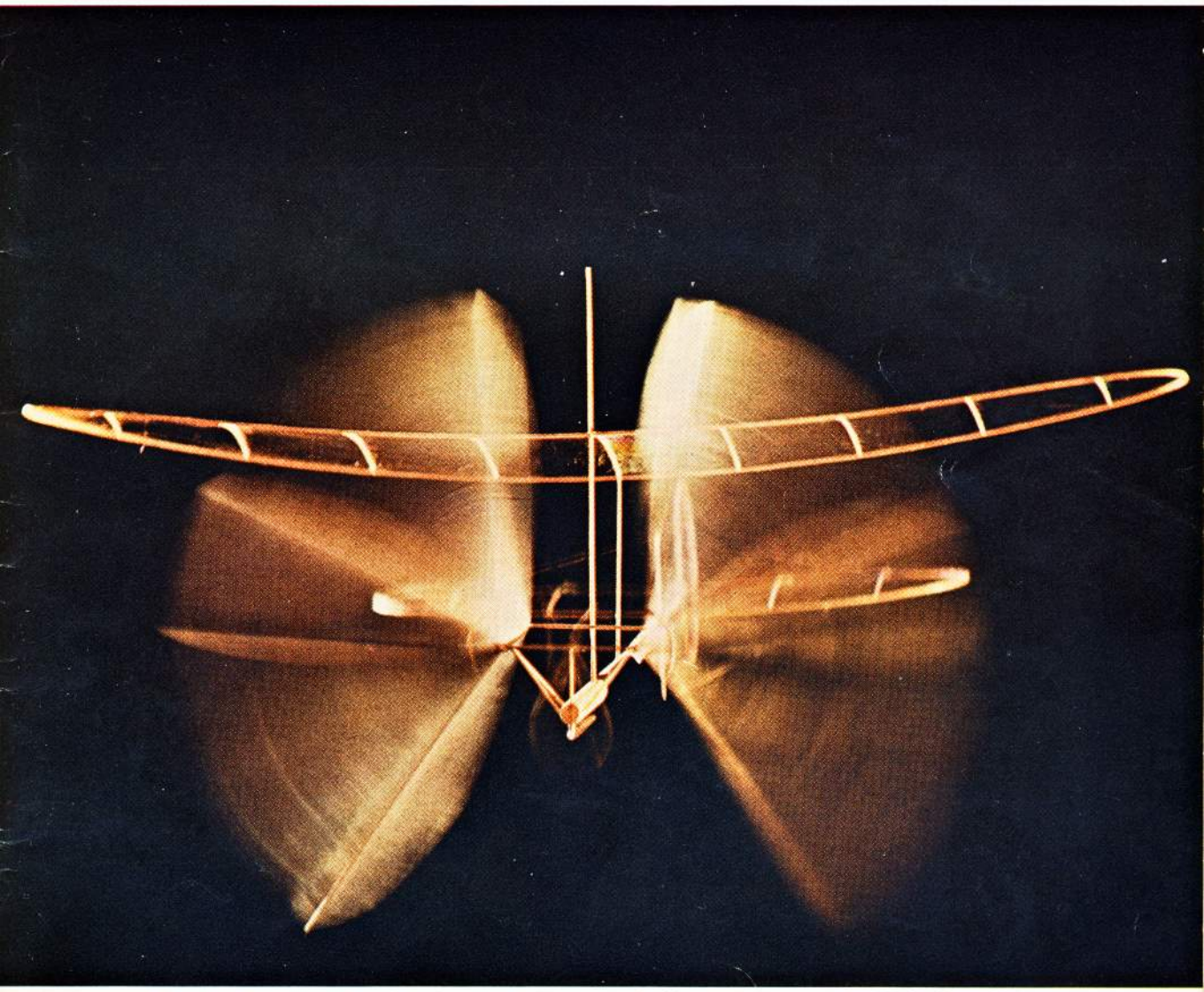
Aero Modeller

February 1972
15p
(USA & Canada 75c.)

INCORPORATING
MODEL AIRCRAFT

MAP HOBBY MAGAZINE



TWO FREE PLANS * RECORD HOLDING ORNITHOPTER * DUCTED FAN 'LIGHTNING' * THORP T-18 3-VIEWS

at your model shop !

