\rho\,V^4}{P^2} \int_0^{\frac{SP}{V}} \Delta\, k_L\, \frac{yP}{V}\, \alpha\left(\frac{yP}{V}\right)$$

$$\text{i.e. } M = \frac{C\,\rho\,V^4}{P^2} \int_0^{\frac{SP}{V}} \Delta\, k_L\, \Delta\alpha\, \alpha\left(\Delta\alpha\right)$$

For a given aircraft, we can plot a graph connecting $\Delta\alpha$ and $\Delta k_L\, \Delta\alpha$ and the area under the curve will be proportional to the rolling moment. The general form of the curve is given in Fig. 2. For a certain value of $\Delta\alpha$, the positive and negative loops of the curve are equal and cancel out, giving zero rolling moment. The wing is therefore stable at a particular angular velocity given by this condition, and a further increase in P would produce a *righting moment*.

So we see that once a roll starts under these conditions it gathers speed until a certain constant angular velocity



is reached, which may be calculated from the above. From then on, the model continues to rotate at constant speed of its own accord, the motion being known as autorotation. This is the basis of the spin.

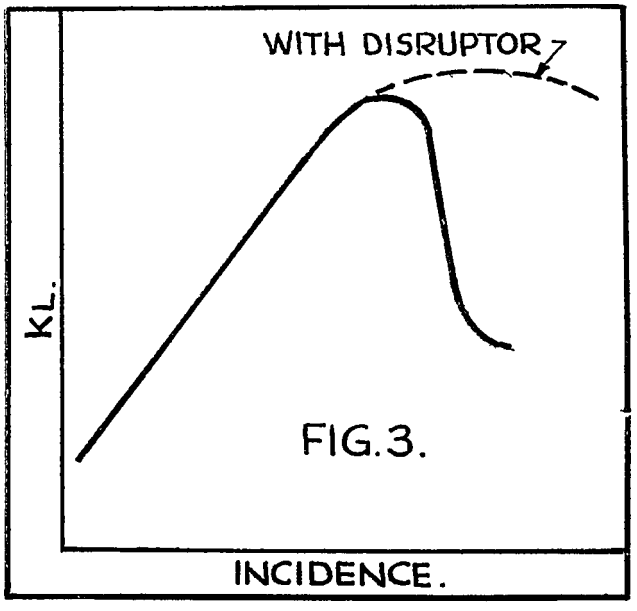


FIG. 3.

If a gust begins a roll when the model is on the point of a stall, then autorotation sets in. The stalled part of the wing has a greatly increased drag, and this quickly slews the model round into a tight circle. At the same time, the nose drops, following the stall, and all these factors combine to produce a spin. The speed of the model is usually quite small, in spite of the steep angle of descent. This is, of course, due to the very high angle of incidence, which may have an average value over the span of 25 degrees or more, so the wing is well past the stalling angle.

From all this, we see that the spin is the direct result of a stall combined with the dropping of a wing tip, so if we can reduce the chances of these things happening, we shall lessen the possibility of a spin. By washing out the tips, the stalling angle of the wing as a whole may be increased, but only by a few degrees. A better way is to fit the much discussed Mattioldi-Randisi disruptors. These will put off the stall for another five or six degrees, only the effect on drag is doubtful (Fig. 3). The best way of all seems to be in fitting nose slots over the outer portions of the wing. This method has been used by Col. C. E. Bowden, who recommended its use in a back number of THE AERO-MODELLER. A nose slot not only increases the stalling incidence by as much as nine or ten degrees, but also decreases the drag at high incidences (Fig. 4). There is therefore less drag on the falling side of the wing, which means that the model will, if anything, turn away from the direction of the spin, and remain in stable flight.

One important side of the question has been purposely omitted from this article, and that is the effect of the size, shape, and arrangement of the wing and tail surfaces. This very extensive consideration was fully dealt with by R. H. Warring in the March, 1941, issue

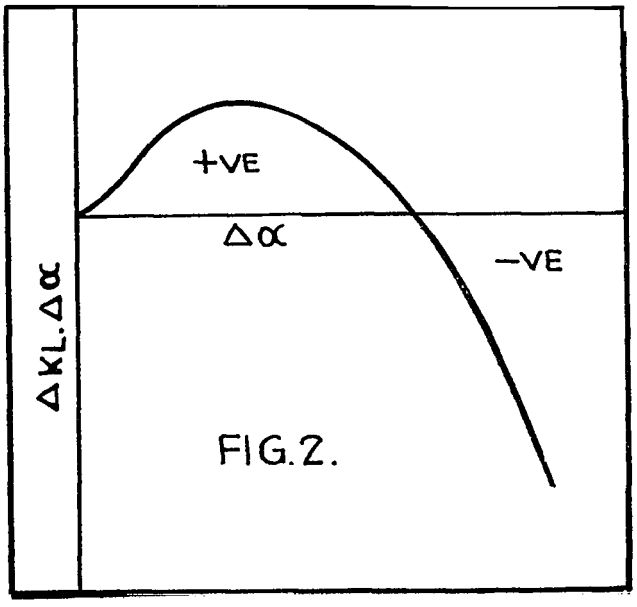


FIG. 2.

of THE AERO-MODELLER, to which the reader is referred, but what can be done on these lines was first demonstrated years ago by Mr. C. A. Rippon with his "Duraplane" design, which was definitely unspinnable. A descendant of this model having the same characteristics is "George," winner of last year's Flight Cup, and plans of which may be obtained through THE AERO-MODELLER Plans Service.

A small scale model of the "Duraplane" was tested in a miniature vertical wind tunnel of the open jet variety, used primarily for practical demonstration. Despite all mal-adjustments tried the undistorted model did prove spinproof and any attempts to induce anti-rotation met with failure. It was only after one of the ailerons (wing "flaps") and one wheel had been removed that the model *did* spin. Then it entered a perfectly uniform spin, revolving slowly in the vertical airstream with no acceleration or deceleration.

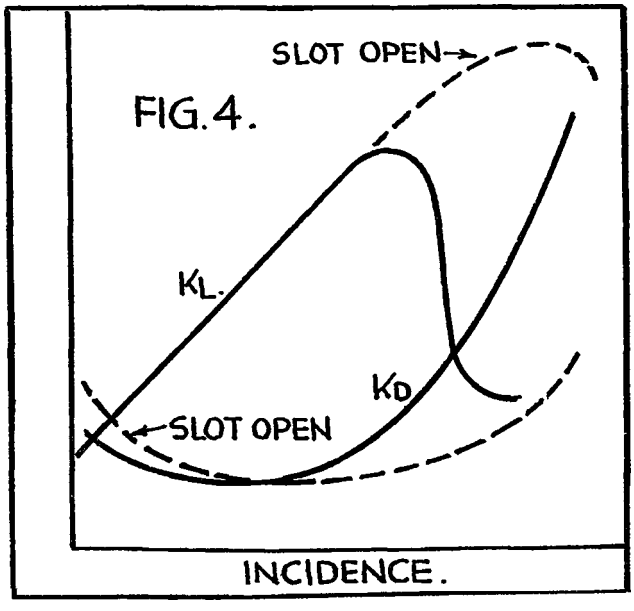
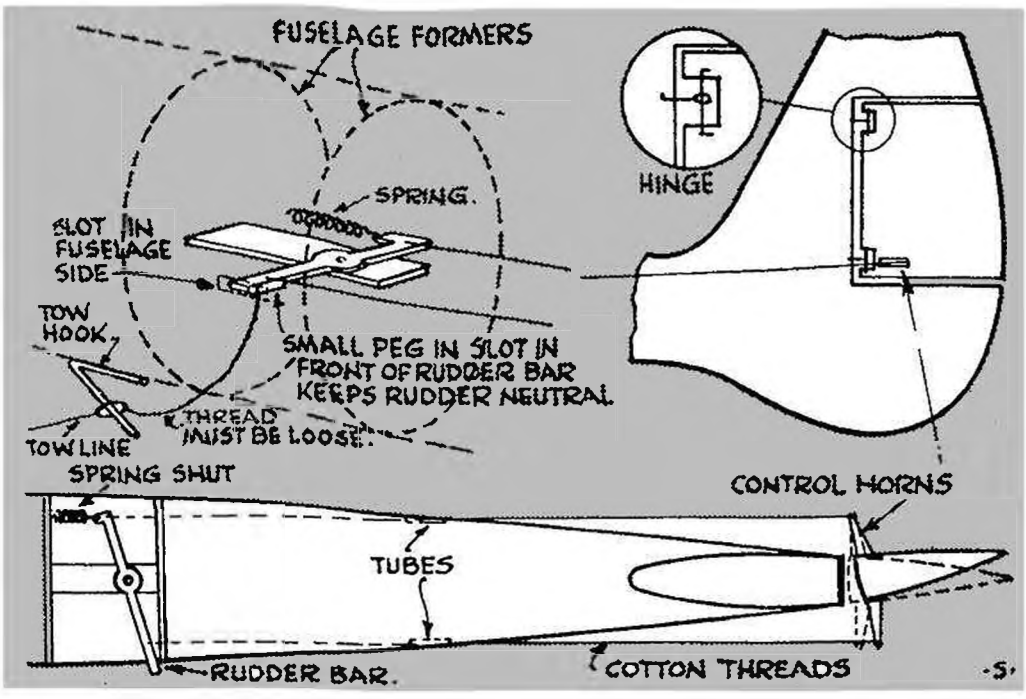


FIG. 4.

AUTOMATIC RUDDER CONTROL

by L · A · HODGSON

A further development of the auto-rudder control which dispenses with a pivoted hook and ensures full locking of the control. It should be particularly suited to large, heavy models where the tow hook comes in for a lot of hard knocks.



ONE of the greatest difficulties with a winch-launch glider is to get a straight tow and attain maximum altitude from the launch and then a sufficient circle in flight to take advantage of thermal currents. The scheme, which is illustrated below, has been developed for use on the larger type of glider.

Figure 1 shows the apparatus in the normal position with the rudder at neutral. The main part, which we will call the rudder bar, is made of $\frac{1}{8}$ in. three-ply and is pivoted on another strip of ply fixed between the two formers. This rudder bar must be free and easily moved. A light spring, one end of which is fastened to the former and the other to the rudder bar, pulls one end forward and thus the other backward, this movement being limited by the size of the slot in the side of the fuselage as shown in fig. 3.

Two lengths of strong thread are attached to the ends of the rudder bar and they must both be attached an equal distance from the pivot. The two control threads go through holes cut in the formers and care must be taken to keep them from coming into contact with any sharp edges and causing unnecessary wear. A short distance from this they emerge from the fuselage through two short tubes, and the ends are attached to the control horns on the rudder. The two horns are made of 1/16 in. ply and firmly secured to the rudder mainspar. It is advisable to dope the threads before fixing to make them weatherproof.

The method of keeping the rudder straight while on the towline is shown in fig. 3. This consists of a small peg attached to a length of thread and the other end of this is attached to the hook on the towline. When the towline is fixed to the hook on the model the thread must hang loose. The portion of the rudder bar outside the fuselage is moved forward until the rudder is straight, then the small peg is inserted between the bar and the end of the slot, keeping the rudder straight.

When the person towing the model up flicks the towline off the hook, only the slightest pull is needed to detach the peg from the slot. When this happens the spring takes control of the rudder bar and pulls it forward, pulling the rudder into turning position, fig. 2. If care is taken in cutting out the slot in the fuselage and not making it too big at the start, there will be no need to have stops on the fin as the end of the slot will act as a stop, keeping the rudder bar from going back too far, thus controlling the amount of turn on the rudder. If more turn is needed all one has to do is lengthen the slot. This apparatus is very simple to make and it is foolproof. One type of hinge that can be used on the rudder is illustrated and it can be made of pins if wire is not obtainable.

If the builder wishes to have a detachable tail unit he must terminate the control threads on small hooks; these in turn can be attached to the control horns when ready for flying.

AERO MODELLER
WINGS FOR VICTORY
COMPETITION

Designed by one of Great Britain's leading designers, C. R. Moore, A.R.C.A., this 35-in. span semi-scale model aircraft—"JACKDAW II"—has been chosen for "The Aero-Modeller" "Wings for Victory" competition, because no balsa is required in its construction.

Here is your chance to build a fine model for the 1943 flying season, and win a handsome prize of National Saving Certificates.

The model may be built entirely of hardwood :—spruce, birch, bass, or whitewood being equally suitable.

All-up finished weight is 5 to 6 ozs., at which the wing loading is only some 5½ ozs. per square foot, giving flights of at least two minutes duration without the aid of "thermals."

PRIZES

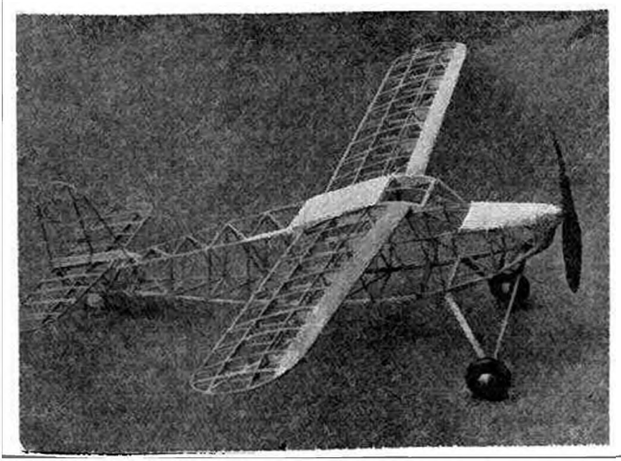
		£	s.	d.
1st ·	10 Certificates value	7	10	0
2nd ·	7 „ „	5	5	0
3rd ·	5 „ „	3	15	0
4th ·	3 „ „	2	5	0
5th ·	2 „ „	1	10	0
6th ·	1 „ „		15	0

Of simple design, this little model is typical of the class of light Civil Aircraft likely to be produced in large numbers for private flying after this war has been won.

A clearly printed plan, 27 ins. by 35 ins., showing all parts drawn full size, and complete with material list and detailed building instructions, may be purchased, price 2/– post free, from the "Aeromodeller Plans Service Ltd," Allen House, Newarke Street, Leicester.

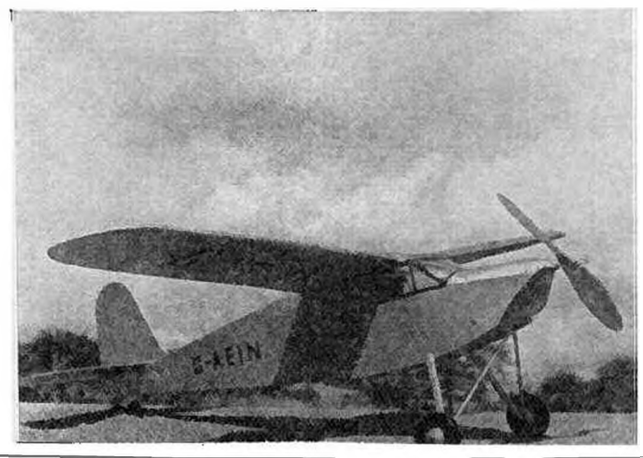
There is no entry fee for this nation-wide competition. All that is required is for entrant's flights to be witnessed by at least 3 additional persons, and that entries are made on the official form sent with each plan.

THE CLOSING DATE FOR THIS COMPETITION IS JULY 31st, 1943



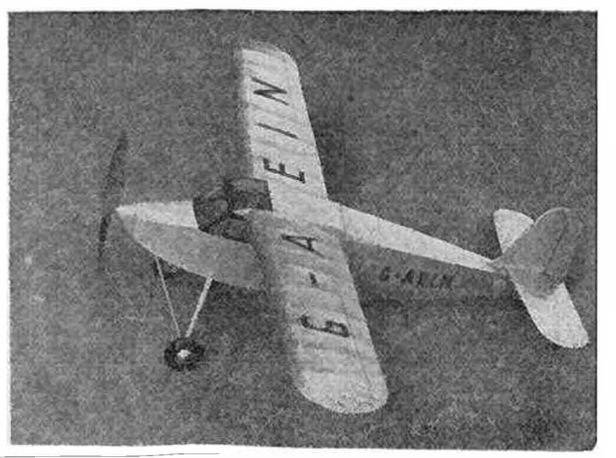
RULES

1. All entries must be received by Aeromodeller Plans Service Ltd., at Allen House, Newarke Street, Leicester, not later than July 31st, 1943.
2. All entries must be made on the official entry form supplied with the plan and building instructions.
3. Flights must be timed by at least 3 persons, not counting the entrant who must himself launch the model, and the entry form must be signed by the entrant and the witnesses (at least 3) who have timed the flight, all of whom must give their addresses.



