AEROMODELLER

JULY
1949

1/3

THE NEW MILLSBOMB

MARK II ORIGINAL DESIGN BY MIKE BOOTH

WATCH FOR FURTHER DETAILS OF THIS SLEEK NEW "HALFAX" DESIGN. A CONTEST POWER MODEL DESIGNED AROUND THE NEW E.D. "BEE" AND "MILLS" ·75 C.C. ENGINES.

"HERMES"

This model is a worthy addition to the range of "HALFAX" CONTEST-PROVED models. Re-designed to take the 1·8 c.c. ELFIN, with stunt tank and drop-off undercarriage, it has proved itself more than capable of "every stunt in the book."

Already well known for its good looks and contest performance (6th place 1948 S.M.A.E. "Nationals") it provides a pleasing change for the experienced C/L flyer. Kit includes :—Stunt Tank parts pre-cut, Wing Ribs and Formers printed on "SOLARBO" Balsa, Rubber streamlined wheels, Wire, Tissue, etc. Fully detailed plans showing installation of both MILLS and ELFIN power units.

Wingspan 32" Weight 10 ozs. (flying 9½ ozs.)

PRICE **18/6**

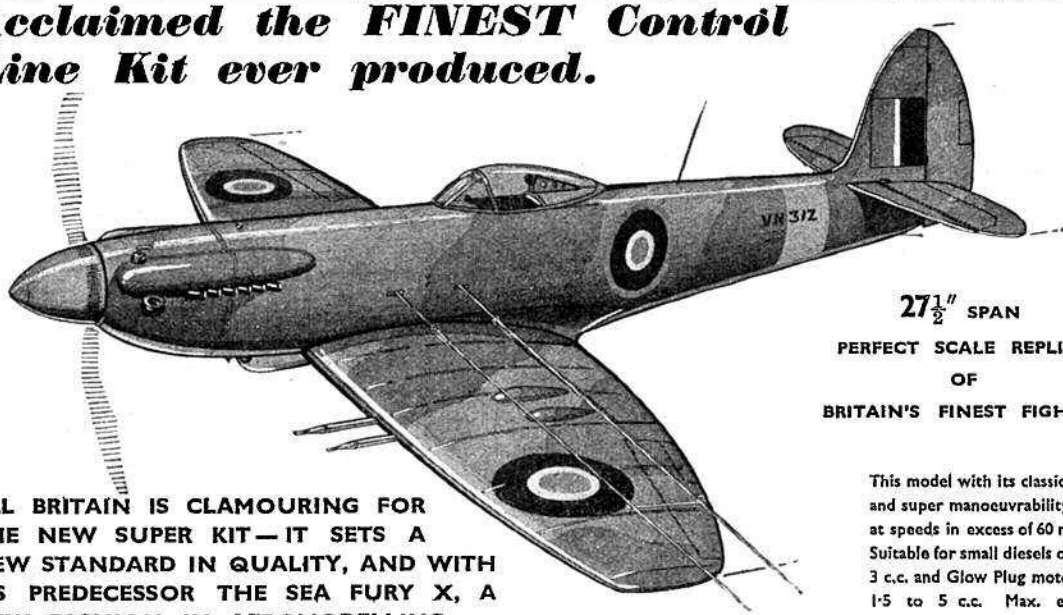
MANUFACTURERS
IMPORTERS EXPORTERS
Phone : HALIFAX 2729
Grams : "AEROMODEL, HALIFAX."

HALFAX MODELS LTD

GREEN MOUNT WORKS HALIFAX PRODUCTS HALIFAX YORKSHIRE

THE "Spitfire 22"

Acclaimed the FINEST Control Line Kit ever produced.



27½" SPAN

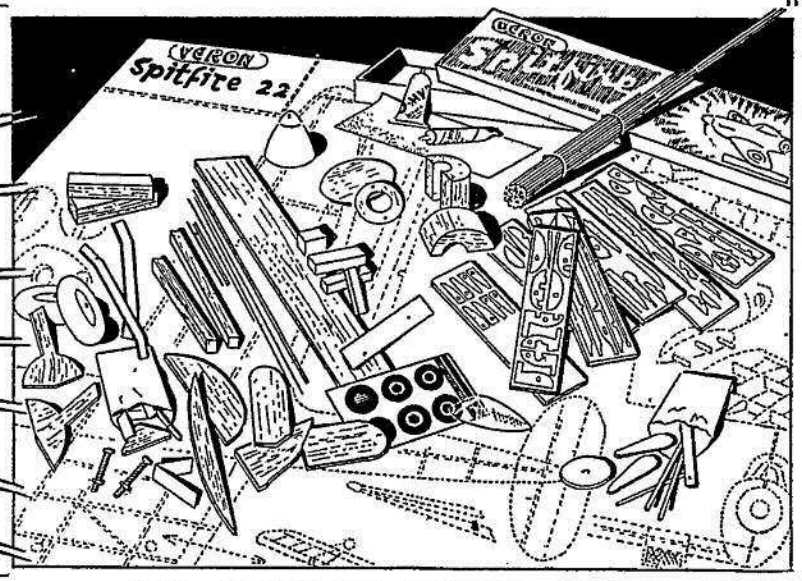
PERFECT SCALE REPLICA OF BRITAIN'S FINEST FIGHTER

This model with its classic lines and super manoeuvrability flies at speeds in excess of 60 m.p.h. Suitable for small diesels of 1 to 3 c.c. and Glow Plug motors of 1·5 to 5 c.c. Max. engine weight 5½ ozs.

ALL BRITAIN IS CLAMOURING FOR THE NEW SUPER KIT — IT SETS A NEW STANDARD IN QUALITY, AND WITH ITS PREDECESSOR THE SEA FURY X, A NEW FASHION IN AEROMODELLING.

After the amazing success of the "Sea Fury," Phil Smith, well-known designer, gives "Veron" undisputed lead with an amazing scale model of the immortal "Spitfire." An improved system of COMBINED FLAP and ELEVATOR Control gives a degree of manoeuvrability never before believed possible, with scale control line models. Consecutive loops and bunts, inverted flight - figure eights, (upright and inverted), square loops - in fact everything in the Stunt Schedule is performed with ease.

- Brilliantly presented stage-by-stage, 30" × 40" plan. A masterpiece of concise instruction.
- Graded Balsa, Printed Sheets and Strip.
- Many ready-cut parts, including nose cowl.
- Moulded Cockpit Cover.
- Cements, Tissue Pastes, etc. (No Dopes).
- Partly formed Metal Stunt Tank.
- Transfer sheet of coloured roundels.
- Lightweight Sorbo rubber scale wheels.
- Metal Spinner.
- All-up weight (with Elfin 1·8 c.c.) 11½ ozs. The undercarriage is scale "drop-off" cleverly designed to keep the tail down till airborne.



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IT'S ANOTHER VERON VALUE KIT!

Price — **27/6**

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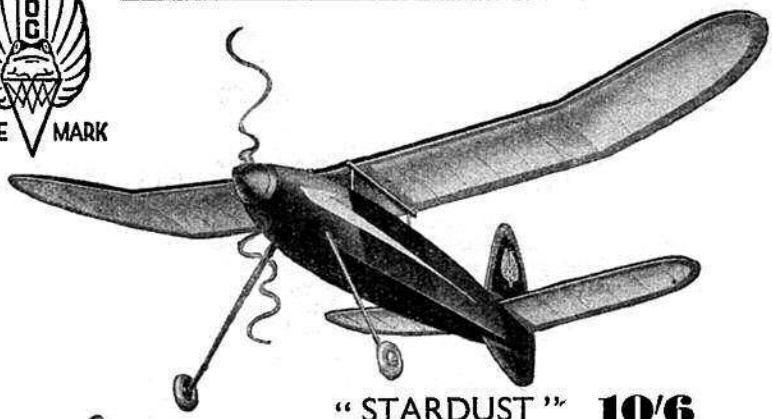
FROG

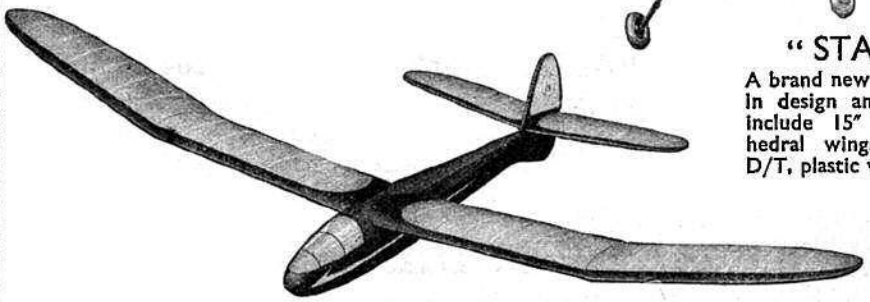
TRADE MARK

CONTEST MODELS



"STARDUST" **10/6**

A brand new 37" span rubber model—modern in design and a certain winner! Features include 15" free-wheeling propeller, polyhedral wings, dihedral tailplane, parachute D/T, plastic wheels and spinner.



"PRINCE" **25/-**

The new 60" span "Prince" has been specially designed to combine semi-scale appearance with contest-winning performance. The FROG kit is carefully planned and complete in every detail. It includes all accessories, transparent pressed cabin, finished nose block, dethermaliser and full drawings, etc.

"VANDIVER" **13/6**

The "Vandiver" is firmly established as Britain's premier stunt control-line model. Simple to construct and a pleasure to fly, it takes the book in its stride and flies around for more ! ! ! 26" span. For FROG "100" and "180" diesels or "160" RED GLOW motors.

FROG SERVICE—

There are 5,000 stockists of FROG products in Great Britain... Buy your models locally and make use of their services.
There are full facilities for servicing FROG engines at our works. All work is carried out by experts and charges are reasonable.

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PRECISION MOULDED IN PLASTIC

Ins. Dia.	Pitch.	RIGID No.	Price.	FLEXIBLE No.	Price.
9	5	A/AS/01	2/6	UB/AS/01	2/-
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International Model Aircraft Ltd.

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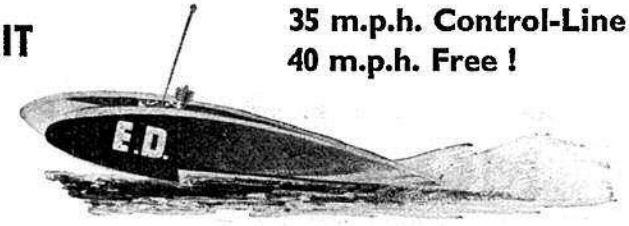
PENGUIN Plastic Scale Models

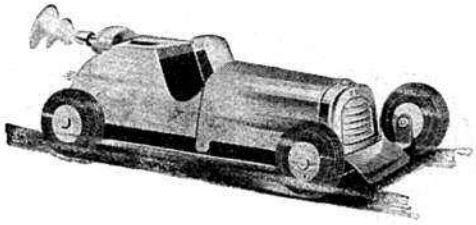
E.D. POWER UNITS, KITS AND ACCESSORIES!

E.D. "CHALLENGER" HYDROPLANE KIT

35 m.p.h. Control-Line
40 m.p.h. Free !



These unequalled terrific speeds were obtained when fitted with a 2 c.c. Competition Special Diesel. Absolutely no drag, less than half the propeller in the water. All Balsa construction. Suitable for 1 c.c. to 2·5 c.c. engines. Complete with easy-to-build drawings and marine unit.
PRICE **50/-**



E.D. "AEROCAR" KIT. Exceeds 30 m.p.h.!

Immediate and effective results guaranteed when fitted with an E.D. 2 c.c. Diesel. Can be built with the aid of a few simple tools. Complete with E.D. Speedicord Wheels, propeller and easy-to-build plans. Packed in strong carton ... ... PRICE **49/6**

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For Mark II, Competition Special and Mark III.	Price, each	**8/6**
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All rubber, 3" diameter	Price, each	**1/3**
Complete with Car Wheel	" "	**6/6**

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Driving Shaft	Price, each	**1/6**
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Stern Tube	" "	**3/6**
Water Screw 1¾" dia. × 3" Pitch. Specially designed for E.D. Power Units	" "	**4/6**

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After exhaustive tests E.D.'s offer the best and most economical unbreakable Air Screws ever manufactured. Do not flex in flight. Pitch can be altered by heating and stays put.

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7¼" dia. × 5" pitch (Free Flight) for Mark I ...	" "	**2/-**
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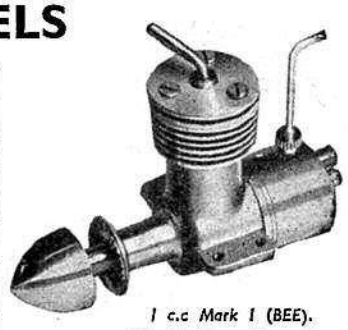
For Control-line and Free-flight, Race-cars . . and Marine Craft you will achieve BETTER results with E.D. Diesels. Range comprises 1 c.c. Mark I at **£2.5.0**, 2 c.c. Mark II at **£3.10.0** and the British Speed Record Holders . . . the 2 c.c. Competition Special at **£3.17.6** and the 2·49 c.c. Mark III at **£4.5.0**.



1 c.c Mark I (BEE).
The Engine with a sting

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The Transmitter

The E.D. Radio Control Unit gives to Modellers the thrill of complete control at long ranges. Planes and boat can be manœuvred at will. Simplicity itself—no technical knowledge required. Guaranteed range of control 1,000 yards, but much longer ranges can be reached. Unit comprises a two-valve battery operated Transmitter, a three-valve circuit Receiver with single tuning control, and a clockwork Servo.

Complete Unit, less batteries **£14.10.0**

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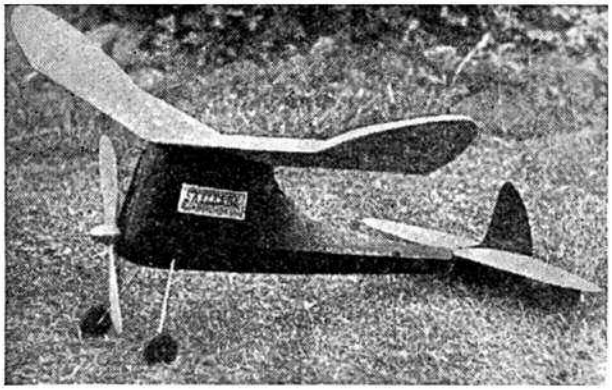

THE ZIPPER

44" WINGSPAN SUPER CONTEST MODEL

COMPLETE KIT **27/6** PLAN and PRINTED SHEET PACK. **7/6**

This model has already proved itself an unbounded success as is instanced by the hundreds of letters received from enthusiastic modellers all over the country.

One modeller writes, "*It is without doubt a vice-less model without any of the usual characteristics and this one truly flew off the board'. The machine is very remarkable as no trace of a spin has ever shown itself in the whole of its flying time.*"

READY SHORTLY.

THE JUNIOR ZIPPER—31" Wingspan Contest Model.

Specially designed for the E.D. Mark I but equally suitable for the Mills Mark I and Mark II and other similar engines.

COMPLETE KIT (including streamline rubber wheels) **14/6**

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Plan and Printed Sheet Pack	6/–

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COMPLETE KIT	25/–
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KORDA WAKEFIELD	17/6
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REMEMBER SKYLEADA SECURES SUPREME SATISFACTION. ASK YOUR RETAILER TO SHOW YOU THE COMPLETE RANGE.

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We would remind customers that there is a free postal service on ALL orders, many of you persist in enclosing postage which is unnecessary !! Our new 1949 Catalogue is now ready and you should send for your copy without delay—Price 9d. post free. Don't forget, lads, the MIDLANDS MAIL ORDER HOUSE is still THE MODEL SHOP RUN BY THE MODELLERS FOR THE MODELLERS.

— that the Veron "Spitfire" Mk. 22 is every bit as good as its predecessor the Hawker "Sea Fury," designed for diesels of from 1·3–3 c.c. and Glo-plug motors of from 1·5–5 c.c. It is capable of speeds well in excess of the stated maximum of 60 m.p.h., whilst retaining full manœuvrability with its combined flap and elevator control. Wing span 27½ ins.; fully detailed plan and all materials complete a really fine job. **Price 27/6, post free.**

RUBBER

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GLIDER

Halfax Tern 10/–, Halfax Albatross 25/–, Keilkraft Invader 6/6, Keilkraft Soarer Baby 5/–, Keilkraft Soarer Minor 8/6, Keilkraft Soarer Major 11/6, S.J.A. Southern Sloper 6/6, Frog Vanda 9/6, Frog Fairey 7/6, Frog Prince 25/–.

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MESSAGE TO MODELLERS—We desire to draw your attention to the super streamlined contours of the "ANITA", which took months to perfect. This model is the last word in compactness. All parts are contained in the fuselage, such as tank, control system, etc., and yet every unit is accessible, and the cabin is left free to accommodate a model pilot if extra realism is required. In addition, great strength has been maintained. To be perfectly honest, "ANITA" is not easy to build, but the perfect performance and beautiful looks will more than repay you for the time taken in building. TWICE the usual building time equals TEN times longer service.

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"SLIPSTREAM" SUPER STUNT C/L TANKS

LIGHTEST TANKS ON THE MARKET

Post 3d.

SMALL 3/9 (½ oz.) MEDIUM 3/9 (⅓rd oz.) LARGE 5/3 (⅔ oz.)

Acetate Sheet 10/1,000 1/– sq. ft. 15/1,000 1/4 sq. ft. 20/1,000 2/– sq. ft. 40/1,000 5/6 sq. ft. "Slipstream" Transparent Tubing, 12 ins., 1½, 2 or 2½ mm. in packets, **5d.** Engine Fixing Outfits, 6 B.A. or 8 B.A., in packets, **9d.** Painted Metal Tool Boxes, positive catch and handle, 10×7×4 ins. 2/6, postage 1/–. Dope Brushes, ½ in., 1/3 and 2/–. Sable Brushes, as illustrated. M.S. Spring Clips for retaining wheels without soldering, 16G.–14G–12G., **5d.** pair. 10G. **6d.** pair. Balsa Cutter and 8 Blades **2/9.** M.S. Air-wheels, 1¾ ins., **7/4**, 2 ins. **8/7**, 2½ ins. **12/3**, 3 ins. **15/11**, 4 ins. **19/6** AMERICAN "MEGOW" Kits. "TYRO" Engines, 2.5–5 c.c., **22/7**, Postage 1/–, and "COMPETITOR" **34/9.** Postage 1/–.

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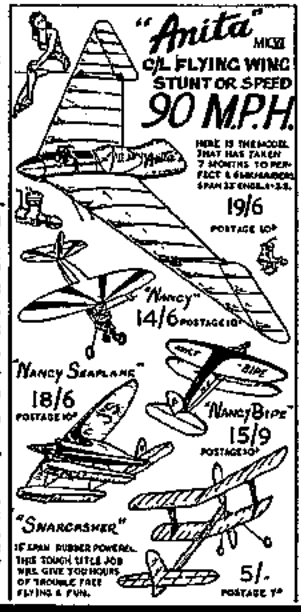
First quality Dunlop Rubber, ½ in. × 1/30 in., **12/6** per lb. or **2d.** per yard. Transparent Cockpit Covers, 3-in. **8d.**, 4-in. **1/–**, 5-in. **2/–**. Britfix Cement **7d.** O' My Cement **5d.**, **9d.** and **1/3.** "Slipstream" Wheels, as illustrated, are absolutely unique in design, the hubs are reinforced and the tyres are flexible. They provide all the advantages of rubber-tyred wheels, but they will not puncture. M.S. 1½" Plastic Ships' Ventilators **6d.** ea.



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PARAMOUNT

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As we have to go to press two months before the publication date of this journal it is impossible for us to include the latest Motors, Kits and Accessories. However, you can rest assured that we carry stocks of all the latest products in the model aircraft world. You can send to us for anything advertised in this journal and we shall be only too pleased to supply it.

PROP GEN.

Since we started to produce power propellers nearly twelve months ago we have had to overcome many difficulties and we have also found out some interesting facts on propeller design.

The propeller must be matched to the engine and model; a variation of only 1 in. in pitch may make all the difference combined with the right diameter. By experimenting with different sizes of propellers you can get the maximum performance from your model.

★ ★ ★ THREE STAR PROPS.

The Aerobatic, 7 in. to 12 in. dia., 7 in. to 10 in. pitch	2/–
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6 in. dia. Propellers for tiny motors	2/–

CONTROL LINE KITS

Mercury MARLIN	19/6
K.K. Stuntmaster	19/6
Magnette 26"	25/–
Stunter 24"	19/6
Anita	16/6
Skyleada F/W	25/–
Millsbomb Mk. II	18/6
Sea Fury X	22/6
Scout Biplane 20"	22/6
Phantom Mite 16"	11/6
Wizard 22"	10/6
Radius 22"	17/6
Royales Tiger Moth 29"	21/–
Royales Tempest 20"	15/–
Nifty 26"	12/6
Nipper 17"	9/6
Martinet 36"	21/–
Trainer 32"	20/–
Sabre 18"	16/6
Precision Playboy	17/6
Van Diver	13/6
Kan-doo	25/–
Thunderbird 29"	22/6

FREE FLIGHT POWER

Slicker 50"	32/6
Slicker 42"	22/6
Slicker Mite 32"	10/6
Bandit 44"	21/–
Outlaw 50"	27/6
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Airflo Baby 44"	17/6
Airflo Mite	8/6
Southerner Mite 32"	11/6
Southern Dragon	25/–
Centurion	63/–
Rapier 48"	22/6
Strato-D	15/–
Triumph 33"	16/–
Zipper 44"	27/6
Scarab 35"	15/–
Hammerhead	19/6
K.K. Pirate 34"	13/6
Stentorian 72"	69/6
K.K. Falcon 96"	17/6
Antspants 48"	40/–
Slicker 60"	47/6
Streaker 37"	19/9

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E.D. Mk. I 1 c.c.	£2 5 0
E.D. Mk. II 2 c.c.	£3 10 0
E.D. Comp. Special	£3 17 6
E.D. Mk. III 2·49 c.c.	£4 5 0
Mills Mk. II 1·3 c.c.	£4 15 0
Mills ·75 c.c.	£3 5 0
Mills 2·4 c.c.	£5 10 0
Ace ·5 c.c.	£4 10 0
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Airstar 2·15 c.c.	£3 15 0
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Frog 100	£2 8 0
Frog 160	£2 8 0
Frog 180	£2 14 9
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M.I. Super Coil	25/6
Elmic Timers, Diesel	11/6
Elmic Timers	10/6
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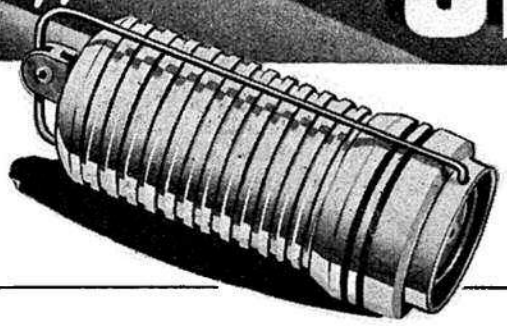
Veron Stunt Tank	4/–
Emdee Eezi-Flo Tanks	7/–
" " " Small	6/–
McCoy Hot Point	5/9
K.L.G. Glow Plug	6/–
Caton 2½" airwheels	12/–

The unique JETEX 50



This is the motor you want if you are making a start in power modelling. It is simple to operate, safe and cheap to run, and very inexpensive to buy!

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ENTER YOUR JETEX MODELS FOR THE JETEX CONTEST. (Decentralised - Finals in Sept. 1949)

Valuable CASH PRIZES to be won.

GET FULL PARTICULARS FROM YOUR CLUB SECRETARY OR FROM WILMOT, MANSOUR & CO., LTD.

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WILMOT, MANSOUR & Co., Ltd.

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KEILKRAFT SKYJET 50 - 3/9

VERON MIN-O-JET 18" - 3/–

Get your 50 to-day, and one of these inexpensive kits —and enjoy some trouble-free flying next week-end!

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JETEX 200 OUTFIT *now only* 27/6
JETEX 350 OUTFIT *now only* 37/6

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BALSA SHEET 3' Lengths

1/16" × 3"	9d. each
1/16" × 3"	9d. each
3/32" × 3"	10½d. each
1/8" × 3"	1/- each
3/16" × 3"	1/2 each
1/4" × 3"	1/3 each
1/16" × 2"	6d. each
1/8" × 2"	8d. each
3/16" × 2"	9d. each
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1/8" sq.	1/- doz.
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1/8" × 1/4"	2/- doz.
1/8" × 3/8"	3/- doz.
1/8" × 1/2"	4/- doz.
3/16" sq.	2/- doz.
3/16" × 1/4"	3/- doz.
3/16" × 3/8"	3/6 doz.
3/16" × 1/2"	4/- doz.
1/4" sq.	3/6 doz.
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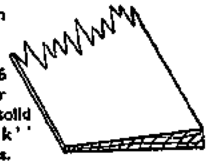

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1/8" × 2"	8d. each
3/16" × 2"	10½d. each
1/4" × 2"	1/- each

SPRUCE, MAHOGANY AND OBECHE STRIP 3' Lengths

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1/16" × 1/8"	2/- doz.
1/16" × 3/16"	2/9 doz.
1/16" × 1/4"	3/- doz.
1/8" sq.	2/9 doz.
1/8" × 1/4"	3/- doz.
1/8" × 3/8"	3/3 doz.
3/16" sq.	2/9 doz.
3/16" × 3/16"	3/- doz.
3/16" × 1/4"	3/3 doz.
3/16" × 3/8"	3/9 doz.
1/4" sq.	4/- doz.
1/4" × 1/4"	4/9 doz.
1/4" × 3/8"	4/9 doz.
1/4" × 1/2"	5/3 doz.
3/8" sq.	4/- doz.
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INCORPORATING "THE MODEL AEROPLANE CONSTRUCTOR"

Your "Aeromodeller"

To both individual readers and model shop traders throughout the country we extend our thanks for their co-operation in sending us the times and dates on which they received their copies/supplies of the June issue of the AEROMODELLER. Whilst, frankly, we have not received as many replies as we would have wished for, those we have received are sufficiently widely distributed to enable us to get a reasonably accurate idea of the rate of distribution and supplies throughout the country.

In several cases, however, distribution was effected so rapidly that supplies to some model shops and newsagents arrived *before* the 25th of the month, and copies were immediately put on sale. The offering of magazines for sale prior to the advertised publication date is of course, deprecated by the Periodical Proprietors Association and Members of the Retail Newsagents Federation, and we do ask model shop proprietors to co-operate by *not* offering copies for sale earlier than the 25th of the month.

If certain shops are going to offer copies earlier than the 25th of the month because they are nearer to London, or distribution is effected to them with greater speed; we shall soon get back to our original position of having *unequal* distribution throughout the country!

Our printers and distributors hope to maintain the new high standard which was set with the distribution of the June issue, and we hope that readers and/or model shop proprietors who do not receive their future copies by the 25th of the month will continue immediately to advise us, so that we can do our share in maintaining as even a distribution throughout the country as is possible. But remember, you model shop proprietors that you must *not* offer your copies for sale before the 25th of the month—PLEASE!

Contributions

With the increased number of pages carried by future issues of the AEROMODELLER, we shall, of course, require an increased number of contributions from our readers.

This opportunity is therefore taken to advise readers of the terms on which, generally speaking, we accept contributions for publication in the AEROMODELLER.

Firstly, only original contributions are acceptable.

Secondly, contributions must not have been published previously elsewhere, and are accepted only on the understanding that the sole publication rights in them are sold to the AEROMODELLER. We pay "top line" rates, and make the above stipulations in the interests of our many thousands of readers, so that they shall receive only the best material which can be made available to them.

Payment for contributions is made on or shortly after publication. There is no fixed scale of so-much per hundred or thousand words, for the reason that we prefer to assess each contribution on its own individual merits. This point is stressed, because it is no good contributors comparing notes as to what they have received for their respective contributions. A short article may have required a considerable amount of research work in its preparation, whilst a long article may consist, partly or even mainly, of building instructions or expressions of opinion. Quite short articles may disclose valuable "know-how" acquired only by long experience, and in our opinion should be remunerated appropriately.

As a general guide however, readers may know that we reckon to pay between two and three guineas per page. Models accepted for description in the AEROMODELLER and the plans of which are published in the AEROMODELLER Plans Service, may earn anything from five to twenty guineas, according to their "size", number of pages occupied, the originality of design, "worthwhileness" and general value of the model.

All models of which plans are published are accepted only after a certificate of performance has been submitted to us, and the more original and generally interesting they are to readers, the more likely are they to be published.

We do not want freaks, and not often do we publish "designs" which have not been built up and proved in flight. It is not our policy to describe models which are very similar to those offered in kit form by our advertisers; rather is it our desire to publish plans of the more developed types, the more ambitious, and the very original—we might say that the more *unlike* the types of which kits which are available the better.

There must be many "lone hands" up and down the country who have concentrated on one or other of the various types of model aircraft, and whose models are not well-known because they are not Club members or entrants for competitions. To these "lone hands" we make the special appeal to let us have particulars of their models.

They need not feel that because they are not "well-known" aeromodellers, that they will be handicapped. Our Editorial policy has been always to give our readers of the best—with little or no regard to whether the designer was *already* "well-known".

Your Questions Answered

Prior to the last war, one of the most popular features in the AEROMODELLER was the page of "questions-and-answers." This consisted of questions received from readers and which had been specially selected on account of their general interest.

We endeavour to answer all queries addressed to our Editorial offices, and of course in many cases the questions and answers are not of a kind which would ordinarily interest the bulk of our readers.

However, where they do meet this condition, they are passed to a certain section in the Editorial department where they are sorted, collated and eventually a number find their way into the AEROMODELLER pages.

Contents

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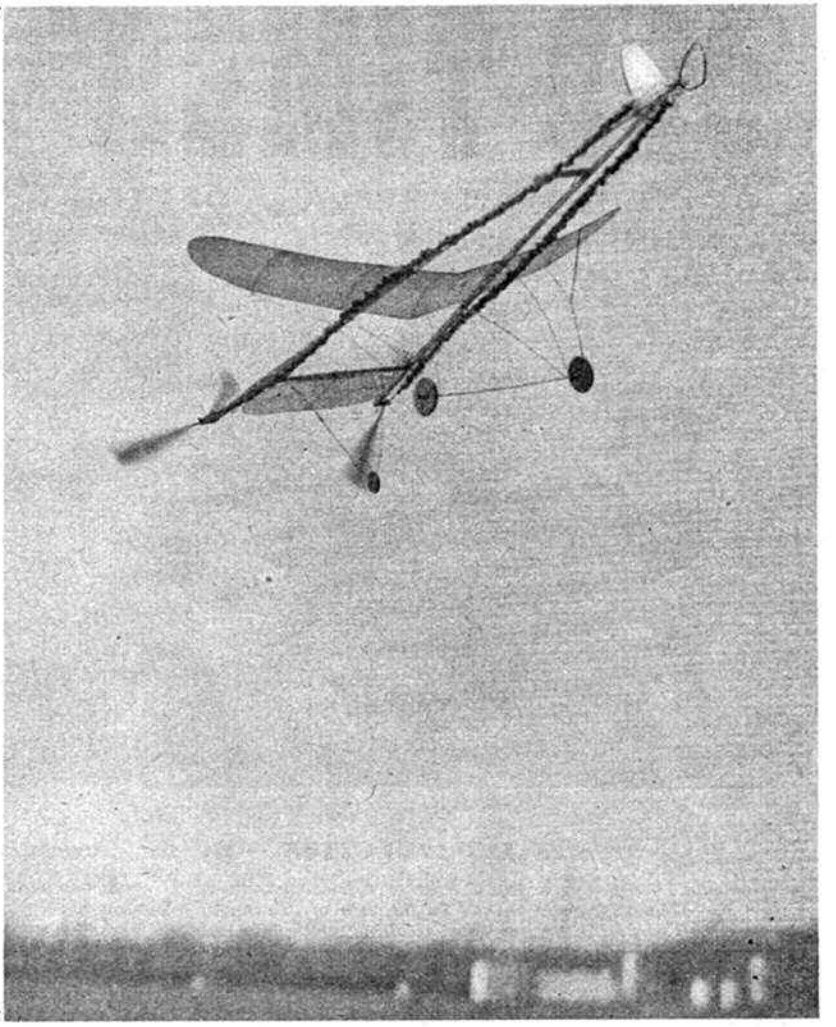
"WIND IN THE WIRES" By no means a sluggard when it comes to climb is the "*Aeromodeller*" replica of the Mann & Grimmer "A" frame pusher featured in this issue.



We intend to revive this feature at an early date, and therefore remind readers of our service, and invite them to send in intelligent questions, to which (we hope!) we can give intelligent answers; a number of them will be published each month for the benefit of the bulk of our readers, and half-a-guinea will be paid to the sender of each question published.

Engine Test Reports

One of the most popular features we have published in the AEROMODELLER has been the series of engine test reports by our Technical Editor, Mr. L. H. Sparey. These reports have been appreciated by a large number of readers and engine manufacturers, some of whom have consulted Mr. Sparey and/or made use of suggestions he has from time to time offered in his series of articles.

There is, however, one aspect of these reports which apparently is not too well appreciated by some of our readers; and the following remarks are inspired by a letter just received from a Doctor reader, who criticises the articles, in that they contain "too much technical data and do not report tests of the engines under flight conditions."

We would explain, therefore, that the main purpose intended to be served by these tests is to ascertain the maximum horse-power, and the R.P.M. at which it is available. To carry out tests of this sort, it is obvious that the engines must be "bench-tested", and that testing under actual flight conditions is not possible.

A point which is perhaps less obvious, is that the engines are inevitably tested to near breaking point, and under adverse conditions, as compared with those appertaining to flight. The engines are tested not for short one-or-two-minute runs, but for quite lengthy periods. They are tested with air-brakes and not airscrews, and thus they run under hotter conditions than obtain when powering a model in flight:—In fact, it may be said that engines are tested very nearly to destruction.