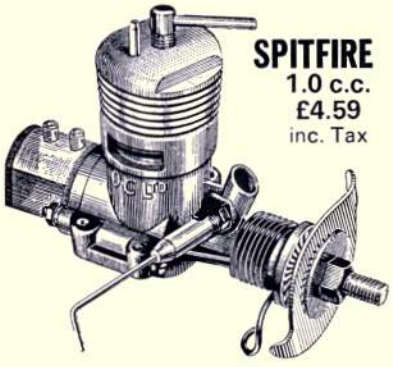
SUPER MERLIN
.75 c.c.
£4.22
inc. Tax

WASP
.049 cu. in.
£2.84
inc. Tax

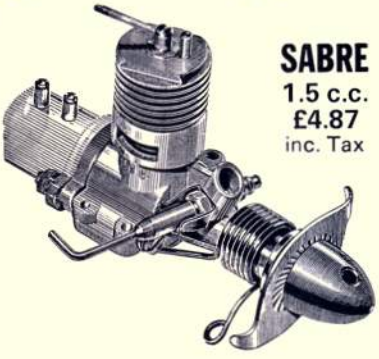
DART
.5 c.c.
£4.87
inc. Tax

QUICKSTART

THE GREATEST RANGE OF SPORTS FLYERS' ENGINES



SPITFIRE
1.0 c.c.
£4.59
inc. Tax



SABRE
1.5 c.c.
£4.87
inc. Tax

MERLIN
.75 c.c.
£3.86
inc. Tax

No spares-backing worries – if you have a Quickstart you can be sure of full and continuous use of your engine

Quality
Reliability
Economy

Full range of special accessories for QUICKSTART engines

Radial Tank/Mount
63p

General Purpose Tank
31p

Quick Glow Clip
36p

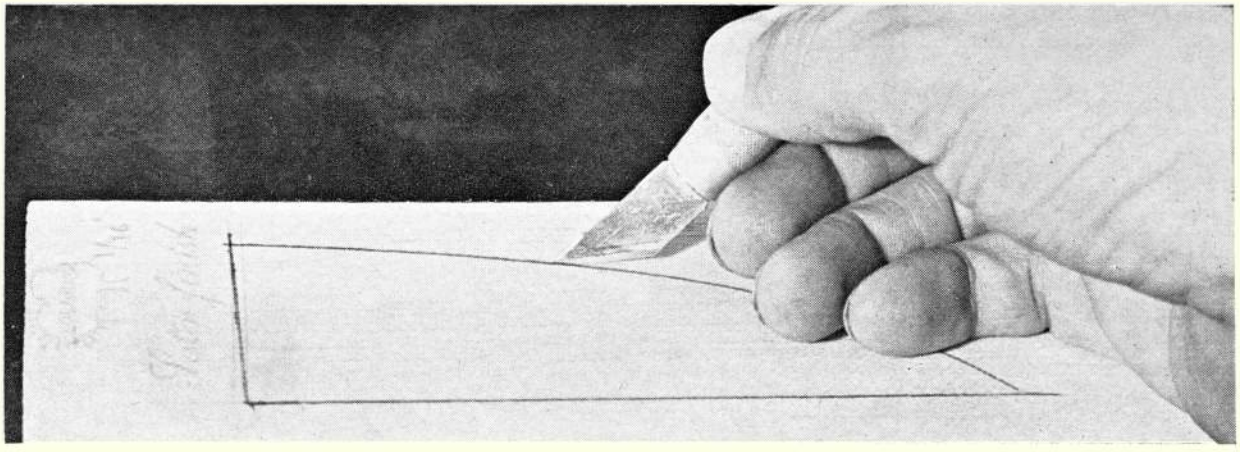
Special Wasp Spanner **26p**

Exhaust Manifold (comes with collector)
60p

DAVIES-CHARLTON LTD.

HILLS MEADOW
DOUGLAS, Isle of Man

SOLARBO



WEIGHT SAVING? USE THIS SIMPLE TABLE

The higher the number in the table, the greater the weight. The ratio of any two numbers for different sizes and/or densities then gives the ratio of the weights.

SHEET SIZE	DENSITY - POUNDS/CU.FT. 6	8	10	12	14
1/32"	5	7	9	11	12·5
1/16"	10·5	14	18	21·5	25
3/32"	16	21	27	32	37·5
1/8"	21	28·5	36	43	50
3/16"	32	43	53·5	64	75
1/4"	43	57	71·5	86	100

Let's explain the Table with an example. Suppose 'Hard' 3/32" sheet is called for – say 12 lb. density, but we want to save a little weight. The Table figure for 3/32" at 12 lb. density is '32'. All the Table figures for 1/16" sheet are lower, so any density of 1/16" sheet would be lighter. Fairly obvious, anyway. But what about using $\frac{1}{8}$" sheet for extra strength? Here, 8 lb. density shows a lower figure (28.5). This would be a good choice, with a comparative weight ratio of 28.5 divided by 32, or 0.89 – just about 10% saving in weight. Get the idea?