RULES

4. This competition is for the longest hand launched duration flight, i.e., timed from the moment the model leaves the entrant's hands, until it touches the ground or any object.
5. No correspondence can be entered into in connection with this competition.
6. The decision of the Managing Director of Aeromodeller Plans Service Ltd., on any and all matters arising out of this competition will be final, and legally binding, and entry to the competition will be interpreted as an acceptance of the above conditions.




FROG
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For the sole Concessionaires
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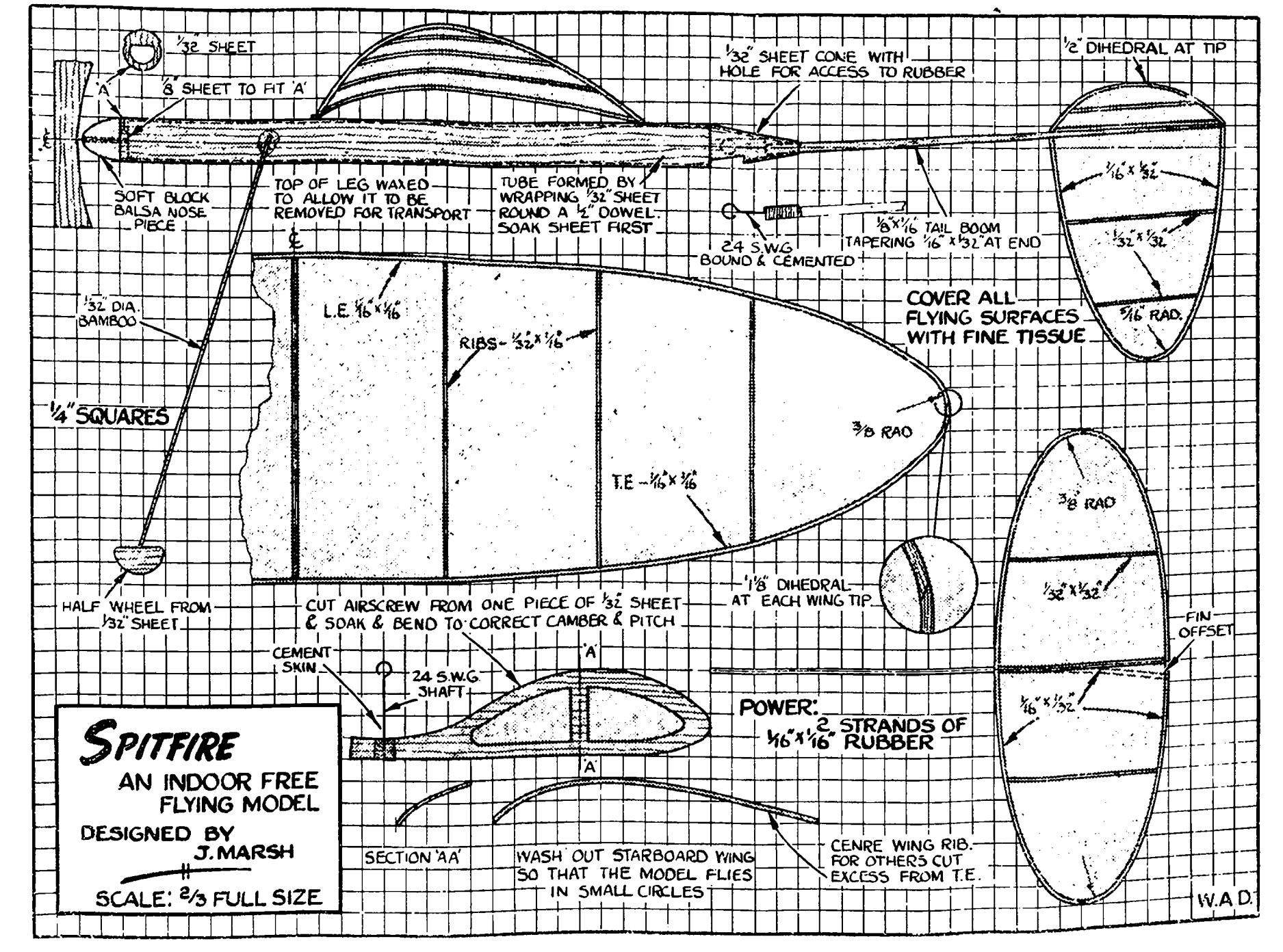


SPITFIRE

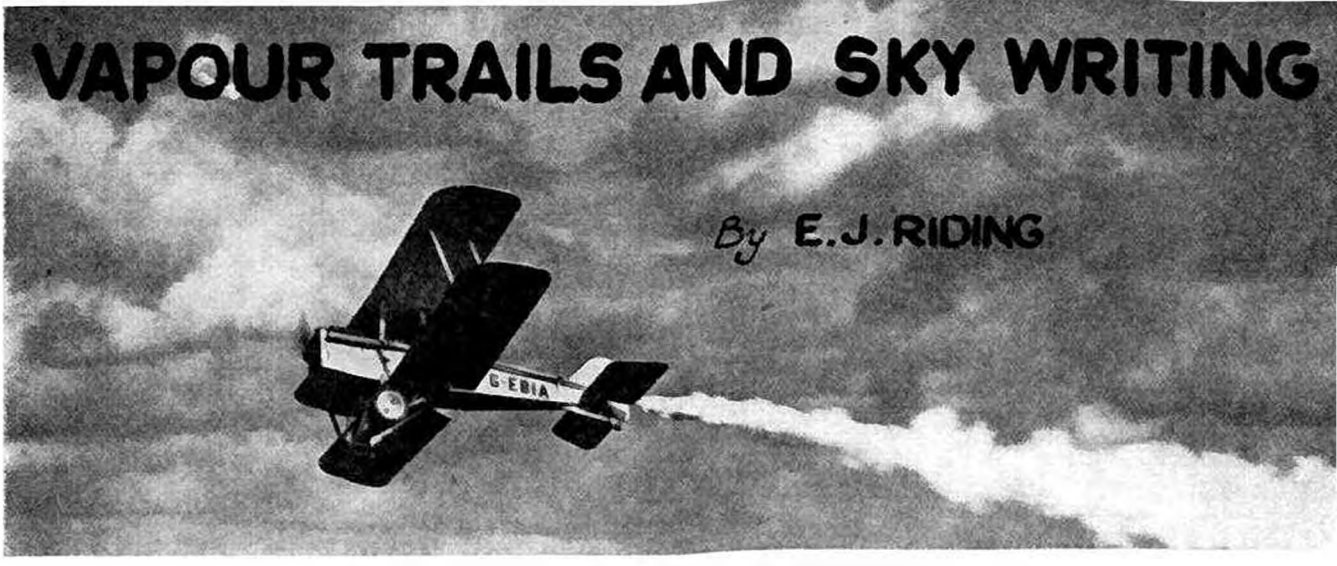
AN INDOOR FREE FLYING MODEL

DESIGNED BY J. MARSH

SCALE: 2/3 FULL SIZE

VAPOUR TRAILS AND SKY WRITING

By E.J. RIDING



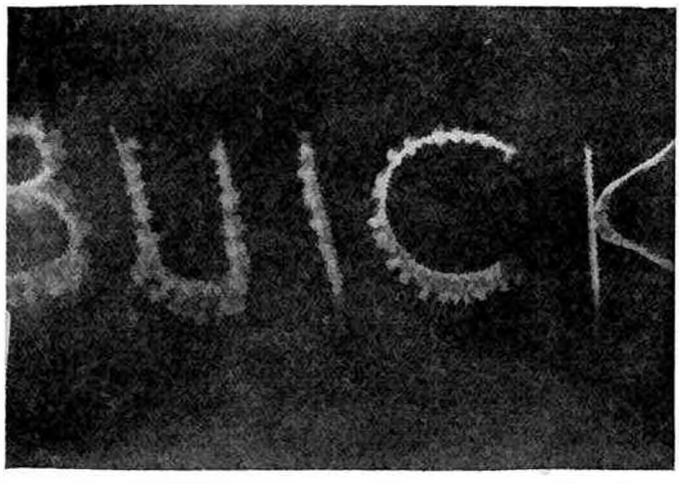
Heading photo by courtesy of "Flight." Other photographs by the Author.

DURING the early part of this war one often used to hear such exclamations as "Look at that aeroplane smoke-writing," and "Oh, yes, the Nazis always make smoke rings round a target for the bombers to aim through."

It is the object of this short article to differentiate between smoke-writing and vapour trails, both of which look somewhat similar but whereas one is of chemical composition, the other is physically formed and entirely involuntary—indeed, much to the discomfort of many a high-flying Hun on reconnaissance bent. Nature seems to have provided her own method for detecting the altitude flyer.

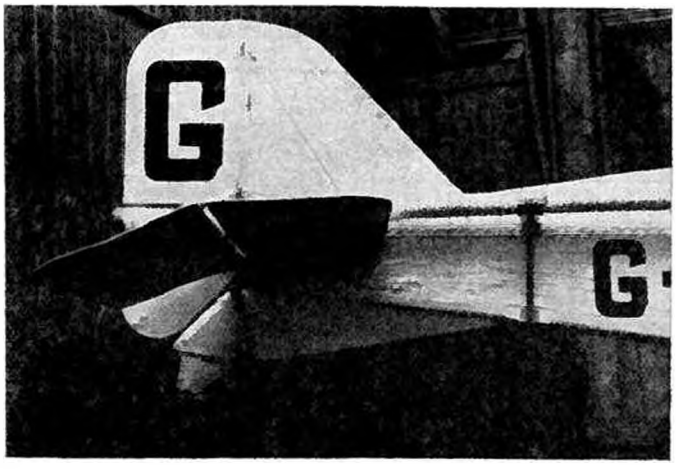
Unlike sky-writing, favourable atmospheric conditions are essential for the formation of vapour trails. These conditions exist in the main when there is a super-abundance of water vapour in the air. The exhaust from an aero engine consists mainly of carbon monoxide and water vapour. Under normal conditions these gases are invisible, but at high altitudes and correspondingly low temperature, the excess water vapour thrown into the already overladen atmosphere cannot be accommodated and therefore condenses and becomes visible as tiny particles of ice, the result being at first a thin, clearly defined trail, later fanning out into rugged strips of cloud. Thus one will often notice that a high-flying aircraft not producing a visible trail will frequently do so immediately it reaches a region in which clouds have already formed. Naturally, it goes without saying that vapour trails will not form above a certain height, i.e., the maximum height at which clouds are able to form—roughly 30,000 feet.

Sometimes the trail will be observed to emanate from a wing tip as well as from the exhausts, and this is commonly assumed to be caused by vortices set up by the wing tip "touching off" condensation in an atmosphere which is already over-saturated with water vapour.

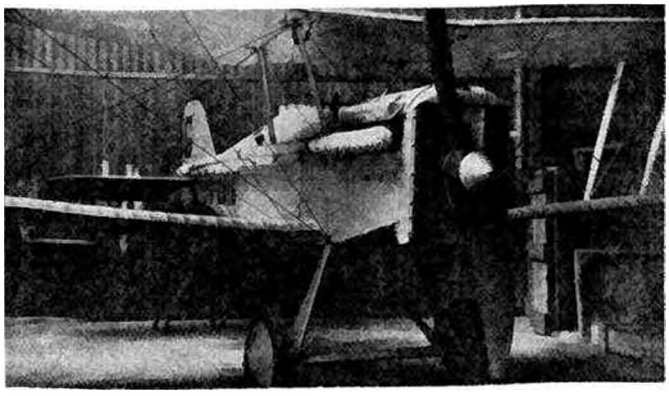


Wing tip vortices observed near the ground when an aircraft pulls out abruptly from a dive are caused by the

The SE-5 with exhaust extended to the extreme tail.

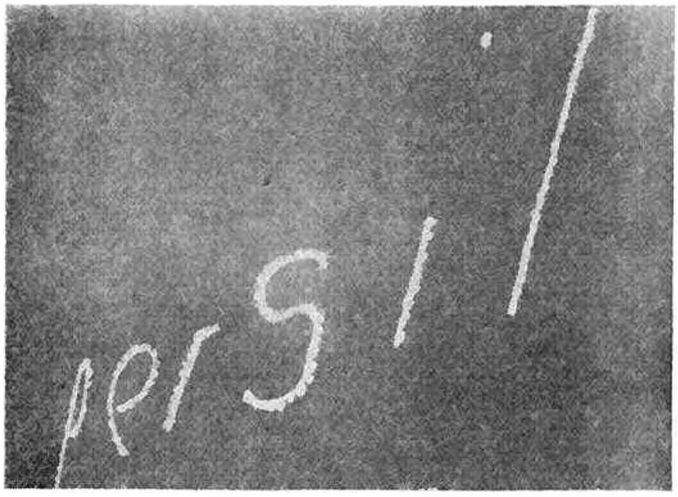


A front view of the same machine.

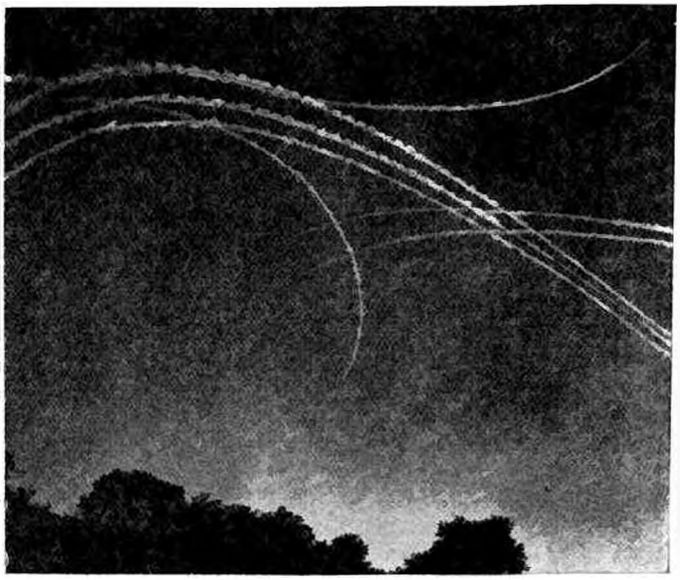


sudden expansion of air along the wing with consequent drop in temperature, producing only a temporary condensation of water vapour in the surrounding air.