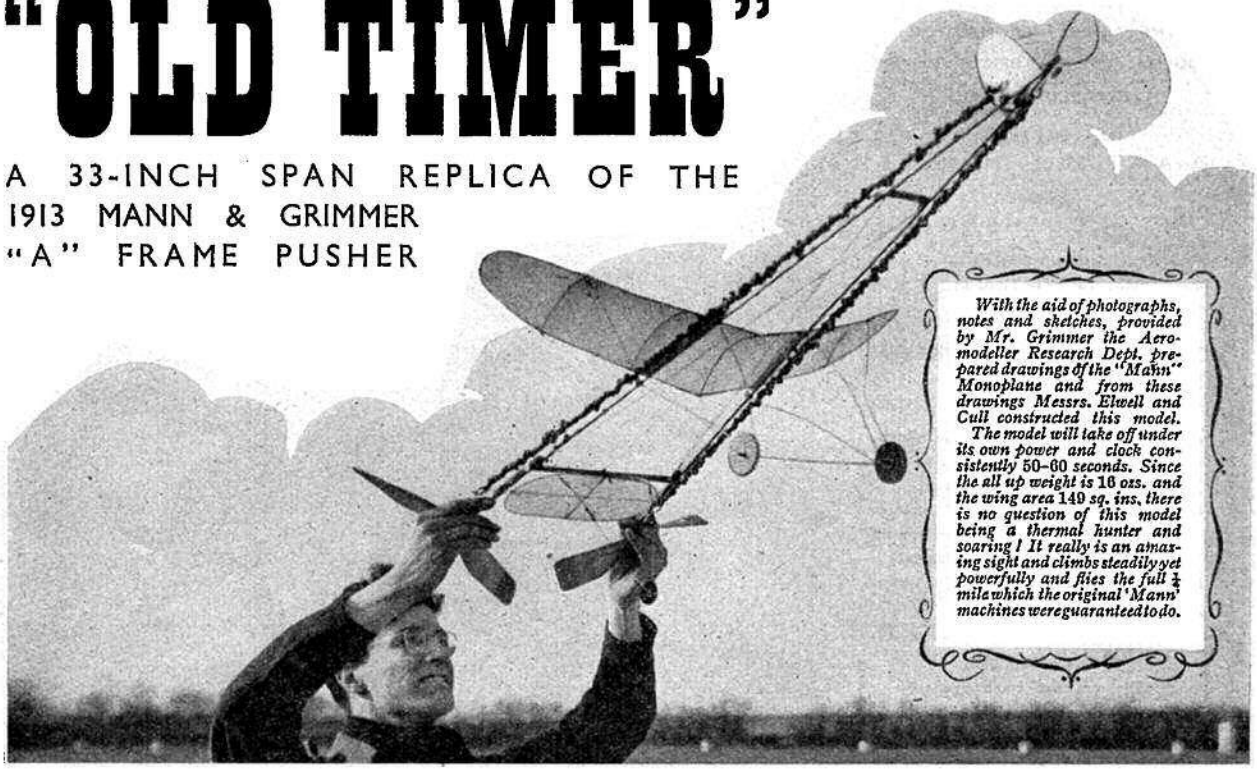
Our Doctor contributor complains that, in the report of a certain engine test, reference was made to some internal trouble developing, but the exact trouble was not ascertained and reported. The point here is that this trouble developed when the engine was run under overload conditions, and the fact that trouble ultimately developed *was to be expected*, and was no reflection on the engine design or quality of manufacture.

On a number of occasions Mr. Sparey has expressed his own opinion in the form of criticism of this or that feature of a particular engine, and at all times he endeavours to be as fair and impartial as possible; but we would ask readers to bear in mind that references to actual breakages occuring under "all out" test conditions, do not indicate any serious fault inherent in the engine.

It may be added that all engines tested are purchased retail by Mr. Sparey by his personally selecting at random from the stocked shelves of one of a number of model shops he is able to visit. Engines are *not* specially tuned and selected units which have been specially prepared and sent in by the makers themselves.

"OLD TIMER"

A 33-INCH SPAN REPLICA OF THE 1913 MANN & GRIMMER "A" FRAME PUSHER



With the aid of photographs, notes and sketches, provided by Mr. Grimmer the Aeromodeller Research Dept. prepared drawings of the "Mann" Monoplane and from these drawings Messrs. Elwell and Cull constructed this model.

The model will take off under its own power and clock consistently 50–60 seconds. Since the all up weight is 16 ozs. and the wing area 149 sq. ins. there is no question of this model being a thermal hunter and soaring! It really is an amazing sight and climbs steadily yet powerfully and flies the full ¼ mile which the original 'Mann' machines were guaranteed to do.

INTRODUCTION — By the Managing Editor

Some months ago, I received a letter over the signature of Robert P. Grimmer, founder partner in the firm of Mann and Grimmer. It was an interesting letter, recalling conditions prior to the first Great War and with it was enclosed a copy of the firm's 1913 catalogue, on the cover of which they described themselves as "The Pioneers of the Tested and Guaranteed Model Aeroplane".

The firm of Mann and Grimmer concentrated essentially on the production of the "Mann" monoplane, a twin pusher of some 3 ft. 6 ins. and with span of some 30 ins. Several thousands of these models were sold and kits of parts and individual parts were supplied in addition to the completed models.

At the invitation of Mr. Grimmer, several of my Staff accompanied me on a visit to inspect his albums, records and plans of the "Mann" monoplane and as a result, I invited Mr. Grimmer to write an article describing a typical model aeroplane meeting of the period 1912-1914.

Those readers who may feel that I have wasted several pages space by publishing Mr. Grimmer's article and the plan and the photographs of the model, can, of course, send me the usual brickbats . . . but those aeromodellers who would like to recapture the spirit of the old pre-war days, and enjoy a change from the current models, can obtain copies of the usual A.P.S. style drawings from our Leicester Offices.

The model we have built will be flown during the summer meetings at Eaton Bray. If there is a lively interest, as I think there may be, in this model, we are prepared to organise a competition in the Autumn of this year, for replicas of the "Mann" monoplane, and for which the "Aeromodeller" will offer a handsome trophy.

AS IT WAS IN THE BEGINNING R. P. Grimmer

I HAVE been invited to write an article on my reminiscences as a pioneer aero-modellist, and my mind goes back some forty years to the period between 1908 and the beginning of the first World War in 1914. I find among my aeromodelling friends to-day a profound belief that aeromodelling is a recent modern development of aviation. Nothing could be further from the truth. Even in the early Victorian era, the STRINGFELLOW aeromodel caught the public imagination nearly a century ago, and although the full-sized machine never materialised for lack of a suitable power plant, there is very little doubt but that it would have flown very successfully had it had the opportunity. The STRINGFELLOW model is creditably reported to have covered a considerable distance propelled by a miniature steam engine, and I consider that this particular field has yet to be explored adequately.

Round about the time when ORVILLE WRIGHT was being catapulted into the air with the assistance of a derrick, weight and monorail at Eastchurch, Isle of Sheppey, an epoch-making event, that I had the privilege of witnessing with awe and amazement in 1908; the aeromodelling movement was beginning to take shape in this country. The first aeromodel that I ever saw was one produced commercially by T. W. K. CLARKE, of Kingston-on-Thames, soon after that time. These aeromodels were of the "Flying Stick" canard type and very frail in construction and unstable in flight, but they did fly and we all thought them very wonderful as indeed they were.

It was the inspiration of these CLARKE aeromodels that caused me to found in 1908 the Arundel House School Aero Club, which was certainly the first School Aero Club in this country, if not in the world, and all the members of which were eventually to make their mark in aviation. Among the original members were R. F. MANN, later to become my friend and partner in two glorious adventures, (1) the launching on the commercial market of the famous aeromodels bearing his name and which were exported to every

country in the world, and (2) the design and construction of the "MANN and GRIMMER" fighting aeroplanes, which were in their time (1915), the fastest "pushers" in the world.

Other prominent members of Arundel House were C. R. RIDLEY, who had a most distinguished career in the Royal Flying Corps during the 1914–1918 War; SCARFF, who was killed while serving with the Flying Corps at Kut-El-Amara; and ROY LUCAS, who was eventually to hold the world's duration record with a Mann Monoplane.

Other famous models of that distant time were the "BRAGG-SMITH" Biplane, which was one of the best all-round aeromodels of that period; the "FLEMING-WILLIAMS," the first of the "A" frames and the inspiration of the "MANN MONOPLANE," and the DING-SAYERS Diamond Wing.

It used to be said that the original flying aeromodels, and certainly those of forty years ago, could be divided into four categories: (1) projectiles; (2) freaks; (3) darts and (4) flying sticks. Some of them possessed more than one of these attributes. Most aeromodellists of the time were in agreement with this nomenclature as far as other people's aeromodels were concerned, but few were willing to include *their own models* in any of these categories!

I have before me at this moment copies of the first three Royal Aero Show Catalogues of 1909, 1910 and 1911 respectively. In the March 1909 Catalogue there were 86 model exhibits, the majority of which were non-flying scale models. In March, 1910 there were 55 model exhibits, of which 37 were of aeroplanes, 3 helicopters (vertical lift), 4 ornithopters (wing flapping) and 1 airship (lighter than air). In the following year, March, 1911, the model exhibits had again dropped to 66, but such famous specimens as the "BRAGG-SMITH" and "FLEMING-WILLIAMS," the "DING-SAYERS" and the "MANN" made their appearance. There was still a sprinkling of "direct-lifters," "wing-flappers" and airships, and also of steam and electrical power-plants, but in 1911 the flying aeromodel capable of flying two or three hundred yards had been definitely evolved.

My readers, who are conversant with the performances of Diesel engined aeromodels resembling full-sized aircraft in miniature, and which fly with the certainty of their larger brethren, would be astonished and intrigued by the appearance and performance of those aeromodels of an almost-forgotten generation. It is true that Blériot had performed the remarkable feat of crossing the Channel in 1909, but the full-sized aircraft of the period were notoriously frail in construction and unstable in flight and the aeromodels, if anything, were even worse. Wing breakages were common and nose-diving an every-day occurrence.

I will transport myself in mind back to the 100 acre field at GREENFORD in the summer of 1910, nearly 40 years ago. A competition is in progress, it does not matter whether for distance or duration, in any case half the aeromodels cannot fly at all and another 25 per cent. will only last a few seconds! Few, other than the "BRAGG-SMITH" and the "FLEMING-WILLIAMS," have any "fly" in them. On approaching the crowd of competitors and spectators, one gets the impression that some sort of religious ceremony, possibly a pilgrimage, is in progress. Scenes of lighted candles are in evidence. These have been brought to "true up" the blades of the bent-wood propellers, which have become warped, and some competitors are applying the heat to improve the camber of their wooden plywood wings.

Here is a man with a biplane aeromodel, constructed principally of sticks and brown paper, braced with dirty string which has obviously been taken off a parcel. There is a propeller with one blade of very fine pitch and the other of very coarse pitch, with a suspicion that the blades are not of the same length. The perished rubber motor has obviously been cut from a discarded cycle inner tube. The width varies from ¼ to ½ inch. The proud owner winds laboriously by hand until suddenly the unlubricated rubber snaps, tearing a great gap in the brown paper of the lower plane. Near this discomfited competitor is a small youth who bears proudly a large aeromodel of the ORNITHOPTER (wing flapping) type. The motive power includes a very large coffee tin with the lid soldered on, in which compressed air is being stored by means of a cycle pump. I was never able to ascertain what sort of mechanism made the wings flap, as before a working pressure was got up, the coffee tin bursts with a loud explosion, and the competitor sadly retires from the scene.

Here is a man with a MULTIPLANE, an awesome contraption with at least six planes one above the other. They are made of thin sheets of plywood and apparently have no camber except a little on the top plane gratuitously supplied by the hot sun. Mr. MULTIPLANE has a steam power plant with a boiler made of many coils and spirals of copper tubing similar to that of the STANLEY steam car, an antique specimen of which has brought Mr. MULTIPLANE and his aeromodel to the scene of battle. Alas! although the propeller turns with great velocity, great clouds of steam emerge, and the quaint aeromodel careers along the ground at a great speed; it does not leave *terra firma*, and eventually collides with a great crash of splintering wood with a terrified Alsatian dog.

Competitor No. 4 has the best specimen of a "flying stick" that I have ever seen, before or since. The "fuselage" is a single thick piece of silver spruce about six feet in length with the rubber motor, which must consist of nearly a pound weight of strip rubber, underneath; and the top braced with king posts and piano wire to resist the tremendous pull. The small front plane and the rear main plane, the latter about 3 feet in span, are carved from solid wood and actually possess

Winding the "A" frame is a man sized job (no pun intended) or should we say three man job! One has also to remember to wind the motors in opposite directions otherwise the results are spectacular!

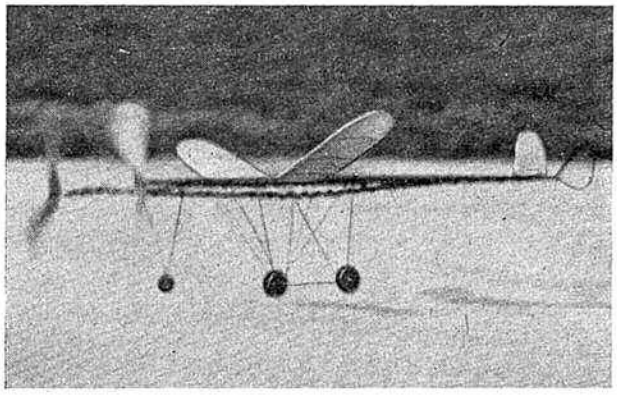
an authentic camber. The owner and his brawny assistant produce geared winders converted from large Millers Falls drills, and after generously lubricating the immense motor with castor oil from a pint beer bottle, proceed to wind from both ends simultaneously, a method that I had not previously seen. After what looks like several thousands of turns, the process is brought to a close by the apparently utter exhaustion of the operators. While the terrified onlookers wait for the rubber motor to snap or the sorely strained fuselage to break, the front portion of the "stick" is placed on the forked tip of a "rest" thrust into the ground, similar to that used by a mediæval arquebusier to support the long barrel of his weapon. Then the owner lets go of the straining propeller and runs for his life. With a terrifying WHIZZ like a large covey of partridges rising, the "flying stick" quivering and straining under the pull of sixteen good ounces of rubber, rises at a steep angle and with the speed of a rocket, slowly rotating in the reverse direction to the propeller, until such time as, the initial impetus having vanished, it suddenly halts and then nose-dives into the terrified crowd. I have seldom witnessed such a panic, even when 35 years later, a crowd in which I was a unit was similarly menaced by a V.1. Down, down comes that terrible missile, diving from perhaps a height of 100 feet, weighing several pounds and still impelled by its huge oil-dripping power-plant. A fat man, vainly trying to mount his cycle, appears to be the target. Throwing down the cycle, he flies yelling with terror, while the missile tears through the back wheel, ripping out several spokes and finally driving itself a foot into the ground before disintegrating.

Competitor No. 5 has a very ornate scale model of a BLERIOT purchased, so he informs spectators, from a large and fashionable London Stores with a world-wide reputation for ladies' underwear. The planes are of coloured silk spread on a very frail wooden frame, and the aeromodel certainly looks, shall we say, very pretty. This competitor prefers graphite, a commodity not entirely unrelated to bicycle chains, as a lubricant; and the red wings have acquired many black spots before the winding is completed, with the assistance of an egg-beater. Firmly gripping the fuselage by the middle, No. 5 vigorously launches his aeromodel, but to his disgust it falls at once to the ground. A second attempt produces a similar result, except that this time the frail wooden frame of the wing snaps. "Bang goes two guineas," remarks No. 5 as he retires.

Here is No. 6, who is the proud owner of a "BRAGG-SMITH" Automatic Stability Biplane. The aeromodel has the reputation of flying, and fly it does, for a distance of perhaps two hundred yards. A great sensation has arisen among the spectators for here is at long last that *rara avis*, an aeromodel that in 1910 is actually capable of flight.

Competitor No. 7 has a QUADRUPLANE, of which he is very proud. He is apparently a believer in variety, for each of the four planes possesses an aerofoil differing from the other three, both as regards span, camber and chord. Even the respective "gaps" would appear to be different. His propeller is four-bladed in contra-distinction to the two and three blades favoured by other competitors. But the most revolutionary tendency about No. 7 is his motor, which has obviously been borrowed from a clock. After winding it by means of a large key, a loud humming noise, reminiscent of a swarm of bees, is produced, and the propeller begins to revolve at speed. With an action worthy of a discus thrower at the Olympic Games, the QUADRUPLANE is launched, but within a second or two, the original impetus having gone, it falls like a stone to the ground and disintegrates into a tangled mass of clock spring, wheels and splintered wood.

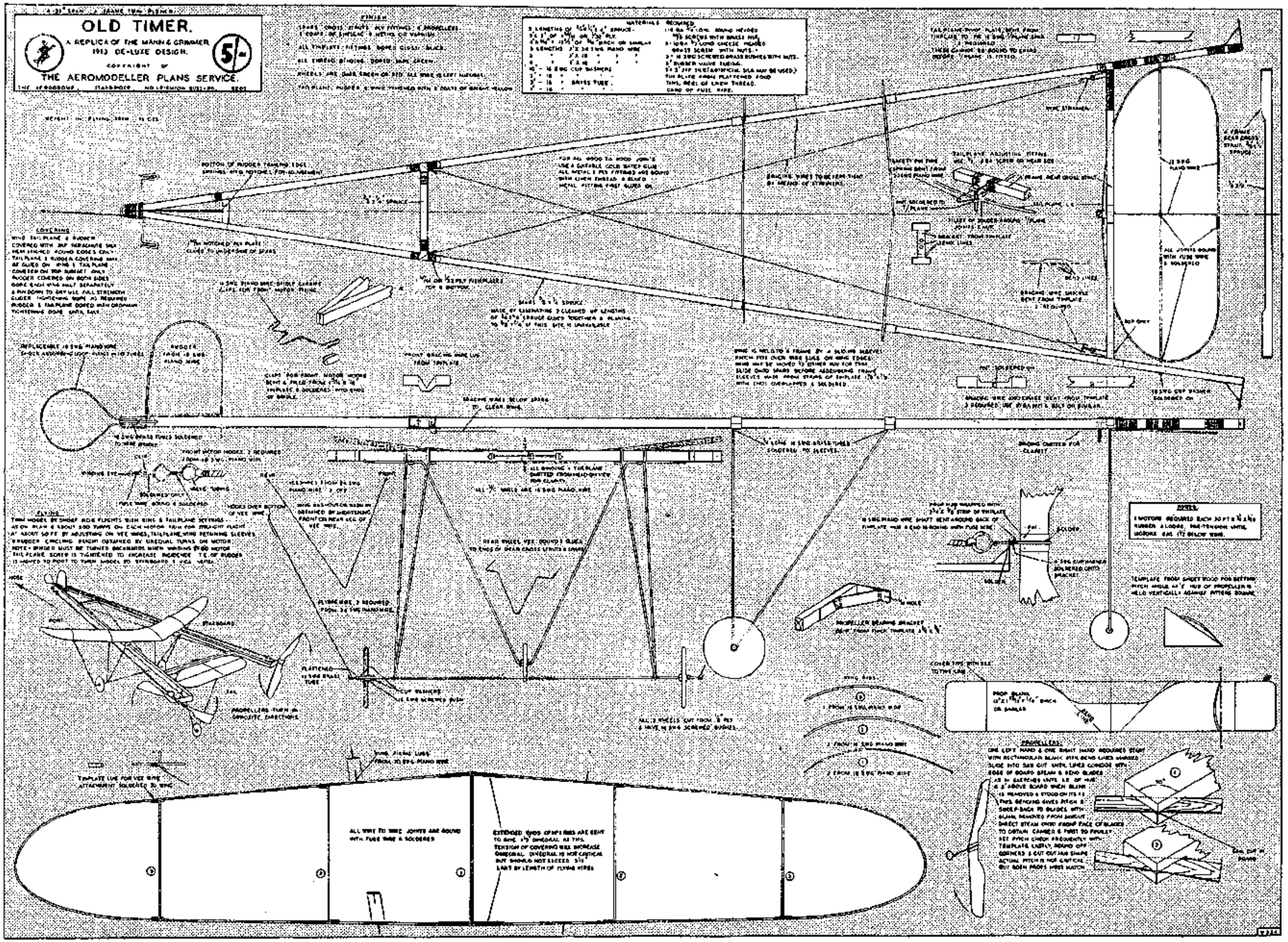
Which way? Well, your guess is as good as ours, but it is in fact taking off from left to right.



No. 8 has an original aeromodel apparently built of bamboo (after the fashion recently set by Col. Cody) and Jap Silk. It is a FLYING-STICK with a tractor screw in front and a propeller behind, each with its own rubber motor, one on each side of the stick. There are at least four ounces of rubber in each motor, which is lubricated by a horrible mixture of rancid Castile Soap and Glycerine. No. 8 does not possess a winder and he disdains assistance. Having hand-wound one motor to his satisfaction and bent the stick into an arc resembling a long bow in the process, he ties the propeller to the stick with a piece of string and commences to wind the second one, which straightens the stick once more. The launching of this extraordinary twin-propellered model presents great difficulty, for the tractor has to be held in one hand and the propeller with the other, while the competitor strives to prevent the Castile Soap and Glycerine from dripping on his obviously best suit. I gathered from subsequent inquiries that for a successful launch it was absolutely essential to let go of both airscrews at once. This, apparently, No. 8 fails to do, for the aeromodel rises like a helicopter, slowly rotating at the same time, only to nose-dive into the ground and completely disintegrate.

Competitor No. 9 now appears on the scene and his advent causes no little sensation. From the depths of a large suit case he proudly produces the best specimen of a "freak" that has as yet made its appearance. It is a triplane and the planes are apparently made of a light steel framework covered with linen fabric. Along the full span of the top plane appears in large black letters the legend PROJECTILOPLANE. Yes, it really is a primitive form of what a later generation was to call the JET. A stick and a hammer are produced and the former hammered into the hard ground. A short length of copper tube, projecting from the rear edge of the middle plane, apparently contains some explosive charge which smells like gunpowder, and it is connected with the stick. A string-like white piece of fuse hangs down nearly to the ground. Neither the Judges, Competitors or Spectators like the look of the PROJECTILOPLANE and there is a general movement to scatter and take cover. The proud owner, whose dark complexion marks him as a wop or a dago of some kind, lights a match, puts it to the fuse, and runs for his life. In a matter of seconds there is a tremendous bang and away goes the PROJECTILOPLANE like the proverbial shot from a gun, incandescent sparks streaming behind it. The stick goes with it for some distance and then drops, scoring a direct hit on a grounded aeromodel. After climbing perhaps to 100 feet, a fierce red glow appears. The amazing aeromodel has caught fire, and in a few seconds the blazing remnants descend slowly, the red-hot copper tube more quickly. This is the end of the PROJECTILOPLANE and nearly the end of several spectators as well.

No. 10 possesses an authentic FLEMING-WILLIAMS "A" frame with twin contra-rotating propellers. This aeromodel, wound to 500 turns with a large converted egg-beater and launched with both hands, made an astonishing "get-away" rising to a height of 50 feet and covering at least three hundred yards. This was the the great sensation of the day, and when the competitor had retrieved his aeromodel from the branches of a tree I was surprised to see that the wing frame and ribs were constructed of piano wire covered with oiled silk. Although I did not then know it, I was destined one day to make a greatly improved aeromodel on these lines, the accepted standard type of aeromodel in every country in the world, and to produce and distribute a production of which it can safely be said that it was in its time "The World's Most Famous Aeromodel."



FULL SIZE PLANS OF THIS ¼-SCALE REPRODUCTION ARE AVAILABLE PRICE 5/- POST FREE FROM THE AEROMODELLER PLANS SERVICE.

A 32" WINGSPAN CONTEST POWER MODEL

GOSSAMER.

DESIGNED BY

K.L. STOTHERS.

3/-

THE AERODROME, STANBRIDGE, NR LEIGHTON BUZZARD, BEDS.

ALL WOODS, UNLESS OTHERWISE STATED, ARE BALSA.

POWER

ORIGINALLY POWERED WITH AMCO .87 C.C. BUT ANY DIESEL OF 5CC - 12CC WILL DO.

MATERIALS REQUIRED

SHEET

5 SHEETS OF 1/32" x 3" x 36" SOFT OR MEDIUM BALSA

1 " + 1/16" x 3" x 36" MED BALSA

2 " + 3/32" x 3" x 36" MED OR HARD BALSA

2 " 1/8" x 3" x 36" " + " "

STRIP

2 STRIPS OF 3/16" SQ x 36" MED OR HARD BALSA

HARDWOOD

1 50 x 1/16" PLYWOOD

1/2" x 20" x 1MM PLYWOOD

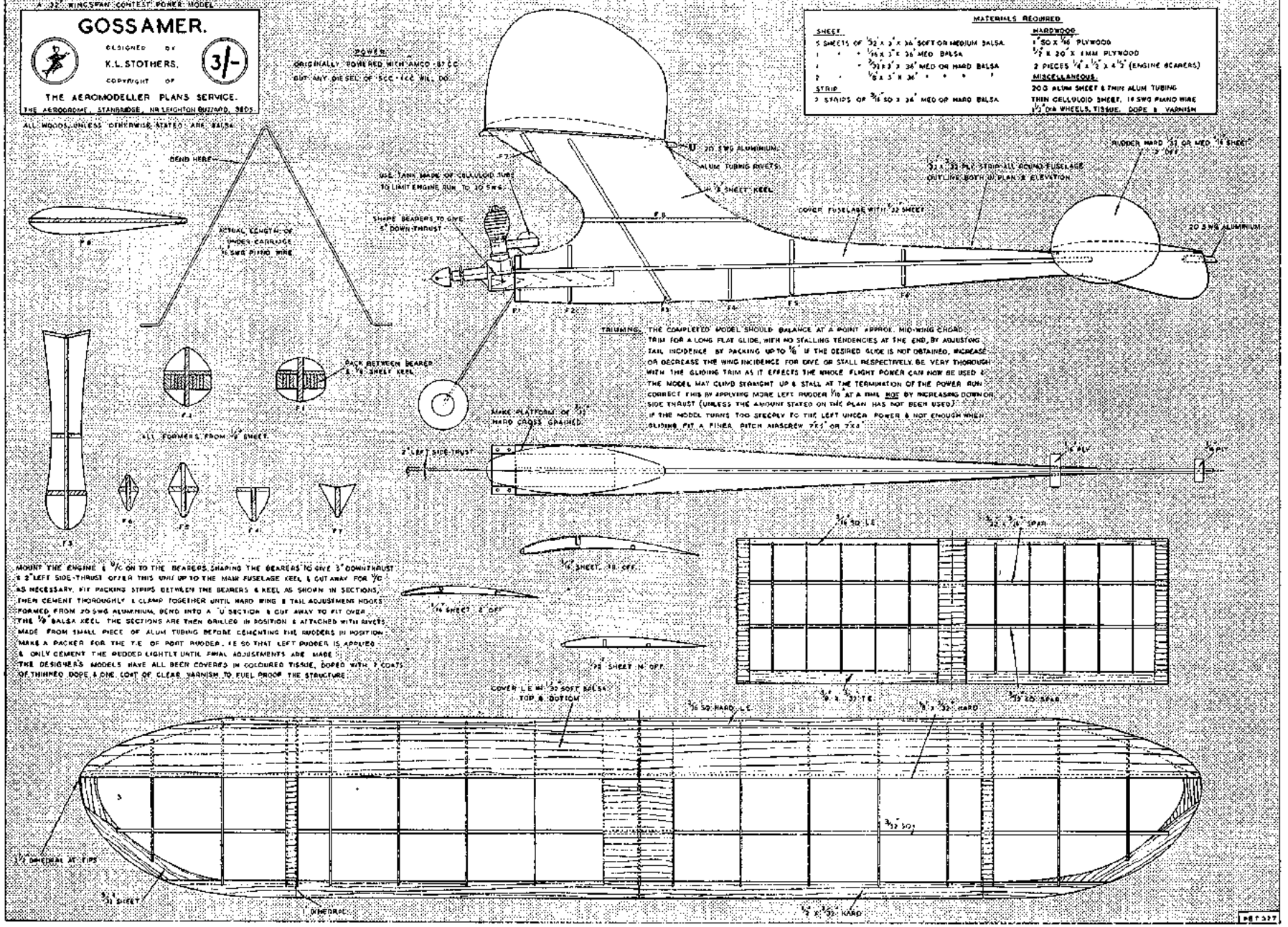
2 PIECES 1/4" x 1/2" x 4 1/2" (ENGINE BEARERS)

MISCELLANEOUS

20 G ALUM SHEET & 7MM ALUM TUBING

THIN CELLULOID SHEET, 16 SWG PIANO WIRE

1 1/2" DIA WHEELS, TISSUE, DOPE & VARNISH



TRIMMING. THE COMPLETED MODEL SHOULD BALANCE AT A POINT APPROX. MID-WING CHORD. TRIM FOR A LONG FLAT GLIDE, WITH NO STALLING TENDENCIES AT THE END, BY ADJUSTING TAIL INCIDENCE BY PACKING UP TO 1/8". IF THE DESIRED GLIDE IS NOT OBTAINED, INCREASE OR DECREASE THE WING INCIDENCE FOR DIVE OR STALL RESPECTIVELY. BE VERY THOROUGH WITH THE GLIDING TRIM AS IT EFFECTS THE WHOLE FLIGHT POWER CAN NOW BE USED & THE MODEL MAY CLIMB STRAIGHT UP & STALL AT THE TERMINATION OF THE POWER RUN. CORRECT THIS BY APPLYING MORE LEFT RUDDER 1/16" AT A TIME, NOT BY INCREASING DOWN OR SIDE THRUST (UNLESS THE AMOUNT STATED ON THE PLAN HAS NOT BEEN USED). IF THE MODEL TURNS TOO SPEEDY TO THE LEFT UNDER POWER & NOT ENOUGH WHEN GLIDING FIT A FINER PITCH MASCREW 7X5" OR 7X4".

MOUNT THE ENGINE & T/C ON TO THE BEARERS, SHAPING THE BEARERS TO GIVE 3" DOWNTHRUST & 2" LEFT SIDE-THRUST. OFFER THIS UNIT UP TO THE MAIN FUSELAGE KEEL & CUT AWAY FOR T/C AS NECESSARY. FIT PACKING STRIPS BETWEEN THE BEARERS & KEEL AS SHOWN IN SECTIONS, THEN CEMENT THOROUGHLY & CLAMP TOGETHER UNTIL HARD. WING & TAIL ADJUSTMENT HOOKS FORMED FROM 20 SWG ALUMINIUM, BEND INTO A 'U' SECTION & CUT AWAY TO FIT OVER THE 1/8" BALSA KEEL. THE SECTIONS ARE THEN DRILLED IN POSITION & ATTACHED WITH RIVETS MADE FROM SMALL PIECE OF ALUM TUBING BEFORE CEMENTING THE RUDDERS IN POSITION MAKE A PACKER FOR THE T.E. OF PORT RUDDER, IE SO THAT LEFT RUDDER IS APPLIED & ONLY CEMENT THE RUDDER LIGHTLY UNTIL FINAL ADJUSTMENTS ARE MADE. THE DESIGNER'S MODELS HAVE ALL BEEN COVERED IN COLOURED TISSUE, DOPED WITH 3 COATS OF THINNED DOPE & ONE COAT OF CLEAR VARNISH TO FUEL PROOF THE STRUCTURE.

THIS IS A 1/4-SCALE REPRODUCTION OF THE FULL SIZE PLANS AVAILABLE PRICE 3/-, POST FREE, FROM THE AEROMODELLER PLANS SERVICE.

Gossamer

1948 BRITISH CLASS A RECORD HOLDER

By K. L. STOTHERS

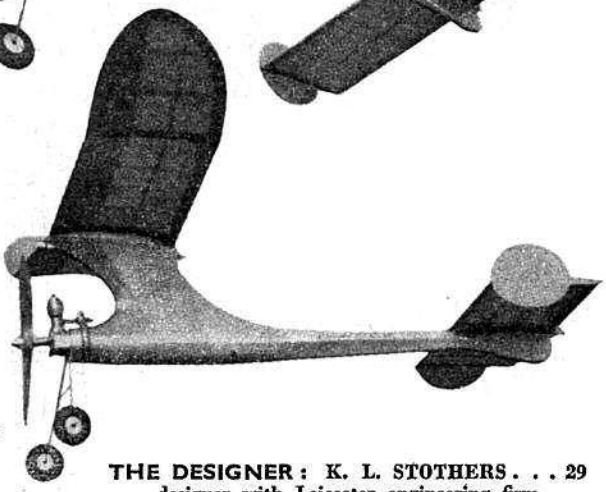
THE designer of Gossamer is not the only one who finds great pleasure in flying small power models powered by the very diminutive diesels and for this reason alone Gossamer should be a popular choice. Even the competition fans who usually prefer something bigger may well consider giving it a trial on account of its impressive flying record.

The original Gossamer was built in November, 1947, and is still flying well, no major repairs having yet been necessary. Well trimmed, it was a very reliable model and turned in such times as 6 : 10·8 on 8 secs. engine and 5 : 40 on 12, winning for the designer the British class A type duration record, and first place at the Langar rally. The latest version was modified to include a slightly larger wing which gave a considerable increase in performance. So far the latest model has only been entered in two contests, the results being a 7½ : 1 average ratio and a three flight total of 10 : 18. The British record time resulted in an 8 : 05 flight on a 16 secs. engine run.