We are talking about sheet Balsa, of course – for aeromodelling construction. That's why the main heading is 'SOLARBO'. Need we explain this? SOLARBO *means* Balsa – or at least is synonymous with true *aeromodelling quality* balsa. People who know their materials don't ask for 'Balsa', they ask for 'SOLARBO'. The name is *your* automatic guarantee of quality.

Solarbo BALSA

ALWAYS ASK FOR IT BY NAME

SOLARBO LTD.,
COMMERCE WAY, LANCING, SUSSEX

"VERON" for VALUE!

KIT OF THE YEAR FOR 1972?

72" SPAN
MOTEUR – PLANEUR

Very-near-to-scale Auxiliary Powered Soarer and Sport Plane for Intermediate 2-Channel Proportional Radio on Rudder and Elevator only.

FOR ENGINES 1.49 to 2.49 RACING DIESEL OR GLOW (0.09 to 0.15 cu. in.)

KIT PRICE
£11.75

NEW! The FOURNIER RF5

This Powered Sailplane is ideal for the Scale Connoisseur who likes to fly both Hillside Soarers and Sport Scale Power with economical 2-channel Propo. Only deviations are slightly enlarged tail surfaces enhancing the already ideal proportions and performances of this superb 'Moteur-Planeur'. All Balsa structure. All Die-cut ply and Balsa ribs. Shaped and slotted Leading Edges. Spindle-shaped coamings. Wheel and Spinner.

Flown best in moderate to high wind conditions – loading 16 oz.

IDEAL FOR THE HILLSIDE SOARERS WHO LIKE TO FLY POWER WHEN THE WIND DROPS!

VERON are now sole Distributors For R.C.P. RADIO

BRITISH BUILT EQUIPMENT with GUARANTEED SERVICING

Harness (for each) **90p**
Bat. Box (for elec. servos) **38p**

SUPER-HET for £21

RELIABILITY – ECONOMY PRICE

Receiver Relay and Relayless
5.5 x 3.8 x 2.3 cm
Weight - both 40 grms
Supply Voltage 9 Volts (PP3)
Tx's have colour coding tags on case.

PRICES

Tx	Rx (R/less)
£9.15	£11.85

Rx (Relay) **£13.10**

SUPER-REGEN for £11.95

Tx	Rx (R/less)
£7.35	£4.60

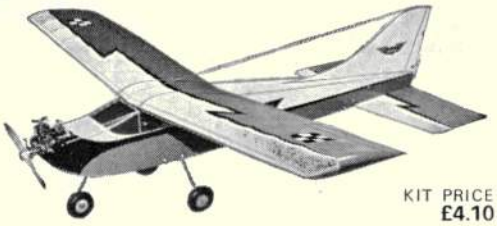
Rx (Relay) **£5.90**

TWO OF OUR MOST POPULAR SPORT RADIO DESIGNS!

MINI-ROBOT

36" span

For motors up to 1 c.c. Lightweight Single Channel for rudder only with rubber driven escapements. Ideal for R.C.P. Relayless – either Super-Regen or Super-Het!

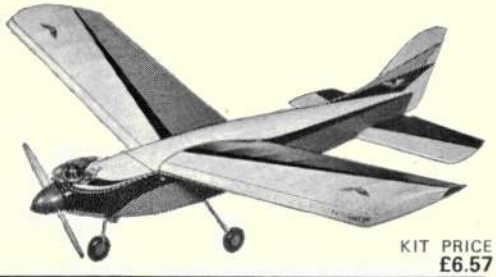


KIT PRICE
£4.10

MINI CONCORD

40" span

For 1 to 1.49 c.c. using Single Channel for Relay or Relayless with Rudder and Flip-up elevator or Pulse. Ideal for **R.C.P.** Relay, Super-Regen or Het!



KIT PRICE
£6.57

ASK YOUR DEALER OR SEND S.A.E. FOR **VERON'S** NEW BROADSHEETS OF KITS & MARINECRAFT.

VERON
THE MOST POPULAR KITS IN THE WORLD

LOOKING FOR A RADIO BARGAIN?

STAVELEY RADIOS – Brand New in First Class Factory Tested Condition. All available NOW from Stock. All Combo prices with Servos.