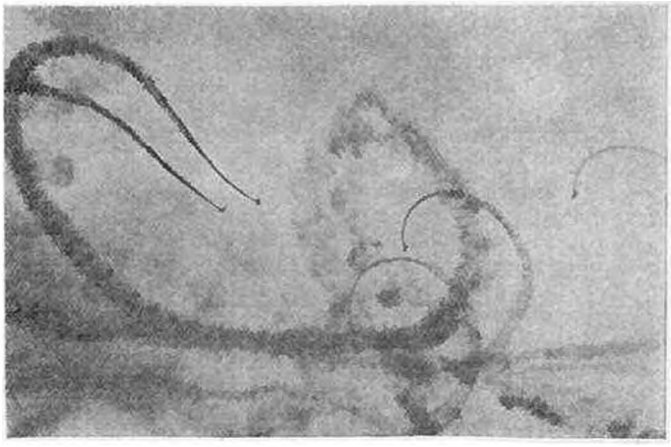
Turning now to the artificial side of the subject—smoke trails in which the smoke is produced chemically



either from containers carried on the machine or through the action of a substance ejected into the exhaust system immediately adjacent to the engine. On May 30th, 1922, for the first time in the history of advertising, writing in the sky by means of smoke from an aircraft was demonstrated to the public, and business houses throughout the country recognised that this medium for boosting their sales was to be a revolution in the art of advertising. When it is realised that this form of advertisement can be seen by all within a radius of 100 square miles one can gain some idea as to the commercial value of this invention. The whole of the means of effecting sky-writing is protected by a series of patents both at home and abroad. The credit for its discovery goes to Major J. C. Savage, who before the last war was manager to the late B. C. Hucks, an early pioneer in exhibition flying. Major Savage adopted the war-time S.E.5a single-seater for his purpose. Fitted with the 200-h.p. Wolseley Viper engine, this machine was eminently suited for the particular demands made upon it. The exhaust pipes were lengthened and carried down the sides of the fuselage to a " Y " junction at the sternpost, the rudder being cut away as shown in the accompanying photographs. The smoke-producing substance—the formula for which is still a closely kept

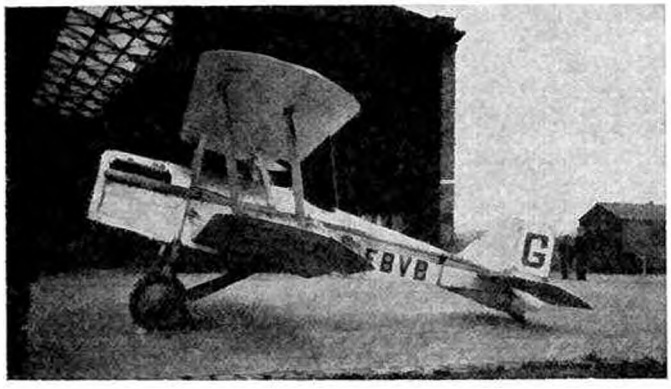


secret—was carried in a tank inside the fuselage and could be fed at will by means of a cock into the hot exhaust pipes, where the action of the heat transformed it into smoke. Several well-known old-timers were engaged on campaigns both in this country, U.S.A. and Germany. The names of Lingham, Turner, Tait-Cox,



Bramson and, latterly, Sidney St. Barbe, will always be remembered in connection with this " art," in which the writing has to be executed not only in script letters but in " looking-glass " fashion as well if it is to be read correctly by those below. A sky-writing pilot's training often began on a bicycle, tracing the letters out on the aerodrome.

SE-5's were widely used for sky-writing.



A Miles Hawk adapted for smoke-writing.

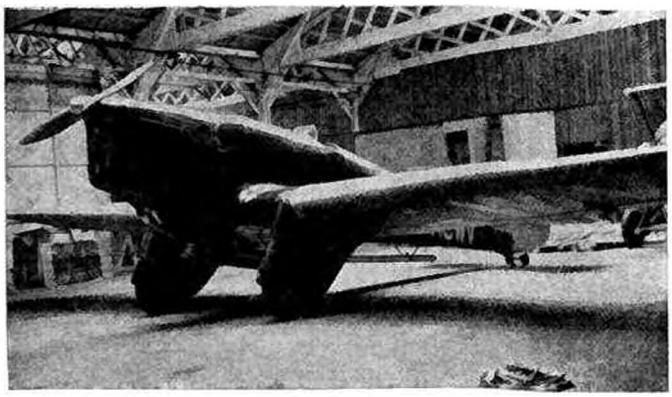


Photo by courtesy of Imperial War Museum.

THE FOKKER D.VII

By E · J · RIDING

THE Fokker D.VII was undoubtedly the best aeroplane ever used by the German Air Force during the 1914–18 war and the first models appeared over the Western Front in the spring of 1918. The machine was a single bay wireless biplane of composite construction, having a welded steel tube fuselage and wooden wings.

The fuselage was wire braced internally with lengths of piano wire tautened by means of a single turnbuckle to each wire. The bracing wires were anchored to lugs consisting of U shaped tubes welded to the framework at the intersection of each member. A single wire was looped through the lugs and coupled together with the turnbuckle, thus duplicating all bracing wires. It is worthy of note that this method of fuselage construction was embodied on the Avro 621 Tutor and the Cadet series—fifteen years afterwards.

The tailplane, rudder and fin were all constructed from welded steel tubing and were very simple in appearance. The fuselage had a wooden sternpost to which the rudder hinges were clamped. The wing was made entirely from wood and was a really beautiful piece of work. There were two box spars in each wing, the top and bottom booms of each spar being made from two spruce lamina with ply webbing on either side. The ribs were made from plywood blanks, with pine flanges following the contour of the rib and tacked on to it so as to form a sandwich with the ply in the centre. The leading edge was also made of plywood terminating in a serrated edge, the peaks being tacked to the front spar between the ribs (shown in dotted line on the G.A. drawing). The wings were internally braced with piano wire and ailerons fitted to the top plane only, the ailerons being of similar form of construction as the rudder and elevators. The trailing edges of the wings were lengths of wire attached to the extremities of the ribs which gave rather an attractive scalloped appearance due to the tautening effect of the doped fabric.

The machine was fabric covered and from examination of a genuine relic appeared to be already *printed* in a lozenge pattern composed of dark blues, purple and green before being sewn on to the airframe and afterwards tightened by doping.

Undercarriage, centre section and interplane struts were all made from streamline steel tubing, ball attachment points being utilised in the attachment of the undercarriage to the fuselage. The axle was encased in an aerofoil shaped plywood covered fairing which very definitely gave quite an appreciable amount of lift. Only the front bay of the undercarriage was braced and the shock absorbers consisted of cotton covered stee springs wound round two stubs welded to the vee struts.

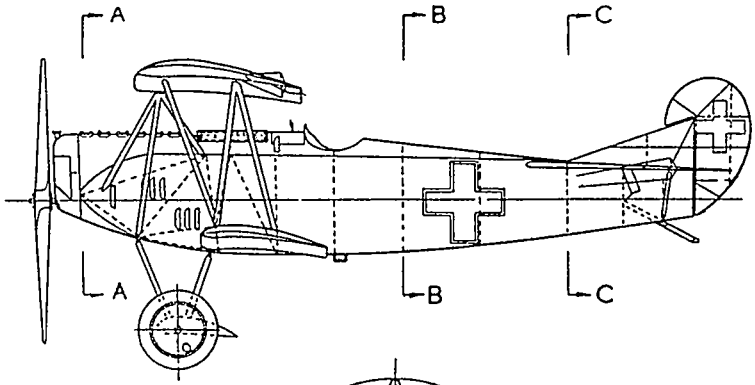
The petrol, oil and reserve tanks were all embodied in one large tank slung from the cross members of the fuselage just ahead of the pilot's cockpit, the capacity of the former being approximately 20 gallons.

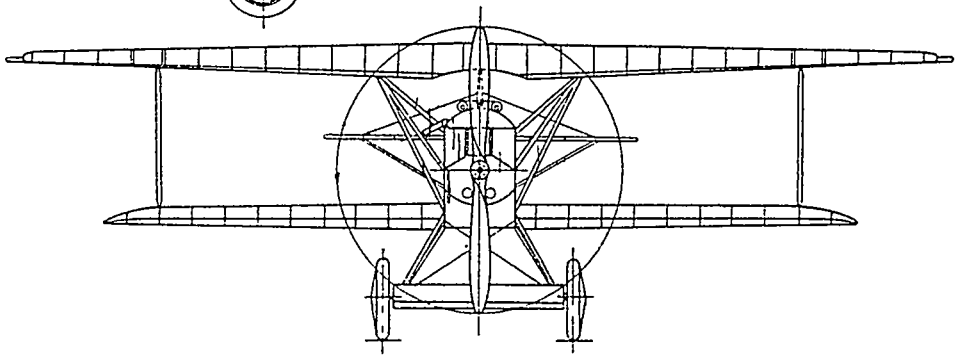
The armament was orthodox, consisting of two forward-firing Spandau machine guns, synchronised by means of a Fokker patent interrupter gear to fire through the propeller. The engine fitted in the first models was the 170 h.p. Mercedes, later succeeded by the 185 h.p. B.M.W. and the 200 h.p. Mercedes.

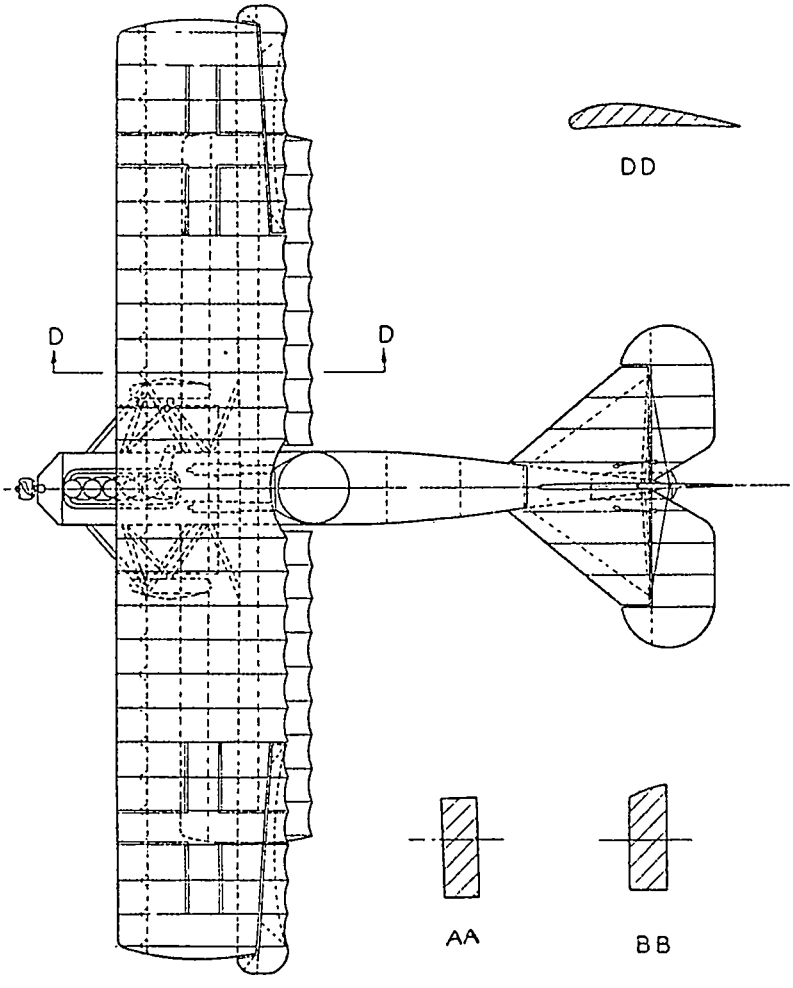
There was little uniformity as regards the colouring of these machines, and pilots apparently had their mounts painted any colour they fancied, but the official colouring is that mentioned above with, of course, the addition of plain black bar crosses outlined in white on the sides of the fuselage, rudder, and top surface of the top wing and under surface of the bottom wing.

Lt. Rudolph Stark, leader of Staffel 35, had a white arrowhead painted on his wings and lilac stripes with narrow black edges across the fuselage; the rest of his machine being camouflaged in the usual lozenge pattern. For the benefit of those preferring a more colourful effect, the following scheme was employed on a machine exhibited at the Enemy Aircraft View Rooms in the summer of 1918:—Front of fuselage and top surface of upper wing vermilion, rear of fuselage white, lower surfaces of wings and fuselage standard camouflage pattern, tailplane and elevators black with parallel white band. The serial number is given as Fok. D.VII. FN. 1450.

Span (upper)	29 ft. 3½ in.
Span (lower)	22 ft. 10¾ in.
Chord (upper)	5 ft. 3 in.
Chord (lower)	3 ft. 11½ in.
Gap	4 ft. 10½ in.
Length, o.a.	22 ft. 11½ in.
Track	5 ft. 11 in.
Dihedral	Nil.
Incidence (top)	0 ft.
Incidence (bottom)	1 degree.
Stagger	2 ft. 0 in.
Span of tailplane	10 ft. 0 in.
Chord	5 ft. 7½ in.
Height	9 ft. 0 in.
Weight, empty	1,540 lbs.
Max. speed	124 m.p.h.
Speed at 16,400 ft.	94 m.p.h.







FOKKER DVII

FT

A FLYING COMPOSITE MODEL

J · M · LAITHWAITE

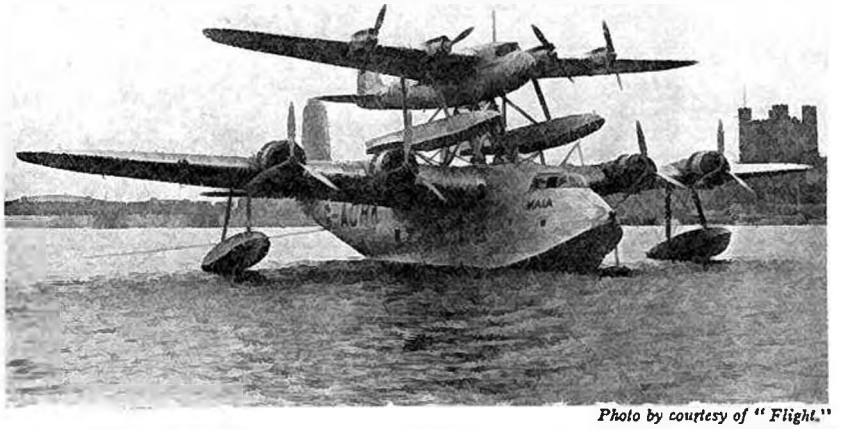


Photo by courtesy of "Flight."

THIS type of composite model has a simple but reliable release action and will give a steady performance. In a typical flight the combination flight lasted 40 secs., then the upper component flew for 35 secs. and the lower component for 45 secs. after separation. The release gear is detachable from the lower component so that both machines can be flown separately. The little machine is a good R.T.P. flier.

The lower component.

This can be any slab-sided high-wing model of over 36 in. wing span. It should be chosen for its qualities of stability and should not be too speedy. If possible the following modifications are recommended for composite flying :—

(i) Fit disruptors to the outer half of the wings. These should be made of $\frac{1}{8}$ in. circular reed and should project $\frac{1}{2}$ in. from the leading-edge. This decreases the stalling speed.

(ii) Increase the rudder and tailplane area by 10 per cent. This tends to increase stability.

Before making the release mechanism, strap the upper component on to the lower one by a rubber band and adjust its position until the larger model flies steadily with its nose slightly up. Thus the length of the release rod " c " can be determined. The larger machine may have some trouble in taking off with its burden ; if it has, increase the power.

The upper component.

This model has been specially designed for stability and the quick assumption of steady flight after release. To this end a very large rudder and anti-spin fairing have been fitted. The construction is rather heavy because the model has to be strong to stand the pressure of the spring (F) and to withstand the shock of release. Special features are the fuselage longerons and the rudder and stabilizer outlines cut in single pieces from sheet balsa. Only one coat of dope is required. The power is one loop of 1/30 in. by $\frac{1}{8}$ in. powerstrip.

The release mechanism.

This consists of three main parts, the actuating and release rods " A," " B," " C," the guide " D," and the spring and support " F," " E."

The rod " A " fits in grooves across the top of the nose and is held in by a very tight rubber band passing below the fuselage. The actuating rod " B " is pivoted to rod " A " by means of a piece of brass tubing. Its lower end has a loop which fits loosely over the prop. shaft and rests against a washer soldered to this shaft. A rubber band, passed round "B" and round a pin in the top of the nose, keeps the loop against the washer. The release rod " C " is freely joined at the top of the rod " B " and passes downwards under the guide " D." The hook on " C " fits just over the crosspiece of the upper component's undercart, thus holding it down. · The top nose panel is left uncovered. The support " E " for the release spring " F " consists of a length of $\frac{1}{8}$ in. by $\frac{1}{2}$ in. hard balsa strapped across the fuselage. A piece of $\frac{1}{8}$ in. dowel $\frac{1}{2}$ in. long is fitted firmly by means of a drawing pin to the centre of the length. The top of the dowel has a hole to take a pin which compresses the spring " F " and facilitates the adjustment of the model. A rubber band holds down the tailskid of the upper component and is pulled forward so that it tends to pull the smaller model forward.