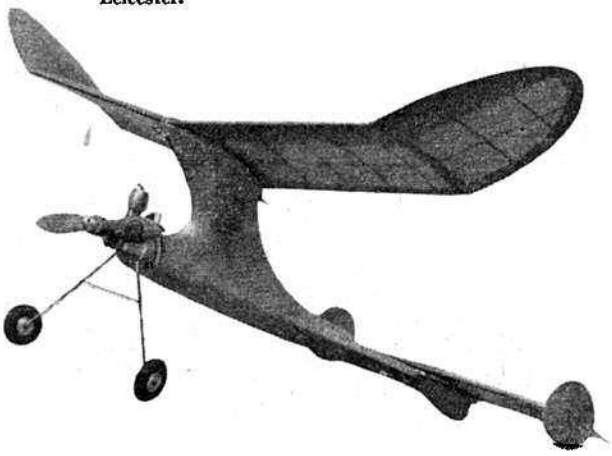
Construction is generally very simple and any average builder will have no difficulty at all in building the model straight from the plan. It may be of help however to mention one or two points that are worth noting.

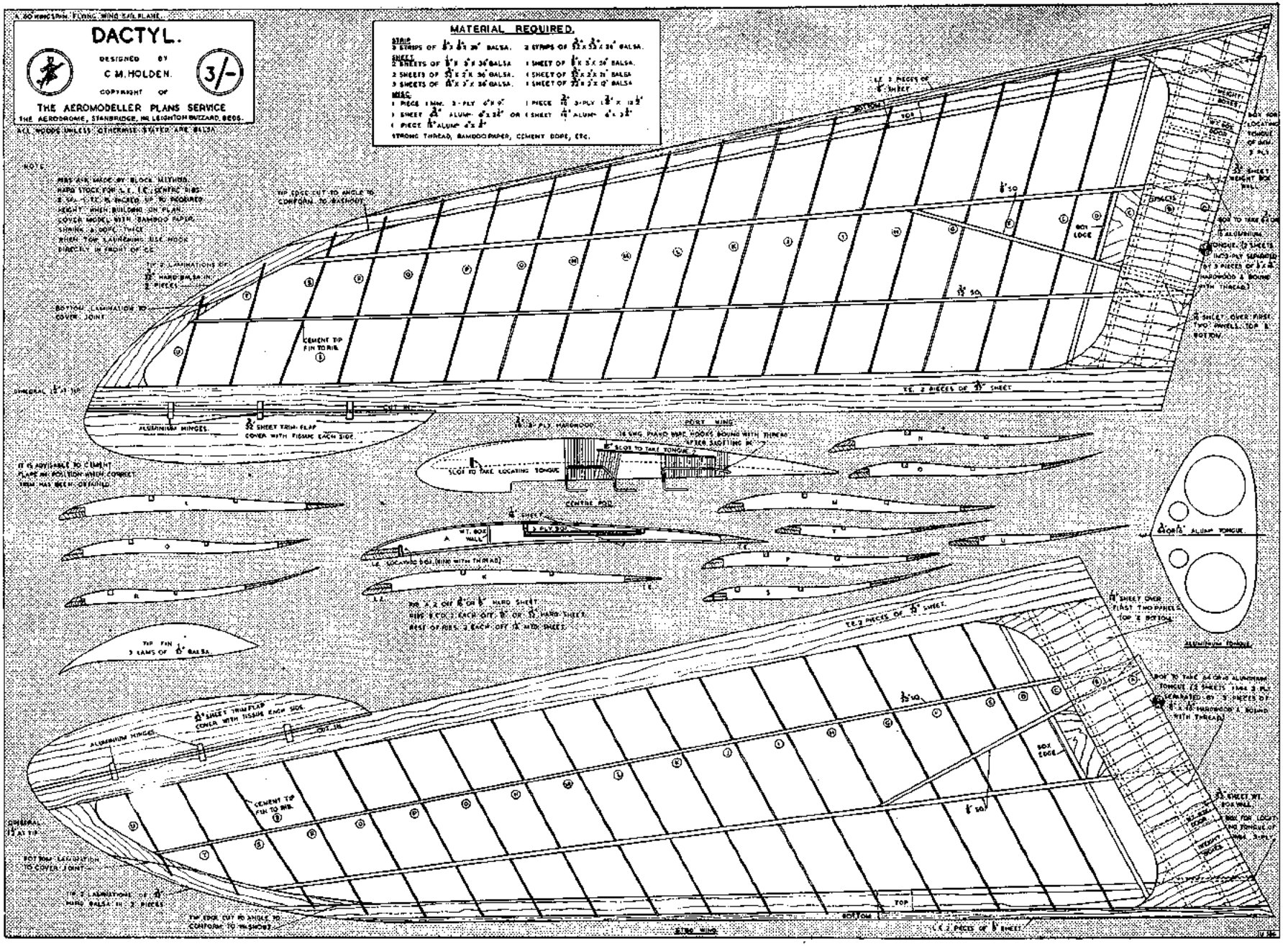
Before cementing the rudder in position make a packing for the trailing edge of the left one and only cement that rudder lightly until all adjustments are made. It is recommended that a celluloid tank be constructed similar to that fitted to the model in the photograph. This should be a ¼ in. diameter tube 2 ins. long or ¼ in. square section 1½ ins. long, in either case shaped to fit snugly round the fuselage contour.

The original model was covered in coloured tissue, given two coats of thinned clear dope and one coat of clear varnish to fuel-proof the structure. When completed the model should balance at a point approximately 50 per cent. of the chord, and the ideal trim is for a long flight with no stalling tendencies at the end. Obtain this by adjustment of tail incidence unless as much as ⅛ in. packing is needed when the wing incidence should be slightly increased or decreased accordingly. It is essential that this glide trimming is thoroughly carried out because it affects the whole flight. Watch the model under power and if it climbs straight up and stalls at the termination of the motor run, correct this by applying more left rudder but only 1/16 in. at a time. *Do not alter down or side thrust from the amounts stated on the plan.* Should the model turn too steeply to the left under power and not enough on the glide, try a finer pitch airscrew. With the Amco the original model performs best with a 7 in. by 5 in. or 7 in. by 4 in.



THE DESIGNER: K. L. STOTHERS . . . 29 . . . designer with Leicester engineering firm . . . Ex R.A.F. pilot with coastal command flying boats . . . member of the Leicester M.A.C. . . building since 1928 . . . likes all models . . . prefers small power jobs and large sailplanes . . . 1948 British class A record holder . . . many club and national wins . . . true aeromodelling wife his greatest rival (she has done 20 mins. on 12 secs.) . . . lives in Leicester.





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'DACTYL'

BY C · M · HOLDEN

A 60 INCH SPAN TRUE FLYING WING SAILPLANE

THE number of "built-up" tailless models to my credit (or otherwise) is some 12, not including several solid chuck-glider types of widely varying shape, and some of the information thus gathered the "hard way" may be of use to other designers.

My first was a 3 feet span glider with swept-back tips, no dihedral, tip fins, and a reflex wing section, which just managed to fly. The next, a converted pair of wings taken off an orthodox glider. These wings were given about 20° sweep-back, tip fins and flaps, and about 6° washout warped into the tips. Wing section was R.A.F.32 and test flights were very encouraging, the model behaving perfectly on the tow-line.

A gull-winged model followed later, without fins but with a small fuselage and centre pylon. About 3 ft. 5 ins. span, it was very stable on the line but had a rather high sinking speed (this model holds the local club tailless record of 3 mins. 28 secs.).

"Gull-hedral" was used again on the next project with small fins and rudders at the breaks, small sheet flaps and a six-sided fuselage pod. Sinking speed was fairly high, but two-line stability was perfect, giving overhead launches in very gusty weather. The model placed third against orthodox models in a local meet under such conditions.

The next design was a step in the right direction. This model was just a pair of wings, with small flaps for trimming purposes, and a piece of thin ply with hooks attached for a fuselage. Washout was practically nil, although the wing section had slight under camber, and the model flew very fast. Side slipping occurred in gusty weather, but soon stopped when slight dihedral was incorporated and several fly-aways followed, aided by overhead tows. The glide was extremely flat, even allowing for the high speed, and sinking speed was very low.

Knowing that larger models possess greater inherent stability I decided that an enlarged version would result in improved performance, especially in poor weather, so I built "Dactyl"—a similar model of 5 feet tip-to-tip span. My estimations were correct. I doubt if I can improve on its performance, except by further increasing the span. Alterations to the original 3 ft. 6 ins. model included slight increase in sweepback, more undercamber to wing section, extremely small tip fins and stronger construction.

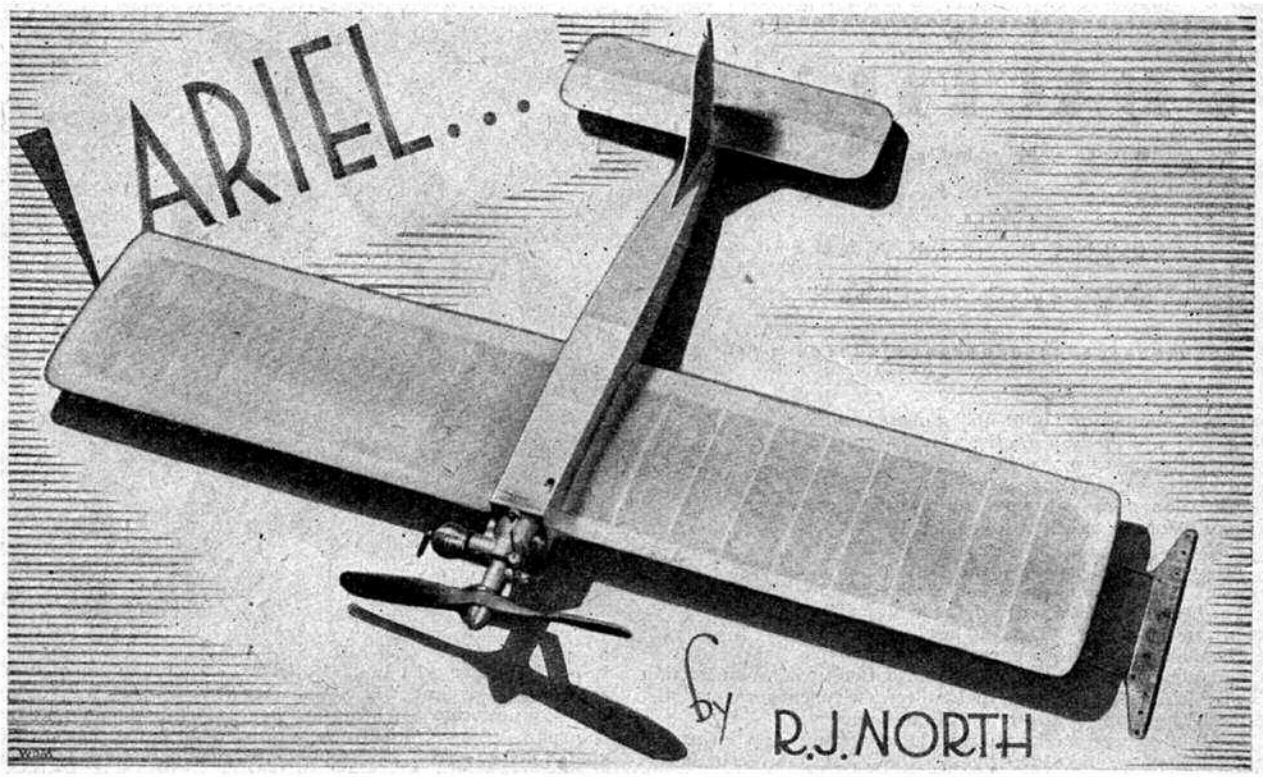
This model won the tailless event at the "Daily Despatch" Northern Area Rally last season, and was later lost after a 20 min. flight and recovered from 8 miles away. An important thing to note about this flight is that the model was entirely devoid of fins—having been extensively damaged when it hit a fence during the previous flight!

This model is very reliable, even more so than the orthodox type when on the tow-line, and is fairly consistent as regards duration. Construction is very simple and needs no explanation.

With regard to general design I believe that undercambered sections are necessary for high-performance, and tailless models are no exception. Mr. Guilmant's note about too much area at the tip destroying central control is only too true, and I have found that tapering everything, i.e. spars, ribs, etc., towards the tips helps very much to stabilize the model. I think that some dihedral is necessary, but if this is overdone some form of fin area or turned-down tips is necessary. Aspect ratio is not very important, as in orthodox design. Some form of control is necessary on a fin-less model, flaps being the only answer at present.

It is essential that wing-tips be kept light in weight or instability on the towline will result. Choice of wing section is very important, and I have found that the thinnest possible (consistent with strength) undercambered section with little washout gives best results. The section will probably have to be thickened to take the usual torque and box-wing fixing in the centre. A major point as regards competition work is the position of the tow-hook. The best position on the majority of model sailplanes, orthodox or tailless, is just in front of the C of G but it is a good thing to fix several tow-hooks, to find by experiment the best.

The photos on this page give a good idea of the general appearance of the machine. Note the absence of tip fins—only very small inset fins being used.



ARIEL: All hail, great Master, grave sir, hail: I come
To answer thy best pleasure; be 't to fly,
To swim, to dive into the fire: to ride
On the curl'd clouds: to thy strong bidding, task
Ariel, and all his quality.
William Shakespeare (THE TEMPEST)

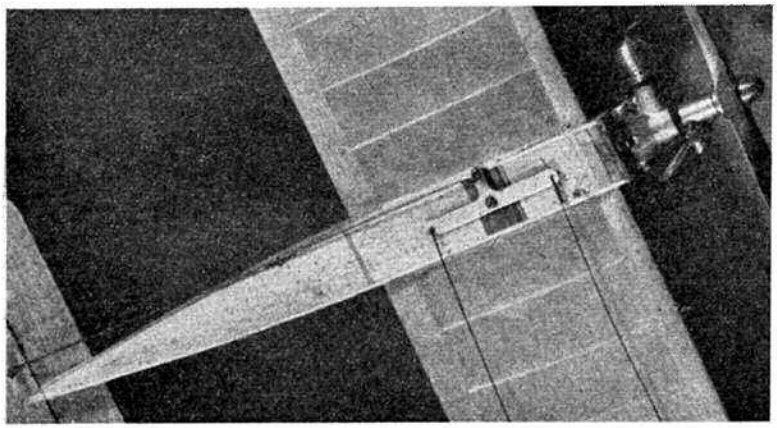
I WILL not say that this model will perform for you, however skilled you are, what the magician Prospero required of his spirit Ariel, but it is a light and simply made stunt job for the Elfin engine, which will meet your needs if you want a competition model to do all the scheduled manœuvres or if you want a smooth-flying model with which to practice them.

Lightness and manœuvrability go hand in hand and it was not to be expected that any model would survive all the crashes which are bound to occur sooner or later in stunting. Therefore it was made as simple as possible in order to facilitate construction and repair. This simplicity has an elegance of its own, in which I take pride.

It is evident that, since almost all stunt models exhibit the same features of aerodynamic design, the chief advantage of one over the other lies in the constructional methods employed. The assembly of this model is so simple that no further drawings need be made and no building board is required. The steps described on the plan are arranged in order so that the parts may be put together as quickly and conveniently as possible.

General Remarks.

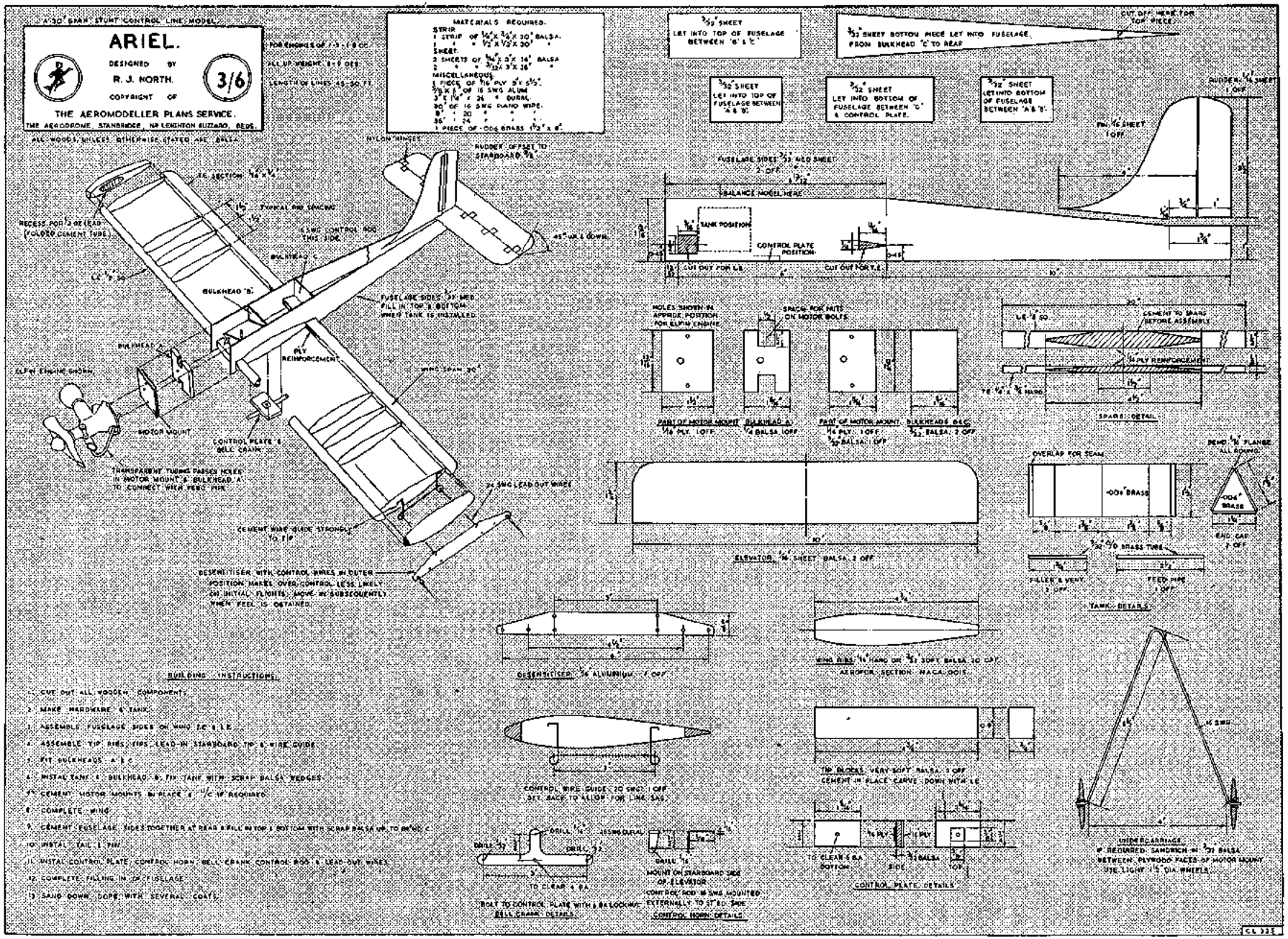
Other radially mounted diesel or glow-plug engines may be substituted for the Elfin, for instance, the Frog engines and the Arden ·009. Slight alterations would have to be made in the motor mount and tank feed-pipe. Since the Arden is considerably lighter than the other engines mentioned the model would have to be lightened by the use of softer wood in order to maintain the C.G. in the first quarter of the chord. Shortening the tail moment arm and using a built up tail would also help. The version shown weighs approximately 8 ozs. and balances at 20 per cent. chord.



An undercarriage was not fitted since the model may be conveniently hand-launched by releasing it, without a push, at an angle of about 30° to the ground, or taken off from a simple three-wheeled dolly, and landings on grass may be made softly enough not to damage the model. If an undercarriage is required for competition work it may be made as shown on the drawing. Two wheels, however, are not necessary as it has been found that a type with a single leg will suffice.

The model has been flown on ·008 in. steel lines about 45 ft. long. It has sufficient urge to stunt well on thread lines but the elasticity of the thread must be appreciated and allowed for.

The propellor used may be 8 ins. or 9 ins. diameter, 6 ins. to 8 ins. pitch according to the performance of the engine and the weight of the model.



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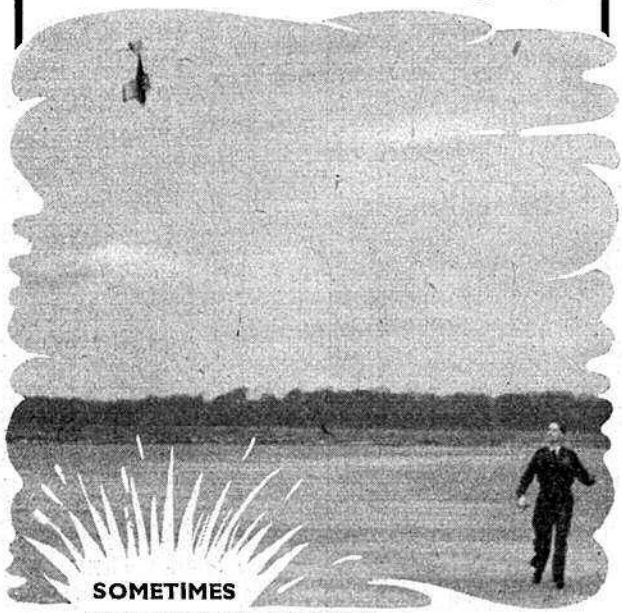
S/LDR. LORD, A.F.C. TAKES THE TYRO SOLO

I CAN DO !

ONE cannot help wondering why there are not more good control line stunt pilots about considering the ever increasing number of stunt models on the market to-day.

It would appear that a great many modellers who wish to try their hand at stunting complete one of the stock model kits and then rest content with flying it round, up and down, and occasionally over. They appear unwilling to " have a go " at the risk of crashing their model.

However, as we all learn from the mistakes of others, here is a simple method of stunt training that can put you in the running for the Gold Trophy, if you persevere and practise hard enough. But seriously, it will at least have you wondering why you had not learnt to stunt before, and get you safely past the stage of a few shaky loops, a bad crash, and complete disillusionment.



SOMETIMES

even the author comes unstuck ! (Ed.)

It is essential to realise that if one is to become an expert at stunting one must be fully prepared not only to risk having crashes, but to have some! This frame of mind is important. Nothing ventured, remember, is nothing gained. Accordingly then make your plans to cover this requirement.

Selection of Model.

In selecting the model bear in mind the following points :—

(i) Proved performance.
(ii) Ease of construction.
(iii) Ease of repair.

In my own case I chose the model that won the first Gold Trophy, obtainable in kit form. (At this point my apologies for the title of this article. No line shooting intended!)

When constructing the Kandoo make two or three of each part. The reason being one wants two complete models in commission. Then as soon as one crashes : change the engine and tank and practise the stunt that fixed you before. Defeatism ? No, just realism !

To those who may have given up at the thought of it let me say that apart from propellors one soon gets past the *complete* write-off stage. You will crash once or twice, possibly more, and you must accept that fact. When building your model always keep one spare of each component so that as each model disintegrates you can commence production again!

In the Kandoo model the weakest points may be strengthened with advantage for practice work. An additional ply member for example, glued on one side of the nose strengthens the engine bearers, while to prevent the fuselage from breaking one need not cut the lightening holes between the trailing edge of the wing and the tailplane.

These modifications often mean the difference between broken engine bearers and fuselage from a straight-in crash, and comparative survival.

Although this model usually has an undercarriage, and will perform all stunts with it, this may be left off and either a dolly undercarriage improvised, or hand launching resorted to. Personally I prefer the latter, as few surfaces are kind to undercarriages and hand launching is quicker.

The resulting " skid-landings " may result in a few broken propellors, but the added speed and performance, I feel, outweigh this disadvantage. One may fit a propellor-saving peg-leg skid until the knack of locking the propellor in position so that it stops horizontally is mastered. When it does not, and stops vertically, take a few quick steps backwards as the model lands. This often results in "wiping" the propellor horizontal without breaking it.

Control Lines.

Control lines may be made of :— 1. Linen or Nylon thread. 2. Wire or stranded wire. 3. Gut substitute.

The main considerations are a high strength /diameter factor to satisfy safety /drag requirements, and the ability to take up to 6 to 8 twists without locking.

Gut substitute meets these requirements with one disadvantage only. Namely in wet or damp conditions it tends to become too elastic for smooth safe control. In dry weather however it is perfect.

Spring link swivels as used for fishing if fitted to both ends of your lines make for ease of attachment, and lessen the chance of too many twists and kinks when laying out your lines.

For storage of lines use discarded 16 m.m. metal film spools. These lend themselves admirably for the purpose and take very little room in the kit box.

Control Handle.

There are many types obtainable, some good, some bad. For all practical purposes for stunt work I prefer a wooden handle, because it is light, comfortable and sufficiently strong. Mine is a modified saw handle. It is light and shaped to fit the hand perfectly, moreover it is impossible to pick it up the wrong way round. Swivels have been let into the extremities, and a coating of red dope completes the job. Try it.

First Attempts.

Assuming you are going to have a go, come what may, and risk a first class crash, commence by a few practice circuits and some vertical wing-overs. A wing-over is the perfect indication as to the capabilities of the model to perform the more advanced stunts.

If the model will not fly vertically over the top of 45 ft. lines without slackening them, assuming the engine is running normally, pack up and check the following :—

1. Correct off-set of rudder.
2. Weight of model.
3. Correct propellor.

The recommended size is 9×8 ins. but the following may be tried until you find one that suits your individual taste: 9×6 ins. 8×8 ins. and 8×6 ins. Personally I use the latter as it gives high revs with ample power.

If you are satisfied with the wing-overs then the big moment has come and you must try a loop. Check the wind direction and after a fairly high circuit dive to the downwind section. Now pretend that you are going to do a vertical wing-over, but as the lines reach about 50°, gently but firmly apply full-up, and the model will loop. Level out and your first loop is a thing of the past.

Most people make the mistake of not allowing the model to gain sufficient altitude before applying full-up elevator and cram it on too low down. The result is generally a stalled model with insufficient height to pull out in and . . . need I say more ?

If one is using gut substitute lines, five loops may be completed without control being seriously affected. So having done one loop do four more at once.

Take your time with each loop, do not rush into them, and make quite certain you choose the downwind sector each time.

Naturally after each loop the lines will be crossed, so do not let keenness get the upper hand as I did once and attempt more than five without untwisting the lines. My sixth resulted in locked lines with full up elevator! The model did two magnificent fast loops clearing the ground by inches each time until it did not! Another lesson learnt the hard way, and Kandoo model number three went into production.

To uncross your lines fly as high and steadily as possible. Now grip the lines in your left hand making any small adjustments as necessary by allowing them to slip through your fingers. When you are satisfied the model is flying accurately, tighten and lock the lines between the fingers of your left hand. Next untwist the handle in a clockwise direction (assuming an anti-clockwise circuit direction) as many full times as you have twists in the lines. Watch the model carefully and be prepared to take control if necessary. Undo one twist only at a time until you get the knack of it, when it is possible to undo the maximum number of five.

Once again do not hurry as it is easy to grip the handle upside down in your haste at untwisting, especially when obliged to take over control quickly, then giving full up as the model dives towards the ground it goes straight in, much to your consternation!

Persevere with loops, and practise untwisting your lines, and you will soon find yourself ready to try consecutive loops. The secret here is to maintain height each time, and to fly the model round each loop instead of holding on full up elevator and hurrying the model round in a semi-stalled condition.

Having successfully mastered the loop, the next stage is probably the most difficult and where some people lose heart, namely inverted flight. Here indeed you will be fortunate not to have some crashes. However, accept these as lessons learnt by experience. Perseverance and practice are essential if you are to reach competition standard.

All control movements are reversed when inverted and for this reason it is wise to adopt the stiff arm method to avoid over-controlling. Make up your mind before attempting inverted flight that the moment you get into difficulties, and the model is not doing what you think it should, to give full *down*. Wait for the model to right itself and try again.

As for the loop, the criterion for successful inverted flight is again the ability of the model to do a truly vertical wing-over without any slackening of the lines.

The main fault when attempting inverted flight for the first time is to try to remain inverted too long with the result that after a series of progressively more violent switchbacks the inevitable happens.

Be warned and as before do not rush the manœuvre. Check as before, wind direction. Commence as for a loop and when over the top, neutralise elevator and using the stiff arm technique, fly no more than one quarter lap inverted. Now apply full down and no one is more surprised than you are to find another lesson has been learnt.

Practise this procedure again and again, resisting the temptation to remain inverted too long. Get thoroughly familiar with the reversal of control movement until it becomes second nature. When you are confident about this, practise complete circuits inverted. Keep the model high to begin with until you are quite certain about down is up!

A word here about engine failure when inverted. Should this occur through faulty tank feed resist the natural tendency to try to regain normal flight. Glide and land inverted. At the worst a damaged fin and torn tissue. The contingency should never occur as tests on the ground with the model in different altitudes should have proved the fuel system. However there are times when the gremlins get to work and then anything can happen!

When you can fly inverted really accurately the worst is over and all other stunts are merely combinations of what you can already do.

Take for example the horizontal figure of eight. Loop as before only hold the model in an inverted dive. Then give full down, complete the other half of an outside loop and the figure of eight is complete. This stunt, in common with all in the looping plane, can be spoilt by hard use of the elevators. Once the feeling of apprehension has passed over the possibility of diving straight into the ground, smoother loops may be executed by pulling out nearer the ground, and by a more gentle and gradual use of the elevators that only comes through practice. Its application marks the expert from the beginner, but for safety's sake full down or up has been specified throughout in this article.

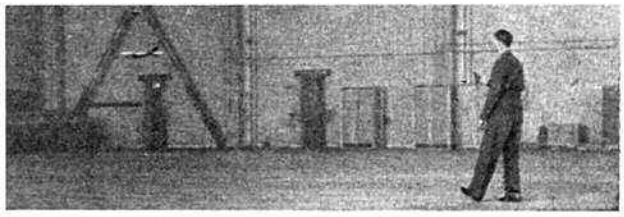
Remember that wind direction is all important. Use the downwind sector only. The few occasions when there is no wind get cracking and really have a go. You will learn more then than at other times owing to the complete freedom of action which allows the full circle for stunt manœuvres.

As you gain more confidence start forming a stunt schedule of your own. Consideration to be paid to continuity of manœuvres so that successive stunts untwist the lines from previous ones.

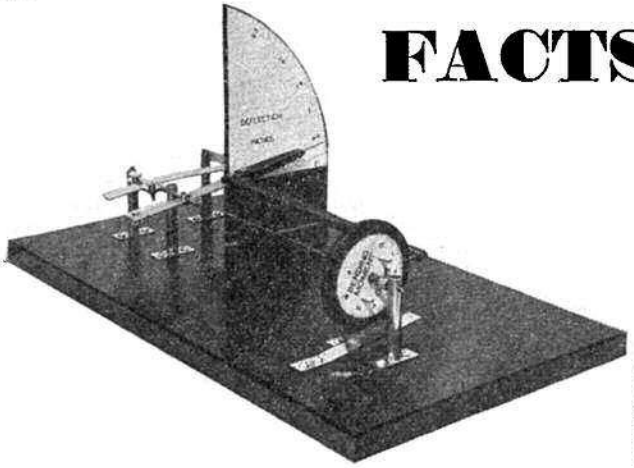
Successful stunting entails regular practice, and if you intend to enter the competition field, attention to detail is vital to success.

Check your equipment carefully and immediately prior to every competition. Strength and condition of control lines and attachments. Accurately mixed and filtered fuel prevents annoying engine failures. Be capable of getting the best out of your engine by using a suitable propellor. Practise being able to get your model into the air within three minutes from being called. This obviously calls for instant starting and the accurate setting of the controls. Many a competition has been lost by an acknowledged expert for lack of these simple precautions.

Finally, persevere, practise, and fly with care. Happy stunting!



The heading picture (despite the mischievous caption) actually shows the result of a situation over which the best of pilots has no control. The engine cut halfway up a loop, and—well, you can see for yourself. These two pictures here are of S/Ldr. Lord starting up and flying, this time without the gremlins!



FACTS AND FIGURES ON BALSA

BY J · H · MAXWELL

BALSA is a hardwood.
Soft balsa is 94 per cent. air.
Hard balsa is stronger than spruce.

These are some of the interesting facts which came to light recently when we did a little research into the subject of balsa. Our researches, however, were not made with the object of uncovering new " Believe it or not's ", but of furnishing information which would help us to build better and more efficient models.

At the outset we found it necessary to go a little way into the botany of timbers. Wood, we learnt, is divided into two main categories: the softwoods, which are the cone-bearing trees such as spruce and pine ; and the hardwoods, the broad leafed trees such as oak, elm—and balsa.

Structure. Apart from external differences in leaves, etc., the two types of wood differ somewhat in their internal structure. A piece of hardwood, such as a piece of balsa, consists of a multitude of little cells, rather like tiny straws all cemented together side by side. If the wood is cut cleanly through across the grain, as in Fig. 1, these cells have the appearance of a honeycomb. In balsa, the majority of the cells are too small to be distinguished by the naked eye, but scattered about at irregular intervals are other larger cells which are clearly visible. These are the ducts, called vessels, through which the sap flowed up and down the tree.

A tree adds a complete layer of cells at its circumference, just under the bark, each year. These layers form the familiar annular rings seen on the end of a log. Unfortunately the tree does not grow at a uniform rate throughout the year. In spring and summer its growth is more rapid than in autumn and winter, and, as a result, the wood formed during the spring and summer, known as early wood, is softer and less dense than the late wood.

All the cells so far mentioned lie along the length of a sheet or strip, i.e. up and down when the tree was growing, but there are others which lie at right angles to the main body. These radiate from the centre of the tree, and form themselves into narrow ribbons called rays. The " ribbons " stand on edge when the tree is growing, so that in a cross section such as Fig. 1 the rays appear as fine lines.

Grain. To the reader who prides himself in being a practical aeromodeller all this knowledge of cells, etc., may seem rather academic and useless, but actually it is of immense value in selecting the correct grade of balsa for any particular job.