STAVELEY 'SILVER-STAR' DIGITAL

Attractive Black Vinyl Clad Transmitter	Transmitter	£34.00
	Receiver	£15.00
Rx & Tx Deacs included	4 Servos	£40.00

FROM VERON OR YOUR DEALER

STAVELEY ANALOGUE 4 DE LUXE

Complete Units	Transmitter	£34.00
Ready to install.	Receiver	£15.00
Rx & Tx Deacs	S4 Servos	£40.00

Deacs included.

STAVELEY ANALOGUE 2 DE-LUXE

Kraft Servos	Transmitter	£26.00
Complete with	Receiver	£14.00
Deacs.	Servos	£20.00

2 ONLY WEBRA **'PICCO'** Propo Units
Tx **£25.19** Rx **£21.20** Actr. **£4.93**

MODEL AIRCRAFT (BOURNEMOUTH) LTD.,
NORWOOD PLACE, POKESDOWN, BOURNEMOUTH

Distributors in Canada: **Academy Products Ltd., 51 Millwick Drive, Weston, Ontario.**
Distributors in Australia: **Pizzey Ltd., 1 Clark Str., Richmond, Melbourne.**

Aero Modeller

INCORPORATING
MODEL AIRCRAFT

February 1972 Volume XXXVII No. 433

CONTENTS

HANGAR DOORS	75
'LIGHTNING'	76
TOPICAL TWISTS	80
AIRCRAFT DESCRIBED – Thorp T-18 Tiger	81
INTRODUCTION TO RADIO CONTROL	84
'WINGFOOT' ORNITHOPTER	88
FLYING SCALE MODELS – Part XII	94
ENGINE TEST – Veco 19 R/C	97
INTERNATIONAL CONTEST CALENDAR	99
CONTROL LINE NEWS	100
'BOORAY' and 'LITTLE GEM'	102
READERS' LETTERS	103
TRADE NOTES	104
FREE-FLIGHT COMMENT	105
S.M.A.E. CONTEST PROGRAMME	108
CLUB NEWS	109

This periodical is sold subject to the following conditions: that it shall not, without the written consent of the publishers, be lent, re-sold, hired-out or otherwise disposed of by way of the Trade except at the full retail price of 15p or 75 cents and that it shall not be lent, re-sold, hired out or otherwise disposed of in a mutilated condition or in any unauthorised cover by way of Trade, or affixed to or as part of any publication of advertising, literary or pictorial matter whatsoever.
Second-class postage rates paid at New York, N.Y. Registered at the G.P.O. for transmission by Canadian Post. American enquiries regarding subscriptions, news stand sales and advertising should be sent to AERO MODELLER, Eastern News Distributors Inc., 155 West 15th Street, New York, N.Y. 10011 U.S.A. U.S.A. and Canada direct subscription rate $6 including Index.

Advertisement and Subscription Offices: Model & Allied Publications Ltd., 13/35 Bridge Street, Hemel Hempstead, Hertfordshire. Tel: Hemel Hempstead 2501-2-3.

Direct subscription rate £2.35 per annum including December edition and Index.

CORRESPONDENCE anticipating a reply must be accompanied by a stamped and self-addressed envelope or International reply coupon. While every care is taken no responsibility can be accepted for unsolicited manuscripts, photographs or artwork, etc. News reports should be submitted to arrive not later than the 15th of each month for publication in the next immediate issue. Photographs should be accompanied by negatives where possible and can only be accepted for use on an exclusive basis for British Copyright.

AERO MODELLER incorporates the MODEL AEROPLANE CONSTRUCTOR and MODEL AIRCRAFT and is published on the third Friday of each month prior to date of publication by:

MODEL & ALLIED PUBLICATIONS LTD.
13-35 Bridge Street, Hemel Hempstead, Herts
Tel.: Hemel Hempstead 2501-2-3 (Mon.-Fri.)

COMMENT

1972 is Jubilee year for the Society of Model Aeronautical Engineers. This 50th anniversary will be celebrated as the year progresses. A special emblem has been created for waterslide transfers to record the occasion in the form of model decoration and exhibitions are planned to carry the message of 50 years' achievement. Already, as the new year dawns, the first congratulations arrive, appropriately from the Parent body, the United Service and Royal Aero Club.

The Royal Aero Club and the S.M.A.E. has watched full size and model flying grow up side by side over the years and through our connection with the aviation industry and through our even closer connections with modelling in the F.A.I. we are very well aware of the debt that is owed to model aeronautical science by full scale design and of the enormous enthusiasm and skill which is brought to bear on modelling internationally by the S.M.A.E. and its many members.