To set the models for flying, proceed thus :—Compress spring " F " over dowel and pass pin through hole to keep it compressed.

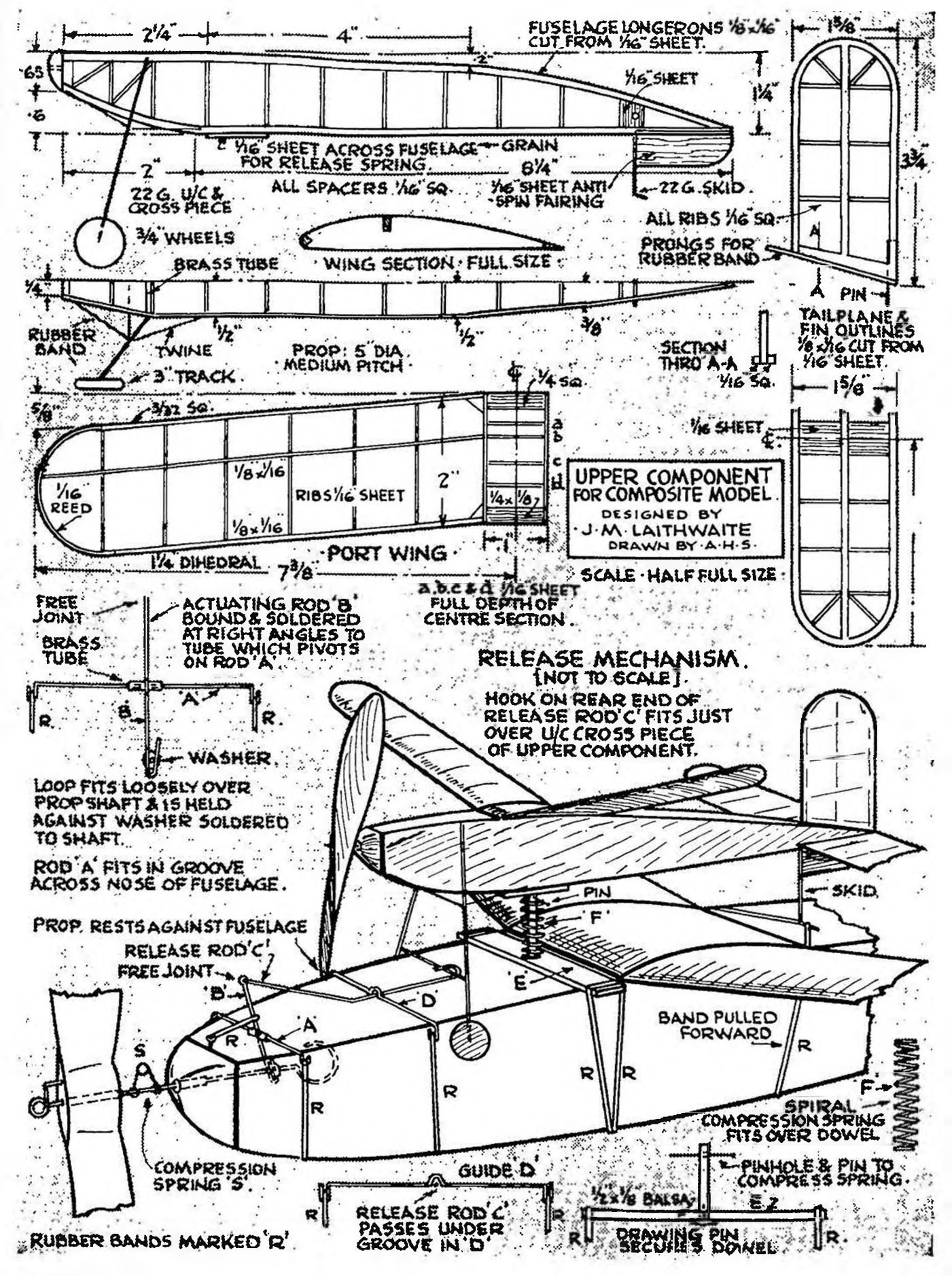
Wind up upper component and push its undercart crosspiece well under the hook in " C." Pass the rubber band over the tailskid and pull it forward. Wind up lower component.

Gently ease the upper component forward by holding the U/C legs until the U/C crosspiece is about 1/64 in. under the hook of " C."

See that the model is central and firm and then pull the pin from the dowel. This causes the spring " F " to butt against a piece of 1/16 in. sheet balsa cemented below the fuselage of the upper component. The model is now ready for flying.

As the tension in the lower component's motor gradually decreases the spring " S " extends, thus pulling the prop. shaft forward. This is transmitted via the washer to rod " B," which in turn pushes rod " C " backward and releases the hook. The spring shoots the nose of the smaller model up, thus clearing the propeller and the rubber band slips off the tailskid thus releasing the model altogether.

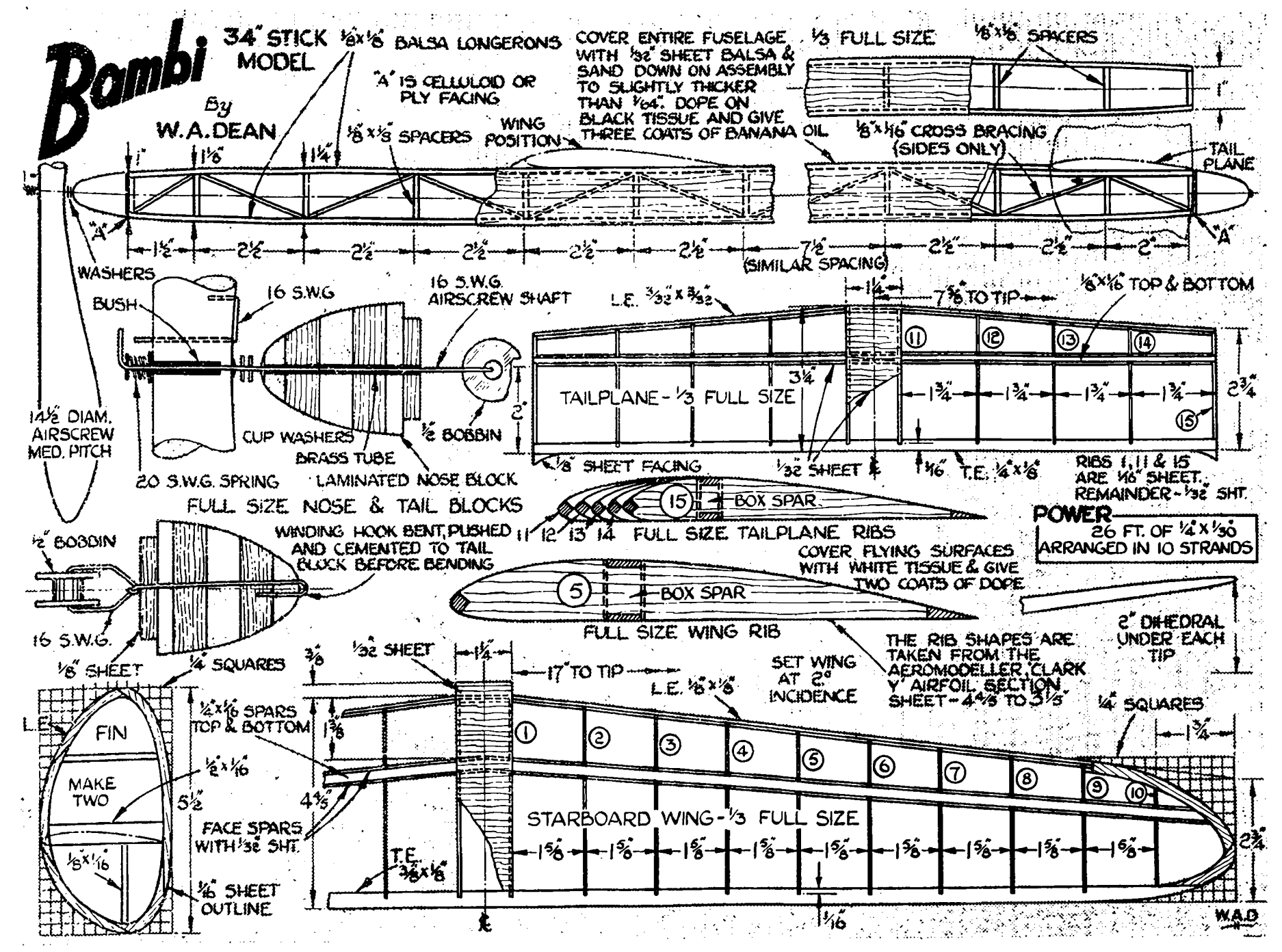
Take care not to bend the tailskid up and see that the rubber bands are tight ; also see that the joint between " B " and " C " is free but not loose. If the mechanism does not function correctly at first trial the necessary adjustments will suggest themselves.


2¼"
4"
FUSELAGE LONGERONS ⅛×⅛ CUT FROM ⅛" SHEET.
⅛" SHEET
1¼"
⅛" SHEET ACROSS FUSELAGE FOR RELEASE SPRING.
GRAIN
2"
8¼"
ALL SPACERS ⅛" SQ.
⅛" SHEET ANTI-SPIN FAIRING
22 G. SKID.
22 G. U/C & CROSS PIECE
¾" WHEELS
WING SECTION · FULL SIZE ·
ALL RIBS ⅛" SQ.
PRONGS FOR RUBBER BAND
A
A PIN
1⅝"
3¾"
BRASS TUBE
RUBBER BAND
TWINE
½"
½"
⅜"
PROP: 5" DIA MEDIUM PITCH
3" TRACK.
SECTION THRO A-A
⅛ SQ.
TAILPLANE & FIN OUTLINES ⅛×⅛ CUT FROM ⅛" SHEET.
1⅝"
⅛" SHEET
¼ SQ.
3/32 SQ.
⅛×⅛
RIBS ⅛" SHEET
2"
⅛×⅛
¼×⅛
1/16 REED
a
b
c
d
UPPER COMPONENT FOR COMPOSITE MODEL.
DESIGNED BY
J. M. LAITHWAITE
DRAWN BY A. H. S.
¼ DIHEDRAL
7⅜"
PORT WING
SCALE · HALF FULL SIZE
a, b, c & d ⅛" SHEET FULL DEPTH OF CENTRE SECTION.
FREE JOINT
BRASS TUBE
ACTUATING ROD 'B' BOUND & SOLDERED AT RIGHT ANGLES TO TUBE WHICH PIVOTS ON ROD 'A'
R.
B
A
R.
WASHER.
LOOP FITS LOOSELY OVER PROP SHAFT & IS HELD AGAINST WASHER SOLDERED TO SHAFT.
ROD 'A' FITS IN GROOVE ACROSS NOSE OF FUSELAGE.
RELEASE MECHANISM.
[NOT TO SCALE].
HOOK ON REAR END OF RELEASE ROD 'C' FITS JUST OVER U/C CROSS PIECE OF UPPER COMPONENT.
PROP. RESTS AGAINST FUSELAGE
RELEASE ROD 'C'
FREE JOINT
'B'
D
E
PIN
F
SKID
A
R
S
R
R
R
R
R
BAND PULLED FORWARD
R
F
SPIRAL COMPRESSION SPRING FITS OVER DOWEL
COMPRESSION SPRING 'S'.
GUIDE 'D'
PINHOLE & PIN TO COMPRESS SPRING.
RELEASE ROD 'C' PASSES UNDER GROOVE IN 'D'
R
R
½×⅛ BALSA
E
R
R
DRAWING PIN SECURES DOWEL
RUBBER BANDS MARKED 'R'

Bambi

34" STICK MODEL

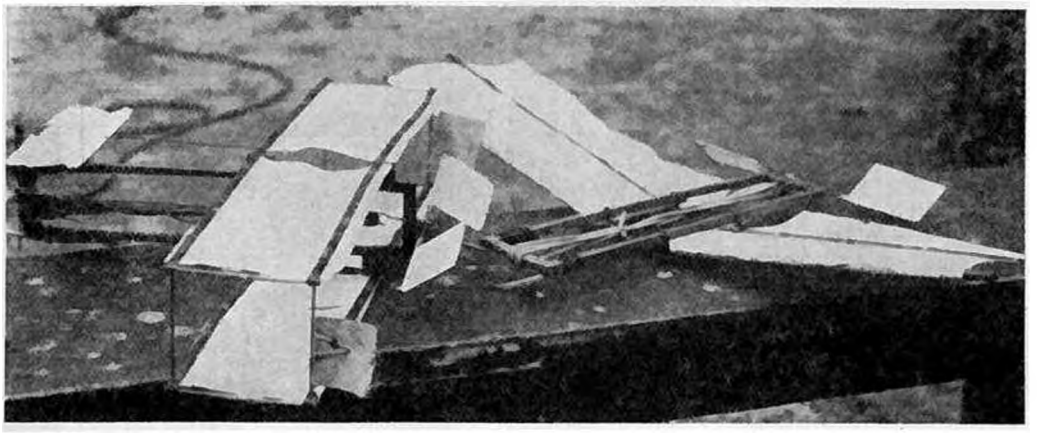
By W.A.DEAN



TWENTY YEARS OF AEROMODELLING

by

J · H · M · SMITH



A tale of trial and error—with some successes and many reverses! The two illustrations on this page are from the album of D. O. Manning showing models constructed by his father in 1910. That below is powered by a steam engine.

MY first toy aeroplanes were a school-time craze for making small scale (about 1/72nd) paper models of contemporary types. "Camel," "Pup," "S.E.5.A," "Albatross," etc. My friend made perfect ones of post-cards, complete with controls and correct colours. I had not his skill in fine work, so mine only looked approximately right. *But* they had to glide to successful landings on the floor. Most of them did. The bodies were drawn out flat on paper and folded up with much seccotine. The wings folded over to a suitable section and were stuck down the trailing edge.

This allowed light paper and yet gave stiffness without spars. The leading edge was sometimes stiffened internally with a layer of seccotine.

Then followed a craze for wireless, and aeroplanes were temporarily dropped, but the urge soon took hold again and many models of all kinds were made. The best was naturally a twin Canard, the propeller of which took a long time to carve and match but was beautifully French polished.

I made some interesting experiments with a tractor—spruce, wire, silk, seccotine and twin gears. This machine carried a trailing hinged (backwards) skid which, on striking the ground, tripped a catch which allowed an elastic band to pull up the elevator. Properly adjusted it would make perfect 3-point landings. This particular model, I remember, had serious wing flutter, which, however, did not appear to affect its flying.

Another amusing machine was a scale (about $\frac{1}{2}$ in., I think) of the Beardmore "Inflexible." This was made mainly of steel wire and solder (plenty). The rubber was to drive the nose airscrew and the outboards were to freewheel. Owing to its weight it would not fly under power, but it did glide in a heavy sort of way, with full power on!

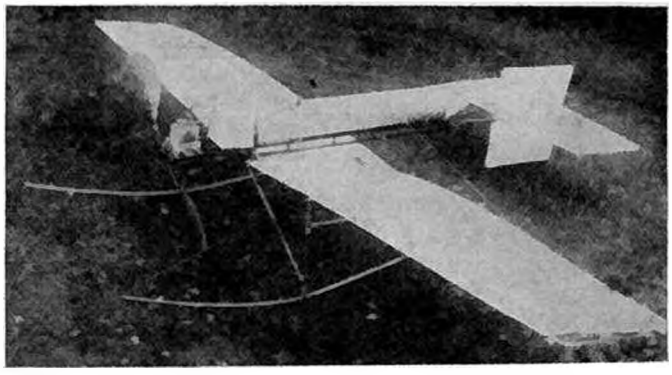
About this time, 1926, a real fillip was given by starting to learn to fly real aeroplanes and production of models was at fever pitch. All sorts were made, mainly semi-scales of about 1 ft. to 2 ft. span. Some were very successful, including a Westland Hill Pterodactyl.

An amusing one was an autogyro—rotors were luggage labels. Under power it would leap into the air (rotor twisted up by hand), attempt a loop, roll off the top and then sink gently down in perfect vertical descent. Most of these small models were made of spruce or other wood, seccotine and lavatory paper.