A sheet of balsa may be sawn from the log so that its width is tangential to the annular rings. Such a sheet is known as " flat sawn ". At the other extreme, the width of the sheet may be parallel to the rays, in which case it is " quarter sawn ". Pieces of flat sawn and quarter sawn sheet are shown in Figs. 2A and 3A respectively. The horizontal ribbons seen on 3A are, of course, the rays.

Experienced modellers know that flat sawn sheets bend in width much more readily than quarter sawn. Several ingenious explanations have been advanced for this, but the correct one is simply that the rays on a quarter sawn sheet act as stiffeners. In effect, quarter sawn sheet is a sort of natural plywood, for it has fibres lying at right angles to one another. For that reason quarter sawn sheet should be used wherever areas of " short grain " are likely to occur, as, for example, in circular fuselage formers, ribs for highly undercambered wings, and wing tips.

Flat sawn sheet is suitable for planking, sheet-covered leading edges, tubular tail booms, etc., and for stripping.

Most of the sheet balsa supplied by model shops is neither true flat sawn nor true quarter sawn, but somewhere between the two. Such sheets are perfectly satisfactory for all general purposes. True quarter sawn sheets, in particular, are relatively rare, but one quite often comes across sheets having a mottled appearance similar to Fig. 3B. These are near quarter sawn, and the dark flecks are rays which are running through the sheet at a slight angle. Sheets of this type are almost as stiff as true quarter sawn.

Just as the rays show the direction of the cross fibres, the vessels indicate the direction of the lengthwise grain. Vessels appear as dark lines on the face of a sheet

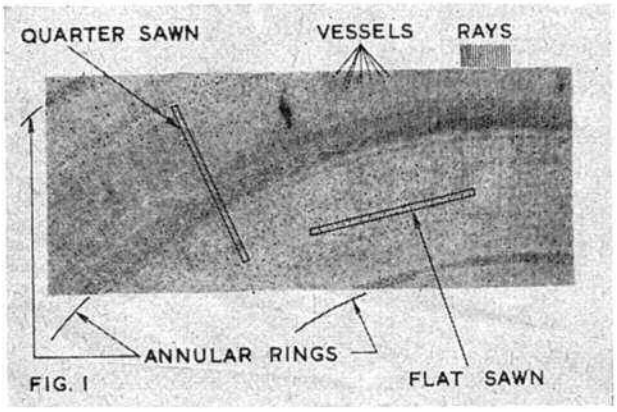


FIG. 1

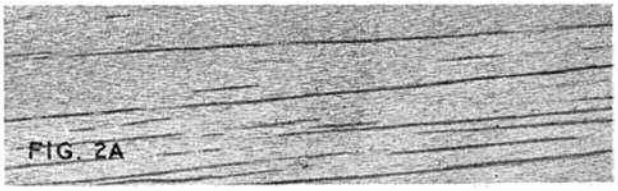


FIG. 2A


FIG. 2B

(Fig. 2A). When these lines are of considerable length (2 inches or more) the grain runs substantially parallel to the face of the sheet. When the lines are short, as in Fig. 2B, the grain is running through the sheet at an angle. If the lines are, on the average, less than ¼ inch long the sheet will be weak, and should not be used for any important structural part of a model.

Frequently the grain, as indicated by the vessels, does not run parallel to the edges of the sheet. It is therefore important if the sheet is being cut up into strips, to ensure that the cuts are parallel to the vessels. The strongest and most uniform strips are obtained by cutting them in this manner from flat sawn sheet having long vessel lines.

Density. The normal density of balsa is about 8 lbs./cub. ft., but, if for some reason, such as abnormal climatic conditions, its growth has been unusually quick or slow, the density may be as low as 4 or as high as 25 lbs./cub. ft. "Medium" balsa, in aeromodelling parlance, generally weighs between 8 and 12 lbs./cub. ft. It is interesting to note that the density of the solid matter, i.e. the cell walls, is the same for all timbers: namely 94 lbs./cub. ft. Thus a cubic foot of soft balsa weighing, say, 6 lbs. is actually 94 per cent. air.

Variations in density occur, not only from tree to tree but also within any one tree or log. We have already mentioned that the early wood in each annular ring is less dense than the late wood. This characteristic is common to most timbers, but it is aggravated, in the case of balsa, by the fact that the annular rings are so wide (about 1½ inches, as compared with 1/8 inch in spruce) and also because the sections used in model work are so small. Thus it is quite possible to cut an 1/8 in. sq. strip and, an inch away, cut another of the same size but weighing twice as much. Fortunately this is an extreme case, and good quality balsa is usually rather more uniform.

Colour is a fairly reliable guide to density, and in any sheet the darker areas are invariably the heavier. In selecting balsa it is a good plan to hold each sheet up to a bright light, then if one is seen to contain very dark and very light patches it should be rejected, or used only for the less vital parts of a model.

Strength. Every aeromodeller knows that hard (i.e. dense) balsa is stronger than soft, but, to the best of our knowledge, the only figures ever published giving actual strength values have been some rather vague ones issued by the full size aircraft people. To rectify this matter, we conducted a series of tests, using the testing machine shown in the heading In this machine, which operates on the torsion-bar principle, the balsa test piece is bent as a cantilever. The load is applied gradually by turning the dial on the right, and readings of Bending Moment and Deflection are taken at intervals until the test piece breaks.

The test piece consisted of 6 in. strips of 1/32 in. balsa, ½ in. wide. These were carefully weighed and measured for thickness, before being tested. In all 22 samples were tested, representing a wide variety of types of balsa. Each sample was broken in four places, and the average of the four readings taken.

The principal results obtained from these tests are Modulus of Rupture, which is simply the bending stress at breaking point, and Young's Modulus of Elasticity. These two values, given in Figs. 4 and 5, are really all that are required for stressing models. The former allows one to design beams (e.g wing spars) and the latter struts (longerons, etc.). It is also sometimes useful to know that the strength of balsa in compression is equal to approximately half the Modulus of Rupture.

Needless to say, strength calculations do not appeal to all aeromodellers, but everyone can learn something from our final graph, Fig. 6. This shows clearly that the Strength/Weight ratio of balsa increases with the density. In practice, this means that if two models, both of the same size and weight, are built, one of hard balsa and one of soft, the hard balsa model will be the stronger. Alternatively, if the models are so constructed that they are equal in strength, then the hard balsa one will be the *lighter* of the two.

Fig. 6 also gives the comparative Strength/Weight ratio of spruce, which is obviously lower than that of hard balsa. There is therefore no reason why even the largest models should not be built entirely of balsa.

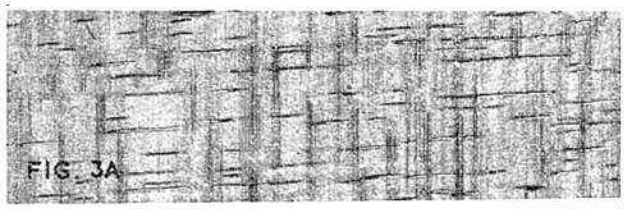


FIG. 3A

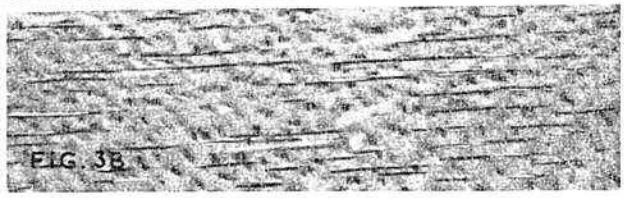


FIG. 3B

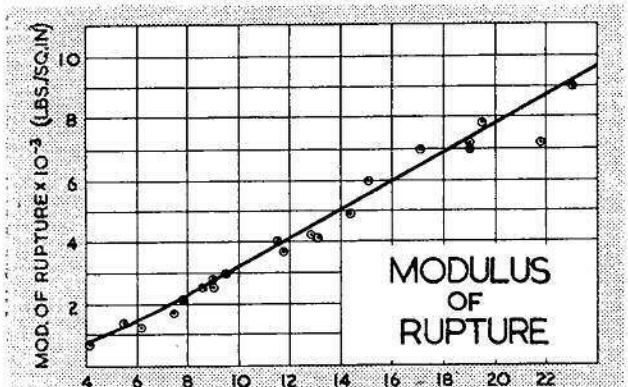


FIG. 4

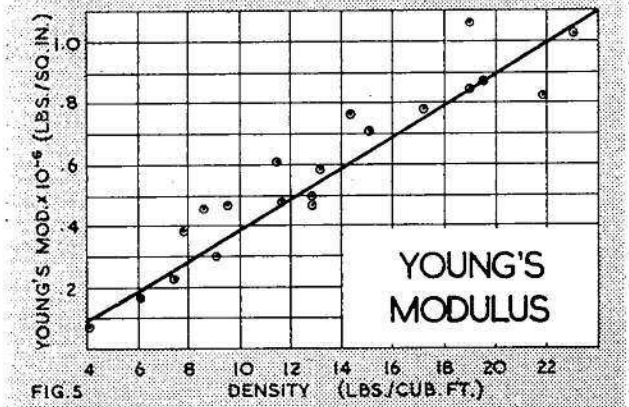


FIG. 5

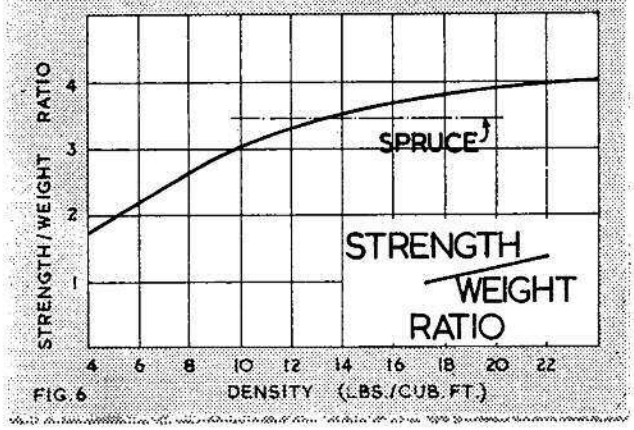
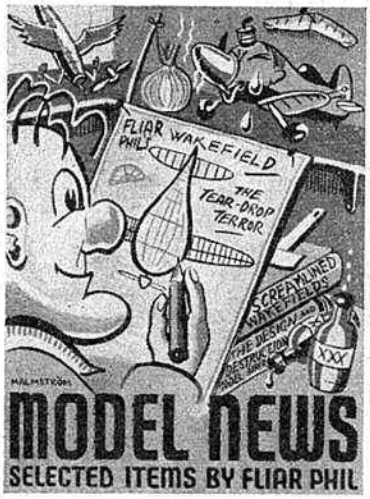
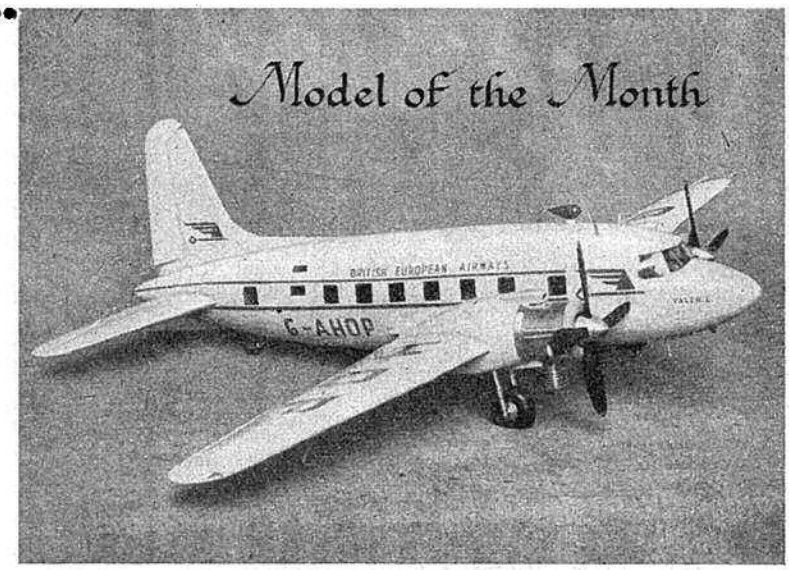


FIG. 6



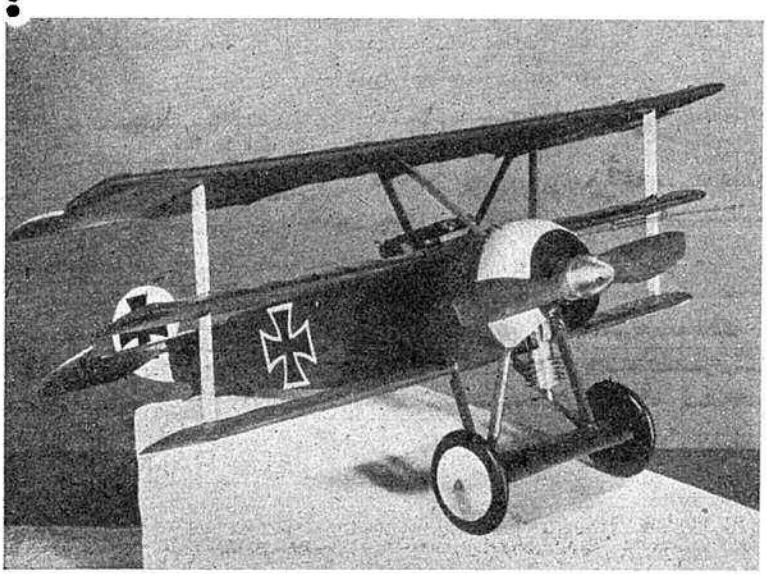


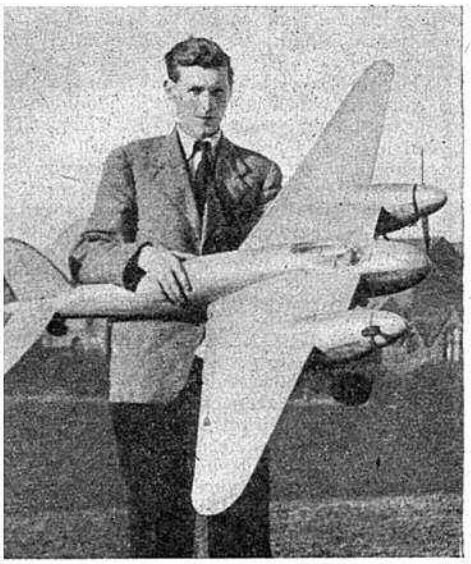
AN absorbing study, Wakefields, and Fliar Phil is not alone in his present struggles—though he'd like to know how to divert his model from the irresistible but painful attraction it seems to find in the back of his neck under full turns.

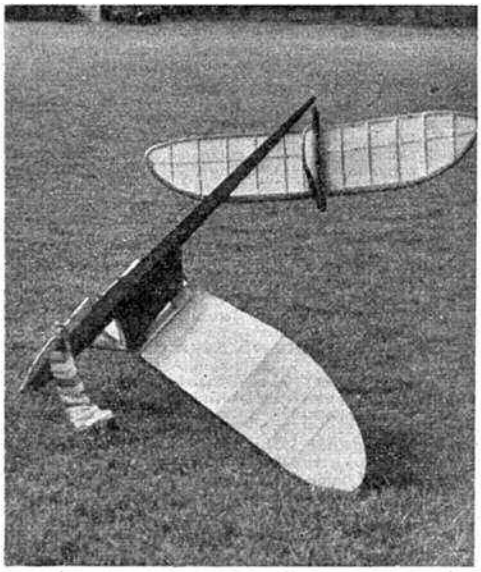
Fliar Phil doesn't know if more of the hard working modellers are turning to control line, but there is no doubt that the standard of construction is going up, while we see ever fewer well made free flight power models. Our Model of the Month is a beautifully finished control-line scale Viking, in B.E.A. colours by H. A. Gibbs of High Wycombe. It is 50 in. span, powered by two E.D. Mark III's whose projecting topknots are the only features that detract from the appearance of the machine. The engines are fed from a central tank in the fuselage. Third line control is used to raise and lower the undercarriage, cut off the engines and preset the mechanism for the next flight, by means of a much modified alarm clock servo movement. All-up weight is 50 ozs. The model won the club's " Best Model " cup at their Exhibition, and certainly must have deserved it. Not yet flown, we are looking forward to performance figures very shortly—Fliar Phil can't help feeling sorry such a nice model will probably come to such a nasty end!

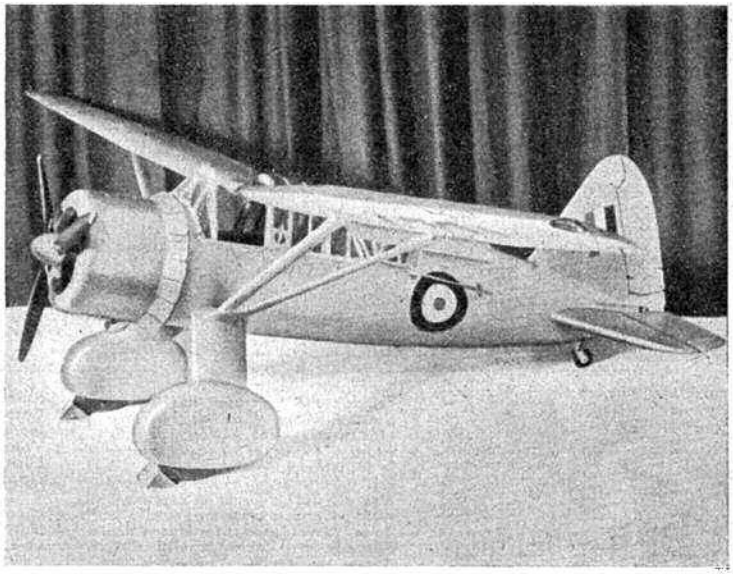
Bottom left—and it's scale control line again; this time a very attractive Fokker Tripe adapted from American plans by the builder and photographer, J. L. Garwood. One inch to one foot scale, it is powered by an E.D. Comp. Special—and to quote the man who made it, it is just about the most sensitive thing he has seen on the end of two wires.

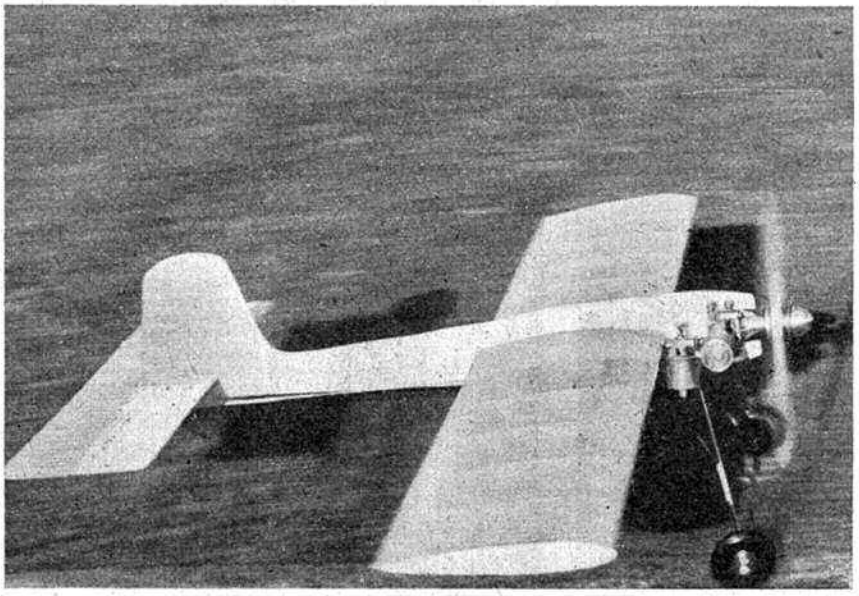
Fliar Phil makes no apology for the preponderance of flying scale models this month—he thinks it time they had a break. And so does W. A. Bird, of Penrith, whose scale 5 ft. 7½ in. span Mosquito shown below right is ultimately designed for radio control, but is at present taking the air, not much, but a little less hazardously, on control line! Three-bladed props are intended for the two Majesco 45's, but have been abandoned for first testing. Incidentally, although all the components detach for convenience in transport, the whole machine can be assembled ready for flight in less than a minute, owing to a unique system of connection. Canopy, nose, cowlings, power eggs, fin, tailplane, tail cone, etc.; are easily removable and the wings simply slot down on to the two spars joining fuselage to nacelles and are held in place by wire rods which are pushed through the radiators. So far results are very promising, but after the radio installation will be the real test.

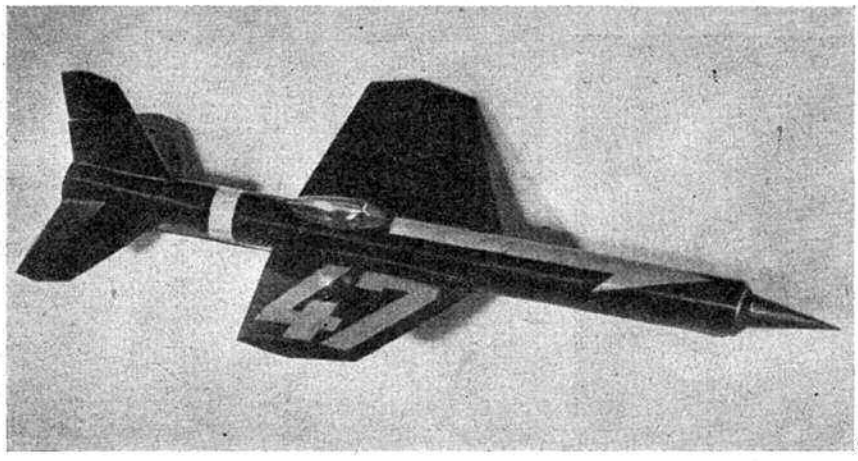












Sadly Fliar Phil draws his readers' attention to the top left hand photo. Here, at least, is one Fugitive that never got away.

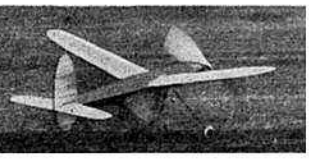
Our final flying scale model is a free flight Lysander which took Sgt. Wells, of R.A.F., Colerne, twelve months to complete. This effort is specially remarkable as it is the sergeant's first expedition into modelling. Powered by an E.D. Mark II diesel, it was built to Welsberg's famous plan and has sliding cockpit canopies, fully working controls, and working details including landing flaps and navigation lights.

Action shots are still not as plentiful as Fliar Phil would like. Here, however, (centre left) is a really first class picture taken by Mr. Leng of Malton. It shows C. Cryer's control-liner rattling off the take-off at full bore, and very nicely caught it is, too. Powered by an E.D. Mark II, it is 28 in. span, 168 sq. in. wing area, and weighs 15¾ ozs. with ply wood profile fuselage. The model loops and wing-overs easily, but the pilot's nerve has so far failed anything more advanced.

Unorthodox enthusiast Guy Ramaekers, in Belgium, is still experimenting. Bottom left is a lethal looking design of his powered by powder rockets of the usual type. Probably the most surprising thing about Ramaekers' designs is that they fly. Mind that nose block!

Don't forget those more and better pictures!

Top left and right show Ron Calvert and C. P. Miller of the Northern Area respectively. The former apparently taking no chances of a fly away to judge by the brace of models.
Left is Eric Smith of the S. Midland Area who lost his Jaguar on its second flight but even so made the grade.
Below. J. Berryman of the London Area demonstrates a natty take-off style. Bottom, we have H. W. Revell of the Midland Area who has apparently deserted his usual Jaguar.



THE 1949 WAKEFIELD

Excellent weather throughout the country apparently blessed all areas of such unusual conditions and the London area in particular put up to all those who qualified, we now look

LONDON AREA (29)

McKenna, J. F.	Park M.A.L.	900.	Tillet, R.	Chingford	511.2
Brockman, D.	Zombies	808.5	Allaker, P. B.	Surbiton	499.6
Pitcher, J. L.	Croydon	802.2	Kendall, R.	Thames Valley	487.1
North, R. J.	Croydon	771.1	Millington, J.	Park M.A.L.	482.9
Marcus, N. G.	Croydon	763.4	Elmes, D. H.	Ilford	475.5
Warring, R. H.	Zombies	762.8	Stuart, L.	Park M.A.L.	473.9
Hinks, W.	Park, M.A.L.	704.5	Dean, W.	Zombies	467.1
Geesing, T. A.	Croydon	701.7	Palmer, J.	Cheam	463.7
Macpherson, R.	N. Heights	630.4	Wilson, A.	Hayes	428.1
Wood, L. E.	Chingford	626.	Taylor, P. T.	Thames Valley	415.6
Copland, R.	N. Heights	618.8	Caswell, R.	Hatfield	403.3
Berriman, T.	Thames Valley	593.4	Miller, J. R.	N. Heights	399.6
Higgins, J. B.	Pharos	532.	Piggott, A. D.	Croydon	395.5
Knight, J. B.	North Kent	527.5	Pettipher, H. T.	West Essex	387.
Jessop, R.	Surbiton	524.6			

MIDLAND AREA (15)

Salt, G. E.	Loughboro' College	738.2	Bolton, A. C.	Birmingham	527.4
Revell, H. W.	Northampton	649.4	Chesterton, R.	Northampton	526.3
Cotton, R. C.	Northampton	617.	Adams, F. J.	Northampton	520.
Monks, R. C.	Birmingham	598.2	Dallaway, W.	Birmingham	491.2
Wilson, N.	West Midland	592.	Wytcherley, J.	Five Towns	470.6
Luck, R. A.	Northampton	598.6	Parham, R. T.	Worcester	466.6
Lloyd, R. J.	Walsall	543.5	Hollingsworth, R.	Rugby	461.
			Eales, W.	Rugby	458.7

NORTHERN AREA (12)

Miller, C. P.	Bradford	512.4	Stott, L.	Bradford	381.
Muxlow, E. C.	Sheffield	427.8	Dubery, V. R.	Leeds	376.
Lees, N.	Bradford	400.	Naylor, A.	Sheffield	362.6
Calvert, R.	Bradford	398.5	Parsons, J. R.	Sheffield	362.5
Peckett, G. D	Bradford	388.	Tubbs, H.	Leeds	361.
Walker, K.	Sheffield	384.3	Less, D. G.	Bradford	329.8

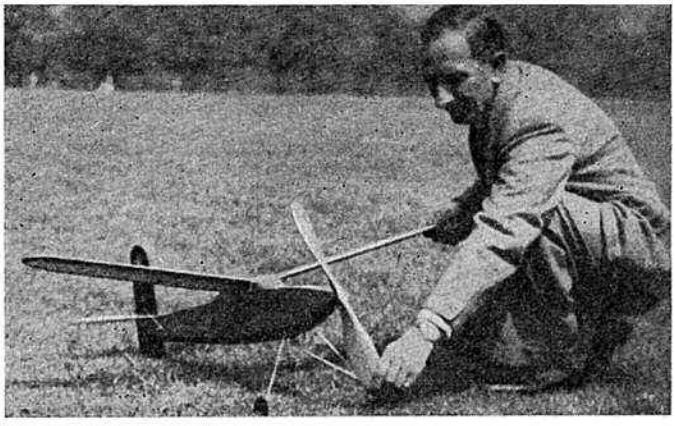
SOUTH MIDLAND AREA (9)

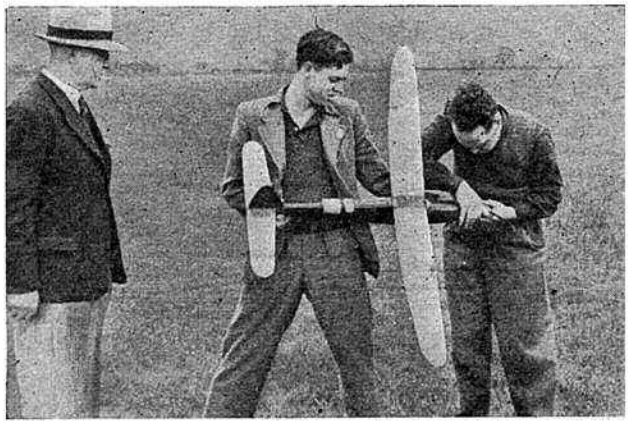
Courtney, A.	Oxford	508.	Webb, R.	Eastleigh	381.1
Smith, E.	Icarians	474.7	Haddock, C.	Reading	378.5
Clements, R.	Luton	448.7	Houlberg, A. F.	Oxford	308.1
Hinks, R.	Luton	434.9	Macphee, H.	Reading	303.1
Chapman, F.	Luton	395.			

NORTH WESTERN AREA (7)

Clarke, F.	Bolton	488.2	Hardman, M.	Rhyll	341.1
Rymill, S.	Merseyside	465.	Bennett, D.	Whitefield	319.1
Alexander, R.	Merseyside	399.4	O'Donnell, H.	Whitefield	311.7
Dillon, E. W.	Liverpool	397.2			

Worthy S.M.A.E. Chairman, Houlberg, shows that the old timers can still do it as his modified "Isis" gets nicely away. Below are three qualifiers from the Northern Area. Norman Lees, son Denis, and inserting his noseblock G. D, Peckett.





ELIMINATING CONTEST

on May 15th. To judge by the results most contestants took full advantage some pretty staggering times including one "possible." Congratulations forward to the Trials at Fairlop on July 2nd.

SOUTH WALES AREA (6)

Holland, F.	—	496.6	Vickery, M.	—	351.
Lilley, P.	—	389.5	Phillips, J.	—	347.5
Crumplin, E.	—	361.	Cole, R.	—	293.3

NORTH EAST SCOTLAND (6)

Campbell, C.	Montrose	448.5	Duthie, J.	Dundee	244.
Tasker, A.	Montrose	358.6	Nixon, J.	Dundee	236.5
Whyte, K. B.	Montrose	270.5	Mackay, J.	Dundee	182.4

WESTERN AREA (5)

Woolls, G.	Bristol & West	647.4	Roberts, J. L.	Yeovil	518.7
Moon, K. W.	Bristol & West	542.5	Watts, T.	Yeovil	395.1
Lee, A. H.	Bristol & West	520.4			

SOUTH EASTERN AREA (5)

Boxall, F.	Brighton	432.9	Blake, W.	Southern Cross	374.
Slater, J. J.	Mid Sussex	415.3			
Boxall, R.	Brighton	374.6	Aldridge, J.	Eastbourne	262.7

EAST ANGLIAN AREA (4)

Field, P. E.	Belfairs	472.7	Laws, G.	Belfairs	229.3
Foden, G.	Chelmsford	314.8	Atkinson, R.	Ipswich	199.

SOUTHERN AREA (4)

Coxon, M.	Southampton	542.5	Brooks, A.	Portsmouth R.Ae.S.	377.1
Worsnop, H.	Country Member	412.8	Foot, R.	Odiham	353.3

EAST MIDLAND AREA (4)

Witt, D.	Peterborough	637.	Marshall, S. C.	Boston	601.4
Rutter, K.	R.A.F. Swinderby	606.8	Trotter, W. L.	Scunthorpe	420.5

SOUTH WESTERN AREA (3)

Carson, G. W.	Plymouth	367.	Woodfine, G.	Plymouth	151.9
Richards, M. D. Jnr.	Plymouth	206.7			

SOUTH EAST SCOTLAND (2)

Montgomery,	Kirkcaldy	562.6	Murray, W.	Kirkcaldy	444.9

NORTH EASTERN AREA (2)

Fairless S. C.	Newcastle	234.0	Bainbridge, R. M.	Seaham	190.5

(394 entries—61 returned no score.)

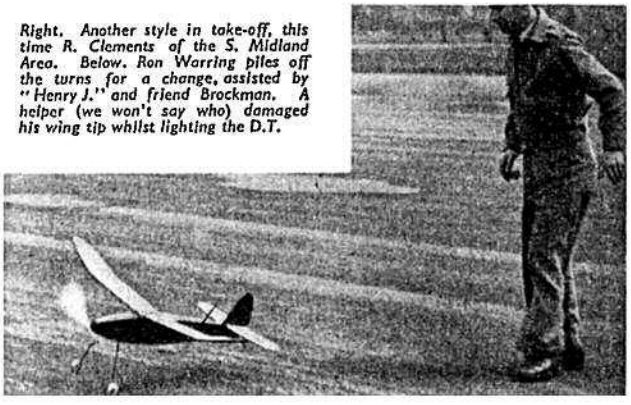
Above shows top man in the Midland Area, Geoff. Salt.

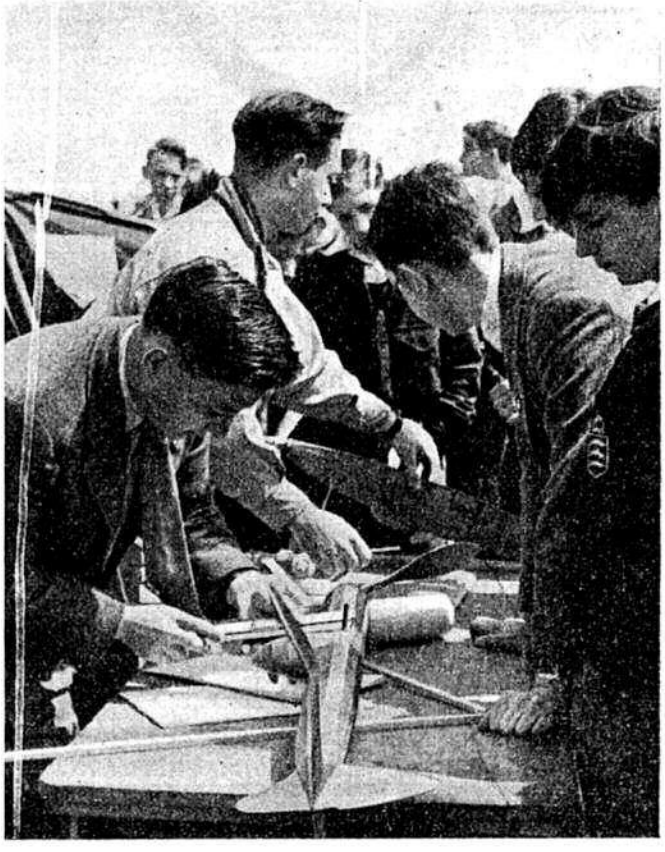
Top right we have F. H. Boxall, top man in the S.E. Area with his reserve model, his first string being lost O.O.S. after 35 mins. Subject to confirmation this makes Mr. Boxall a new British record holder in both the Wakefield and Open Rubber classes.