Let us hope that the next 50 years will be as fruitful for you as the first.

To this fine tribute we add our own accolade, and with it a request for remembrance. Time has taken its toll and the latter half of these 50 years has seen the passing of many devoted servants to our hobby, to whom the S.M.A.E. owes so much for its stature in the world of aeromodelling.
Remember these names:
Barker, Buckeridge, Hill, Houlberg, Ives, Keil, Messom, Rushbrooke, Taylor, Thurston and York.
for they provided the hallmark on this Golden Jubilee.

on the cover

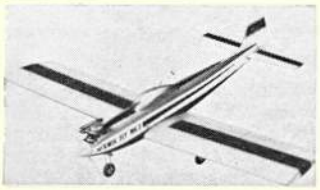
Superb photograph by Ben Rose captures the beauty of Ken Johnson's ornithopter in flight. The 18 in. span model, which forms a special feature in this issue, weighs approximately the same as one cigarette, and yet has achieved a flight duration of over five minutes.

next month

Super-scale **Tiger Moth** plans by Harold Towner for free-flight or radio control. More hints and tips in **Gadget Review**. Special feature on the **Brown Junior CO_2** engine, and its many applications for mini-models. Plans also for **Little Hinney**, a top class A/1 glider design by Tony Cordes, plus advice on the use of power tools in modelling. All this, plus regular features such as **Free-Flight Comment, Latest Engine News, Aircraft Described,** etc.

Made and printed in Great Britain by Graphic Art Services (Brighton) Ltd., Burgess Hill, Sussex RH15 9EH, for the proprietors, Model & Allied Publications Ltd., 13/35 Bridge Street, Hemel Hempstead, Herts. Published by Argus Press Ltd., 12-18 Paul Street, London E.C.2, to whom all trade enquiries should be addressed. Registered at the G.P.O. for transmission by Canadian Magazine Post.

Graupner



KWIK FLY Mk. III £19.65

This kit makes an authentic duplicate of Phil Kraft's WORLD CHAMPIONSHIP winner. Kit includes glued and curved fuselage sides, shaped wood parts, diecut balsa and ply sheets, formed undercarriage wheels, canopy, hardware, etc. 59½" wingspan. Engines up to .61.

Acclaimed as the Finest Kit yet for R/C 'multi' or proportional.

AMATEUR £7.65

43¼" span. Kit includes full length diecut balsa fuselage sides, diecut sheet and ply, shaped wire parts, wheels, hardware, etc. Takes engines up to 1.5 c.c. for sports flying, also 2- or 4-channel radio.

Also **TAXI 59" span £12.80**

MINI-PIPER Quickie £5.90

Diecut all-sheet construction for speedy, accurate assembly, 29" span.

Also

BO 209 MONSUN £2.95

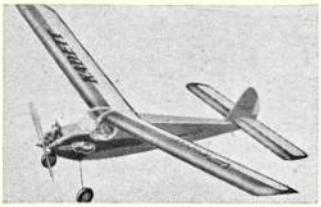
All-sheet 21½" span scale model for rubber power. Complete kit with all hardware, etc.

CESSNA 177 CARDINAL £29.40

A truly SUPERB prefabricated kit with injection moulded plastic fuselage, foam wings and tail. Span 61" for 5-6 c.c. motors.

CONSUL £9.95

41" span super kit with finished moulded foam plastic fuselage, wings, tail, diecut wood parts, formed undercarriage, wheels, etc. Ideal for rudder-only R/C – or equally suitable for free flight.



KADETT £5.40

High wing F/F sports model, in the traditional style. Kit is complete down to hardware, wheels, adhesives, decals, etc. A popular favourite for 'Sunday flying'.

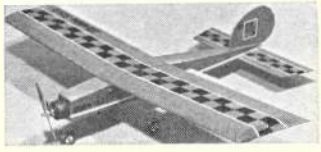
Also

TOPSY 32" span £3.45

Very stable high wing cabin monoplane for free flight, or radio control. Ideal for 049 motors.

MIDDLESTICK £15.65

Wing span 55". Length 38¾" overall. Wing area 611 sq. in. Tail area 124 sq. in. Weight approx. 3¾ lb. (up to 5 lb. with radio). Suitable for .40 engines. Assembly time is reduced to a minimum with plenty of precut parts, including precurved, preglued fuselage sides.



AT YOUR LOCAL MODEL SHOP

U.K. DISTRIBUTORS

RipMax Ltd 80 HIGHGATE RD LONDON, N.W.5

other Graupner Agents include—

U.S.A.: POLKS MODEL HOBBIES, 314 Fifth Avenue, New York, 1, N.Y.