I also reintroduced my original all-paper fuselage models and had some good flights with these of about 18 in. span. Many good stick models were made with turkey tail feathers for wings and tail, and several all feathers—wings, tail, airscrew, stick and undercarriage.

Then came heavy stuff! First some rocket attempts were made. By placing the rocket under the c.g. the varying weight as it burned out did not matter, but the difficulty was to get the wings to stay on. I realize now I made the wings too large for the rocket's power. Wings, usually cardboard, folded to suitable section.

Then some quite successful gliders were made, using solid 3-ply for wings. I soon discovered that wing loading did not matter so long as speed was suitable and so a super glider was made. The wing—about 6 ft. span—was planed up from a piece of wedge-shaped weather boarding to about R.A.F. 15 section. This was bowed up by fixing wire into dihedral. The body was a length of 3 in. by 2 in. timber slightly tapered aft, with a 3/16 in. 3-ply tail. Undercarriage was made from the two sides of an iron gate hinge. Wheels were the ends of a wire spool about 4 in. diam. Axle a piece of golf club shaft. This monstrosity weighed somewhere around 10 lb. and however hard it was thrown against the strongest wind merely fell on the ground like a stone. A launching rope was made by cutting up old cycle inner tubes into lengths and the great test took place. With a frightful whistling noise the machine hurtled into space and actually glided in a stable manner at about 30 ft. up, for several hundred yards. Extensive repairs were always required to wing attachment after each flight, but it did prove the point that a heavy wing loading was quite O.K. if it got going fast enough.



Another projectile was a miniature, about 8 in. span with solid wooden body and sheet tinplate wings and tail. It could not be hand-launched fast enough, but off a catapult it went incredible distances. I fitted this with an ordinary whistle, which sounded in flight! The first screaming bomb!! When flying, this one used to bend violently fore and aft, but never got unstable enough to loop or bust.

In 1928 I went to New Zealand to a civil flying job. I was instructing at an aero club and made frequent use of paper gliders as the best way to illustrate my points of theory of flight.

I did not do very much serious modelling but saw many good ones when monthly competitions were held on my aerodrome. The prizes were free joy rides.

One member had a large petrol job. The engine (10 c.c.) he had made himself, turning the cylinder from a solid bar of steel.

This flew well, and one evening it got loose and I chased it in a Moth for about 15 miles before the fuel ran out.

It was then at about 3,000 ft. and took a long time to glide down. But I was able to locate the field in which it landed and the owner recovered it.

In 1939 I returned to England and made many small scale models from the 1/3rd kits. Some of them flew really well, particularly a "Fury."

At about the beginning of the war I determined to get cracking on an ornithoptic. I had made many attempts over many years, but unsuccessfully.

The first of these new attempts was a pigeon in outline made entirely of 1/64 in. balsa sheet. The wing was hinged so that when it flapped it changed its angle of incidence in relation to datum line. This would glide beautifully but was too heavy to fly under power.

The next one, quite light, was made of wood and paper with bamboo span and mechanism. This was quite successful and was the original "Flapper" of A.M., Christmas, 1940.

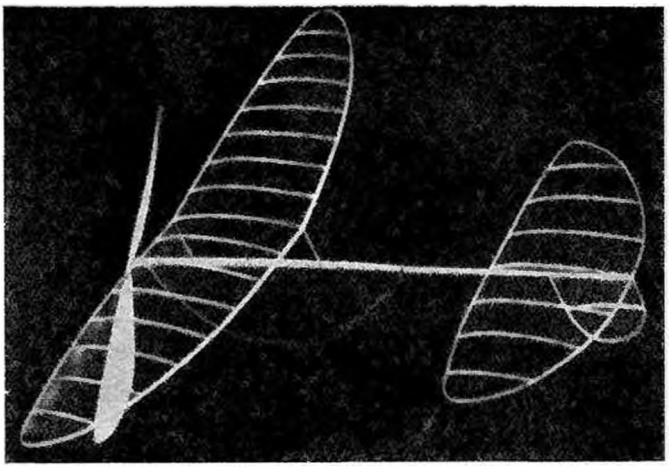
This has been considerably improved and simplified by making the stick of spruce, the wing support hinges and bearing, etc., unit construction of wire, soldered to a piece of tube (pencil end) slid on to stick, and the wing spars of quills shaved of their feathers. These are, of course, the obvious material to use, being developed by nature for that very purpose.

Connecting rods of hard balsa with bearings each end, made by sticking celluloid washers each side.

The Flapper now will take off under its own power and climb to about 20 ft.

Experiments are also in progress to make a dragonfly, but are not yet complete, although several attempts have made promising short flights. The difficulty with this model is wing loading. Can someone suggest a material for me with a really super ratio of strength and stiffness to weight? For its weight steel wire is strong but too flexible, balsa is stiff but too weak. Bamboo is similar to steel wire.

During the long bad winter before last my friends and I made many various models which we flew at an R.A.F. Station where we worked. It was quite a usual sight to see the mess ante-room cleared of furniture and R.T.P. flying in progress with models tethered to the fire iron support placed in the centre of the room. Best models here were a ½ in. to the foot Defiant of mine—all monocoque and indestructible, a Veron Hawk, and a small duration model made by others. We used to race them R.T.P. with as many as three on the pole



at once, and also had some excellent formation flying by tethering the models line abreast, fastest outside!!!

Launching was a tricky business, but if all were got away successfully together with the right number of turns on they would circle round, three abreast, for 30 to 45 seconds, and all land smoothly together.

A 1 in. to 1 ft. Lysander of mine was successfully flown round the pole here in this mess, its gearbox making a noise like a tube train! This started as a super scale kit given to me by some previous flying pupils. I modified it somewhat with monocoque fuselage and sprung undercarriage, but it flew well and is still alive, as is also a similarly modified 1 in. to 1 ft. Miles Kestrel Trainer. This latter is a really good flier. It is 1½ oz. *below* allowed weight and is not far off Wakefield performance when fitted with a direct drive "air shovel."

Indoor models were made by the score—small scale, feathers, paper, and microfilm. The microfilm and feather ones always had straw motor sticks. The feather ones were super aerobatic and would upward roll indefinitely. Duration of several minutes was often had with microfilm ones.

An all-balsa racer about 6 in. span (1/64th sheet balsa wings and tail), clocked over 25 m.p.h. across the length of the cinema! Experiments are still continuing. The present one being an ½ in. to 1 ft. all monocoque "Lightning." The construction of this is my "two in one" method. This is first make solid of any suitable wood and with parts detachable. Then cover it all over with a skin of 1/32 in. balsa (the last of my stock!), cut where necessary to remove the skin. Assemble the shell and fit with motors and airscrews, etc. That is one model. Then repaint the solid after reassembly and stick it back on the piano!

This model is not yet finished, but when it is I shall offer the details to the A.M. for information.

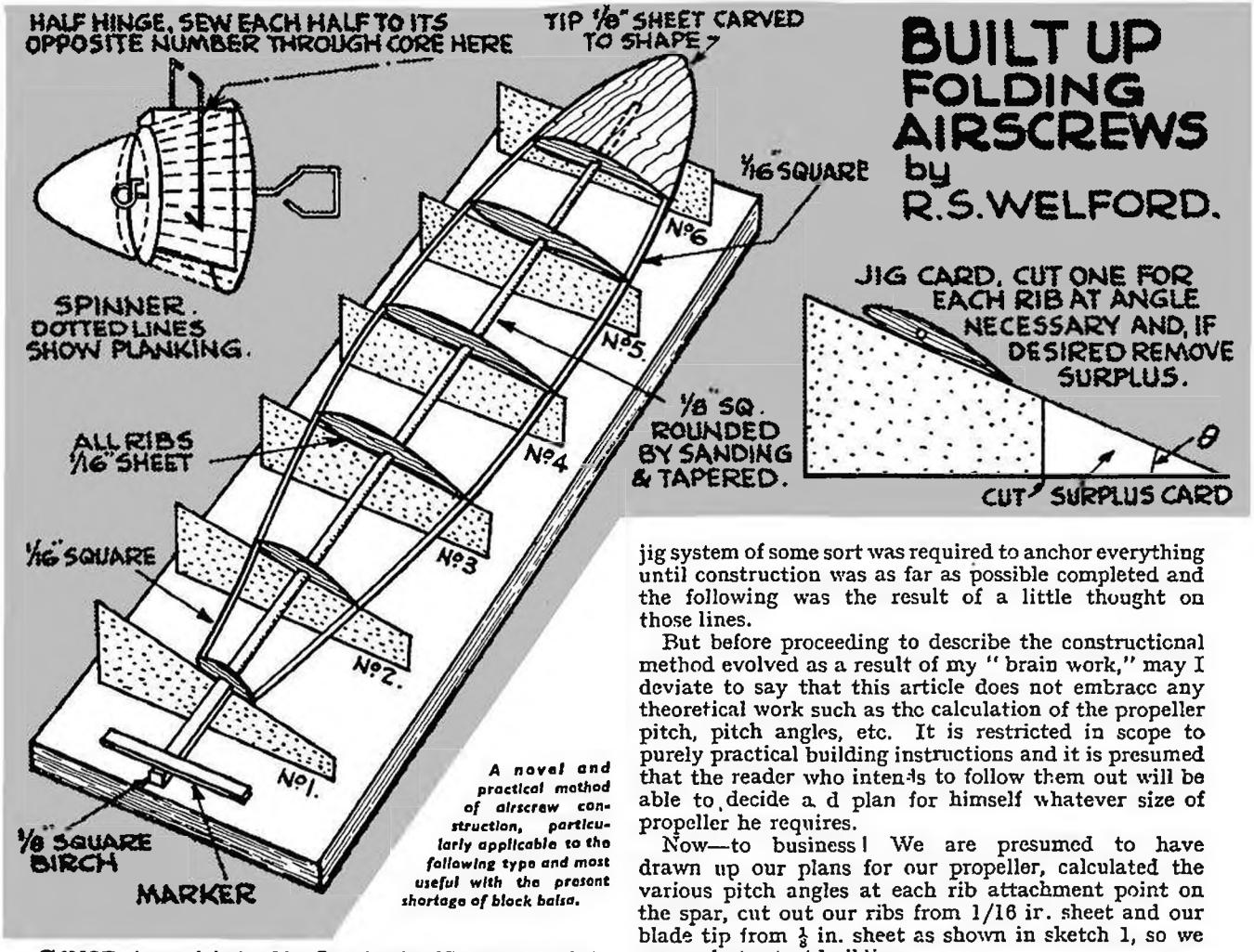
Conclusion! Endless enjoyment, particularly with tricky ones to fly. Construction of any but very small models should, I think, be monocoque. 1/16 in. stringers unsupported for several inches may be O.K. for flying and rubber stresses, but are not "thumb-proof." I have so often seen a good and beautiful model spoilt by cracked stringers and sagging covering.

Likewise wings should at least have a hollow sheet leading edge. Multiple detail construction makes a good scientific job, but is very liable to local damage.

Airscrews should be constant speed, particularly for indoor microfilm jobs. This is done by overhanging the leading edge as in the old "Chanvier" pattern. With flexible blades the first burst of power then coarsens the pitch and keeps the revs. and thrust down until the power gets weaker.

BUILT UP FOLDING AIRSCREWS

by R. S. WELFORD.



SINCE the article by Mr. Day in the November, 1941, issue of THE AERO-MODELLER first brought the built-up propeller to my notice I have built several such for various duration models and as a result of my experience have evolved a jig-built constructional method for them which may be of interest to other readers who have tackled the building of similar "props." and come against some of the difficulties.

Readers will remember that building a propeller (folding) as described by Mr. Day, involves mounting a number of ribs, of airfoil section, upon a central spar at certain calculated angles to ensure that the pitch of the finished propeller is correct at each point along its blade from tip to root, fitting leading- and trailing-edges of 1/16 in. square balsa and planking all in with 1/32 in. sheet. Reference to Mr. Day's article here referred to should be made for a detailed description, if required.

The chief snag I found at my first building attempt was that although I started with all the ribs at approximately the angles they should be, by the time I had fixed the outlining 1/16 in. balsa strip in place and had some of the planking done, all the ribs had been pulled from their correct angles and the blade had tended to flatten out owing to the twist which the planking had unavoidably to take when it was applied. As it was thus quite obvious that the blade, when finished, would not be correct as regards the designed pitch, I proceeded no further with the constructional work but turned the whole matter over to the "brain department" for a satisfactory solution of the trouble. It seemed that a jig system of some sort was required to anchor everything until construction was as far as possible completed and the following was the result of a little thought on those lines.

But before proceeding to describe the constructional method evolved as a result of my "brain work," may I deviate to say that this article does not embrace any theoretical work such as the calculation of the propeller pitch, pitch angles, etc. It is restricted in scope to purely practical building instructions and it is presumed that the reader who intends to follow them out will be able to decide a d plan for himself whatever size of propeller he requires.

Now—to business! We are presumed to have drawn up our plans for our propeller, calculated the various pitch angles at each rib attachment point on the spar, cut out our ribs from 1/16 in. sheet and our blade tip from $\frac{1}{8}$ in. sheet as shown in sketch 1, so we are ready to start building.

For your centre spar take a piece of $\frac{1}{8}$ in. square birch, cutting it a full inch longer than the tip-to-butt length shown on your plan. Next, from the point of attachment of the root rib, sand it until round and with a progressive taper from root rib attachment-point to tip. The remainder, the butt end, is left square (see sketches 1 and 2). This is important and the reason will be apparent later.

The tapering of the spar is necessitated by the fact that the ribs will eventually have to be threaded on to it and the small ribs towards the tip of the blade are very narrow in section.

Having tapered your spar, next deal with the ribs. Mark them from the plan to show where the spar has to pass through them and drill each one centrally with a hole large enough to take the spar.

The $\frac{1}{8}$ in. sheet tip is next dealt with, by slotting or drilling it to fit the spar tip. Everything is now ready for assembly so let us proceed to the jig.

On separate sheets of cardboard mark out the pitch angles. You require one card for each rib and one for the tip. Cut the cards to the angles drawn on them but ensure that the angular face of each card is ample in length for the rib which will eventually lie upon it.

Now mark out on a baseboard the distances between each rib as shown on your plan and also the location of the tip. At each such situation we intend to erect the cards just referred to (see sketch 1).

Place the cards in position on the baseboard and secure

them in place (do not cement them) by nailing or glueing on either side of each card small blocks of balsa or other wood to support them.

Now thread the ribs on to the spar and fix the tip in position but *use no cement yet.* Apply the spar with the ribs on it to the cards, concave side of the ribs down and leading-edge of each airfoil lying pointing "uphill." By sliding the cards between the wood blocks contact must be made between each card and its respective rib and it is here that the extra length which we arranged for on the angular face of each card proves to be necessary. When each card and rib have been juggled to make contact, glue the cards to the baseboard.

The next step is to cement lightly the underside of each rib to its card and, when each is set. firmly cement ribs and spar together.

Now apply your 1/16 in. square leading- and trailing-edges, recessing them into the $\frac{1}{8}$ in. sheet tip and the leading-edge of each rib. The trailing-edges can be somewhat thinner in section than that suggested above—say, 1/16 in. by 1/32 in.—if so desired, and probably with advantage aerodynamically.

Before proceeding further, cement across the square butt of the spar a small piece of 1/16 in. sheet balsa. This must lie parallel to the baseboard and its purpose is solely to act as a marker so that when we come to build up the butt, as we will do, and fit the hinge we will not spoil the efficiency of our propeller by inadvertently fixing the hinge otherwise than parallel to the balsa strip. The complete assembly should now appear as shown in sketch 1.

Now apply the 1/32 in. sheet in strips $\frac{1}{4}$ in. wide on the leading-edge and $\frac{1}{2}$ in. wide elsewhere, securing to the ribs, etc., with cement and fine pins. When all the convex surface of the blade is sheeted, remove the work from the jig, which can be discarded thereafter. However, if you fear the likelihood of the blade not keeping its shape on removal from the jig owing to the twist which each strip of sheet has had to be given to make it conform to the blade contour, thoroughly wet all the sheet covering and leave for forty-eight hours to dry before detaching blade from jig. My experience, though, has not shown this to be necessary.