Right is J. J. Slater, 2nd in S.E. Area, another Jaguar flier.

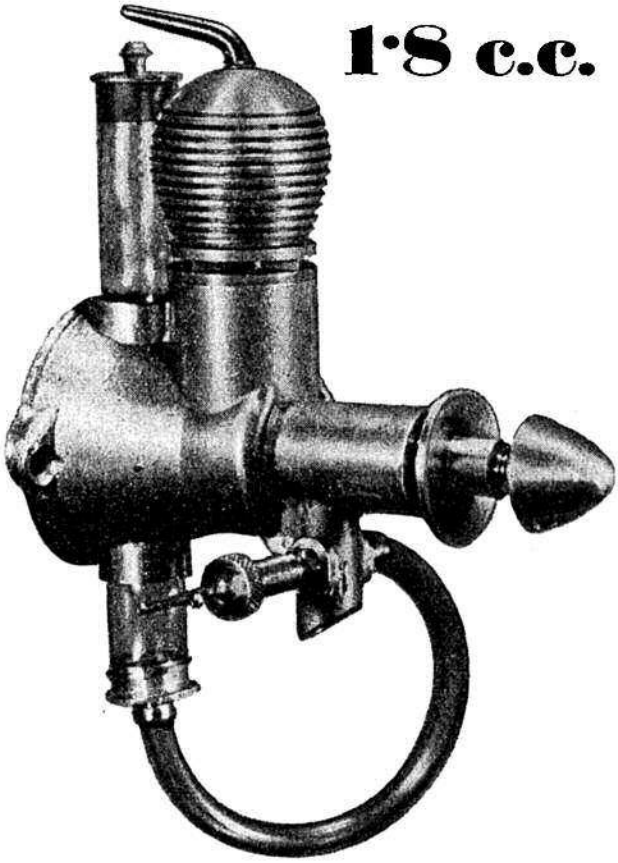
Below: A scene that might have been inacted in any Area—but this picture of models being checked was in fact taken at Fairlop.

Right. Another style in take-off, this time R. Clements of the S. Midland Area. Below. Ron Warring piles off the turns for a change, assisted by "Henry J." and friend Brockman. A helper (we won't say who) damaged his wing tip whilst lighting the D.T.





The ELFIN 1·8 c.c.

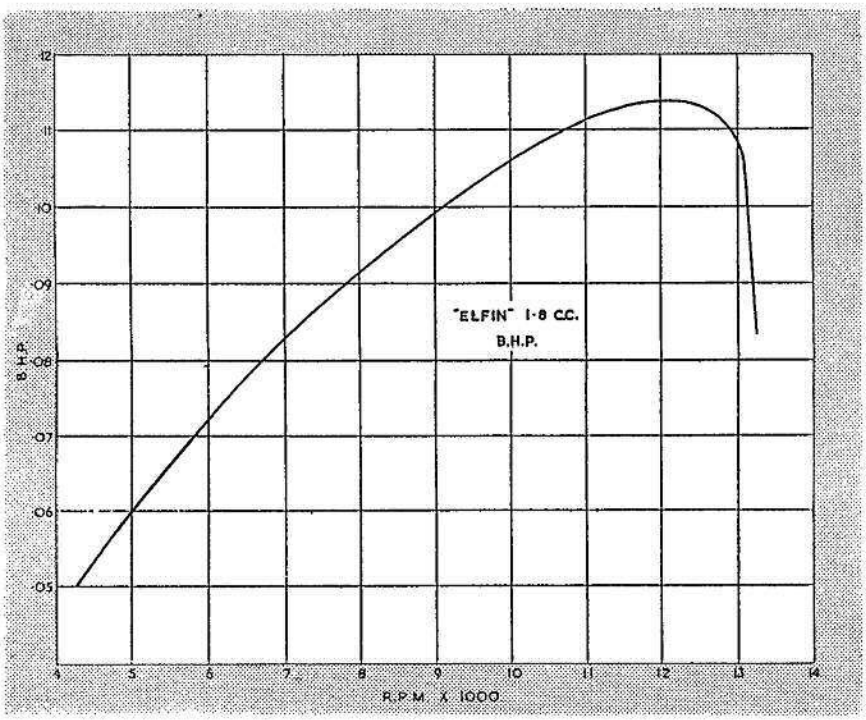


CURIOUSLY enough, the suppliers—who seem to be remarkably candid—seemed to think that this engine, like most other "hot-stuff" power units, was rather fussy to start from cold. I can only say that no trouble was experienced during these tests, and the engine was one of the most responsive starters which I have yet handled. A little trouble was, at first, encountered in finding the correct technique, as there seemed to be a reluctance for the engine to suck in its initial charge of fuel. It was found, however, that if the engine was choked and flooded, and then flicked over until a running burst was obtained with the needle valve shut off, the needle might then be set to its approximate running position, and a few further flicks of the propeller had the engine running nicely.

During the whole of the tests no serious mechanical trouble was discovered, but there was a tendency for "things to vibrate loose". For one thing, the cylinder head and liner persisted in unscrewing themselves from the crankcase, and while a real tightening-up seemed to hold them securely at speeds up to 12,500 r.p.m., no tightening by "fair" means would make them stay put at 13,000 r.p.m. and above. At one point, consternation was caused by the crankcase back-plate unscrewing itself at about 12,000 r.p.m., and although on investigation it was found that the plate was hanging on by about one thread of the screw, and the air leak must have been colossal, the engine was really running quite well in this state except for a little "hunting"! When the back-plate was again securely tightened no further trouble was encountered from this source.

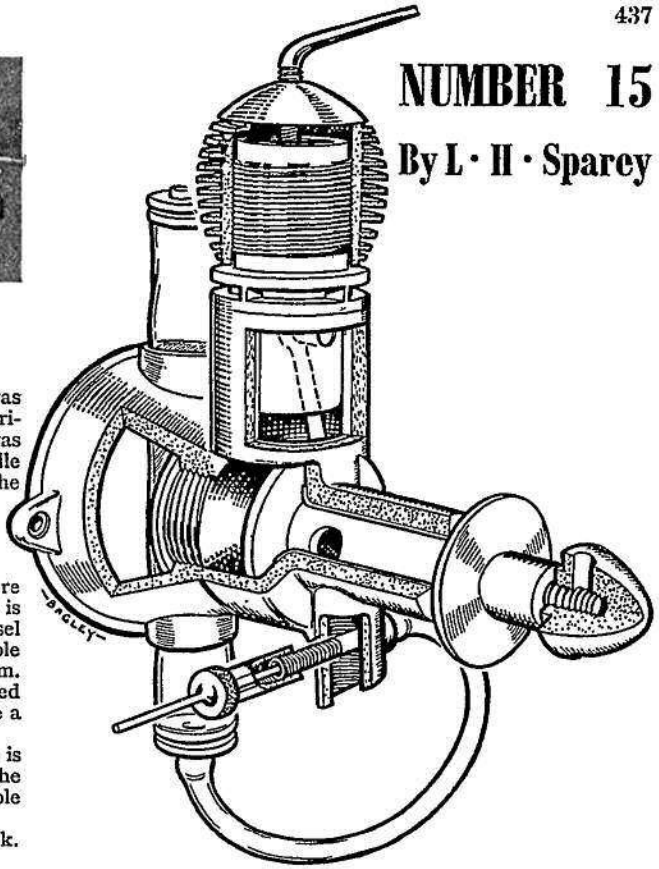
Owing to the construction of the airbrake used in these tests in place of the orthodox propeller, only a short portion (about 1/8 in.) of the crankshaft thread protruded to receive the retaining nut. As the airbrake is removed between each reading this frequent disturbance caused the end threads of the crankshaft to become stripped. It is only fair to remark that these frequent operations corresponded to the fitting and removal of some dozens of propellers in actual practice. It does seem that the threaded portion of the crankshaft could be made longer with advantage. The small spinner-nut supplied with the engine is useless, and was replaced by an ordinary brass nut. The hole drilled in the spinner for a tommy-bar cuts into the internal thread, and removes about 30 per cent. of it.

I cannot speak too highly of the handling qualities of the "Elfin". Throttle and compression control were smooth and sensitive, and the engine responded instantly to adjustment. Speeds were smooth and even over a remarkably large range, and the "fussiness" usually associated with hotted-up engines was conspicuously absent. That the "Elfin" really does come within this category of engine is amply demonstrated by the power curve obtained.



NUMBER 15

By L · H · Sparey



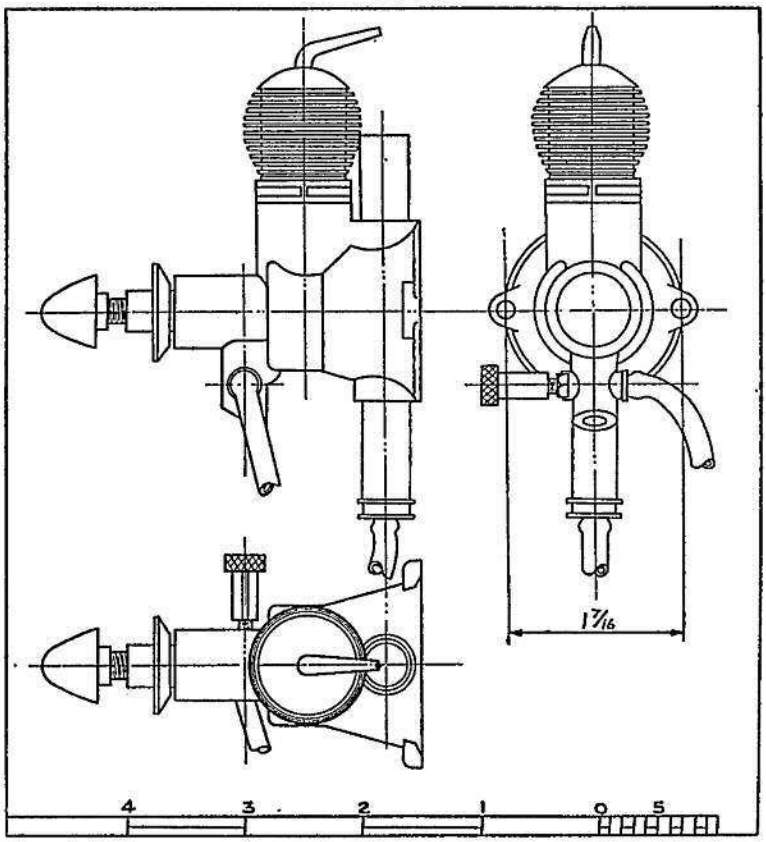
TEST

Engine : " Elfin " 1·8 c.c. Competition Diesel.
Fuel : Mercury No. 3.
Starting : For convenience, pulley-and-cord starting was generally used, but the engine was hand-started, experimentally, at intervals. When the correct technique was found starting was excellent under all conditions. The needle setting, however, did not correspond to that advised by the makers on the test card.
Running : Probably one of the best running and " good tempered " engines yet tested. At all loads and speeds between 4,000 and 13,000 r.p.m. the running was faultless.
B.H.P. : Apart from the remarkably high output figure obtained, the engine is unique insofar as the peak output is registered at a speed in excess of the peak point of any diesel yet tested. For this capacity of engine, the remarkable figure of ·1138 b.h.p. was obtained at a speed of 12,100 r.p.m. Beyond this figure very little increase of speed can be permitted without great loss of power, although on the low-speed side a drop of 1,500 r p.m. loses only about 0·038 b.h.p.

Due to the early cut-off timing of the ports the engine is hopelessly inefficient at speeds below about 5,100, and the torque graph (not shown) shows an unusual but permissible drop in torque at these speeds.
Checked Weight : 3 7/8 ozs. including plastic limiting tank.
Power/Weight Ratio : ·472 b.h.p./lbs.

GENERAL CONSTRUCTIONAL DATA

Name : Elfin.
Manufacturers : Aerol Engineering Co., Henry Street, Liverpool, 13.
Retail Price : £3 19s. 6d.
Delivery : Ex stock. **Spares :** Ex stock.
Type : Compression Ignition (Diesel).
Specified Fuel : Mercury No. III.
Capacity : 1·8 c.cms. ·11 c. inches.
Weight : 3¼ oz. bare.
Compression Ratio: Variable—16 : 1, 20 : 1.
Mounting : Radial, upright, side or inverted.
Recommended Airscrew : Control line 8"×6"; free flight 9"×4".
Tank : Tubular, plastic.
Bore : ·505". **Stroke :** 5·626".
Cylinder : Tool steel hardened. 360° porting. Attached to crankcase by screw thread.
Cylinder Head : Duralumin, screwed to cylinder.
Contra Piston : Cast iron, screw adjustment.
Crankcase : High duty die cast aluminium alloy.
Piston : Cast iron, domed top.
Connecting Rod : Duralumin.
Crankpin Bearing : Plain.
Crankshaft : Steel.
Main Bearing : Cast iron, plain.
Little End Bearing : Plain.
Special Features : No screws are used in the manufacture of this engine, thus ensuring easy fitting of replacement parts. A heavy section crankshaft is used and the cylinder liner is subject to special treatment on running in.



ONCE again the gadget pie is opened but Consus, half-baked though he may be, has no intention of beginning to sing, despite the universal sighs of relief all round. It is something of a miscellany this month (stand up the little boy who said "Hash!") and many and varied are our readers' brainwaves, but they all have the quality of ingenuity.

From Horfield, Bristol, G. WOOLLS writes in with his modification to the normal tongue and box fixing shown in Fig. 1. As he very truly points out, although tongue and box fittings are one of the best attachments for wing to fuselage they are prone to wear, when they become a loose fit and slip treacherously after a time. At the other extreme, if in order to prolong their life they are cut too tight to begin with they will then not dislodge when required—again with unpleasant possibilities. However, by the simple expedient of cutting a notch as shown and inserting a small wire pin or brad, when the tongues are inserted and the pegs joined by a tensioning rubber band any tendency to slip is retarded.

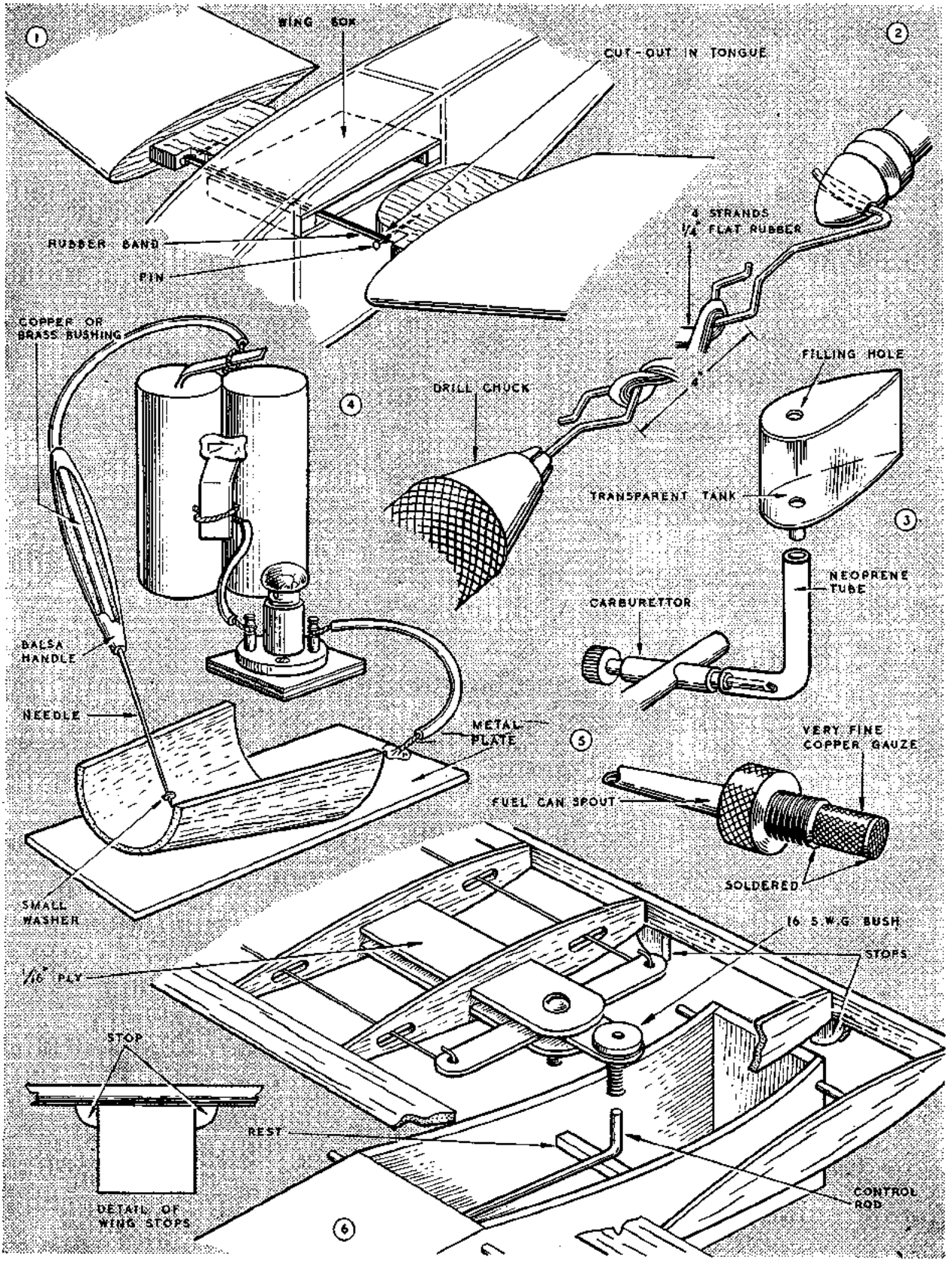
It is likely that many of you possess or have possessed one of the ultra small diesels, and if so you will be familiar with the difficulties these often present when starting from cold, due to the high compression and the low weight of the airscrew. J. K. HUGHES of Farnborough gets over the trouble by a system illustrated in Fig. 2. If a tommy bar hole is not already available in the engine spinner one is bored to take a piece of steel wire shaped in the manner shown. An ordinary winding hook as used for rubber models is inserted in the chuck of the hand brace, and a rubber motor is made of 4 strands of ¼ in. flat 4 inches long. It will be found that 18 S.W.G. is of sufficient strength for both hooks, and it should be noted that the shape of the spinner fitting hook is very important and should be as in the diagram. To start the model is held firm by the assistant and the turns are piled on the rubber. There is no need to hold the airscrew as the air compression present in the engine suffices to lock it until the turns reach the point where the energy stored is enough for starting. It will be found that at this point the prop will turn over several times and the engine should fire. Should the engine not do so of course the process is repeated. The specially designed hook will be found to throw clear as soon as the engine starts.

With all our vaunted progress in the aeromodelling world the number of people who can regularly go out and fly their model and obtain the engine cut-off dead on time can still just about be counted on one finger, to judge by Consus' own experiences, at some of the big meetings. Airdraulic timers are notoriously unreliable, clockwork timers are too heavy and expensive, and the amazing contortions necessary to fill a limiting tank from the fuel can just before launching the model renders the attitude of nine out of ten people an obviously couldn't care less one. However, from TOM HURST of Ashton-under-Lyne, a really sensible solution and one which, if modellers have got any sense, many will adopt this year, for here is a gadget which obviously works. A wide piece of neoprene tube runs from the fuel lead of the carburetter, its length being adjusted according to the thirst of the engine to give half a second run under the required limited time. This tube is of course fixed to the fuselage so that it retains a semi-upright angle, 45–50 degrees to horizontal is usually about ideal. A small transparent celluloid or perspex tank is made as shown in the illustration with a filling hole in the top and a length of celluloid or plastic tube protruding from the bottom of such a diameter that it is a good slide fit in the neoprene tube. For starting this auxiliary tank is plugged into the neoprene tube and the whole filled with fuel. When the engine is running correctly the auxiliary tank is whipped out at the moment of take-off and the model launched. Thus, there is no trouble in keeping the main tank filled and it is impossible to run over the limited time. There is only one real disadvantage, that fuel may be wasted from the auxiliary tank when detached. If the thumb is placed over the filling hole as the tank is detached and the tank is then held inverted as the model is launched no fuel will spill.

The advent of control lining and in particular of speed models has brought the use of balsa shell fuselages into much greater prominence. It is therefore likely that many people will find the ingenious little contrivance in Fig. 4 of considerable interest. Designed by P. Wheldon of Birmingham it is designed to enable the whole of a balsa shell to be carved out to exactly the same thickness, normally a very difficult job. However, by a simple electrical contact the apparatus shown immediately indicates whether the required thickness has been obtained. The drawing is almost self explanatory, the only point to watch being the small washer which must be very small lest it foul the concave surface of the interior of the shell and therefore not give a true reading. This washer must be well soldered on to the needle, on the upper side only, and the needle sweated into the copper or brass tube. It is easy to adjust the distance from point to washer by sweating or unsweating to whatever distance is required. The flashlight bulb and holder is mounted on a small piece of plywood and placed in a convenient position. The balsa shell is then placed on the metal sheet and pierced by the needle as far as the washer will allow the point to penetrate. If the thickness is as required the bulb will light as the needle point makes contact with the metal sheet. If the bulb does not light, a little pressure on the needle will cause the washer to sink into the balsa until the bulb again lights and when removed will leave a small depression which serves as a guide for levelling up.

Commercial filters are appearing on the market and are sure indication that at last the value of clean fuel is being appreciated by more than just the odd one or two. B. WOODS of Reigate, however, extracts any dirt there may be at its source as Fig. 5 will show. It is a simple attachment to a fuel can of Valvespout or any similar long spout type and consists simply of a cylinder of very fine copper gauze soldered to that screw portion of the spout which fits into the can. Any impurities in the fuel are trapped on the outside of the gauze.

As modellers realise it is a great advantage in control line to be able to remove the wings for transport, providing their attachment when fitted is firm enough not to shift in flight. However, the method universally used, where the control wires are external and passed through a plywood guide which has enlarged holes to allow the passage of the loops upsets D. BRYANT'S æsthetic sensibilities (*Cor! Ed.*) and so he uses the system shown in our last diagram. This enables a wing with internal control wires to be made detachable just as easily as the more usual type. The bellcrank is carried between two 1/16 ply tongues and the apex is equipped with a 16 S.W.G. bush of fair length. The end of the control rod in the fuselage is bent up at right angles so as to fit loosely into this bush. To prevent the rod dropping out, a hard wood rest is glued across the fuselage. Small triangular stops are glued on the leading and trailing edges of the wing—these rest against the fuselage sides when the wings are in position and thus prevent faulty alignment or shifting in flight.

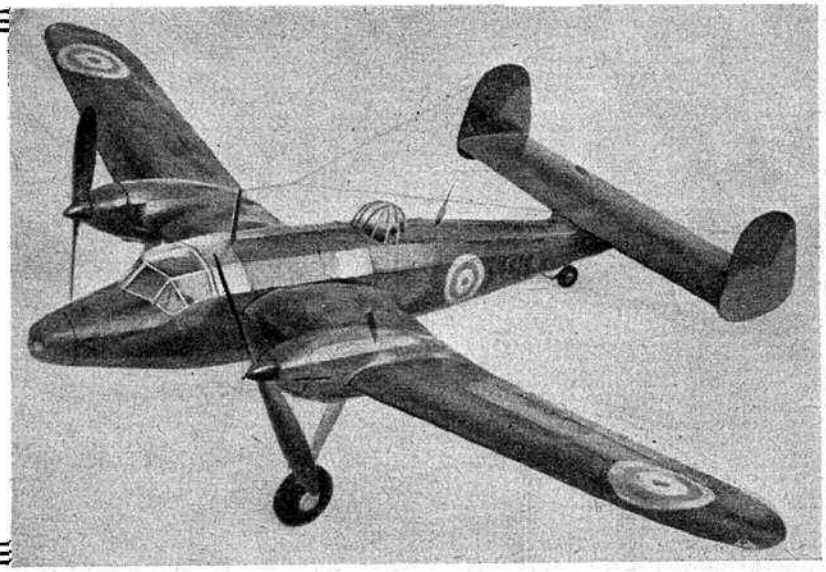

1
WING BOX
2
CUT-OUT IN TONGUE
RUBBER BAND
PIN
4 STRANDS
1/4" FLAT RUBBER
4"
FILLING HOLE
TRANSPARENT TANK
3
COPPER OR
BRASS BUSHING
4
DRILL CHUCK
NEOPRENE
TUBE
CARBURETTOR
BALSA
HANDLE
NEEDLE
METAL
PLATE
5
VERY FINE
COPPER GAUZE
FUEL CAN SPOUT
SOLDERED
SMALL
WASHER
16 S.W.G. BUSH
STOPS
1/16" PLY
STOP
REST
CONTROL
ROD
DETAIL OF
WING STOPS
6

The FLYING SCALE MODEL

PART ELEVEN

by

C. RUPERT MOORE A.R.C.A.



THERE is a large field of experiment I have so far only mentioned and that is twin and multi-engined models. Unless it were possible to make this type fly well it would be impossible to live up to my ideal of being able to make *any* flying scale model *fly*. Of course I have never fulfilled this ideal and never shall, but there is no harm in trying. Fourteen years ago when I decided to experiment in this field petrol engines were curiosities and diesels unknown, therefore rubber had to be used. This being so the first problem to solve was to find a thoroughly efficient and light angular drive with a minimum of friction and absolute RELIABILITY. This drive must incorporate the following features:—Thrust line must be adjusted and the airscrews "knockoffable". For the first model at least the wing must be adjustable for incidence and if possible in a fore and aft direction for trim. I suspected that I should have certain aerodynamical curios to get over and I was not mistaken, but more of this later. If possible the drive should not require precision in alignment for its efficiency, otherwise a very rigid and therefore heavy airframe would be necessary to ensure this precision. I built twenty-three angular drives of various types and tested them to destruction on the bench, finally deciding that the "Fork and Stirrup", later patented and christened the "Moore Drive", was the only one which fulfilled my requirements. The problem of a drive for rubber is peculiar because the *whole of the energy is active* on the drive and has to be held back and eked out. With other power, energy is created bit by bit, when required and so simplifies the transmission problems. This explains why pulleys could be used on the early steam-driven models.

The drive itself is only half the problem, winding the rubber by the airscrews is not practical beyond about 75 per cent. of the maximum as too much strain is put on the wing spar, therefore a square is built up on one of the gear shafts so that an old clock key can fit on this square. The head of the key is sawn off and a piece of brass tube soldered over to lengthen it. The front end of this tube is plugged with wood so that the tin swivel piece can be fixed by a small wood screw. Tied to this swivel is a 7 in. loop of string. A 2½ in. hard wood disc is fixed on the spindle to form a grip. In this disc are two holes big enough to allow the heads of two round-headed screws to pass.

These screws are fixed in the front surface of the "winder bar" to form a non-slip connection. Between these screws is a hole large enough to clear the swivel and string. To wind the model by hand, the winder bar is fixed to the disc and the stater pushed on the square spindle. The rubber is then wound as if by an airscrew. To start, the model is put on the ground (or held by a second person) and in order to remove the winder bar the starter disc is held in the right hand. When the winder is clear the left wrist is put through the string loop and the left hand takes the place of the right hand on the starter disc. The right hand is now free for launching. To start the model the grasp is gradually lessened allowing the slack in the transmission to be taken up gently. The starter is left free in the nose for a part of a second revolving on its spindle. The starter is withdrawn by simply throwing the left wrist forward when the swivel string pulls it clear. With a little practice this action becomes very rapid and is as quick as this:—one, ease grasp; two, withdraw. The general principle of the drive should now be understood.

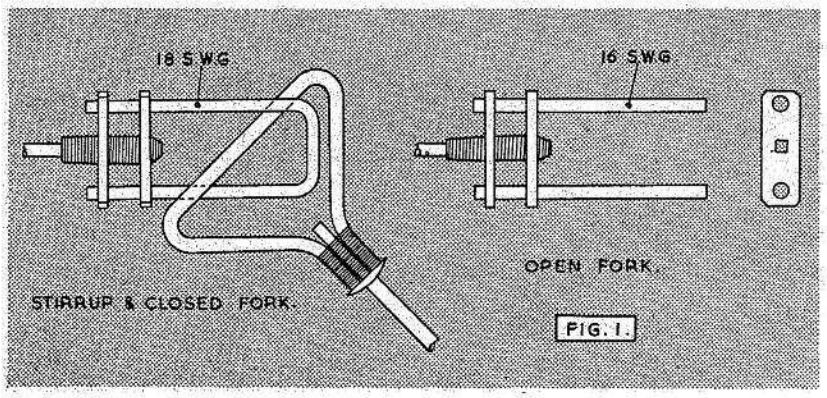


FIG. 1.

In order to compare efficiencies I designed "Castor" to the same specifications as Viper II (the Coronation Cup requirements). The same power drove two smaller airscrews which together roughly equalled the swept area of the Viper's single airscrew. The twin airscrews had a step-up gear to bring the effective pitch equal to that of the Vipers, one rubber revolution was to do an equal amount of work in each case. The performance of these two models was practically identical, 54 secs. R.O.G. the best timed duration. The weight of Castor is 8 per cent. greater than Viper and this is all in the airframe as I built it excessively strong in order

to concentrate on transmission problems. When designing twin or multi-engined models one fact must be given priority —unless the distance of the airscrew from the leading edge is reasonable excessive downthrust has to be used causing the angle of the slip stream working over the whole of the centre section to magnify the lift during power flight with consequent trimming difficulties for glide. This principle of excessive down thrust has been patented for real aircraft to improve take off.

In " Castor " most of the twin engined problems seem to have been solved and it is therefore a good model to describe for that reason.

In later models I have found it possible to simplify considerably, but Castor being so revolutionary I was ready to tolerate any structural complication until I knew the nature of the beast.

The drawing of Castor shows the original drive, which is still in use and, incidentally has had no adjustment or repairs since built in 1937. The " fork " heads are of tubular structure. Tube being difficult to drill true by hand, I soon replaced it by double brass strip heads Fig. 1.

These are made in pairs from doubled strip and drilled before shaping while double. You will notice that a closed " fork " is also shown, this is used at D where disengagement is not required.

The gear box at A is removable, a feature discarded on most later models. This necessitated a " make and break " joint at A. A three pronged fork, made in a similar way to Fig. 1, engages a brass strip T piece on each pilot shaft. The distance between the centres of the pilot gears is a Ruling measurement, this rules the spacing of the shafts, etc., therefore the gear box is built first.

Because I desired the wing to be adjustable a portion of the pilot shafts had to be parallel to the wing rests themselves and of course the shafts telescopic. This required a simple universal at B and the " telescope " at C. Joint B is easier made as a fork head Fig. 1. To keep both halves engaged a copper wire saddle is added. The " telescope " C is made from brass tube, the ends from 16 S.W.G. bore crushed flat at one end and soldered on to the shaft end, the sleeve is ⅛ in. bore squashed to an oval. The flat ends are filed to slide inside. When the model has been finally trimmed it is wise to replace these sleeves with the longest ones possible.

The wing is held in place by two pairs of piano wire clips which allow no vertical movement. These hook under the rests, bend over the spars, and are held together by rubber.

At D, the secondary gear box is situated, the centre gears are not in mesh but are staggered. In later models where the wing is fixed the secondary gear box and telescopic shafts are unnecessary, a four joint drive, instead of two joint, starts at B and goes through the wing, 45 per cent. at each joint. The alignment of fork and strirup is important. The drive is aligned from gear box A backwards, each joint being aligned to the one before it. After fixing B, which is done before the hardwood capping is cemented to the top of the spars, cut away the spars to take the strirup shafts. The centre of the stirrup bar should be in line with the fork shaft. Revolve the gears and cut or pack until the fork prongs remain engaged with the stirrup during the complete revolution.

The front stirrup should have its centre point in line with the propeller shaft. The nacelle nose former is cemented in place with its centre line on the centre point of the stirrup bar.