AUSTRALIA: PAUL GROSMANN 164 Tinsbury Road, Ashfield N.S.W.

HONG KONG: RADAR CO: LTD., 2 Observatory Road Kowloon H.K.

CANADA: G. BOOK & CO., 45 Wingold Avenue, Toronto 19, Ont.

S. AFRICA: PHIL de BRUYN 85 Pritchard Street, Johannesburg.

N. ZEALAND: BURTON BRAILSFORD 261 Willis Street, Wellington, C.2.

W&H (MODELS) LTD

14 New Cavendish Street
London W1M 8DJ

Telephones: 01-935 8835
01-486 3561

MEIA Model Engineering Trade Association

FOUND

At the above address, a most comprehensive stock of model aircraft kits and accessories!!

We stock KEILKRAFT, MERCURY, VERON, MAINSTREAM, RIPMAX, GRAUPNER, STERLING, HEGI, TOPFLITE, etc., etc., and can offer many interesting kits to suit all types – from the beginner to the more advanced modeller.

For example – For the beginner: KeilKraft Eezi-Bilt kits from 50p; other recommended 'starter' models: Mercury Mistral, 96p; K/K Ajax, 83p; K/K Competitor, 96p;, K/K Playboy, 45p; K/K Rapier, 50p – all these rubber-powered duration models. Gliders: K/K Soarer Baby, 72p; K/K Avia, 50p; K/K Wisp, 75p; K/K Invader, 99p; Pioneer, 75p; Kirby Prefect, 45p; etc.

Going to the other extreme: RipMax Ivinghoe – Quickform slope and thermal glider kit, £8.95, Graupner Cumulus 2800 glider, wing span 2800 mm, a really superb kit, £41.60. RipMax Dazzler 54, Quickform kit for 0.49 engines and R/C, £11.70. Hegi Burda Piper, free flight R/C, £19.30. Sterling kits, with automatic action features, e.g. fires rockets, drops bombs, etc., from £2.18. K/K Elmira R/C sailplane, £9.95. K/K Intruder, multi-channel R/C, motor size 49-61 cu. in., 72 in. wing span, £19.25. TopFlite Rascal, free flight and/or R/C, £2.80. Graupner Topsy, free flight for 5 c.c. engines, £3.45. Graupner Glider, Nancy, wing span 1240 mm, £4.15.

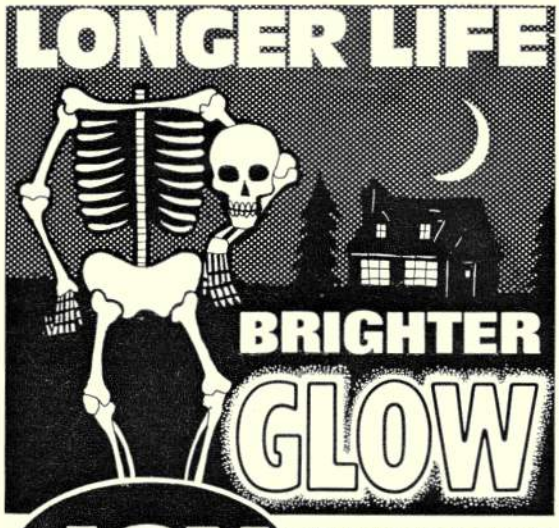
We also keep good stocks of MacGregor, Mainstream, Radio Control equipment, Balsa, dopes, tissue, silk, tanks, wheels, props, fuel tubing, test stands.

WHY NOT PAY US A VISIT?

And to help you achieve a good finish . . . **X-ACTO.** Send S.A.E. for free illustrated leaflet detailing this superb range of knife and tool sets.

LEADING WEST-END STOCKISTS OF ALL THE QUALITY MODEL AIRCRAFT KITS, BOATS, RAILWAYS. MAIL ORDER.