Having removed the blade, plank in the underside, trim all round leading, and trailing-edges and sand paper till a smooth surface is achieved.

Now to deal with the butt and hinge. Take two pieces of $\frac{1}{8}$ in. square birch and fit and glue them top and bottom of the projecting butt of the spar, first having drilled or carved the root-rib away as necessary to allow the additional square birch pieces to enter the blade and take up with No. 2 rib. Use plenty of cement inside the blade. You now have a blade butt, $\frac{1}{4}$ in. by $\frac{3}{8}$ in. (see sketch 2). Increase the thickness of this to $\frac{1}{4}$ in. by $\frac{3}{8}$ in. by applying one thickness of 1/16 in. hard sheet balsa each side of the butt. When doing so, care must be taken to see that the resultant flat sides of the butt are at right angles to the 1/16 in. marker strip.

Make side plates of aluminium sheet next for each side of the butt—do not secure them in place at this stage. You are now ready to start work on the hinge.

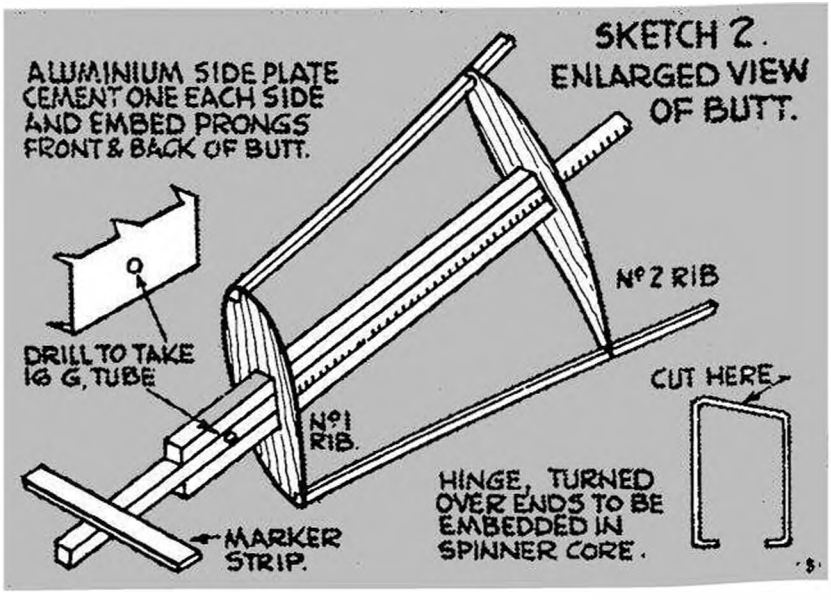
The hinge is again one of my "patents" and is made by drilling through the butt and inserting brass tube for the hinge wire to work in, the result being a much more workmanlike job than the more usual and more unsightly "back-of-the-blade-and-root" attachment of the hinge wires. The drilling must, of course, be done at an angle to secure that the blade folds flat and this angle can only be found by experiment before the aluminium side plates are fixed to the butt by piercing the root through with a fine wire or needle until the right angle is found, the butt then being marked on the back or front to show the angle at which to drill.

Having found your angle, drill the butt through parallel to the marker strip so that a piece of brass tubing to take 16-gauge wire can be inserted. Drill the aluminium side plates also with a hole large enough to take the brass tube as a snug fit. Fix the side plates in position and cut off the tubing to length so that about 1/16 in. projects beyond each side plate. Carefully bell out the projecting tube ends by inserting and working a suitably sized file-tang or nail. Then with careful taps from a hammer rivet the ends over on to the side plates. Remove any surplus length of the butt at this stage as the marker strip can now be discarded.

As regards the hinge wire, this is bent to the shape shown in the sketch and cut in the centre of the sloping top. Each half of the hinge is fitted to one side of the centre core of the spinner (constructed as described by Mr. Day) using plenty of cement and wherever possible is stitched with fine wire to its opposite number *through* the balsa core particularly near the point where the hinge emerges from the spinner. It is also important that each half of the hinge be dead opposite the other across the spinner core or the calculated pitch will "lost" (see sketch).

I may say that the easiest way to deal with this hinge is to cement one side of it to the spinner core and leave it to set thoroughly. Then slip on your blade insert the second half of the hinge and deal similarly with it. It is practically impossible to make an accurate job when trying to fit both halves of the hinge at once.

In conclusion I would say that I have found the propellers I have constructed on these lines very efficient and light. They also stand up to knocks and hard usage better than the carved balsa type if well constructed. Another advantage is they are economical in balsa.



An interesting diamond fuselage model with shoulder-wing fixing and semi-cantilever undercarriage. A single-bladed airscrew is fitted as standard and may be of the folding type, if desired. The simple type of construction also lends itself admirably to hardwood construction, replacing the balsa specified by spruce or bass of smaller section.

Fuselage.

Construction of fuselage follows usual practice. Lay out one side, fit cross pieces, glue, and when set, without moving pins, build up other side. Two reminders here: (1) make sure that longerons are cut from same sheet in order that tension is equal on all four; (2) when cutting cross pieces cut four each of the same length and from same strip. When both sides are set, join nose formers and tail spar. It is advisable to fit sheet balsa up to No. 1 former before cementing remainder of cross pieces. Cut aluminium or brass tubing to size shown on plan for undercart. Bind to fillets in position shown, reinforce fore and aft with ⅛ in. balsa strip. Use 1/16 in. three-ply for motor dowel. Build up under fin with reed or birch. Make nose block from laminated ⅛ in. sheet.

Wings.

Make wing in two halves, pin down bottom lift spar, cement ribs in position then fit leading- and trailing-edges, using plenty of cement. When set, fit and cement two (2) top lift spars. When the both wings are set crack spars in position shown and don't forget dihedral commences from centre-section. Where wing has been cracked, reinforce with fillets of balsa; again don't spare the cement. When finished you will have a really strong efficient wing. Before covering, wire saddles C—C can be cemented to leading- and trailing-edge of the centre-section. This simplifies mounting of wing on the platform. The rear of centre-section can be built up to conform to lines of the fuselage.

Tail and Fin.

Tail and fin construction is self explanatory from plan. Use thin Clark "Y" section for tail, pinning main-spar down, cementing ribs in position, then building leading- and trailing-edges. Tips are made from sheet and sandpapered to correct shape.

The undercarriage is simple to make, there being no soldered parts. Each side is made separately and held to fuselage with elastic bands.

Propeller.

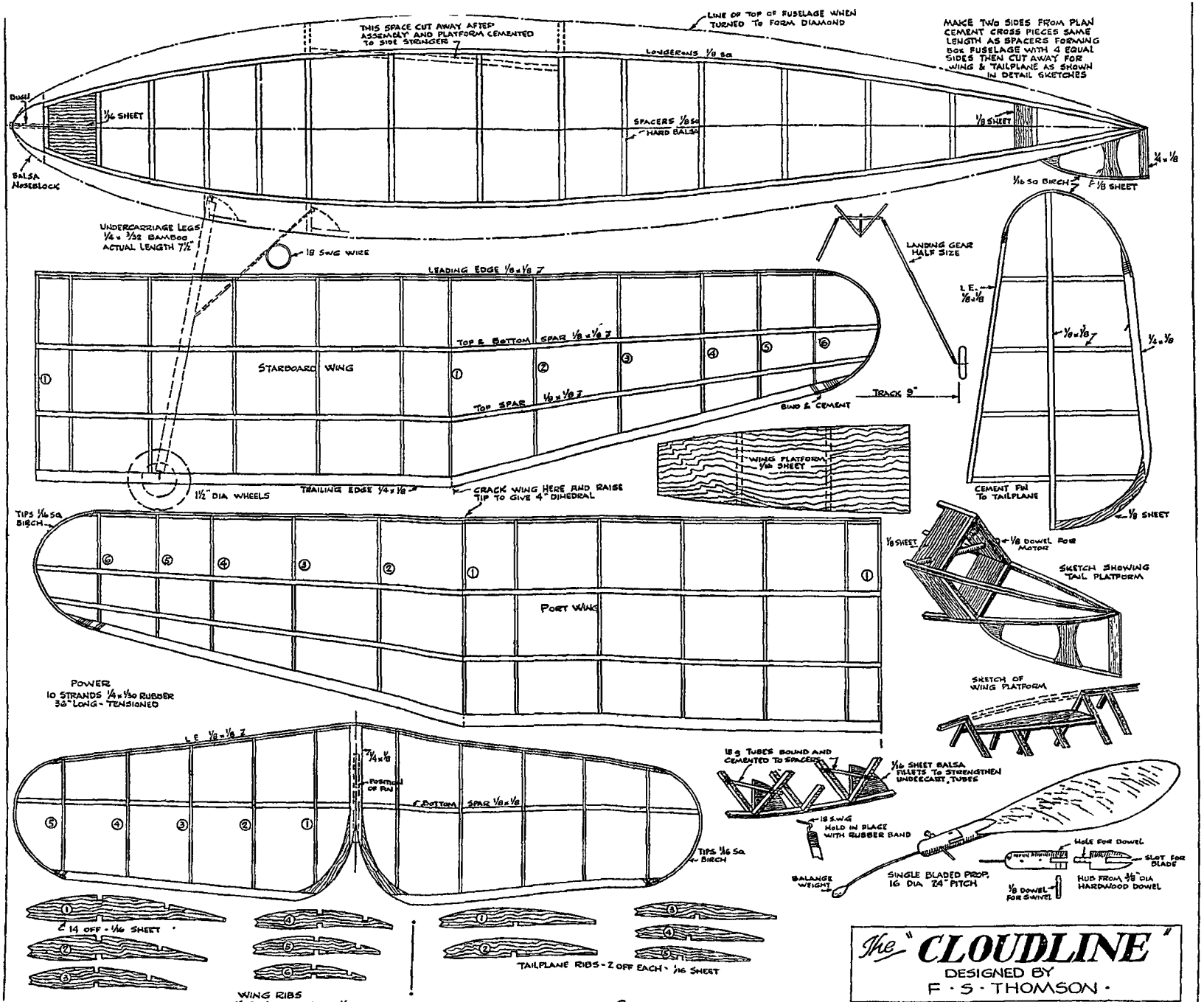
This is made from hardwood dowelling. It is important that slot in shaft portion be cut fore and aft with a slight incline. This prevents propeller leaning forward from the vertical. Pitch of blade is marked out on dowel end; before cutting slot to receive it this procedure is most important.

When this is finished, balance with solder or lead. This prop. is practically crashproof and during eighteen months flying, prop. on original model is still functioning. Various pitches can be tried out, with different power.

Flying Model.

It is advisable to wait for a calm day before trimming the model. Tail incidence will be different for each model built. However, test for glide, making sure that rubber is tensioned (Lance method for preference). When the glide is satisfactory glue tail and fin to fuselage. This latter will save you from many crashes. Give about 100 turns test for power. It may be necessary to add down and side thrust; this can be done by inserting a block of balsa on port topside of nose.

REDUCED SCALE DRAWING ON OPPOSITE PAGE.



The "CLOUDLINE"

DESIGNED BY

F · S · THOMSON ·

MONTHLY MEMORANDA

No. 13 OF SERIES

by O · G · THETFORD

A finely posed model of a Wellington. Model and photography by W. Wilson of King's Lynn.

Mosquito replaces Blenheim.

Since the autumn months of 1942 those squadrons of Bomber Command which make a speciality of daylight bombing attacks at zero altitude have been receiving the new De Havilland Mosquito twin-motor close-support and light bomber in place of the obsolescent Blenheim IV aeroplanes. One of the most successful squadrons is that led by Wing Commander H. I. Edwards, V.C., D.S.O., D.F.C., who will be remembered as having led the spectacular low-flying attack on Bremen with Blenheims in July, 1941.

This squadron, which was originally formed with Battles before the War, was one of the first to be equipped with the Mosquito and many machines in the unit now have a dozen or so raids to their credit, this being indicated by a neat row of white bombs painted on the nose. The code letter combination, formerly familiar on the Blenheims, "GB," is retained on the Mosquitoes. It is painted aft of the cockade on port and starboard. Mosquito "A" is serially numbered DZ 360, "E" is DZ 353 and "J," DZ 367. Many of the Mosquitoes used on the "hedge-hopping" stunts are finished in fighter camouflage, i.e. dark green and dark sea grey on the upper surfaces and sea grey medium underneath. Others retain the usual day bomber scheme.

The Spitfire IX.

Most of the home-based Spitfire squadrons are now flying the new Mk. IX version in place of the earlier Mk. III, VB and VC. The improved Spitfire has a Rolls-Royce Merlin 61 motor of 1,280 h.p., with a two-stage supercharger and intercooler to maintain power up to 40,000 ft. In flight the Spitfire IX is distinguishable from its predecessors by reason of its slightly longer nose and radiators beneath both wings instead of only the port as formerly. To absorb the extra power a four-bladed airscrew is fitted.

An Auxiliary Squadron and a Polish unit were amongst the first to receive the Spitfire IX in 1942. The Auxiliary Squadron with Spitfire IXs carries the letters "FY" and has been officially stated to be the West Lancashire Squadron which was stationed at Speke Airport before the War. They first received Spitfire Is in the summer of 1939 and many of these aircraft were peculiar in carrying their serial in black on the fin. A number of Battles then formed part of the equipment and they were also marked with the letters "FY."

The Polish Squadron is believed to be the famous No. 303 (F) Squadron which co-operated in the making of the film "Eagle Squadron." The Polish international military marking is painted just beneath the exhaust ejectors on the side of the cowling.

Another Blenheim Derivative.

It was announced in December, 1942, that a special version of the well-known Bristol Blenheim had gone into action in the Middle East and had been named the Bisley. There are two versions of the machine, one of which is a close-support bomber with a multi-gun non-transparent nose. The other has a transparent nose with facilities for a bomb-aimer. The Bisley is the Bristol Type 160 and is almost identical to the Blenheim IV Type 149 except for the nose, motor cowlings, undercarriage and dorsal turret. It was originally known as the Blenheim Mk. V and in January, 1943, was officially re-named Blenheim V. The name Bisley is now no longer applicable.

In addition to the operational versions in home and tropical forms there are a few trainer Blenheim Vs. Many of them are painted yellow underneath. One of the Blenheim V close-support bombers is serially numbered AD 657.

Transferred to U.S. Army.

The Vultee Vengeance single-motor dive-bombers ordered for the R.A.F. have been transferred to the U.S.A. A.F. according to reports from the U.S.A. They are to operate in the Pacific area against Japanese shipping and naval bases. The Vengeance I has been re-named the Georgia and is designated A-31. An interesting point is that many of the machines in squadron service with the U.S.A. A.F. retain the British serial number on the fuselage and British type camouflage too, although the U.S. national marking replaces the cockades and the fin flash is painted out. One of the Georgias carries the British number AF 229 together with the U.S. markings.

Coastal Command Equipment.

In addition to the many Boeing Fortress IIs now operating with Coastal Command in this country on anti-submarine patrol duties the remaining Fortress Is are now used for this work. The Fortress Is were originally employed for sub-stratosphere daylight raids over France and Germany during 1941 and afterwards a number were used in the Middle East where weather conditions were found to be more suitable for such operations. For these duties the Mk. Is were painted dark green and dark earth above and azure blue below. For work with Coastal Command they have been repainted and they are now dark slate grey and dark sea grey above and white below, on the sides of the fuselage and on the vertical tail surfaces. The Mk. II Fortresses are painted the same way and a batch recently delivered was numbered from FK 189 to FK 197 inclusive.

A rather unusual paint scheme has been noticed on certain Coastal Command Beaufighters and it is not yet clear whether it is to be finally standardised or is as yet only experimental. The fuselage and vertical tail surfaces are painted white in the main with one or two irregular patches of dark grey, whilst the upper surfaces of the wings and tailplane retain the normal slate grey and sea grey. One Beaufighter I painted in this manner is numbered V 8520 and has a dihedral tailplane.