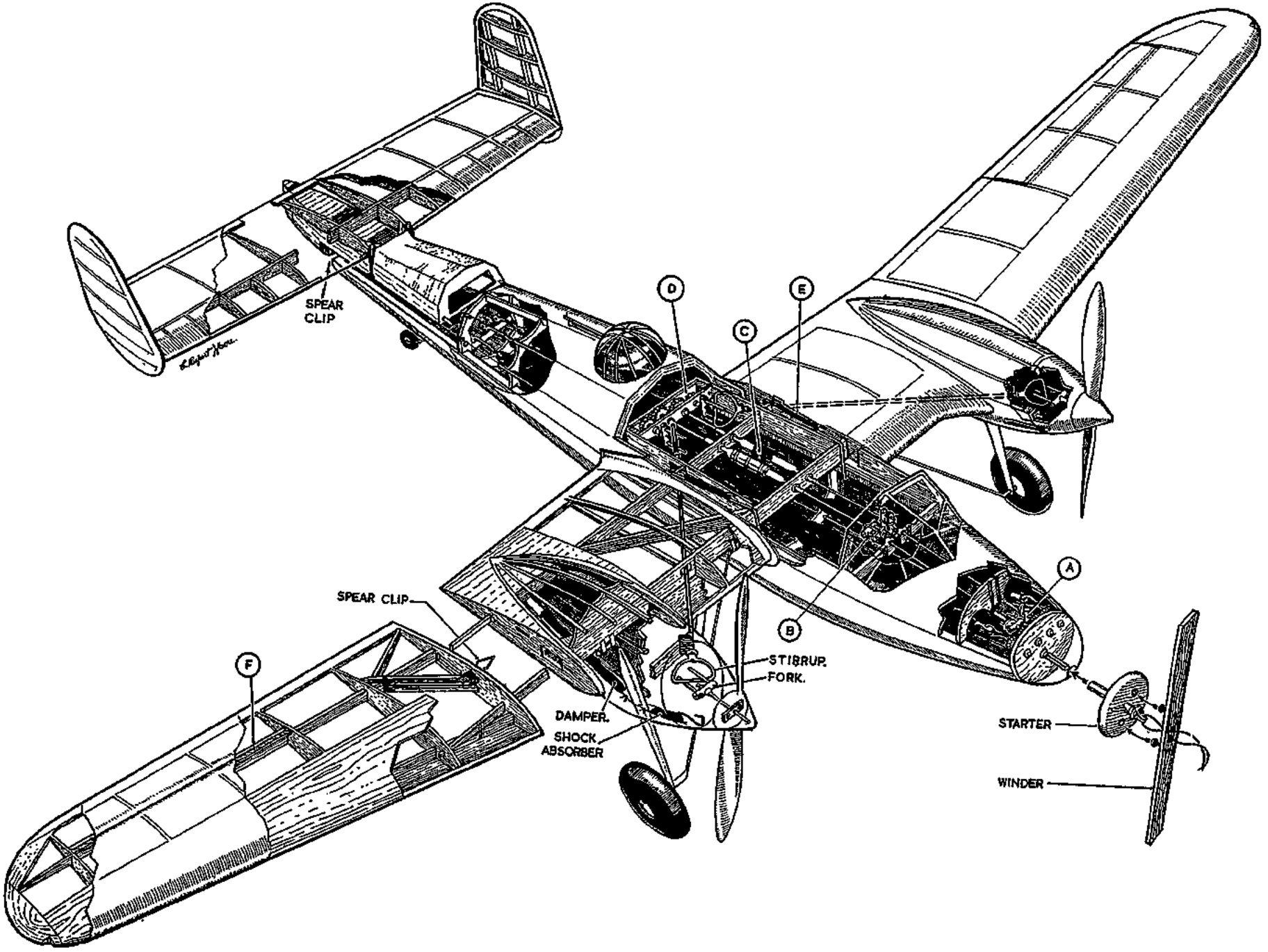
The propeller shaft fork is aligned on to the stirrup. The nose block former is put on to its locating pegs on the nacelle nose. The rest of the nose is completed, except for sheeting, complete with bearings. The back of the nose is trimmed and moved about until aligned and is then cemented to the nose block former. The nose blocks are held on by rubber bands.

When flying twins it is wise to look and see that the prongs are on opposite sides of the saddle bars before winding. In order to stretch wind the tail end is detachable. A telescopic cradle is built up to hold the model firmly. The starter bobbin slips on to two prongs to prevent it turning. Special tail shackles to allow detachments are made from 18 S.W.G. piano wire (see April issue). From all this I think it will be seen that a completely different angle of approach must be made when considering twins. The centre section replaces the fuselage as the primary structure, everything literally hinges on it. Unless centre section spars are to be made too heavy, back lash from the shock absorbers must be cancelled out by dampers. I broke the main spars several times before I discovered this.

Another interesting feature of twins is that direction of power flight can be controlled by giving more down thrust to one airscrew and less to the other. If 1/16 in. be added to one then 1/16 in. should be subtracted from the other. Another surprising feature is that slight inaccuracies of airscrews are not vital and can be trimmed out by differing thrust line.

Soft solder when reinforced by tinned copper wire (fuse wire) is enormously strong but soldering materials are vitally important. TINMAN'S SOLDER only should be used as flux cored solder is not made to take stress. Killed spirits of salts is the best flux though Fluxite or Baker's Fluid are satisfactory. An electric iron with a 2½ × ½ in. bit is ideal. A gas ring and soldering iron of the size is just as effective. The bit should be filed clean and then heated, if in a gas flame, till the flame turns green. File again while hot and onto a clean piece of tin smeared with flux melt solder with the iron. Rub till the four faces are silver, this is called tinning. GREASE is the one enemy of solder. I boil all metal parts in soda and water and then burnish with fine glass paper. Every surface to be soldered should be tinned first, i.e. shaft ends, stirrup necks, prong ends, gear shafts, etc. This is done by dipping in flux, then melting solder over them with the iron. While molten wipe clean with a CLEAN rag. The iron should be hot enough to melt the solder at a touch but never reach red heat. Prepare all parts thus and also fill the gear teeth with coloured dope (Plumbers' Black is better). Internal surfaces should be cleaned with a drill or reamer.

Start by soldering the gears to their shafts. Slide the gear on to its tinned shaft and place the hot iron against the shaft and gear until it melts its way to its position. When cool build up a collar 1/8 in. along the shaft and up the gear face with tinned copper wire (fuse wire), smear with flux and flood with solder. Scrape off any solder on the running surface. Put the shaft in its bush and mark where the cup washer is to go. Remove and tin. Replace, slot on paper washer then cup washer. The paper prevents the solder sticking to the bush end. Build up with fuse wire behind and solder solid. The square on the winding shaft is simply a coil " spring " of 20 S.W.G. copper wire in front of the cup washer, soldered into a solid lump and then filed to a square. The stirrup neck is bound onto the shaft end with two layers of fuse wire and then soldered solid. To solder the fork head, force on the fork plates and bind between with fuse wire. Build up a fuse wire collar 1/8 in. behind the head to form a bearing. Align prong holes with match sticks and solder. Remove match sticks and solder in prongs. The short brass tube bearing for the fork shaft onis held in place with a match stick while the fuse wire collar is built up and soldered. Be careful that all the bearings are threaded onto their shafts before soldering both ends.


SPEAR CLIP
D
E
C
A
B
SPEAR CLIP
F
STIRRUP.
FORK.
DAMPER.
SHOCK ABSORBER
STARTER
WINDER

CONTROL-LINE SPEED DESIGN

PART II. BY R. H. WARRING

TYPICAL design data is summarised in Tables I to IV, but in analysing American models one must bear in mind that the British classification for record and contest purposes are slightly different. The 1949 S.M.A.E. classes are :—

Class I —motors 0–1·5 c.c.
Class II —motors 1·51–2·5 c.c.
Class IIIa —motors 2·51–3·5 c.c.
Class IIIb —motors 3·51–5·0 c.c.
Class IV —motors 5·01–8·5 c.c.
Class V —motors 8·51–15 c.c.
Class VI —jet models.

The American classes are now similar to their free flight classes, namely :—

Class A —motors up to ·199 cu. ins. (3·25 c.c.)
Class B —motors ·201 –·30 cu. ins. (3·25–5 c.c.)
Class C —motors ·301–·50 cu. ins. (5–8·2 c.c.)
Class D —motors ·501–·65 cu. ins. (8·2–10·6 c.c.)

Now speed models are designed around a particular motor or class of motor, using one of the racing motors outstanding in that particular class. These are invariably of the largest capacity permitted in that class (with the exception of the new American Class D where the original class D motors of 0·6–·61 cu. in. capacity are still the standard).

However, racing motors as such are generally confined to the larger classes. A racing motor, as discussed previously, develops its maximum power at around 15,000 r.p.m. and almost all types have sleeved cylinders, meehanite being a favourite material for the sleeve, with a light alloy casing. Piston rings are used on the piston to reduce friction and enable the latter to be reduced in weight as far as possible (i.e., light alloy pistons) and so reduce the overall weight of the reciprocating parts. This, coupled with a relatively short stroke and high compression ratios, is the formula for a racing motor. In the smaller classes—below about 5 c.c.—the power output of a standard free flight motor can compare with that of a racing design. Thus although, for example, the McCoy 29 is definitely a racing motor, in the same class the general purpose Forster 29 and K and B Torpedo have a comparable performance. With even lower capacities the question is still more open. Only one production motor of racing layout is made in the ·199 (3·25 c.c.) class— the McCoy 19. This motor is also the smallest successful production job to be fitted with rings. As a racing motor it has just that edge over such outstanding general purpose motors as the Arden 199 for speed control line work, although the Class record at the end of 1948 was still held by the Arden.

Some knowledge of American motor development is necessary to tie up with our home production. The serious speed modeller *must* get the most powerful motor available in its class to stay on top as regards contests and records. And, in general, American motors are that much superior to their British contemporaries in the same class. This is particularly true of the larger class, which have been neglected in this country.

However, since the S.M.A.E. classification differs from the American there is definite scope for using current British production motors for speed work. In time, no doubt, British manufacturers will cover the whole field, but up to the end of 1948 design and development of British motors has been largely concentrated in the under 2·5 c.c. class. That the manufacturers themselves are aware of the need for other types is exemplified by the development work going on. The Nordec 10 c.c. racing motor appeared in 1948, followed by the Rowell of the same capacity. Both, quite naturally, are based closely on American practice and may be compared with the McCoy 60 and Hornet respectively. Also in this same class, the E.D. company have running a prototype racing motor of which very good reports have been received.

In the smaller racing class the Eta 29 has appeared in 1949, in every way comparable with the best 5 c.c. American racing motors and as time goes by the present trend to use American motors exclusively for control line speed in any but the smaller classes will change.

In Class I we have no high-performance production motor of the full 1·5 c.c. permitted, and so motors like the Mills 1·3 c.c. will be widely used. This motor has, in fact, proved itself capable of a very creditable performance. The smallest high speed American motors are the ·099 class, or 1·6 c.c.—just out of our Class I, and obviously capable of being outclassed in Class II where a capacity of 2·5 c.c. is permitted. In Class II we have a number of very good general purpose motors available, such as the Mills, Elfin and E.D. III, all of 2·49 c.c. capacity.

Class III has now been split, so that the American ·199 motors (Bantam, Arden, McCoy, 19) and British 3·5 c.c. motors (Amco) will not have to compete with the larger 5 c.c. racing motors. In Class IIIb, the McCoy 29, Eta 29, Forster 29 and K & B Torpedo are definitely the best current production lines—all very much more powerful than the best of the 3·5 or ·199 motors.

Above this, Class IV just includes the American ·49 class, and having no comparable motors of home production the logical choice is the McCoy 49, or similar. Again, in Class V, Doolings, McCoys and Hornets will compete with our own Nordec and Rowell and the new E.D.

A few ardent pro-British fans may find the latter paragraph hard to accept, but the fact remains that to win contests in speed work, the fellow with the best motor has the best chance. A large number of American motors *are* in use in this country and can be expected to appear in the classes mentioned. Any contest flier who sticks to a British motor on principle in such classes can be expected to be beaten when he comes up against another competitor with the best American motor, until such time as British motor production covers the whole range of classification as fully as have their American counterparts. In the small capacity field—Class I and II—the outlook is entirely different.

The question of motor selection is all important and the fact that one particular motor is outstanding for its size is not necessarily a reason for its adoption. There may be another motor of equal efficiency and greater capacity (and consequently greater power) within the same class. As an example, take the Frog "·160" glow plug motor, which is quite an efficient power unit but comes within the bottom limit of Class II. It cannot hope to compete with the new 2·49 c.c. Elfin, for example, and anyone building a Class II speed model would be at a disadvantage with the smaller motor.

For the purpose of design analysis, Class I and II models may be grouped. The same model will, in fact, do for both classes, with different motors. Very few American speed models have been built within this range as their rules now allow ·199 motors (3·25 c.c.) in the smallest class. Owing to the relatively recent development of speed control line flying in this country there is very little data to draw on concerning home designs. In these classes, however, the same basic layout as the larger jobs still applies and Class I and II speed designs can be scaled down from larger machines, but generally with proportionally larger tail areas.

Weight is particularly important. For best results with small models a light wing loading is desirable—the optimum figure being about 16 ozs. per 100 sq. ins. This enables a relatively small wing to be used with an area of between 40 and 50 sq. ins. and so reduce drag. A larger wing, to reduce loading still further, will only add unnecessary drag and decrease ultimate speed.

Since these figures limit motor weight to between 3 and 4 ozs., obviously spark ignition is out of the question. Hence diesels or glow plug motors are to be preferred. As a general rule, diesels are inherently slower than spark ignition or glow plug motors, but in the very smallest class this difference is less noticeable. Hence in Class I a good diesel of near the maximum motor size is a very good proposition. In Class II glow plug motors should give the best speeds, although at present the "limit" motors of 2·49 c.c. are all best operated as diesels again. These two classes are essentially a British field, as far as motors are concerned, at least.

In the larger classes, wing loadings tend to increase, a usual figure being between 35 and 40 ozs. per 100 sq. ins. with spark

TABLE 1. LOADING DATA

Model	Class British	Class American	Area sq. ins.	Total Weight	Wing Loading ozs./100 sq. ins.	Wing Loading ozs./sq. ft.	Bare Motor Weight : Total Weight %	Remarks
Flash	I–II	A	34	5½	16	23.25	64	Glow Plug
Orbit	I	A	58	9	15.5	22.7	39	Diesel
¼ Whammy	III	A	50	8½	17	24.5	41	Glow Plug
Speedwagon 20	III	A	—	7½	—	—	47	Glow Plug
Speedwagon 30	III	B	—	15	—	—	50	Glow Plug
Speedwagon 49	IV	C	76	22	29	42	60	Ignition
Speedwagon 60	V	D	80	25	31	45.0	60	Ignition
Invader	III	B	46	15	16.3	23.5	50	Glow Plug
Dmeco Junior	III	B	60	24	40	57.5	31	Ignition
Dmeco Senior	V	D	118	48	40	57.5	30	Ignition

TABLE 2. DESIGN DATA

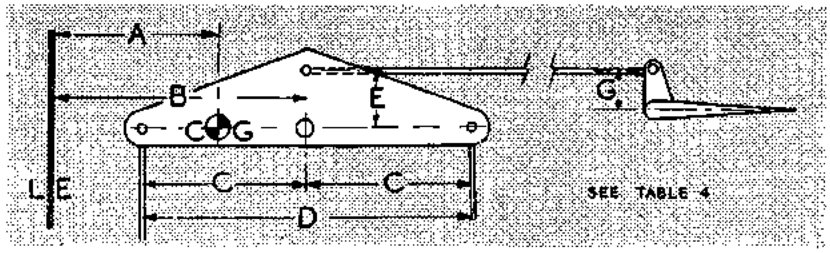
Model	Motor	Class British	Class American	Span ins.	Area S.w. sq. ins.	Aspect Ratio	Wing Planform	Wing Section Type	Wing Section % Thick	Total Tail Area Sc. Area	Total Tail Area Sc. %Sw	Elevators Area	Elevators %St.	Moment Arm Ins.
Orbit	Mills II	I	A	18	58	5.6	St. taper	Lifting	7.5	15	25	6	40	8½
Flash	Miles II	I	A	13½	34	5.4	St. taper	Lifting	10	10	29.5	2	20	4⅝
Midget	Mite Diesel	II	A	12	30	4.8	St. taper	Lifting	10	8	26.7	2	25	6
Classy	Bantam	III	A	17	51	5.6	St. taper	Lifting	7.5	19	37	7.6	40	6½
¼ Whammy ...	Bantam	III	A	12	25	5.75	St. taper	Bi-convex	10	8	32	2.5	31	7
Little Rocket B ...	McCoy 29	III	B	17	40.5	7.2	Parallel	Lifting	10	16	40	4.7	29	7½
Invader	McCoy 29	III	B	16	46	5.5	St. taper	Bi-convex	15	11.5	25	3	26	5
Dmeco Junior ...	Torpedo	III	B	16	60	4.3	Elliptic	Lifting	10	12	20	4	33	6½
Speedwagon 20 ...	Bantam	III	A	—	—	—	Elliptic	Lifting	12.5	—	—	—	—	—
Speedwagon 30 ...	McCoy 29	III	B	—	—	—	Elliptic	Lifting	12.5	—	—	—	—	—
White Fawn ...	McCoy 29	III	B	19	47	7.7	St. taper	Clark Y	12.5	17.5	33	3.5	28	7
Glo-Debbil ...	Torpedo	III	B	14⅝	34	6.1	St. taper	Lifting	10	12.2	36	3.5	28.5	4⅝
White Comet ...	McCoy 49	IV	C	21½	90	5.1	St. taper	Bi-convex	15	29	32	8	77.5	7
Speedwagon 49 ...	McCoy 49	IV	C	18	76	4.3	Elliptic	Lifting	12.5	22	29	3	13.6	4¾
Little Rocket C ...	McCoy 49	IV	C	20	60	6.7	Parallel	Lifting	10	22.5	37.5	7.5	33	8½
Screamer	Hornet	V	D	22	110	4.8	St. taper	Lifting	15	27.5	25	10	36	8½
Snowflake ...	Dooling	V	D	22	106	4.5	St. taper	Lifting	12.5	28	26	3	10	8
Dmeco Senior ...	Hornet	V	D	24	118	4.9	Elliptic	Lifting	12.5	25	21	6	24	7½
Racer	Nordec	V	D	24	108	5.4	St. taper	Bi-convex	15	24.5	22.5	7.4	30	10½
Jughaid	Hornet	V	D	19	88	4.1	St. taper	Lifting	14	26	29.5	7	27	5½
Little Rocket D ...	McCoy 60	V	D	20	60	6.7	Parallel	Lifting	10	22.5	37.5	7.5	33	9
Sizzler D	Hornet	V	D	22	72	6.7	St. taper	Bi-convex	15	26	36	6	23	10½
Speedwagon 60 ...	McCoy 60	V	D	20	80	5.0	Elliptic	Lifting	12.5	22	27.5	3	13.6	4¾

TABLE 3. STRUCTURAL DATA

Model	Class British	Class U.S.	Layout	Fuselage Crutch	Fuselage Top	Fuselage Bottom	Fuselage Mount	Wings Type	Wings Construction	Undercarriage Type	Wheel dia. ins.
Orbit	I	A	Hood Cowling	Sheet	Sheet	Sheet	Hardwood	Solid	¼ Balsa	Fixed	2
Flash	I	A	Hood Cowling	—	Balsa	Block	Knock-off	Monospar	Balsa—$\frac{1}{16}$ Covering	Drop-out	2
Midget	II	A	Uncowled or Hood	Hollow Log	Balsa	Balsa	Hardwood	Sparless	1/20 Covering	Dolly	—
¼ Whammy ...	III	A	Hood Cowling	Poplar	Block	Block	Poplar	Solid	⅛ Balsa	Dolly	3
Little Rocket B ...	III	B	Hood Cowling	Sycamore	Balsa	Block	Sycamore	Solid	¼ Balsa	Drop-out	2½
Invader	III	B	Hood Cowling	Metal	.015	Alclad	Dural	Metal	.015 Alclad	Dolly	3
Dmeco Junior ...	III	B	Uncowled	Balsa	Plank	Block	Hardwood	Sparless	LE & $\frac{1}{16}$ Sheet	Drop-out	2
Speedwagon 20 & 30	III	A & B	Asymmetric Cowling	Balsa	Plank	Block	Hardwood	Sparless	LE & $\frac{1}{16}$ Sheet	Drop-out	2
White Fawn ...	III	B	Long Hood	Maple	Pine	Pine	Maple	Solid	$\frac{3}{16}$ Balsa	Dolly	—
Glo-Debbil ...	III	B	Hood, Pod and Boom	Hollow Log	Pine Pod	Balsa Boom	Hardwood	Solid	¼ Balsa	Dolly	—
White Comet ...	IV	C	Hood Cowling	Hollow Log	Pine	Pine	Hardwood	Monospar	$\frac{1}{16}$ Covering	Dolly	3½
Speedwagon 49 & 60	IV & V	C & D	Asymmetric Cowling	Balsa	Plank	Block	Hardwood	Sparless	$\frac{1}{16}$ Covering	Drop-out	3
Little Rocket D ...	V	D	Hood Cowling	Sycamore	Block	Pine	Sycamore	Solid	⅛ Balsa	Drop-out	3
Screamer	V	D	Hood Cowling	Hollow Log	Balsa	Balsa	Hickory	Monospar	$\frac{1}{16}$ Balsa	Dolly	3
Snowflake... ...	V	D	Hood Cowling	Hollow Log	Pine	Pine	Dural	Monospar	$\frac{1}{16}$ Balsa	Dolly	3½
Dmeco Senior ...	V	D	Uncowled	Balsa	Plank	Block	Hardwood	Sparless	$\frac{1}{16}$ Covering	Drop-out	2½
Racer	V	D	Hood Cowling	Hollow Log	Pine	Pine	Hardwood	Monospar	$\frac{1}{16}$ Covering	Drop-out	3
Jughaid	V	D	Uncowled	Hollow Log	Bass	Bass	Maple	Two-spar	$\frac{1}{16}$ Balsa	Dolly	2½

TABLE 4. CONTROL AND RIGGING DATA. FIG. A

Model	Dimensions A	Dimensions B	Dimensions C	Dimensions D	Dimensions E	Dimensions G	Tailplane	Hinges	Circuit	Thrust	Rudder	Incidence Wing	Incidence Tail
Flash	¼	1½	¾	1½	—	—	$\frac{1}{16}$ Balsa	Wire and Tube	Anti-Clock	Left	—	0°	0°
Classy	¼	1⅜	¾	1½	$\frac{3}{16}$	$\frac{3}{16}$	$\frac{1}{16}$ Balsa	Wire	Anti-Clock	Neutral	Neutral	0°	0°
¼ Whammy	—	1¼	$\frac{11}{16}$	1⅜	$\frac{3}{16}$	¼	3/64 Ply	—	Anti-Clock	Neutral	Neutral	0°	0°
Little Rocket B ...	—	—	¾	1¼	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{16}$ Ply	Wire and Tube	Anti-Clock	Neutral	—	0°	0°
Invader	¼	1¾	1 $\frac{1}{16}$	2⅛	¼	⅜	Metal	Rubber	Anti-Clock	Neutral	Neutral	0°	0°
Dmeco Junior	—	2¼	1	2	—	—	⅛ Balsa	Metal and Dowel	Clock	Neutral	Neutral	0°	0°
White Fawn	—	1	$\frac{3}{16}$	$\frac{7}{16}$	—	—	⅛ Hardwood	—	Anti-Clock	2° Left	2° Left	0°	0°
Glo-Debbil	—	$\frac{7}{16}$	$\frac{11}{16}$	1¼	$\frac{3}{16}$	¼	¼ Balsa	—	Clock	Neutral	—	0°	0°
White Comet	0	2½	1¼	2¼	¼	⅜	3/64 Ply	Metal	Anti-Clock	Neutral	Neutral	0°	0°
Speedwagon 49 and 60	$\frac{7}{16}$	$\frac{7}{16}$	1⅜	2½	⅜	$\frac{3}{16}$	$\frac{1}{16}$ Ply	Metal	Clock	2° Right	—	0°	0°
Little Rocket C ...	—	⅜	$\frac{11}{16}$	1⅝	⅜	⅜	$\frac{1}{16}$ Ply	Wire and Tube	Anti-Clock	Neutral	Neutral	0°	0°
Snowflake	—	2	1½	3	$\frac{11}{16}$	¼	$\frac{1}{16}$ Ply	—	Anti-Clock	Neutral	¼ Right	0°	0°
Dmeco Senior	—	3¼	1½	2½	—	—	$\frac{1}{16}$ Balsa	Metal and Dowel	Clock	Neutral	Neutral	0°	0°
Racer	—	2	¾	1¾	⅜	⅜	$\frac{1}{16}$ Ply	Tape	Anti-clock	Neutral	Neutral	0°	0°
Jughaid	—	2½	1 $\frac{1}{16}$	2⅝	$\frac{3}{16}$	⅜	$\frac{1}{16}$ Ply	Wire and Tube	Anti-Clock	Neutral	Neutral	0°	0°
Little Rocket D ...	—	⅜	$\frac{11}{16}$	1⅜	⅜	⅜	$\frac{1}{16}$ Ply	Wire and Tube	Anti-Clock	Neutral	Neutral	0°	0°
Sizzler	—	1¼	1	2	¼	$\frac{3}{16}$	$\frac{1}{16}$ Ply	Tape	Clock	Neutral	Neutral	–2°	0°



ignition. With glow plug motors the usual loading figure is about 30 ozs. per sq. ft. Of course, adjustment can be made to the design if spark ignition is used by increasing wing area to keep the loading within desirable limits. But an increase in area will also bring an increase in drag and decrease in speed. On this score alone a racing motor run with glow plug should be better than the same motor operated on spark ignition in the same model. Against this is the greater overall reliability of the spark ignition motor and less critical fuel. Unless the correct fuel is used for glow plug running the actual power performance may be inferior to that with spark ignition.

As Table I shows, with glow plug or diesel motors, a motor weight, total weight figure of about 60 per cent. should be realised. In the smallest classes this can be improved. With spark ignition, the figure tends to fall to about 30 per cent. This is particularly true of the larger models where the extremely powerful racing motors employed demand relatively strong structures—especially the motor mount—and airframe weight tends to go up. The smaller model can have a far lower factor of safety for the airframe than its larger counterpart since the flight forces alone are considerably less.

At this stage, then, optimum loading figures can be summarised for each class, when airframe weight can also be estimated. Knowing the total weight, the required wing area can be determined and checked back, if desired, against models detailed in Table 2.

OPTIMUM LOADING FIGURES

Class	LOADING Ozs. per 100 sq. ins.	Ozs. per sq. ft.
I	16	23
II	16	23
III	20–25	29–36
IV	25	36
V	25–30	36–43
VI	25–35	36–50

Model proportions within the limits decided best follow from a study of contemporary designs, when the data tabulated in Table 2 should be useful. The modern trend is to produce the smallest possible model within the given loading limits and reduce wetted area to a minimum. The most popular form is undoubtedly the slim circular-section fuselage with hooded cowling. Where no ignition components have to be located internally the lines of such a fuselage can be reduced to a degree, adequate strength being the limiting factor.

The final problem, will, of course, be structural, and here Table 3 has been compiled to cover a number of leading types. In the smaller classes plain hollow log construction is generally adequate with insert hardwood bearers for the motor mount. As the size of the model increases, hollow log construction allied to a stout crutch is a better proposition. Frequently, the whole of this crutch is made of hardwood, sycamore being a favourite choice, so that adequate strength is maintained right back to the tail. From Class III upwards, too, pine and similar "hardwoods" tend to replace balsa for the hollow log part, hollowed right out for lightness. This is not absolutely necessary, for a comparable result can be obtained with balsa if the whole fuselage is finally bound with gauze bandage, applied with cement. The strength of a hollow balsa fuselage so treated is very high. At the same time it is still lighter than pine or bass.

Solid balsa wings are again coming into favour as aspect ratios have increased. Probably in the smallest class the saving in weight resulting from a built-up structure is very small, but built-up construction *is* inherently lighter and the difference can be quite marked when the area exceeds 75 sq. ins. Actually, the trend towards high aspect ratios is contrary to theory. A low aspect ratio wing *should* be best and lighter (or stronger for the same weight). Since the wing operates at a low angle of attack at maximum speed induce drag does not enter into the problem, which is one reason why squared or blunt wing tips are equally as effective as elliptic shapes. Straight tapered wings, it will be noticed, are widely favoured.

Thin ply is greatly favoured for tailplane construction, being very strong and reasonably light. Balsa tails are readily damaged; hardwood or ply tails usually tear out of the fuselage without breaking if given a hard blow. On the score of weight saving alone, balsa sheet is recommended for Class I and II models. Above this size the final choice is a matter of preference.

From experience in operating models with both dolly and drop-out undercarriages the writer would state his preference for a drop-out unit. Provided this is located well forwards, ground stability is excellent whereas dollies have to be very carefully designed to fit the particular model to be really foolproof. No modern speed model in any class would, of course, be fitted with a fixed undercarriage. Although the reduction in drag may not be very appreciable at speeds below about 50 m.p.h., even the smallest class of speed model can be expected to exceed this figure by a large margin and, again, the saving in weight resulting from jettisoning the take-off gear is well worth the little extra trouble.

The final table summarises control plate installation and rigging data. None of these figures appears to be critical as invariably the centre of gravity is located extremely well forward and well in front of the pivot. The pivot is very seldom located more than mid-chord aft of the leading edge of the centre section.

In general, the "D" dimensions on speed models tend to be small and the coupling of the push rod also of small dimension, so that controls are not too critical. On a properly trimmed control line model excessive control movement is both unnecessary and tiring. Only the safe minimum required for adequate control should be used, the usual criterion for "up" elevator being that required for good landings. The faster the model the smaller the control movement required. Class I and II models may require as much as 15–20 degrees up and about 10 degrees down movement. Larger, faster models seldom have more than 10 degrees up and 5 degrees down and may often have only one half of this figure.

Details of moment arm and tailplane areas follow from Table 2, where it is noticeable that the trend is towards quite long moment arms. This is in direct contrast to the modern stunt control liner, where the tail moment threatens to disappear entirely. Tail areas are, in general, not critical, but it is always best to err on the generous side. One of the main flight essentials is that the model must be longitudinally stable and too small a tail may result in a model which "hunts" i.e., pitches up and down in flight with the controls held neutral.

Flying a speed model needs very little practice. The speed to the pilot appears very much slower than it does to spectators outside the flight circle, for the pilot is turning with the model the whole time. And very little practice is necessary before contest work. Time is best spent in tuning up the motor and trying different fuels and propellers. For record work—and for some contests, at least, an anti-whipping post is used and some little practice is necessary here to get accustomed to holding the wrist on this cradle and turn round with the model. Apart from that, and finding the best propeller by actual flight checks, a contest speed model is very rarely flown except in the actual contests themselves.

G. Woolls ON DETHERMALISERS

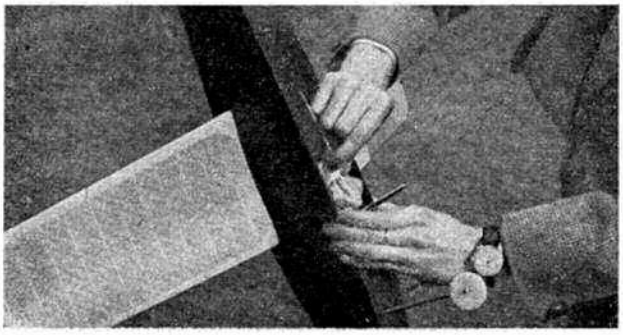
Above an enthusiast gets his model well away in the Flight Cup — note the lashed-on dethermaliser parachute of generous proportions. Photo below contrasts maestro Warring's compact stowage inside his Wakefield fuselage.

IT was a long time before I found it necessary to fit a dethermaliser to any of my machines.

I was quite bucked when I turned in a flight of more than 90 secs., but slowly these 90 secs. became more frequent, especially when strong thermals were about and I began to realise that perhaps one day one of my brain children would fly away on an extra powerful riser. In due course this happened and then, after much more perseverance, models flew away on weaker thermals and I began to consider some method of bringing them down. There are a number of ways that a model may be forced to return to earth against its will, but as the parachute seemed to be the most popular I decided to use this method.

Some years ago, when I packed up my paraphernalia prior to climbing into uniform, I had carefully hidden away a small amount of really light Jap silk, so I raided this store and got my better half to make me a parachute from it. Shroud lines were a bit of a problem. I had a job to find something that was strong, light and would not twist itself into horrible knots at the slightest provocation. Eventually I tried soft mending cotton (used for sheets, etc.), and found that it is very good for the purpose.

I got out my books and magazines to see what I could find about chute boxes and how to operate them, but I could not find one that really pleased me. As I couldn't find somebody else's idea that made me happy I designed a method of my own.



It seemed to be necessary to have a spreader to keep the shroud lines open, so I decided to use the lid of the chute box to carry out this purpose, and attached the lines to the inside of the lid—equispaced as far apart as possible. The box itself was made as large as possible and built into the fuselage using soft 1/16 sheet for the sides, and harder 1/32 sheet for the bottom as the motor is liable to bounce on the box and soft balsa absorbs more lubricant than harder material. The rear of the lid was fitted with a " catch " built up of 1/8×1/16 in. and 1/4×1/32 in. balsa as shown which engages with a piece of 1/16×1/16 in. cemented to the rear of the box. A little wire catch of 22 S.W.G. swivelling freely in alum tubing was sewn and cemented to the outside of the box front. This retained the front of the lid by means of an elastic band stretched from the wire catch to a pin embedded in a small scrap of balsa cemented to the outside of the rear of the box. A small piece of mica cemented to the front of the lid prevents the fuse from burning the lid and also the front catch from pressing into the balsa.

The chute attachment line is attached to the centre of the lid (outside) and to an elastic band at the tail in such a manner that it is in tension as the lid is fitted. Directly the forward catch is released by means of the fuse the whole lid pulls clear. This is as neat and tidy a method as I have come across and probably lighter than many. It is foolproof and I have never had the chute fail to come out.

In general I would advise the use of as large a box as possible so that the chute does not get caught. I prefer to fold the chute tightly, place into the box and drop the shroud lines loosely in on top, rather than wrapping the lines right around the chute. When not in use for long periods always allow the chute to hang loose and free (taking a tip from full size) and a frequent ironing all helps the chute to open properly on release.

A parachute is a very good way of dethermalising a model, but it does have its snags. In these days of small fuselages there is often little room to spare for a chute box, also when the model lands in a tree a parachute catching in the branches does not make retrieving any easier. The steep descent a parachute causes can be rather nerve racking too, although I have never had any actual damage caused to the airscrew by this during many dethermalised flights. Finally, should the chute get wet, its opening qualities are seriously affected.

Recently I have been experimenting with another type of dethermaliser, the flip up tail. I confess I jibbed at the idea for some time on account of the fact that, on principle, and I think it a good principle, I dislike anything that could possibly affect the position of the flying surfaces, as even the minutest change in the setting of these will materially affect the flight.