"EXPORT A PLEASURE"



JOY LUMINOUS PAINT

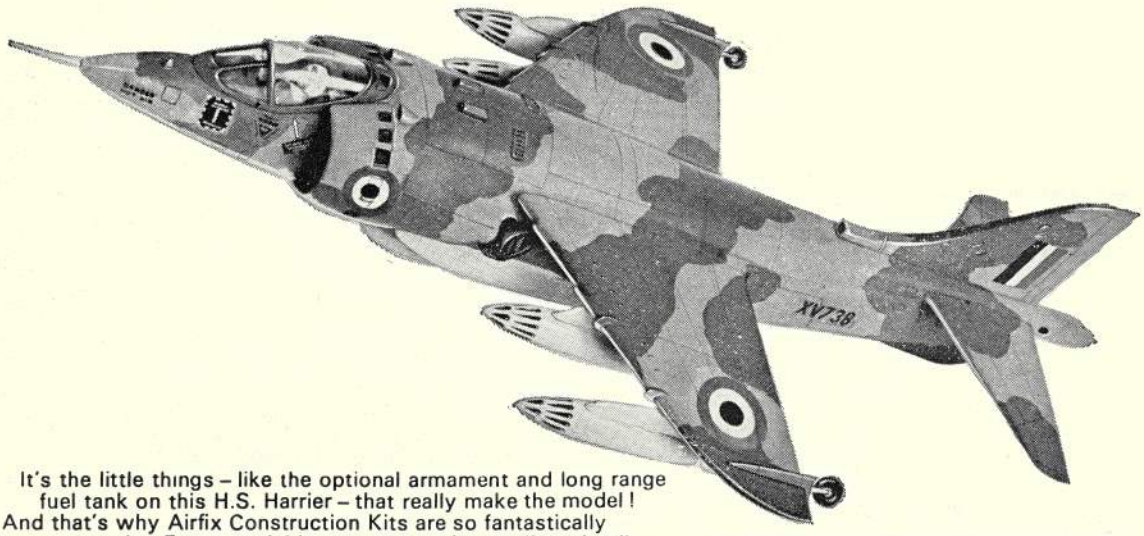
See in the dark with JOY Luminous Paint. Ideal for use on skeletons, toys, models, novelties, light switches, door numbers, paper, cardboard, and materials etc.

Light active but not radio active. Outfits contain Base Reflecting Coat and Top Luminous Coat. Green shade only.

JOY quality products for Sticking Staining Polishing Painting

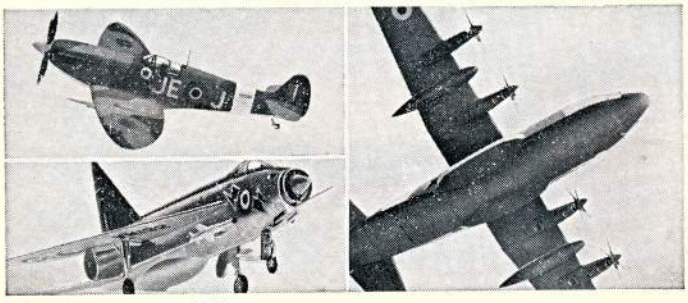
JOY is a registered trade mark of TURNBRIDGES LTD., LONDON, S.W.17.

Get every detail right with Airfix



It's the little things – like the optional armament and long range fuel tank on this H.S. Harrier – that really make the model! And that's why Airfix Construction Kits are so fantastically popular. Every model is accurate to the smallest detail – a perfect replica of the real thing! There are nineteen series, each made to a constant scale. Over 300 kits to choose from. 17p. From all good hobby shops and F. W. Woolworth. Ask for the catalogue.

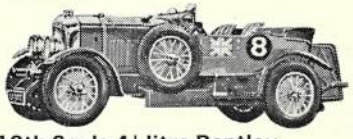
Top left: Spitfire. Left: E. E. Lightning. Right: Hercules



AIRFIX

The world's biggest range of construction kits

STOP PRESS



New 12th Scale 4½ litre Bentley
With accurately detailed engine, suspension and steering; flexible tyres and bonnet straps; this model of a Le Mans winning Bentley is in the new 12th scale and measures 14" overall. Price: £4.50.

24th Scale Messerschmitt Bf109E

This is another superb model in the Super Kit range with its working ailerons and tailplane, fully detailed Daimler-Benz engine and retractable undercarriage Price: £1.95. Propeller motorising unit available(32p).

News, articles, conversions for modelling enthusiasts every month in AIRFIX MAGAZINE. 15p from your model shop or newsagent.

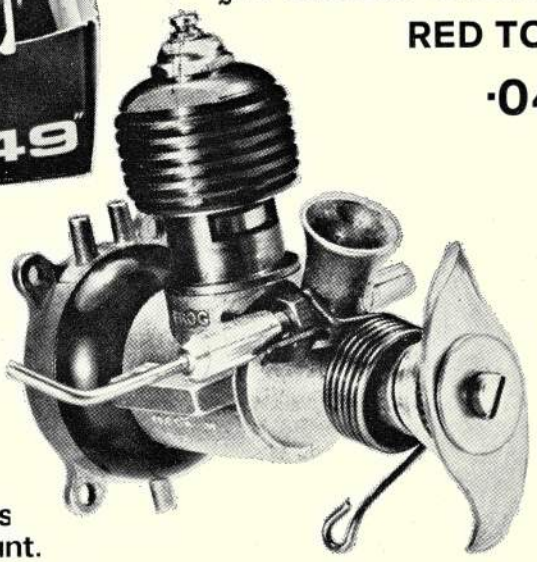
at your nearest model shop!