AEROPLANES DESCRIBED—II

By H · J · COOPER

RYAN TRAINING MONOPLANES

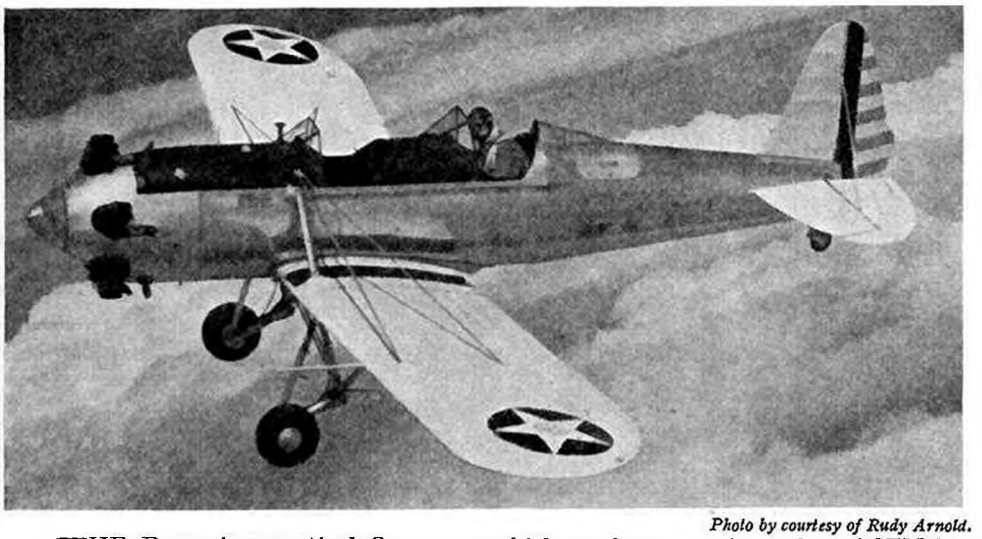


Photo by courtesy of Rudy Arnold.

THE Ryan Aeronautical Company, which produces the monoplanes hereafter described, was formed in 1931 as a successor to the old Ryan company which had made itself known as the producer of the monoplane—"The Spirit of St. Louis"—in which Colonel Lindbergh made his solo Atlantic flight in 1927.

The present company commenced production of the ST series in 1934, and since then many hundreds of trainers have been built for military and civilian service in the United States, and have been delivered to several foreign governments, including Guatemala, Honduras, China, the Netherlands East Indies, Mexico and others.

The original ST was produced in two forms: the ST-A, with a 125 h.p. Menasco four-cylinder inverted in-line air-cooled motor, and the ST-A-Special, powered by a 150 h.p. Menasco C-4-S supercharged motor.

The ST type was progressively developed, and in 1939 a contract was placed by the U.S. Army for a number of ST-As to be delivered for training purposes. It was the first low-wing monoplane in its category to be employed for this purpose in the U.S. Army, and was designated the PT-16. (Lower photograph.) It differed from the civilian version in having larger cockpits and different internal equipment, which included full dual control.

A later development, the STM-2, was accepted by the U.S. Army and re-designated the PT-20. It also was equipped with a 150 h.p. Menasco C-4-S motor. This machine was generally similar to the prior model but the cockpits were further enlarged by the placing of the top longerons outside the metal skin of the fuselage A crash-post was placed in front of the forward cockpit to prevent injury to the crew in the event of a nose-over landing.

Photo by courtesy of Keystone Press Agency.

A number of STM-2s were ordered by China in 1940.

A further modification to the design was called the PT-20a, which differed only in minor details of equipment.

A seaplane version of the STM-2, known as the STM-2-S, was ordered for the Netherlands East Indies Army and Navy, and a number were used for naval training at Sourabaya at the time of the Japanese invasion. The STM-2-S, presented in the accompanying general arrangement drawing, is equipped with twin Edo floats, but otherwise differs little from the land-version.

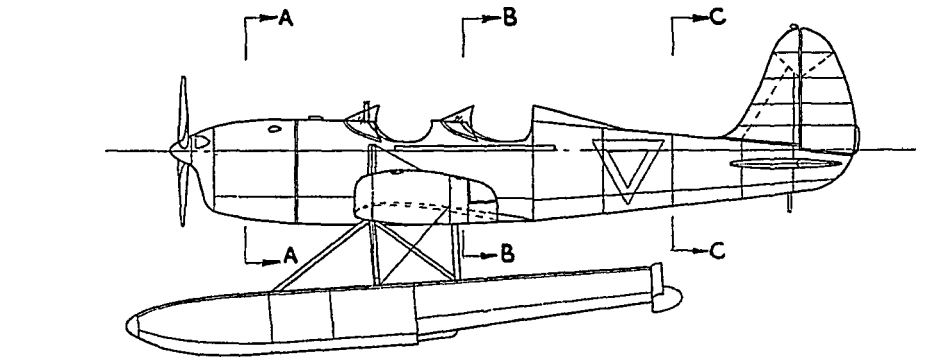
In 1940 the ST was fitted with a Kinner radial motor, which resulted in the c.g. moving backward, and the wing was consequently swept-back 4½ degrees. The undercarriage was also modified, and the fuselage was increased in depth and width.

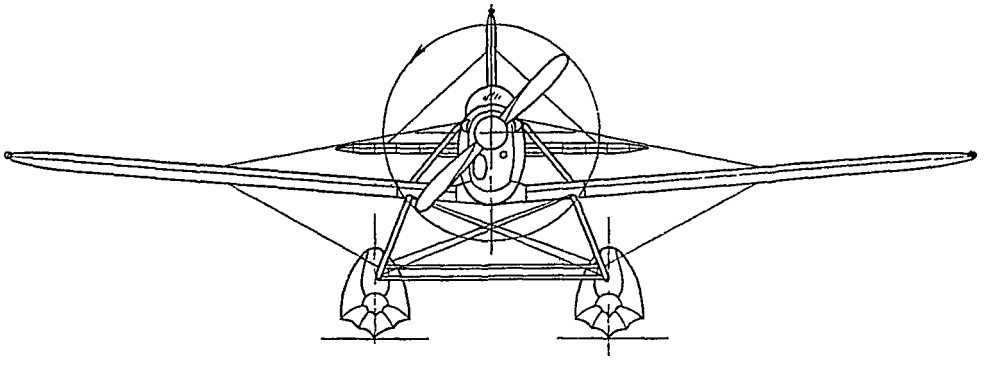
Two versions of the ST-3, as the radial version is known, the PT-21 (125 h.p. Kinner B-54 motor) and the PT-22, with a 160 h.p. Kinner R-54, are in service with the U.S. Army, and another is with the U.S. Navy as the NR-1. The floatplane version is called the ST-3-S.

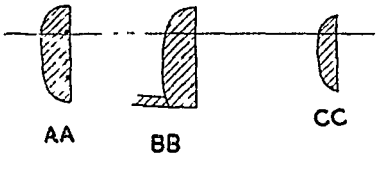
Monoplanes in the ST series are all similarly constructed. The wings are of solid spruce spars, with stamped aluminium alloy ribs, and are fabric-covered, except for the metal leading-edge. The outer sections are built in one piece and attached to stubs of steel-tube construction. Metal ailerons and plain-hinge flaps are fitted to the trailing-edge. The fuselage is an oval metal monocoque, of aluminium alloy internal structure with "Alclad" covering.

Specifications are as under:—

	PT-20.	*PT-22.*	*STM-2-S.*
Span:	30 ft. 0 in.	30 ft. 1 in.	29 ft. 11 in.
Length:	21 ft. 5 in.	22 ft. 5 in.	22 ft. 8½ in.
Tare weight:	1, 027 lbs.	1,313 lbs.	1,311 lbs.
Loaded weight:	1,600 lbs.	1,860 lbs.	1,828 lbs.
Max. speed:	160 m.p.h.	131 m.p.h.	122 m.p.h.
Operating speed:	135 m.p.h.	123 m.p.h.	108 m.p.h.
Landing speed:	42 m.p.h.	54 m.p.h.	59 m.p.h.
Service ceiling:	21,000 ft.	15,550 ft.	12,250 ft.
Range:	350 miles.	352 miles.	246 miles.







SCALE 1/72 FULL SIZE.

RYAN STM - S 2.

Club News

By **CLUBMAN**

THE "Wings for Victory" exhibitions are making great strides, and I see that a general meeting of the London Club secretaries was held recently, at which various methods of co-operation, etc., were discussed. I reiterate an earlier opinion when I say that one of the best things that this series of shows will produce is a greatly stimulated spirit of mutual help among aero-modelling clubs. There has been (and in cases still is) far too much of a dog-in-the-manger attitude among some groups, and just a bit too much of the radical inter-club rivalry to make things thoroughly pleasant. You know the sort of thing—So-and-so doesn't belong to our club, so he can't be any good whatever he does! And the usual chivvying always to be found among aero-modellers all over the country does get a touch of spitefulness at times, and tends to spoil things. I dare say you all have come across instances of this sort of thing now and again, and will agree with me that it is most unnecessary.

Mainly, the trouble is lack of contact, and a mutual understanding of neighbouring groups, and that is why I foresee a great deal of good arising from the very necessary co-operation between different clubs. If such an improvement can come about, believe me, I'm all for it.

The list of National Competitions for the 1943 season arrived just too late for inclusion in the February issue, but in view of the fact that we have until May 16th before starting the official flying season, we all have plenty of time to make out individual club programmes, and get those extra special models ready. The absence of models on exhibition may handicap certain chaps at the beginning of the season, but this should not detract from competition work generally.

I am rather at a loss to understand the requirements for the National Cup event, as the details so far given state that this is for a team using gliders up to Wakefield specifications. Are we to take it that Wakefield models are to be developed along the lines of gliders? This seems a bit strange on present indications, but no doubt with the publication of full competition details, a better explanation will be forthcoming. The Model Engineer No. 1 Cup is scheduled for "open individual," and here again some explanation seems to be desired. The Eastbourne M.A.C. is to hold a Gala Day on the 12th June and special permission is granted to all clubs attending to enable them to fly their entries on that day.

An article in the current issue of "Air Trials" throws a strong light on the hard feeling against certain new rules laid down for national competition. To quote the heading—"We protest against rules that ignore the needs of average builders, and are formulated only by 'experts' for 'experts.'" Apparently the new rules allow of a total disregard of the recognised minimum cross-section rule, and hand launching is now allowed in all contests. (We are talking mainly of "gas" models at the moment, but remarks apply to all types of event.)

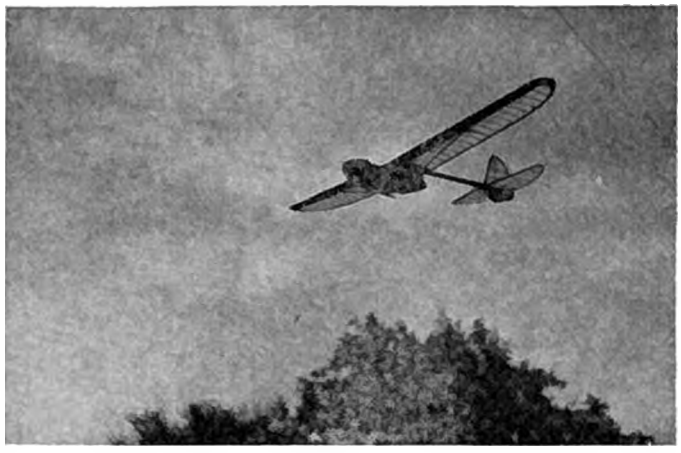
The hand-launch ruling is visualised as a "grouse of a few contest directors who were too lazy to cut the grass or provide suitable take-off platforms or runways." I fully agree that this retrograde method should not be reintroduced, and you will note that our Powers-that-be were alive to the improvement required when they cut out all hand launching in S.M.A.E. events, with the exception, of course, of gliders. Regarding the minimum cross-sectional area controversy, there's nothing to be said. How on earth designers can tolerate broomstick-like fuselages, and pylons sticking feet above the fuselage, beats me. The caption to one illustration (the front view of a typical contest model) tickled me, and sums up the situation concisely. It states—"You're wrong, it's not the front view of a grasshopper but merely the fuselage of a typical contest job. Any resemblance to an actual aeroplane is purely coincidental." That really hits the nail on the head, and I think most keen modellers will agree that the development of these spindly, high pylon type models is not good for the movement.

Quoting further—"Most manufacturers select winning designs for their kits; worse still, they employ the designers themselves. Out flows a stream of routine kits; hardly anything else is for sale—and Mr. Average Builder is up a decayed tree." "Progress is being stifled. It does require a mental effort, some understanding of aerodynamics, and personal ingenuity to build a model with an honest-to-gosh fuselage and a semi-scale appearance. Such models serve a practical purpose, and they are educational. Beginners can build them just as easy when they are in kits." The article winds up with the following: "This isn't a campaign for flying scale models. They are an

S.M.A.E. COMPETITIONS.

1943.

May 16th	Gamage Cup.
June 6th	Weston Cup.
June 13th	Model Engineer No. 2 Cup.
June 20th	National Cup.
July 4th..	Pilcher Cup.
July 11th	Flight Cup.
July 25th	Gutteridge Trophy.
August 8th	Model Engineer No. 1 Cup.
August 22nd	K. & M.A.A. Cup.
	Women's Challenge Cup.
September 5th	Thurston Cup.
May 16th to September 5th	Caton Trophy.



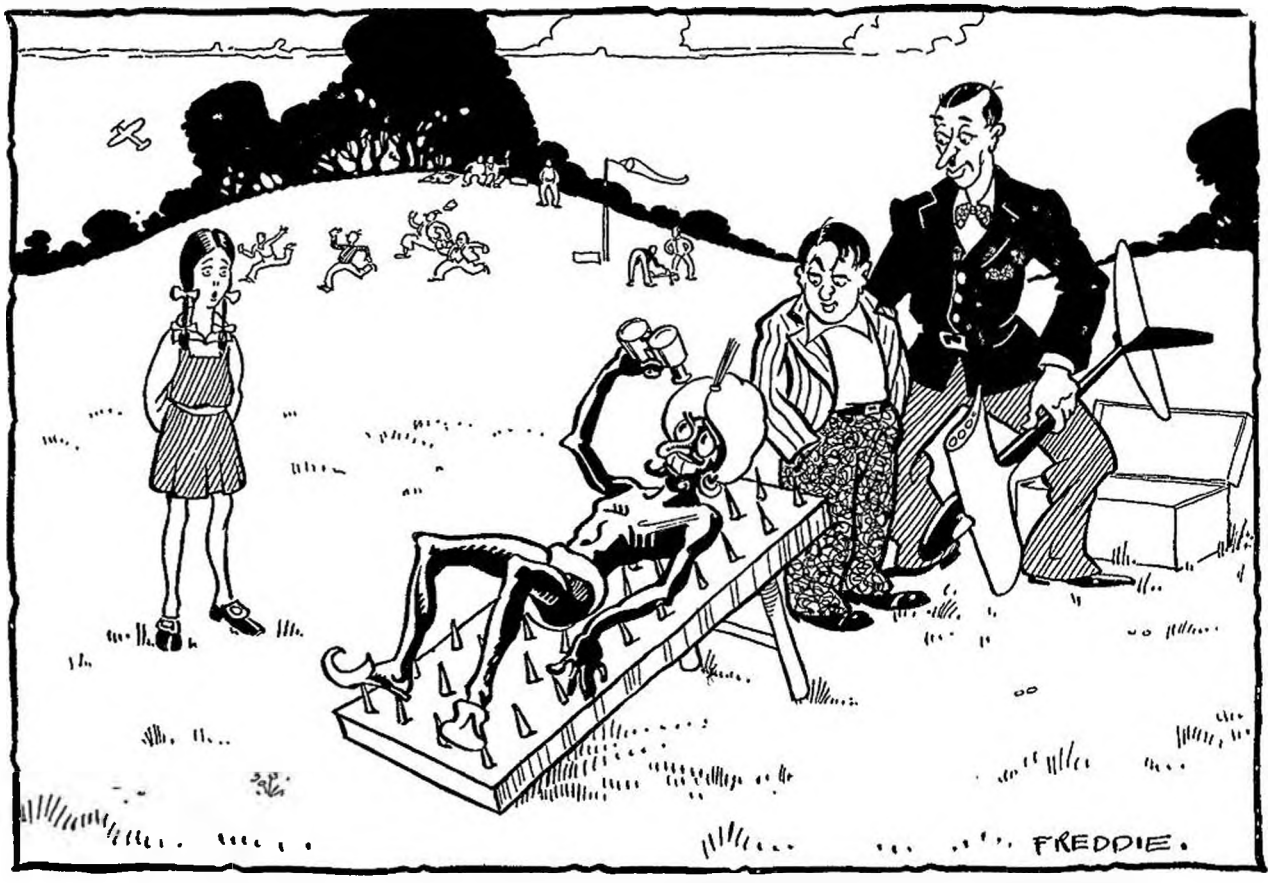
The "Baby Albatross" constructed by T. G. Phillips, of Tenby.

interesting and worthwhile phase of the hobby. But even better is the model which ties together the qualities of the scale and contest types. Let's have more realism. Design them like aeroplanes—build and fly them like aeroplanes."