However, in spite of this I tried this method on an old Wakefield with great success. The model bucks a bit at first when the tail whips up, but immediately settles down to a vertical descent with the machine horizontal. The actual angle which the tail assumes does not appear to be critical as long as it is sufficient to stall the wing completely, about 30 to 40 degrees is satisfactory.

I had seen no article in an English magazine as to how this operation should be accomplished, although " Model Aeroplane News " has published an article on the subject. However, the method described here is of my own design and it has proved to be successful. A length of alum tube is bound to the leading edge of the stabiliser adjacent to the fuselage, this tube fits between two wire hooks (20 S.W.G.) bound to the longerons. A length of 20 S.W.G. wire passing through the tubing is bent down on each side into hooks which fit the fuselage. The small hooks previously bound to the longerons are engaged between the leading edge and the wire saddle.

At the rear a dowel firmly cemented to the stern post passes through a reinforced hole in the stabiliser trailing edge and protrudes through sufficiently to allow an elastic band to be looped over. The other end of this band is hooked onto a pin

forced into the lower end of the stern post. This band is, as usual, cut by the fuse. The actual "mechanism" consists of a control horn of sheet balsa and bamboo cemented to the centre rib of the stabiliser over which another elastic band is passed and stretched back to a small hook to the stern post.

A stop bar of about 3/32 in. diameter bamboo located between two side plates is fitted in such a position to limit the movement of the stabiliser to between 30 and 40 degrees to the horizontal.

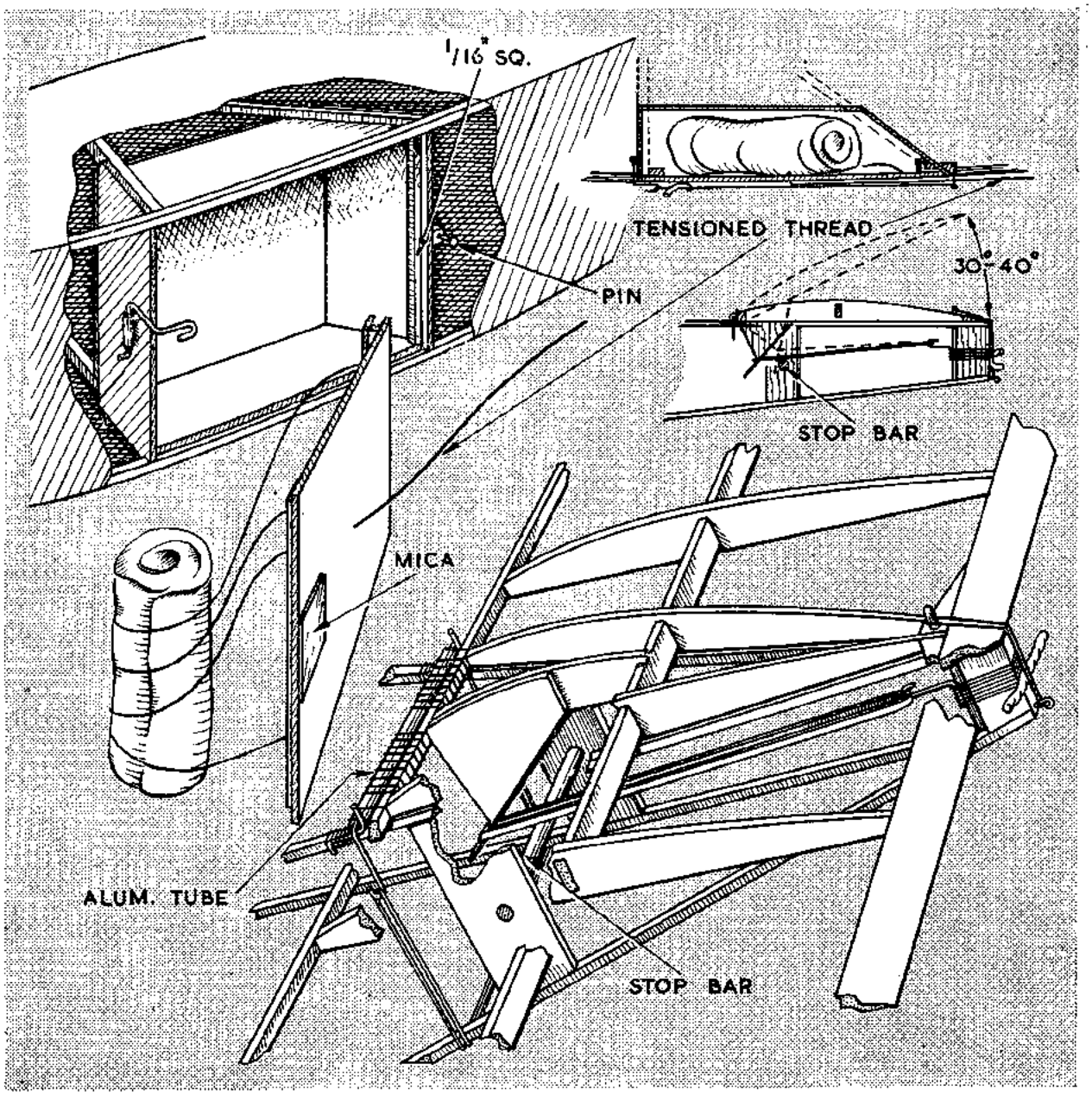
I fit the stabiliser as follows: hook the horn on to the operating band and push the stabiliser forward making sure that the horn clears the stop bar and engages the longeron hooks. Pass a strong band round the saddle hooks and then pull down the rear end and fit the retaining band.

If the front hooks be fitted slightly askew (forming a hinge similar to that often used on a folding prop, so that when the stabiliser goes up the fin is offset) the model descends in a flat spin exactly like a maple seed.

A word of warning! Don't use a vertical peg leg undercarriage with a model equipped with a flip up tail. Such an undercarriage will not absorb the landing shock and something is likely to go. A friend of mine used a flip up tail on his petrol model which had a single peg leg. He succeeded in shoving the undercart leg right through the top of the fuselage.

Cheap cigarette lighter wicks make excellent fuses and do not need treating with saltpetre or similar chemicals. Round lamp wick about 3/16 in. diameter as used for those little fairy oil lamps burns slowly and so a long flight can be made without a mile of fuse hanging out in the wind.

Always light your fuse before every flight whether test or otherwise. I forgot to light my D/T fuse on the final test flight prior to last year's Gutteridge and although I had only put on half power a thermal sneaked up on me and after a breathtaking chase my machine disappeared after 5 minutes. It put me out of the Gutteridge and taught me a lesson. Don't you get caught as well!!



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

DEAR SIR,

Congratulations to Squadron Leader Lord on his fine article on jet models. Several of us in the local club are flying jets and we feel that in spite of the prejudice being shown by certain of those "in high places" jets will soon become deservedly popular. As for the so-called danger of jets, we agree with Squadron Leader Lord that common sense is all that is required to avoid accidents. Our own models have exceeded 130 m.p.h. on numerous occasions, yet we have never had the slightest mishap.

One factor which could make jets dangerous, however, is the imposition of the rule that models must weigh four times as much as the engine. Models built to this rule will certainly be slowed down, but even so, the extra weight will cause a great increase in the pull on the lines. Further, all will appreciate that the momentum of a four pound model at 100 m.p.h. is much more than that of a 30 oz. model (the average weight of a hot speed model) at 140 m.p.h. I have heard it argued that this rule assures that models shall "resemble actual aircraft and not be merely projectiles" surely faulty reasoning! Squadron Leader Lord states that presumably for safety, model jets should not weigh more than 3 lbs. In other words, we (and several others, some, quite prominent modellers) consider this rule very unsatisfactory and believe that speed modelling has enough natural difficulties, without the imposition of further complications, and hope to see this 4x (jet) engine weight rule removed. We would like to know the views of other jet or speed modellers on this matter, too.

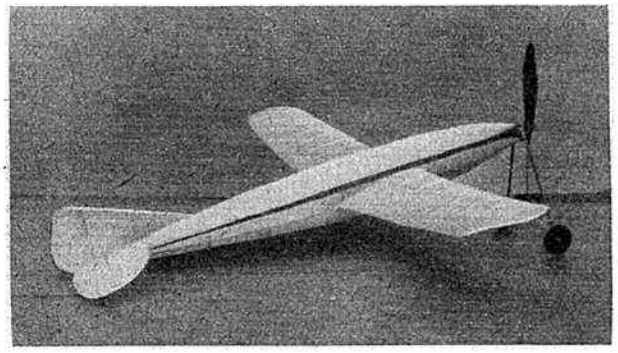
Worksop, Notts. P. G. RUSSELL.

DEAR SIR,

Upon reading through your April issue the newcomer to aeromodelling is rather led to believe that the Streamlined-Slabsider, that we know of to-day in Wakefield events, has been developed since the last war. For record's sake I think it should be pointed out that one of the first—if not the first—of such models was Bert Judge's winning model of 1936.

(*J. W. Kenworthy and the Editor were using this in* 1933!).

Being a "true-streamliner" fan myself, I have often wondered who originated this type of model for Wakefield events. While I hasten to state that I make no claim to this distinction I am enclosing a photograph of a model which I built in 1930 and, although a mid-wing job, it carried most of the external features which we see to-day, including a cantilever undercarriage which was not generally introduced until 1938-39. The wing, for lightness, was built in with the fuselage and as the whole model was made of spruce and birch it can hardly be said to be the forerunner of to-day's design, and which I understand is generally acknowledged as R. N. Bullock's brain-child. However, if any other "old timers" can produce evidence of early streamlined Wakefields, I think it would be most interesting.



Regarding P. R. Payne's letter in the April issue ". . . pointing out Warring's error . . ." I think that a good many aeromodellers, like myself, assess a man's real ability by what he does rather than the amount that he writes and although R. H. W. probably writes as much, if not more, than P. R. P., Warring is, to most of us, known for his practical successes as much as his theory. Therefore, if an article bears Warring's signature, many know that it carries the seal of practical application. I am all for differences of opinion but I shall be much surer of Mr. Payne's opinions when he proves Mr. Warring wrong "on the field."

Burgh Heath. P. T. CAPON.

DEAR SIR,

Obviously, from his letter in the April AEROMODELLER, Mr. Payne is expecting an answer from me. But his comments are verbose rather than factual and there are very few points which can be answered briefly. L.S.A.R.A. Report No. 6, to which he refers, comprises some six large foolscap pages. It would need a similar length "letter" to criticise it in detail and I very much doubt that it warrants that space or publicity. I always try to give useful facts or data in my writings—not try to tell readers what *should* happen *theoretically*. Theory is a two-edged weapon. A lot of things can be "proved" by mathematics. I can offer a fairly reasonable "proof" that two equals one*—but I find it hard to get that fact accepted! Ever thought of checking your "Taplin performance" figures, Mr. Payne?

Apropos of L.S.A.R.A. Report No. 6 I will say that Walker goes to extreme length to introduce "spiral instability" and "oscillatory instability" into towline gliders, when in both cases he is mainly referring to directional instability. And I will also quote one passage which I am sure will interest such struggling power model tyros as Carl Goldberg, Leon Shulman, Don Foote, Gussie Gunter, Bill Dean, and other (including myself), *viz.*: ". . . the contribution of the fin to spiral instability is unimportant as a change in fin area increases n_r and n_v equally" (i.e. the two opposing stability factors in the stability index equation).

I once wrote an article on spiral stability, Mr. Payne. Read it. It explains that we place an importance of the relative disposition of the fin area—and the C.L.A. so-called (by you) theory is a convenience which appears to work. This kind of theory was worked out the opposite way to the theoretical methods you employ. We had a design layout which proved unstable. First we found the answer by flying it out and then put it in the form you object to. But despite the fact that "side area method has no sound foundation and could easily give incorrect results", quite a number of modellers have found anti-spin fins the answer to their own particular spiral instability problem. And above all, Mr. Payne, you then talk about *guessing* your own fin areas. Who are you trying to fool with your formulæ and nomograms?

R. H. WARRING.

* *Take the expansion of log $(1+x)$ when $x=$ the limit of 1. Multiply by 2 and partially simplify, when you get back to the original series; i.e. 2 log $(H+x)=$log $(1+x)$, or 2—1.*

American News Letter

*** *** *** *Bill Winter writes ...*

THE gentleman with the cigar (see snapshot) is our C. O. Wright, president of the Academy of Model Aeronautics, and an ardent builder since the days of the first World War. As much as we would like to tell you more about "C.O.", we have got to get off our chest some dope about the airplane he is holding. This is Carl Goldberg's new Super Zipper, which, according to the grapevine, is finally to go on the market. With the industry reluctant to touch free flight, proponents of this type of flying have been getting by with pre-war kit types, like the Sailplane, Zipper, and Bombshell, and various originals. About the only post-war free-flight kit of national repute has been Dick Korda's Powerhouse.

Among the more interesting features of Goldberg's latest is low dihedral—which will do things for the glide, a timer on the starboard side of the fuselage connected to a pop-up tail dethermalizer, and a fully-enclosed engine, accessible through a door in the side of the "pylon." The entire engine and landing gear assembly snaps into place in the fuselage bottom and is readily removable for servicing and repair. The single wheel gear appears to retract rearward and the prop (here shown) is a two-blade folder.

Wing construction apparently features multispar construction with two spars on top and two more on bottom. The upper leading edge section is sheeted in. Like the Sailplane, the Super Zipper probably will display phenomenal glide. When the bigger airplane was developed before the war, the writer once was shown eleven sets of test wings used indoors for the comparative study of airfoils. Powerplant in this particular Super Zipper is an Arden ·199. On the first flight, C. O. Wright's test job caught a ground riser but dethermalized.

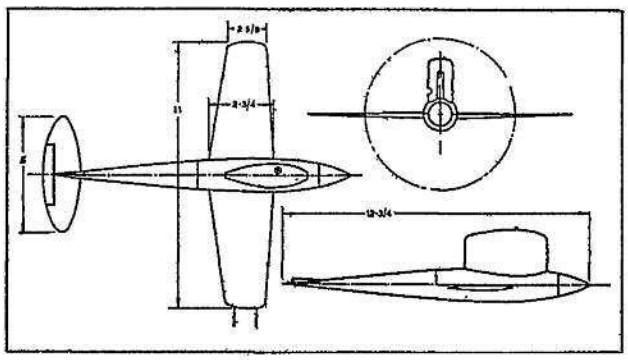
Further indication of the latest trends in free flight is Vernon Oldershaw's new pylon described in "Air Trails." For ·29 cubic inch displacement engines (·24 to ·32) it has a wing area of 500 square inches. The airfoil is a 15 per cent. thick hybrid Davis. Whereas Carl's new machine has his usual short-nosed design, Oldershaw's reveals at least five bulkhead stations forward of the wing. He uses two remade Austin timers, one to shut off the flow of fuel to the glow-plugged engine and the other to activate the pop-up tail dethermalizer. With no wing loading restrictions in the rules for the past two years, free flight airplanes are now settling down to a new combination of loadings found best to compromise between power and glide. Oldershaw's new design has about 90 square inches more area than would have been used for a minimum airplane under old rules.

H. A. Thomas' grand article on speed practice in our Southwest (in recent AEROMODELLER) makes it difficult to pass on really timely info in this field. But perhaps representative of a slightly different school of thought is the fast airplane shown in the accompanying three-view, a McCoy 19-powered record holder designed by Dick Rigney, Long Beach, California, and piloted by Lew Mahieu to the 120·76 m.p.h. mark about six months ago. This ship features a symmetrical-section wing placed on the thrust line with the upper forward part of the fuselage lifting off. The wing is made from ·088 aluminium sheet. (Many of these California airplanes are wholly or part metal; some have turned engine sections made from magnesium and the writer has seen a Dooling come through unscathed after a 145 m.p.h. impact on concrete.) Rigney's fuselage is turned mahogany, the stabilizer plywood, but weight is only 9¼ ozs. A 6¼ inch diameter prop, with 10 inch pitch, is cut down from an 8–10 Ex-Cell. Fuel was Supersonic 100 with 20 per cent. nitro-methane.

There is also a continued, gradual trend to light loadings in stunt, with as much as 400 square inches for a Class B motor, ·201 to ·300 maximum displacement (23's, but mainly 29's, being needed). Construction of wing and tail frequently resembles free flight. What the boys have discovered the hard way is that the abruptness of manoeuvre is tantamount to boosting wing loading and those so-called mushes actually are high-speed stalls induced by powerful elevator action. First step was to increase area and when machines began to resemble kites, construction was lightened to reduce weight and consequently wing loading. A humorous aspect of the problem is that Dave Slagle's stunters always were light but this was more criticized than appreciated. Too many hobbyists assume that weight means nothing in U-control. Having learned our lesson three years ago in speed, we now see a repeat performance in stunt. Incidentally, these modern stunt machines have well weighted wing tips on the outside.

Business may or may not be bad, one always hears so many rumors, but the Model Industry Association is holding its annual convention and trade show in San Francisco on June 13–17. A special train was chartered from the Chicago area (while mid-west, Chicago is well to the east in a strict geographical sense). . . . One of the big hits of recent months was Monogram's introduction of their prefabricated Speedee Bilt models, 75-cent. kits of various lightplanes. These kits are a bold step forward in merchandising. For example, the fuselage side and other balsa parts are printed in a solid color of the appropriate hue. Nose and prop are completely finished from moulded plastic, which permits realistic air scoops, grilles, etc. The one-piece wing is milled from balsa after the manner of the big Piper Cub scale-stunter by the same firm. This wing presents a solid top surface, routed out underneath to leave just reinforcement spar and edge ridges. This undersurface is covered with ribs and tissue. Inasmuch as the wings lack dihedral, experts are inclined to criticize without realizing that industry has often admitted that over 90 per cent. of the youngsters always were unable to complete small flying scale kits. Monogram's new kits practically ensure a finished model. To be practical, this is vastly more important to both the new builder and the industry. (Anyway, it is a simple manner to sever the wood and glue in dihedral.)

Backing up these clever kits, Monogram provides give-away paper gliders with rubber bands attached, free rulers for dealers, mats, easel displays, window streamers, and throw-away circulars. They also have going a national contest with prizes to winners who write best letters about building the kits. And, of course, one must mail in a box top! . . . While on the subject of industry, did you hear that Comet bought up Megow at auction early this spring? At the peak of business, both firms had the better part of 1,000 employees.



MILES M.28, MERCURY IV

PRODUCED as a two/three seat trainer, or four seat communications aircraft during the latter years of the war, the Miles M.28 gave some idea even in those days as to the future design policy of the Miles organisation with regard to post-war civil aviation. In actual fact the design work had been started in 1939 by Mr. G. H. Miles, and the machine had been intended as a successor to the popular Monarch and Whitney-Straight designs of the middle thirties. The M.28 also has the distinction of being the first light aeroplane to be built during the war, and it will also be remembered as the forerunner of the M.38 Messenger, for it was from the M.28 U.0223 fitted with the now familiar fixed knuckle-jointed undercarriage and wings of 6 ft. greater span but retaining the twin fin and rudder arrangement of the M.28—the central fin being added at a later date after flight trials had shown that by its addition greater directional controllability could be obtained at speeds at or near the stall, that the first Messenger was evolved.

Originally there were four variants of the Mk. IV design, the Mk. I being a dual control trainer, with a Gypsy Major IIa engine, fixed pitch airscrew, mechanically operated undercarriage and vacuum operated flaps.

"Aeromodeller" Photos:

The Mk. II was a three-seater trainer with dual control, Gypsy Major or Cirrus Major engine and hydraulically operated undercarriage. The Mk. III three-seater triple control trainer had vacuum operated flaps, undercarriage and air brakes, and had a Cirrus Major III engine.

The Mk. IV described here is a four-seater single control (pilot sits on the port side) light communications and/or private owners machine fitted with full blind flying equipment and radio.

Since the war the five M.28's have been allotted civil registration letters as follows:—G-AGVX-a Mk. IV machine formerly, U.0243—which was sold to an operator in Switzerland in April 1947, where it was re-registered HB-EED, only to be restored to this country in March 1948. G-AHAA, a Mk. VI registered to Sir Harold Hartley, chairman of B.E.A. in 1946, and now owned by K. E. Millard & Co., of Wolverhampton. G-AISH, a Mk. III was scrapped in February 1948, G-AJFE, Mk. V, and G-AJVX, a Mk. VI which had seen service in the R.A.F. as HM.583.

Our photographs show G-AGVX in flight near Watford, piloted by Miss Sharpe of W. S. Shackleton Ltd., who are offering the machine for sale complete with Certificate of Airworthiness for £1,150.

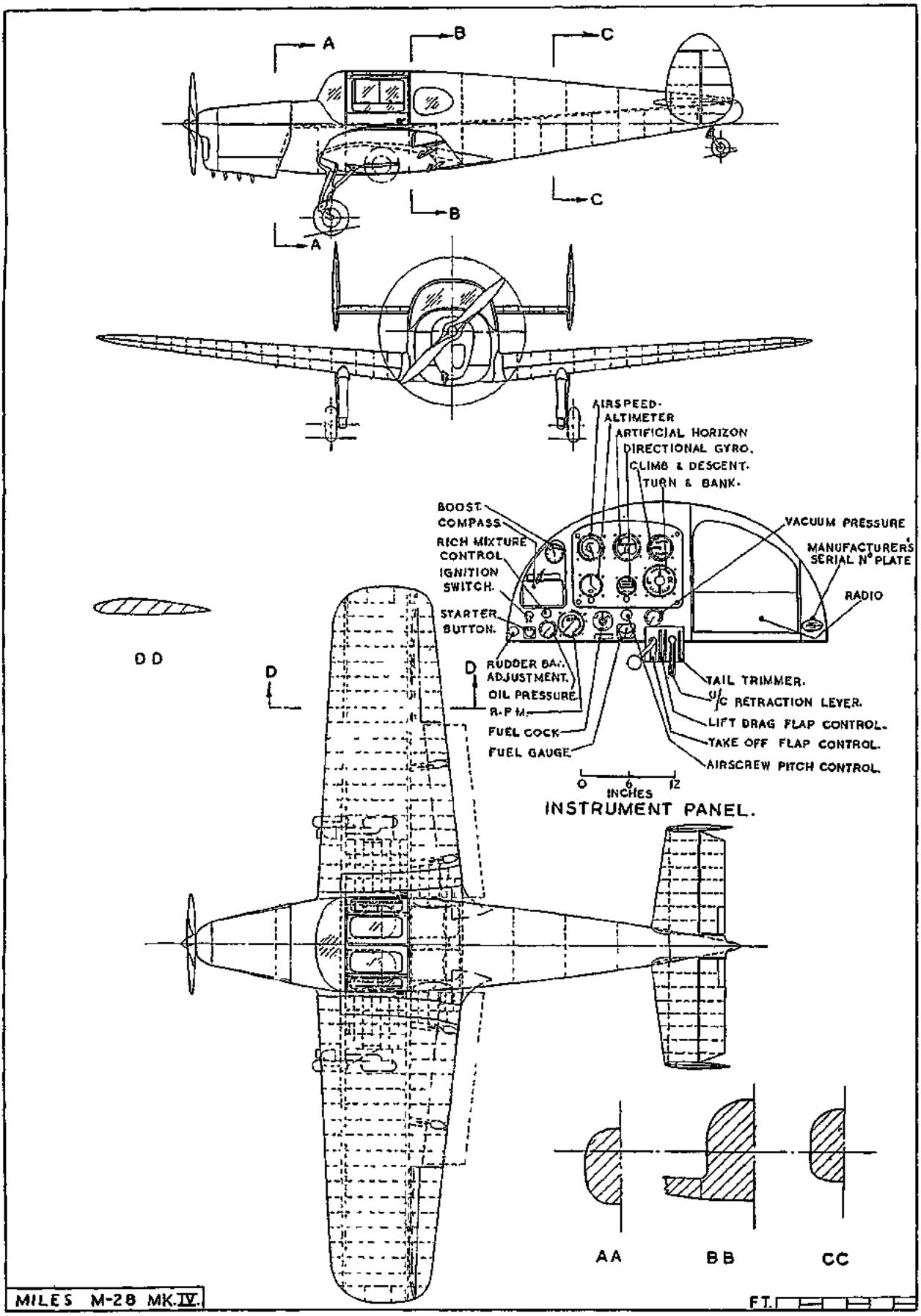
Construction. All wood, and in accordance with standard Miles practice, the fuselage, wings and tail surfaces being plywood covered. The undercarriage retracts backwards and upwards into the wing structure, leaving a small portion of the wheels exposed when in the fully retracted position.

Miles patent low-drag pattern flaps are fitted to the portion of the wing trailing edge inboard of the ailerons, and these, together with the air brake in the form of a flap hinged to the underside of the fuselage are vacuum operated from the cockpit. 24 gallons of fuel are carried in two wing tanks. Power is supplied by a four-cylinder inverted inline aircooled de Havilland Gipsy Major IIa engine driving a controllable pitch metal airscrew.

Colours. G-AGVX. Aluminium all over. Registration letters and fuselage flash pale blue outlined in dark blue. The letters on the wing appear on the upper surface of the starboard wing and lower surface of the port wing with the tops of the letters adjacent to the leading edge.

Specification: Length: 22 ft. 0 in. Span: 30 ft. 6 in. Height: 8 ft. 6 in. Wing Area: 160 sq. ft. Tare Weight: 1,480 lbs. Total Loaded Weight: 2,500 lbs. Max. Speed: 175 m.p.h. Cruising Speed: 160 m.p.h. Stalling Speed: 40 m.p.h. Range: 700 miles.

¼ in. to 1 foot reproductions of the G.A. drawing, price 1/- from A. P. S., copies of the photographs at our usual prices from Eaton Bray Studios.


A
B
C
AIRSPEED.
ALTIMETER
ARTIFICIAL HORIZON
DIRECTIONAL GYRO.
CLIMB & DESCENT.
TURN & BANK.
BOOST.
COMPASS
RICH MIXTURE CONTROL
IGNITION SWITCH.
STARTER BUTTON.
VACUUM PRESSURE
MANUFACTURER'S SERIAL N° PLATE
RADIO
D D
D
RUDDER BAR ADJUSTMENT.
OIL PRESSURE.
R.P.M.
FUEL COCK
FUEL GAUGE
TAIL TRIMMER.
U/C RETRACTION LEVER.
LIFT DRAG FLAP CONTROL.
TAKE OFF FLAP CONTROL.
AIRSCREW PITCH CONTROL.
0 6 12
INCHES
INSTRUMENT PANEL.
AA
BB
CC
MILES M-28 MK.IV.
FT.

TECHNICAL TOPICS

by P. R. PAYNE

THE "Aeromodeller" torque bars—so called because the publishers financed the necessary research—have had a chequered history dating from late in 1946. Even now full use cannot be made of them because there is no accurate rev. counter on the market, but by taking say ten suitable bars it is easy to obtain a fairly accurate *torque* curve from an engine. This curve can then be converted into b.h.p.

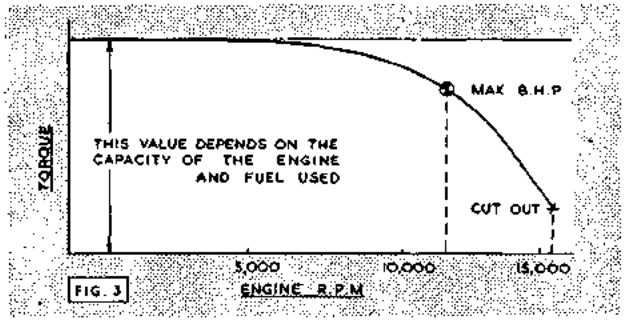


FIG. 3

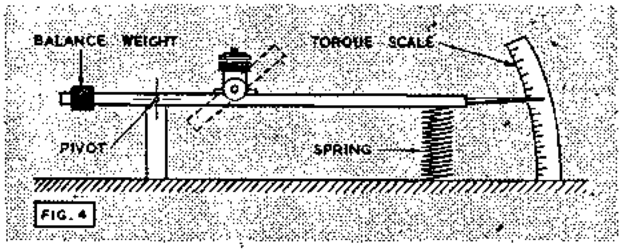


FIG. 4

TABLE

Dia. (Inches)	Thickness (Inches)	Width (Inches)	Edge (Inches)	Torque (r.p.m.)² / 1000
6·02	0·434	0·875	0·002	0·229
6·02	0·434	0·875	0·016	0·212[1]
7·52	0·426	0·870	0·012	0·463
9·02	0·433	0·874	0·004	0·990
10·51	0·435	0·872	0·002	1·79[1]
12·02	0·438	0·876	0·008	2·84[1]
13·54	0·435	0·874	0·012	0·0469

The reasons for this roundabout way of getting b.h.p. are firstly, that we have only to square the r.p.m. to find torque, whilst it must be cubed for b.h.p. Thus any error in the rev. counter reading does not have such a serious effect. Secondly, the torque curve is almost invariably of the form shown in Fig. 3 (except at tick-over speeds) and thus it is easy to see where the correct curve should lie, even if the measurements are widely scattered.

It does occasionally happen that an engine "resonates" at a certain speed, with the result that the torque is materially increased. On the b.h.p. curve this may show up as two maxima or "peaks" such as that very remarkable curve put out by the manufacturers of the new Amco. The L.S.A.R.A. have measured the same effect on one of the new Arden designs, but normally it is very rare.

An alternative function of torque bars is the actual measurement of r.p.m., but for this a torque balance must be made (Fig. 4). With this method the engine is started up with the torque bar in position and the torque measured with the balance. The r.p.m. can then be read from the torque bar calibration graph. Provided the balance is reasonably made, this method is even superior to using a stroboflash, unless the L.S.A.R.A. "cross-check" technique is used: and this is far too cumberous and expensive for general use, in fact it is believed that the L.S.A.R.A. actually use torque bars as a check on their electrical rev. counters.

Figs. 1 and 2 are L.S.A.R.A. calibration curves for torque bars with a 7/8 × 7/16 in. cross-section, which were found more suitable than the larger ones described in the March issue. As a result of these extremely accurate measurements it has been found possible to complete the general theory[1] with some confidence in the results. The following formulæ can be applied to any bar whose cross-sectional dimensions are in the ratio of 1 : 2, for any diameter.

$$\text{Torque (Ft. lbs.)} = K D^3 n^2 \qquad (1)$$

where

$$K = \frac{1{\cdot}234\, t}{D}\left(K_{DO} + \frac{{\cdot}00002575}{D}\right) \qquad (2)$$

and for r.p.m. measurements:

$$n = \sqrt{\frac{Q}{1{\cdot}234\, D^4 t \left(K_{DO} + \frac{{\cdot}00002575}{D}\right)}} \qquad (3)$$

$$\text{Finally b.h.p.} = Qn\ 87{\cdot}5 \qquad (4)$$

In these equations:—D=Torque bar diameter (feet), t=Torque bar thickness (feet), n=revolutions per second, K=Torque coefficient, K_{DO}=profile drag of bar section=·00118 where the edges of the bar are sharp,=·00108 where they are rounded off to a radius of ·012 inches (i.e. three or four strokes with glass paper). Q=Torque in ft. lbs., e.g.:—

A bar is made 7/8×7/16 in. in section and diameter 10½ ins.

From equation (2) the torque co-efficient will be:—

$$K = \frac{1{\cdot}234 \cdot 0 \times 3645}{{\cdot}875}\left({\cdot}00118 - \frac{{\cdot}00002575}{{\cdot}875}\right)$$

$$= {\cdot}0514\ ({\cdot}00118 \times {\cdot}00002945) = {\cdot}0000621.$$

Ref. 1. L.S.A.R.A. work on torque bars has been under the "commercial test" scheme, but a complete report on the subject will shortly be issued to members

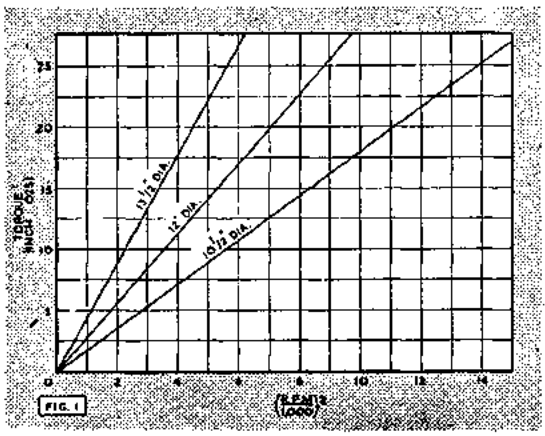


FIG. 1

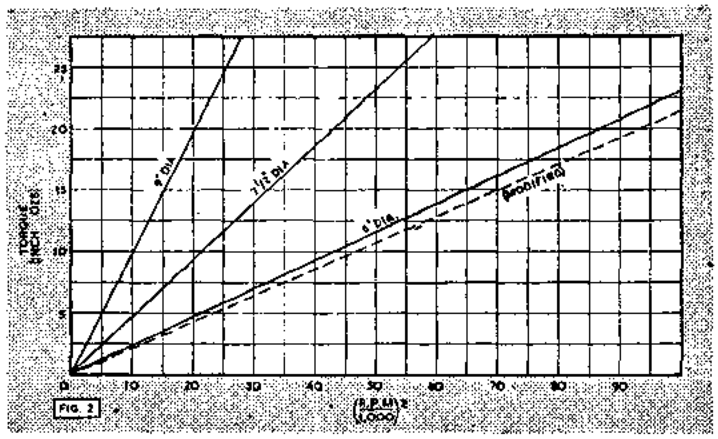


FIG. 2

H. MacPhee of the Reading Club holding for J. Frampton in the Gutteridge Trophy during the South Midland Area Rally.

CLUB NEWS

BY CLUBMAN

WORD just received from Frank Zaic indicates that arrangements for the selection of the American Wakefield Team are not going too smoothly, undoubtedly the outcome of the dates for this event and the American Nationals clashing. Pity, as I know a number of the leading lights in the States would have been visiting us for the Wakefield if their business commitments did not place their Nationals first.

I am not aware of the exact details of the method they are adopting for team selection, but any duplicating of our double-eliminator method is highly complicated by the greater distances they have to cope with. Let us hope they are able to overcome these difficulties, which I have no doubt they will just in time!

Everything is building up for a first class meeting at Cranfield, now announced as the official venue for this important International event. We hear that so far eleven countries are sending teams or models, and that number may yet be increased. Our South African correspondent informs us that a team was selected at their Nationals held at Easter, "Jaguar's" placing first and second. It is anticipated that the S.A. Air Force will fly the models over, also the team members if those individuals can get the necessary time off. Here's hoping they can manage it, as proxy flying is at best a poor substitute for the owners themselves.

Details of a remarkable flight are to hand from our old friend C. Austin of Londonderry—and it's not a piece of Irish blarney either, though some may say a leprechaun had something to do with it—said animal of course being an Irish gremlin. Austin's Mills 2·4 powered model took off from the local 'drome at 9.50 p.m. on Monday the 9th May, the large Bat tank being full. The timer (yes, you've guessed it) did not function, and the model finally disappeared into a blue sky. The wind remained in the same direction nearly all night till the land/sea breezes started in the early morning. Now comes the amazing part—the model was observed to land in a small lake only 200 yards from the take-off spot at 5.45 a.m. the next morning.

All the club saw the take-off, and a family of four living in a house on the edge of the lake saw it land, the reason for their unusually early rising being the advent of a special Catholic Feast day which meant 6 a.m. Mass. The eldest son took a boat out and retrieved the model before it got too wet, and thus ended what must surely be the world's most unusual flight by a model aircraft, some 8 hours of night flying, and a return to base. Submitted sketches show that the model must have travelled some miles inland, only to be turned back when the breeze direction shifted. The local Met. Station confirmed that the wind changed direction at 4 a.m. from approx. 040° to 190° following a dead calm from 2 to 3.45 a.m.

I am pleased to announce the formation of two Scottish S.M.A.E. Areas, these being the North East and South Eastern sections. Both competed in the Gutteridge, and we shall at long last see an official Scottish contingent aiming for a place in the British Team for the Finals on July 31st. Welcome from a Sassenach!

A number of Areas held Rallies coinciding with the Wakefield Eliminator, and taking it all round, the weather encountered was some of the best yet.

The **NORTH EAST AREA** report almost ideal conditions and a programme well supported by most of the clubs.

OPEN GLIDER	D. Shawcross	(N. Shields)	7 : 47·5
	R. Elsdon	,,	5 : 13
JUNIOR RUBBER	Lillburn	(N. Shields)	3 : 25
	Harris	(Blaydon)	1 : 51
FLYING SCALE	J. Teasdale	(Blaydon)	
	Sherratt	(Newcastle)	
C/L STUNT	C. Stevens	(N. Shields)	82 pts.
	W. J. Ford	(Teeside)	47 pts.

Walsall Airport was the venue for the **MIDLAND AREA** events, which comprised a power/ratio and C/L stunt in addition to the Gutteridge. Weather was tip-top, and many fine flights were witnessed. Results were :—

GUTTERIDGE	G. E. Salt	(Loughborough College)	738.2 agg.
	H. W. Revell	(Northampton)	649·4 ,,
	R. C. Cotton	(,,)	617 ,,
POWER/RATIO	C. A. Threlfall	(Stourbridge)	75·52 ratio
	R. C. Monks	(Birmingham)	17·85 ,,
	J. Hill	(Wolves)	11·46 ,,
C/L STUNT	N. A. Long	(Sth. Birmingham)	255 pts
	B. G. Hewitt	,,	255 ,,
	I. M. Yule	,,	252 ,,

Threlfall's flight was 15 : 6·25 from a 12 second engine run, whilst the Stunt event was decided on a fly-off after the top two had tied on general flying.

The **SOUTH WESTERN AREA** will hold their first Area Rally at Exeter Airport on Sunday July 24th, from 10.30 a.m. to 6 p.m. Events will include Rubber, Glider, Power/Ratio, C/L Speed and Stunt.

The **SOUTH MIDLAND AREA** held their first Rally at Aldermaston Aerodrome on May 15th, all contests received the benefit of the excellent weather conditions with the exception of the last, the Control Line event. This received the attentions of a cloudburst and has been postponed to a later date.

CONCOURS D'ELEGANCE		
R. Jeffery	(Reading)	90 points.
H. Hervey	(Icarians)	70 points.
OPEN GLIDER		
N. Reeve	(High Wycombe)	1291 secs.
R. Sandy	(Henley)	1056 secs.
JUNIOR RUBBER		
R. Carter	(High Wycombe)	301·2 secs.
J. Dillamore	(Icarians)	168·2 secs.
POWER RATIO		
G. Gunter	(Bushy Park)	10·275 ratio.
H. Wells	(Winchester)	7·7 ratio.

April 24th saw the start of the 1949 season for the **ISLE OF THANET M.A.C.** at Manston Aerodrome with a full programme of comps. The weather was fine, but no thermals could be found, and times in general were low. P. Davies carried off both the rubber and glider events, flying a "Warring

Lightweight" and "Saint" respectively, and also won the Concours with the same models.

The **CANTERBURY PILGRIMS M.F.C.** (formerly the East Kent club), successfully held the first of a series of sub-area meets in perfect weather, and, although times were not startling in the contests, several flyaways were witnessed. Rubber honours were taken by S. Barlow of Folkestone with an aggregate of 4 : 10·6, sailplane by K. Rosenz, also of Folkstone, with 2 : 07·5, and the power ratio event by G. Stanies of Canterbury with a ratio of 7·15. The next meeting of this series takes place at Dover in July.

Co-operation with the local authorities has been successfully negotiated by the **READING & D.M.A.C.** who have been granted facilities to fly control-line stuff at Patner Park.

Members of the **NORTH KENT M.A.S.** managed to get nine flights of over five minutes at Fairlop during the "M.E." and "Flight" comps, and six models were lost in spite of dethermalisers. In the first round of the London Area cup they defeated West Essex, and followed this up by similarly treating St. Albans. D. Rumley was the winner of a junior contest with a aggregate for two flights of over 8 minutes.

Apparently **NEWBURY & D.M.A.C.** are going all out to lose their models, having had five flyaways in the past three weeks, four being recovered from distances up to 12 miles. C. Allen won a recent glider event with an aggregate of 7 : 06, followed by D. Willsher, 5 : 26 and J. Kemp, 4 : 12.

NORTHAMPTON M.A.C. have got off to a flying start this season, as witness members' successes in S.M.A.E. comps to date. (Who said the "Jaguar" is unstable in a high wind? They should have seen the Northants boys on Gamage Cup Day.) Howard Boys has resigned Presidency as he no longer lives in the county, and this office is now filled by Mr. C. M. Newton of Sywell Aerodrome.

Two 'lost' cups having been found again in the **BUSHY PARK M.F.C.**, these are being donated to the best juniors in S.M.A.E. comps throughout the season. Controlining is still going strong with the club, and news is given of a number of interesting models that we look forward to see proving themselves in contests in due course. Whilst flying in the Astral Trophy, John Kish's "Frog 100" powered model cleared off on its first flight for a time of 14 : 30·5 from a 10 second motor run With a white fuselage, and orange wings etc. news of this model will be welcomed.

Picked against Northern Heights in the first round of the L.A. Cup, **RAVENSBOURNE M.F.C.** put up a stout fight, but went down to a score of 1784·8 to 1224·2. J. Simmons had bad luck when his Jaguar spun in after three minutes, pushing the nose back to the tail. On his last glider flight, E. Walker put up a time of 5 : 14.

The **HUDDERSFIELD AIR LEAGUE M.A.C.** announce their control-line rallies of June 26th and July 3rd, also the second Annual Rally on September 4th. The C/L events will take place at the Cricket Field, Paddock, Huddersfield, and the other at David Brown's Airfield, Crosland Hill.

Members of the **SAINTS** (Northants) **M.A.E.** attended the Evesham Rally in force, N. Barry being the most successful member with a first (Power, times 2 : 36·5 and 12 : 33) and a third in the rubber event with an aggregate of 7 : 26.

Following a bad spell, the **EAST LONDON M.A.C.** is beginning to augment its membership. A goodly number turned up for a glider contest at Fairlop—also a strong gale!—but some good times were put up in spite of the conditions. T. McNess placed first flying his "Fugitive" for an aggregate of 4 : 37, his best flight being 3 : 10 o.o.s. (Lost; One red and white "Fugitive", last seen heading Ilford way!)

That "Fairlop Tornado" appeared once again on April 24th. Bods were taking it easy after chasing models over the horizon, when the wind took a hand in the shape of a minor whirlwind, whipping several models and boxes into the air.

Gliders have been performing well in the **DAGENHAM & D.M.A.C.**, D. Bertrand winning the Wreford Trophy with an aggregate of 8 : 40, though he was lucky in that E. Mann's "Thermalist" cleared off on a trial flight, 24 mins. o.o.s. This flight made a new club record, and was recovered from 9 miles away, after a total flight time of 9¼ hours. Junior member A. Headley won a later comp. with an aggregate of 3 : 43, but I learn that another junior had put up a nice time of 18 : 32 o.o.s., though it is not stated whether this is a record or not.

The members of the **SALISBURY & D.M.E.S.** were rather shaken to see a full coach load turn up from the Winchester and Eastleigh clubs, and more so when said visitors proceeded to clean up the events. E. Higlett won both the stunt and speed C/L classes with 200 points and 54·1 m.p.h., whilst Mr. Walsh won the sailplane class with 4 : 24 o.o.s. and the rubber event with an average of 1 : 16·4

The newly formed **WAYFARERS M.A.C.** seem to be going places in a hurry, and have cleaned up some nice comps. recently. B. Woolland currently holds the glider record with 9 : 57, C. Taylor the rubber class with 5 : 45, W. G. Farrow the Wakefield with 3 : 05, and P. A. Ward the power class with a ratio of 9-1. An unofficial 'record' was made by Pat Ward's "Ouragan" powered ship when he chalked up over 10 minutes from a 5 secs. engine run.

P. E. (Natsneez) Norman gave the **TUNBRIDGE WELLS M.A.C.** an interesting natter, illustrating same with his well known scale type models utilising pendulum controls. A successful exhibition saw K. D.Bardon the winner with his "Albon" powered "Magnette", prizes being awarded by Mr. Leslie Mitchell of B.B.C. fame, who is a keen aeromodeller.

Honours in the **MERSEYSIDE M.A.S.** go to Secretary Roy Alexander. Whilst doing a grand job in his official capacity he has been stealing the honours in recent contests, putting up the Club's best times in the Flight Cup, being the club's only entrant in the Astral and Halfax Trophies, and more recently gaining third place in the N.W. Area Wakefield eliminator. Heard of the sad tale of Dick (Black Mark) Bickley? Going to Sealand by motor-cycle, his box (containing three models fell off, and was flattened by a passing truck.

BRIGHTON D.M.A.C. announce the revival of the South Coast Gala Day this year, to take place at the Chatri, Patcham, near Brighton on July 24th. Full details from the club Sec., Brighton, supplied four of the South Eastern Areas 15 entries for the Gutteridge, the Boxall brothers placing first and third, F. H. claiming a British record with his flight of 35 mins. o.o.s.

The **MANCHESTER M.A.C.** had a successful time at the Blackpool Rally, D. (Prof.) Flint collecting first place in the rubber event with two flights of 1 : 35 and 5 : 05. This club

Gussie Gunter top man in the power contest at Aldermaston sets his timer.

now has R/C models, which it hopes to display at the Chester Rally in June.

Plenty of flying has been going on in the **WHITEFIELD M.A.C.**, and M. O'Donnell won the junior championship at Blackpool. Brothers H. and D. Bennett qualified for the Wakefield Trials by placing 6th and 7th in the N.W. Area eliminators, though O'Donnell was very lucky to get his model returned when lost on a test flight. This job, a very 'square' design, was finished the night before the comp.! (Someone taking a leaf out of my book it seems.) Some very good times were put up on May 7th when a number of 'flying axe' gliders went careering around for times of 10:30, 12:30, 17:00 and over 18:00. The wind drift was so slight, the chasers had a slight lead all the way.

The **HAYES & D.M.A.C.** had a fine day's flying at Chobham when they met the Brentford & Chiswick club in the 2nd round of the L.A. Cup, losing eventually by some 200 seconds. At a recent meeting on Hounslow Heath the club had no fewer than seven tailless types in the air, including Marshall's record holder and Wilson's "Manx Queen". Flying in the Wakefield Elim. at Fairlop, Marshall produced a 1938 model complete with rubber of the same vintage. The output from this was amazing, taking the model up in a terrific corkscrew climb, which unfortunately grew tighter.

The **ICKENHAM & D.S.M.E.** staged an exhibition on the 14th May. Unfortunately, the space alloted to the aircraft section for C/L flying limited the line length to 18 feet, rendering it quite impossible to give a good show of stunting as projected.

Starting in March with five members, the **BROMLEY M.A.C.** now numbers over 30. Although not forsaking free flight, the accent is on controliners at the moment, though R. Warwick did well enough with his glider at the Surbiton Gala to collect a club record of 3:27.

At the first free flight contest at Hebden Moor, several members of the **CHEADLE M.A.S.** lost models, Askew and Duncan losing two each, one being returned from 20 miles away after having crossed the Pennines. Stunt flying is giving way to speed with these boys, a "Phantom" having clocked 78 m.p.h. with a McCoy 19 on board. They tell of a good supply of duration jobs that can ratio 12 to 15 in still air on a 5 seconds motor run. We shall see at Fairlop just how much salt is to be taken with this.

Six **WEST ESSEX A.M.** bods travelled to Aldermaston for the South Midland Rally, only to get washed out by their special brand of rain. However, the 'local' benefitted till 8 o'clock, when they enjoyed flying on an otherwise deserted aerodrome. A July tour to Switzerland, including C/L and a study of Swiss modelling is being undertaken by eight members on motor bikes, so we look forward to hearing "Stoo" yodel in his particular brand of cockney in due course. Should be worth hearing if they all get the urge.

The **ABERDEEN M.A.C.** have lost the use of the Airport through the intervention of the Air Ministry, but are not downhearted. Com. Sec. McCluskey has been flying his cabin type gassie to such good purpose that they are asking is a pylon really necessary.

Despite lack of space, and with only 21 models on show, the **OLDHAM & D.M.A.C.** more than held their own at the Oldham Centenary M.E. Exhibition. A good line of patter, plus engine running and a demonstration of model building succeeded in holding the attention of a large crowd. Intentions to round off with a flying display were scotched by the weather turning awkward. Recent records include Musgrove's power flight of 4:09 and Gabriel's similar time with an F.A.I. glider.

PETERBOROUGH M.A.C. held their usual exhibition which was very well supported and attended. C/L flying took place in the hall, including a pulse-jet job on 30 ft. lines, which certainly attracted the crowd. Later, a power comp. was won by N. Slade who set up a ratio of 33-1 with an "Elfin" powered "Jersey Javelin".

Four club records have recently 'had it' with the **BIRMINGHAM M.A.C.** as follows:—Class A Power—10:41 by K. Kendall's E.D. powered Slicker; Class B Power—20:28 by W. Dallaway's Ohllson 23 "Banshee"; Class C Power by F. Chatwin's Ohllson 60 powered job, time 1:20; and finally J. Nicklin's 16:15 with an F.A.I. glider. News comes through that Chuck Doughty has successfully looped his radio controlled job, using a Mercury/Cossor in conjunction with a ruddervator.

J. Meseguer of Obispo Maura 143, Palma de Mallorca, (Baleares) Spain, whose main interest in gliders, wishes to correspond with a keen modeller from this country. (Just heard from a New Zealand reader whose similar plea brought forward no less than 32 would-be pen-pushers!)

And so we pass yet another mid-season issue, and let us hope the weather continues to be reasonable with us. This is written before the Nationals, with the weather looking anything but promising, but I'm crossing my fingers and trusting that it will at least give all you contestants a fair chance. If only aeromodellers could control the weather—what a boring succession of calm hot days we would get. Be quite a change to get a windy, rainy day, wouldn't it. So, till next month, keep 'em flying.

L.S.A.R.A. NEWS

It is perhaps not generally known that the old "excess horse-power" formula for rate of climb gives an entirely wrong answer for models with a high power/weight ratio. In view of this N. K. Walker, B.Sc., examined the theory of climbing flight in considerable detail and in December, 1947, issued a report on the subject (No. 32).

His work led to the conclusion that while the normal climb at about 45 was a safe and efficient method of gaining altitude, a very big gain in performance was possible if a true "vertical-spiral" climb could be achieved reliably. This implies that the weight must be up to a half of the static thrust or thereabouts, and that a premium would be put on engines of high power/weight ratio. First experiments, described in Report 32, showed that a vertical climb could be achieved in a model powered by a "hotted up" and lightened MILLS Mk. I, weighing about 8 ozs. all up, and fired by this knowledge, a number of L.S.A.R.A. members, Burry, Annenberg, T. W. Smith and B. Wager have attempted to solve the problems of control and stability, using highly efficient aircraft which *cannot be made stable except in a vertical spiral climb.*

The present tendency is to design the airplane to weigh the same, or less than the bare engine weight, and to select the engine of highest possible power/weight ratio. Examples already built are:

Mills	1 0·75 c.c.	(super-hotted)	All-up weight 3·8 ozs.
Amco	0·75 c.c.		" " " 4 " (Made many flights)
Mills	1·3 c.c.	Mk. I (lightened)	All-up weight 8 ozs.
Mills	1·3 c.c.	Mk. II "	" " " 7 "
Elfin	1·8 c.c.		" " " 8 "
Arden	1 1·67 c.c.	(0·909 cu. in.)	" " " 4 "
Arden	3·3 c.c.	(·199)	" " " 7 "

The disposition of the fins appears to be important, NOT because of rolling axes, or spiral stability, etc., etc., but because the slipstream is very powerful, and has an effect on the pylon, which must be cancelled by an equal and opposite effect on the fins. It may be possible to make an investigation in the 24 in. tunnel which should solve some of the difficulties.

A further innovation introduced by Annenberg and Smith independently, is the use of sweepforward on the wings. This eases the problem of C.G. position, and even may allow us to eliminate the pylon with a consequent improvement in weight.

These innovations have already produced climbing speeds of 3,000 ft./min., and it is possible that the Arden engined aircraft may achieve 7,000 ft./min., with a *very* low sinking speed, since the wing loading will, of course, be quite low.

An interesting point is the fact that American engines such as the Arden 0·029 produce roughly the same power as the Mills Mk. II, or something like half the weight, and are hence very suitable for English competitions where there is no weight rule. In American competitions the weight is fixed by the cubic capacity of the engine, and hence what is required is the engine which produces maximum power/ce., even at the expense of increased weight. Hence there is a big market for the highly efficient British Diesels in the U.S.A.

S.M.A.E. NEWS

IN future all claims for a British Record must be submitted within 14 days of the event. (It will assist the Records Officer if notification of a record application is forwarded immediately. Applicants are reminded of the necessity to fully comply with the requirements indicated in the 1949 Handbook.

The award of a Record Certificate has been made to R. Skinner of Beverley, East Yorks, in recognition of his flight of 31 min. 31 secs. with a Wakefield model on the 2nd June, 1940. This belated award is the result of representations and a close study of files, etc., it being apparent that the initial award was held back pending a clarification of what constituted a British Record.

For purposes of clarification, it is decreed that the appelation British National Record will only apply to flights made within the British Isles, but need not be made by a British National.

Owing to pressure of business, the P.R.O., Mr. E. J. Buxton, has tendered his resignation, and this office has been delegated to Mr. F. E. Wilson.

Mr. A. Pilcher has replaced the old " Pilcher Cup " with a magnificent new Trophy, thus ensuring continuity of this popular contest.

A sub-committee is currently studying a system of grading meetings, for introduction in 1950. The same committee is also producing a system of examination and certification of official Timekeepers, the present method of appointment being too haphazard for such an important function.

The following new Area Committees have been formed :—
NORTH-EAST SCOTTISH AREA; Secretary—E. E. Thompson, No. 5, Married Quarters, East Haven Camp, Carnoustie, Angus.
SOUTH-EAST SCOTTISH AREA; Secretary—A. Lamb, 2, Sutherland Avenue, Stirling.

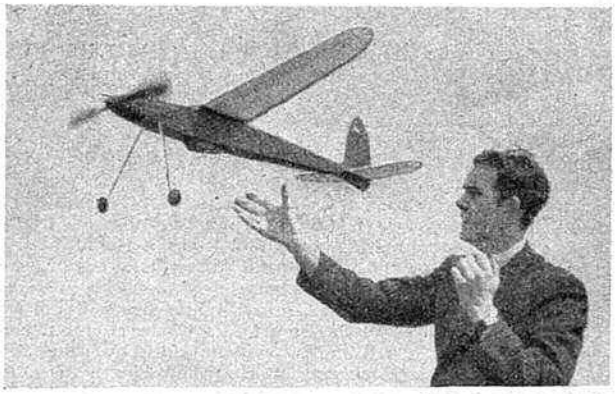
The following British National Record claims presented to Council on the 28th May, for ratification on July 9th.
Rubber-driven Monoplane and Wakefield, F. H. Boxall (Brighton D.M.A.C.) **35 min. 00 secs.** on 15/5/1949. **Class "A" Power**, K. W. Kendall (Birmingham M.A.C.) **10 min. 41 secs.** on 17/4/1949 **Class "A" Power**, E. R. Comley (Swansea & D.A.M.) **12 min. 04 secs.** on 1/5/1949. **Class "B" Power**, W. E. Dallaway (Birmingham M.A.C.) **20 min. 28 secs.** on 17/4/1949. **Class I Control Line Speed**, D. C. Butler (Surbiton M.A.C.) **58·5 m.p.h.** on 18/4/1949. **Class IIIB Control Line Speed**, I. R. J. Monkhouse (Brighton D.M.A.C.) **98·36 m.p.h.** on18/4/1949

No less than seven applications were presented for the Class " A " Record. An application of 34 min. 46·2 secs. from A. J. Brooks of the Portsmouth R.A.S. for the Wakefield class record had to be turned down, as Boxall's flight was made on the same date.

The following Merit Certificates were awarded on the 28th May 1949.

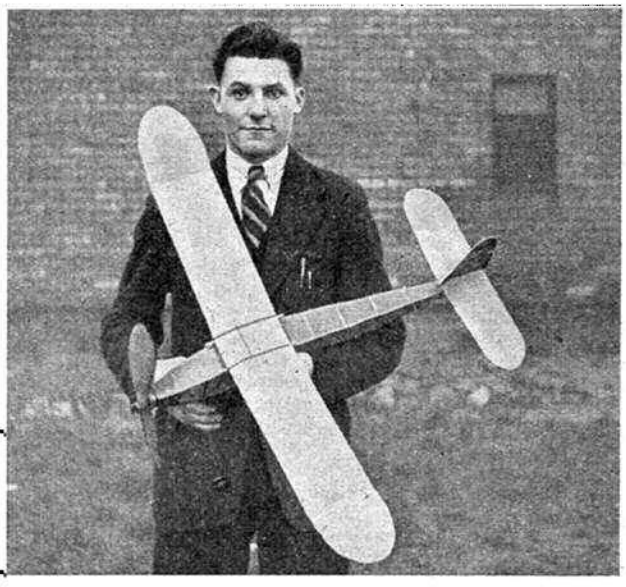
Class " B ". No. 258 F/Lt. N. W. Verney (R.A.F. Middle Wallop). (The first Class " B " to be awarded under the new requirements.)

No. 270 B. Leach (Southampton) No. 271 V. Johnson (Southampton) No. 272 R. Howard (Evesham) No. 273 E. W. Pumford (North Wirrall) No. 274 A. Ricks (Willesden) No. 275 F. Lord (Accrington) No. 276 E. Lord (Accrington) No. 277 R. W. Smyth (Bournemouth) No. 278 G. E. Bee (Foresters) No. 279 N. E. Davies (Liverpool) No. 280 J. H. Ree (Wallasey) No. 281 T. A. Royle (Salford) No. 282 S. Hinds (Wallasey) No. 283 H. J. Childs (Winchester) No. 284 D. Cunliffe (Salford)



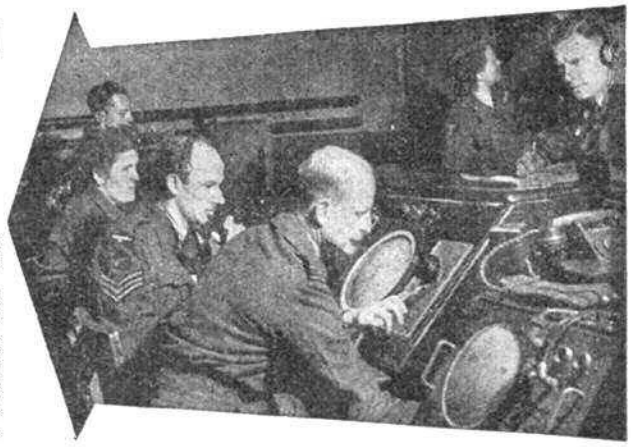
GUTTERIDGE TROPHY

1	McKenna, J. F.	Park M.A.L.	900.
2	Brockman, D.	Zombies	808·5
3	Pitcher, J. L.	Croydon	802·2
4	North, R. J.	"	771·1
5	Marcus, N. G.	"	763·4
6	Warring, R. H.	Zombies	762·8
7	Salt, G. E.	Loughboro' College	738·2
8	Hinks, W.	Park M.A.L.	704·5
9	Geesing, T. A.	Croydon	701·7
10	Revell, H. W.	Northampton	649·4
11	Woolls, G.	Bristol & West	647·4
12	Witts, D.	Peterborough	637.
		(394 entries)	



Top. Ed. Stoffel of Ilford, top man in the "Flight" cup with his winning model. Centre. A glider getting away in the South Midland Area Rally ar Aldermaston. Bottom. R. M. Bainbridge of Seaham, winner of the Gamage Cup.

There's room for you in a Fighter Control Unit



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CLASSIFIED ADVERTISEMENTS *(cont. from page 468)*

TRADE—cont.

Valuable old books. F. W. Lanchester's "Aerodonetics" published 1908, and Rankine Kennedy's "Flying Machines" "Practice and Design" published 1909. Will exchange for new unused Nordec and Juggernaut Redhead with spares. Contact Tock, 46, Joon Hiang Road, Singapore.

Back issues of the AEROMODELLER can be obtained from W. H. Forway, 353, Manford Way, Chigwell, Essex.

Attention all Modellers!!! The finest equipped model shop in West Middlesex. Kits for the beginner and the expert. A comprehensive range of kits, including the latest Hawker Sea Fury, and "Prince" Sailplane by Frog. Write for our mail order lists. Mail orders despatched by return of post, or, better still, pay us a visit at Staines Model Shop, 53, Thames Street, Staines, Middlesex.

Staffordshire's 100% Model Shop is well worth a visit. Est. 1936. J. W. Bagnall, South Walls Road, Stafford. 'Phone 420.

SITUATIONS WANTED

Aeromodeller, sound knowledge design/construction all types model aircraft. Seeks position in trade. Previous experience. Box No. 215.

WANTED

Wanted. Bench run diesel of approx. 1 c.c. in exchange for Hobbies lathe. Clunas, 33, Ulundi Road, Johnstone, Renfrewshire.

CLASSIFIED ADVERTISEMENTS

PRESS DATE for Sept. issue — July 20th, 1949.
ADVERTISEMENT RATES:
Private Minimum 18 words 6s., and 4d. per word for each subsequent word.
Trade Minimum 18 words 12s., and 8d. per word for each subsequent word.
Box numbers are permissible — to count as 6 words when costing the advertisement.
COPY and Box No. replies should be sent to the Classified Advertisement Dept., The "Aeromodeller," The Aerodrome, Billington Road, Stanbridge, Beds.

FOR SALE

Mills '75 diesel. Mills 1·3 diesel. AMCO ·87 diesel. E.D.1 c.c. Bee diesel. Various dopes, wood, kits, etc. Epton, 3, Rufford Avenue, Yeadon, Leeds.

Ohlsson 23, less coil, condenser. Good condition, bench run only. £7. Stranack, Hawke House, R.N. College, Dartmouth, Devon.

McCoy 60. New with spare crankshaft, 2 speed props and other spares. £15 or best offer. Nordec ignition test run, £10. Rowell 60 test run, £10. Nordec Glo-plug, £8. R. Scott, 185, Cambridge Road, St. Helens, Lancs.

New diesel engine, approx. 2·8 c.c., 35/- for quick sale. Disposal reason, owner giving up aeromodelling. Box No. 217.

E.D. Mark III, with Glo-plug, 3 props and 2 in. spinner, excellent condition, £3. 15s. or offers. Write S. Haley, 48, Roundtable Road, Downham, Kent.

Well-finished Eros for sale. Nylon covered, Z.N. air wheels, Elmic timer, fully sheeted. Photos available. Less engine, £6.

Two Mills Mk. I, 1·3, Kamp ·2: little used. Best offers secure. Box No. 215.

E.D. Mark III. Brand-new 77/6 Orwick, perfect condition. O.K. Twin, run once New Dooling. Offers. Box No. 219.

Ohlsson 23, bench tested 30 mins., plugs, props, coil, condenser, perfect condition, £5. The Dell, Kingfield Road, Woking. Phone 605.

Brand-new E.D. Radio Control Receiver and Transmitter, £10. Glowplug Micron 20, massive ball race, £5. 19s. 6d. Money back if not satisfied. Box No. 218.

American Ohlsson Super 60 10 c.c. petrol engine, brand new, £8. 39, Kingsbury Road, Erdington, Birmingham, 24.

Frog Red Glow engine. Good condition, 30/-. Apply C. Kenrick, Brendon, Briardale Road, Willaston, Wirral, Cheshire.

American Ohlsson 60, £5. 10s. "Gwyn Aero" 7·5 c.c. £5. "G.H.Q." 8·5 c.c., £4. 10s. Good condition. Box No. 213.

Stentor 6 c.c. petrol with electrics plug and glow plug, run one hour only, £4. Aldridge, 50, Redesdale Avenue, Coventry.

"A.F.P." III, VII Miles, "Westland Books." AEROMODELLERS, December '45 onwards. "Wonders of World Aviation," 1938–9, 40 vols., etc. S.A.E. for list. Bargain prices. Tasker, 120, Lavender Hill, Tonbridge, Kent.

Ohlsson 23, rotary. Unused. Aero spark ignition. Burgess battery, £7. 10s. Bainbridge, 31, Mostyn Avenue, Liverpool, 19.

E.D. radio control unit, tested, but never used on model, complete outfit, perfect condition, £12. 10s. Also unused Jaggers Juggernaut Jet engine, £4. 10s. Wheatley, 80, Millmead Road, Margate.

Frog 175, complete, bench run Frog 160, 3 props, unused Jetex 200, complete, Keil Co. prop, Frog revmaster. Offers. Weir, Fever Hospital, Helensburgh.

Ohlsson 60, near new, £7. 10s. Eta 29, new, £6. 10s. Juggernaut Redhead, as new, £5. Russell, 26, Gateford Road, Worksop.

Mercury radio control unit. New and unused, sacrifice £9. 17s. 6d. Also Keil-Kraft Falcon kit, untouched, £4. 17s. 6d. Tidd, 91, Duncombe Road, Hertford, Herts.

Fly or glide at Redhill Aerodrome—3 miles from Redhill, Surrey, 1 mile from Nutfield Station; residential accommodation. Miles Magisters, Austers, Kirby Cadets and Tutors (gliders) and Olympia sailplanes. Come and get your "A" (flying) licence or your "C" (gliding) certificate. Full particulars for solo or tuition, Secretary, Redhill Flying Club.

TRADE

New clamps for modellers. Spring type, 5d. Screw type, 1/6. Aluminium sheet, 7d. Celluloid, 4d. Diesels, aircraft, racecar kits. Send 6d. for new 20 page illustrated catalogue. Beverley Products, 28, Oakwood Avenue, Leeds.

America's famous magazines post free one year. "Model Airplane News," 17/6. "Flying", 20/-. "Soaring" 25/-. For a list of Aviation and other magazines send S.A.E. to Willen Ltd., Dept. (I), 101, Fleet Street, London.

Manchester Model Aero Sales are pleased to announce the sole Baby Radio Control Transmitter Chassis. The smallest, lightest and cheapest available. Ready to install in your own case. S.A.E. for details. The Ed. Tank Adaptor now reduced to 1/- post free. 539, Wilbraham Road, Manchester, 21.

Hampshire Modellers. When in Portsmouth pay a visit to The Portsmouth Model Shop. You are welcomed to inspect our stock. Engine demonstrated before sale. Engine repairs and spares. In stock now, Amco 3·5 Elfin 2·49, Yulon 30, Eta 29. Stockists of kits and accessories by Keil, Mercury, Slipstream, etc. This shop is run by an active modeller and you can be sure of getting the best from R. H. Thwaites at The Portsmouth Model Shop, 248, Fratton Road, Portsmouth.

Wildfire 26 span Elfin powered stunt model, details in April Aeromodeller, plan 3/6. Ready soon, an easy to build stunt model, especially designed for the E.D. Bee, Prototypes on view. The Portsmouth Model Shop, 248, Fratton Road, Portsmouth.

The K·2 c.c Hawk and 2 c.c. Falcon are worth your inspection. Available now at Model Supplies, 17, Bath Road (Three Lamps). Bristol, 4. S.A.E. for new list.

Continued on previous page.

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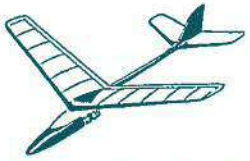

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