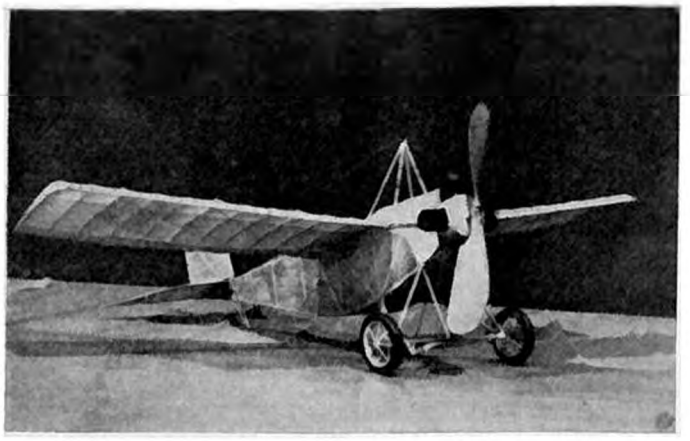
Well, what do you think, chums? What's that—who wrote the article? Well, someone who knows his onions all right, and one of the best known chaps in the game. Gordon S. Light is the name, and it's a name to conjure with, as any of the old hands will tell you.

Sailplanes are all the rage with the MERSEYSIDE M.A.S., as is only natural with Cup winner Gosling as leading light. His "Ivory Gull" (see the January issue) has proved a good seller, and many members are building this model. Another good designer is Mr. Cameron, whose "Elmira" was featured in the February issue, and he is busy experimenting with a new type of exceptionally clean lines. This job is 5 ft. in span, and has a fuselage similar in profile to the Davies airfoil.

An indoor meeting held by the LEEDS M.F.C. resulted in a win for secretary C. Furse, his time for three flights totalling 3 : 03·7. Second was H. Tubbs with 2 : 36·6, and third, H. E. Vauvelle with 2 : 33·6. Furse holds the club R.T.P. records with 1 : 18·1 h.l., and 1 : 10·3 R.O.G. All flights are made with a 6 ft. line and 3 ft. 6 in. pole. Outdoor flying has started already, and P. Holt has set up the highest time for 1943 with his Gutteridge Trophy Winner, time 1 : 18·4. Still, there are another ten months to go, so this time shouldn't last.



"HE INSISTS ON WATCHING THE COMPETITIONS IN COMFORT!"



Left: A scale model 1911 "Caudron," that turns in regular flights of 45 seconds. Builder, K. F. Lee, of the West Yorks M.A.S.

Right: Two nice looking solids built by A. P. Colclough, of Glasgow.

The PHAROS M.A.C. held an indoor gala in January, and it proved a great success. The Harrow, Walthamstow, Blackheath, Croydon and Uxbridge Clubs were all represented, and the results were as follows :—

Scale.		
F. Houchin (Pharos)	20 secs.	average.
P. Hume (Pharos)	14·3 ,,	,,
Team.		
Harrow	35·5 ,,	,,
Walthamstow	28·75 ,,	,,
Open duration.		
S. Bradshaw (Harrow)	67 ,,	,,
N. Gregory (Harrow)	58·25 ,,	,,
Best flight of day.		
S. Bradshaw (Harrow)	84 secs.	
Nearest to 45 secs.		
C. H. Saunders (Blackheath)	45 secs. dead.	

Frank Davies of the LEICESTER M.A.C. is still in winning form, winning a recent R.T.P. competition with an aggregate time of 6 : 29. He set up a new club record while doing this, the time being 2 : 21 h.l. The R.O.G. record is held by B. A. Germany, time of 1 : 38·5.

The newly formed CHESHUNT M.A.C. is holding an open indoor flying meeting at the Rowlands Fields Hall, behind the "Victoria" Inn, Cheshunt High Street, on February 21st, at 3 p.m. An attractive series of events has been arranged, and prizes are to be awarded.

Another open day, this time for outdoor work, is the Gala Day of the BEVERLEY & D.M.A.C. This will be on May 30th, and will be in conjunction with the Beverley "Wings for Victory" week. All who can attend are heartily welcome.

By kind permission of the firm of Kodak, the HARROW M.F.C. are to hold a Grand Indoor meeting on Sunday, 28th February, at the Kodak Hall, Wealdstone, Harrow. Contests will be held for both free and tethered flying, testing to take place from 11 a.m. to 1.30 p.m., and competition flying from 2–7 p.m.

A new club is the TOLLCROSS & D.F.M.C. (Glasgow), who are operating at their clubroom in Amulree Street, Sandyhills, Glasgow. This room is fully equipped with every required facility, and meetings are held on Wednesday nights from 7.15 to 10 p.m. Club record is held by F. Ellis with a time of 2 : 24·2, but this should not last long. New members will be welcomed.

A new club has been formed at Messrs. Cunliffe-Owen Aircraft, and meetings are held the first Monday in each month. Sir Hugh Cunliffe-Owen is President.

Still another new group is the BISHOPS STORTFORD M.A.C., with headquarters at 15, Pinelands. Best outdoor time so far is 1 : 12 R.O.G. in a high wind, while T. James holds the indoor figure at 30 secs.

The Motherwell club has changed its name to the MOTHERWELL YOUTH M.A.C., in view of its intimate connection with the Youth movement. R.T.P. activity is in full swing, though lack of rubber is handicapping things greatly. Application for affiliation to the S.M.A.E. is being made.

D. Soar of the SEAFORD M.F.C. set up a new indoor record of 48·5, but this is not expected to last. The secretary of this group, D. W. Bartlett, of 7, Sea View Cottages, Seaford, would like all modellers in the Lewes, Newhaven and surrounding districts to contact him, with the view of arranging a big "get-together" in the summer—if any!

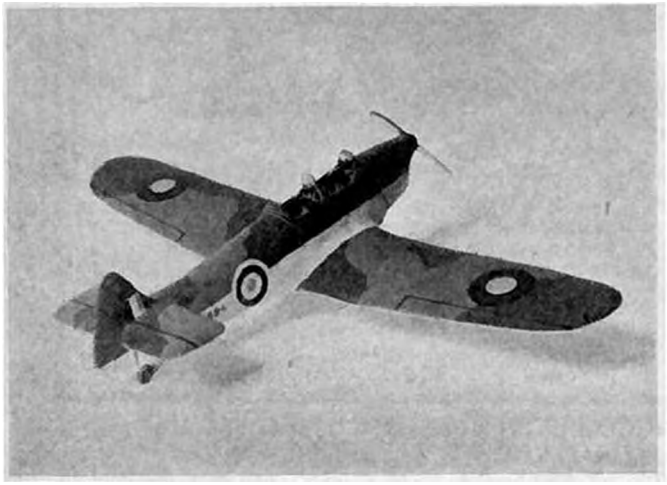
The local authorities with our friends the BURY & D.M.A.C. have apparently relented, and are now assisting this club. This has brought about increased activity, and things are going with a swing. The winner for 1942 of the Cleveland Cup was D. Ashton, while J. Greenhalgh won the solid contest with a finely detailed "Boston."

R. Boardman, of 6, Maple Grove, St. Helens, Lancs., would like to get in touch with someone about his own age of 14, with a view to becoming pen-pals.

L. Carik, 298, Hounslow Road, Hanworth, Middlesex, has a finished "Temple Tribute" for sale; and A. E. Landon, 4, Goodwin Road, Shepherds Bush, London, W.12, has a 99 per cent. completed "Miles Kestrel" complete with M. & M. air wheels for disposal. 1686602 L.A.C. Hays, Officers' Quarters, 4 Site, R.A.F., Riccall, c/o G.P.O., Selby, Yorks., is keen on obtaining back issues of American model magazines. Any offers?

And so, that's that for another month, fellows. Still not enough club reports to suit me, and I wonder if some of the established clubs have decided to hibernate—or have they gone snooty on us? Perhaps they are too busy building hush-hush jobs for the exhibitions!! However, let's hope to hear more from them next month. Meanwhile, all the best with both flying and building, and till next month, this is yours truly signing off.

The CLUBMAN.



Left: A 1/48 in. scale model of the "Miles Magister," constructed by P. T. Guilmant, of Shirley.

Right: Nice work by L/cpl. Hale using Aeromodeller plans. Model is, of course, the "Whirlwind."

S.M.A.E.

Minutes of the Council Meeting, held on Sunday, December 13th, at the Royal Aero Club.
In the Chair :—Mr. A. F. Houlberg.

Minutes.

The Secretary opened the meeting by reading the Minutes of the previous Council Meeting held on October 18th. After questions arising had been answered, Mr. C. A. Rippon moved, seconded by Mr. A. A. Courtney, " Their adoption as read." Carried.

Correspondence.

A letter had been received from Mrs. C. R. Clarke informing the Secretary that Mr. Clarke, our Records Officer, was seriously ill. All members of the Council expressed regret, and the Secretary was invited to reply to Mrs. Clarke expressing the Council's sympathy and hopes for a speedy recovery. It was also reported that Mr. H. York (now with the R.A.F.) had been unwell, and the Secretary would write to enquire as to his present condition.

Badges.

The Council, knowing that quite a number of clubs had ordered, and in some cases paid for, badges quite a long time ago, felt that this question should be taken in hand immediately. First, all club secretaries should send to Mr. Bell all details of orders not delivered. Secondly, the Secretary had been in contact with Mr. W. T. Chandler of the Chingford M.A.C., who had helped the Secretary considerably in making contacts that would ensure ample supplies of badges to our members. Our Chairman now has the matter in hand and would order between 2,500 and 5,000. The number would depend on price quotations. Mr. Gosling's claim to the British Record for Class " B " Towlined Glider was left on the table as the Council wished to give further consideration to the application.

Affiliations.

Rhyl M.A.C. and Prestatyn M.A.C. were granted affiliation to the Society.

Re-affiliations.

Stewarton M.A.C., Streatham Aero-Modellers and Taunton M.A.C., were re-affiliated.

The " Wings for Victory " Exhibitions.

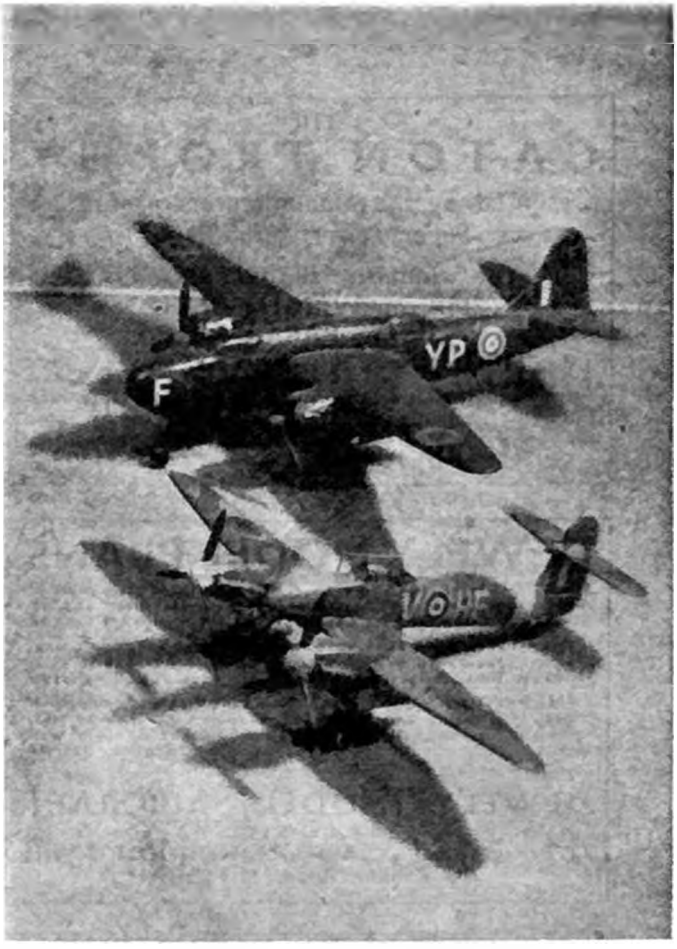
The Council discussed the details and the system adopted for the exhibition and its present stage of development. Entrance forms would be used and two forms would be necessary for each model exhibited and each would have to be signed by the entrant. This was necessary, as it was of the first importance that our members should obtain the building materials. Laxity on this point would lose considerable materials to the members of the Society. The Council showed some anxiety because of the little time remaining for the preparation of models for the displays. The Secretary agreed that very little time remained, and expressed the hope that the clubs would do their best to send as many models as possible by the middle of February to the National Savings Committee. He further pointed out that models sent along at later dates would of course be accepted. A request for the early delivery of models was put to the clubs to enable the National Savings Committee to give a grand send-off to the Exhibitions, and he felt that the urgency implied was justified.

The Brochure.

A Committee of four members with the Secretary was elected for the purpose of drawing up the Brochure in its final form. The members were Messrs. A. F. Houlberg, C. A. Rippon, H. P. Costenbarder, and M R. Knight. They would meet at the Secretary's house at the earliest possible date.

Vote of Thanks to the Chair.

Was moved by Mr. M. R. Knight, seconded by Mr. C. A. Rippon, carried, and brought the meeting to a close at 5.45 p.m.



MORNINGSIDE M.A.C.
W. J. Wheeler, 1, Elmar Court, 738, Fulham Road, Fulham, S.W.6.

BISHOPS STORTFORD M.A.C.
D. M. Page, 15, Pinelands, Bishops Stortford.

CUNLIFFE-OWEN AIRCRAFT SOCIETY OF MODEL ENGINEERS.
A. Ganter, Swaythling, Southampton.

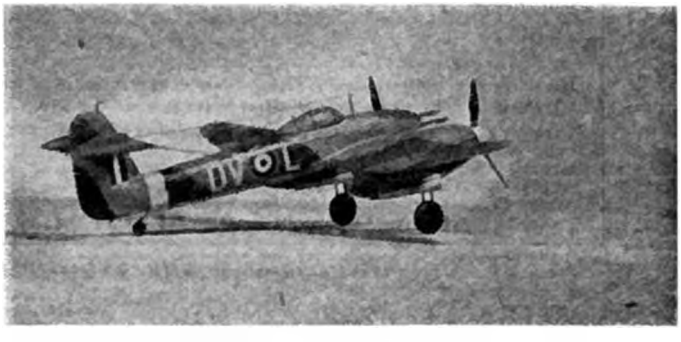
KING EDWARD'S M.A.C.
R. J. Emms, 14, Thornton Road, Ward End, Birmingham, 8.

TOLLCROSS & D.M.A.C.
D. McGhee, 477, Amulree Street, Sandyhills, Glasgow.

SECRETARIAL CHANGES.

KENDAL M.A.C.
J. K. Brady, 13, Castle Circle, Kendal.

SOUTH BIRMINGHAM M.A.C.
R. H. Greaves, 47, Moorpath Road, Turves Green, Northfield, Birmingham.



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