THE NEWEST! LATEST!

½A class Glowplug

RED TOP

·049 engine



HALES FROG VENOM

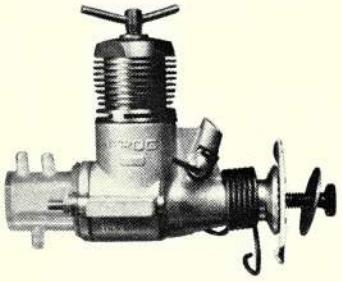
£3·85

Full power porting with front rotary valve, twin transfers and two high speed exhaust ports make the VENOM a .8 c.c. contest/ sport motor par excellence comes complete with radial tank/mount.

HALES FROG DIESELS

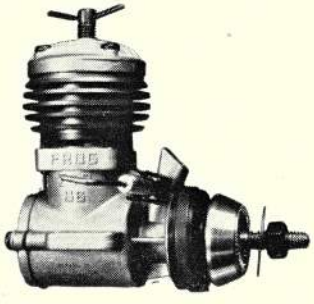
FOR SPORT OR CONTEST FLYING

Choose FROG for easy starting and power to please



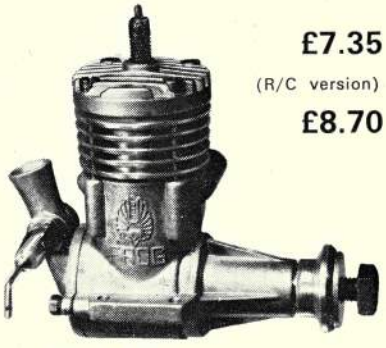
FROG 100 Mk. III **£4.15**

A high-speed rotary valve engine (16,000 r.p.m. plus) specially developed for easy starting.



FROG 249 BB **£7.10**

2.5 c.c. twin ball race racing engine. Develops well over ¼ b.h.p. whilst retaining easy starting and handling.



£7.35

(R/C version)

£8.70

FROG 349

The ideal Power Plant for Combat or the larger sizes of free flight and control line models. Also Radio Control version.

A. A. HALES LTD., P.O. BOX 33. HINCKLEY, LEICESTER, LEICS. Tel: Hinc. 4746

it's the simple ideas that win!

Right from the start model makers of all ages have risen to the challenge of the Bic Model making competition. The simple but imaginative racing cycle shown below, entered by David Smith of Clifton, Bristol, won first prize in the first quarter of the competition.

Instead of throwing away those used Bic Crystals, model makers have fused them, glued them, bent them and submitted a fascinating assortment of models of all shapes and sizes. Why don't you join in the fun ?

Because Bic Crystals write first time every time, there are far more sold in the U.K. than any other ballpen. In fact, each year a Bic Crystal is sold for every man, woman and child in the country plus a few million more.

This is why you will probably find more than you expect in your own home. In offices and factories you should find them by the hundred.

All you have to do . . .
. . . is start collecting medium or fine used Bic Crystal ballpens now, complete a model and enter the competition.

There are cash prizes for the best models produced every three months both senior and junior. Finally, the supreme modeller at the end of the year will be awarded a further cash prize of £250 and the handsome Bic Championship Trophy.

If you have a creative flair and a little imagination – prove it!

BIC

Regd. Trade Mark

model making competition

BIC

Regd. Trade Mark

Model Making Competition

Start collecting your pens now but—
one word of warning—

make sure they are genuine Bic Crystal Medium or Fine Point ballpens carrying the Bic Registered Trade Mark because only these are eligible

RULES

1 The participants of the Bic Model Making Competition will be judged on their originality and technical model-making expertise.

2 The competition will be divided into two parts:
Junior: Participants, either sex, under the age of 16 at time of entry. Within this group no heat or flame technique for moulding may be used, but any other form of adhesion may be utilized.
Senior: Participants, either sex, over 16. Within this group, any form of adhesion is accepted. Heat to bend or shape the pens may be used.

3 Entries for the competition must be accompanied by the official entry form below.

4 Any number of BIC Ballpen barrels may be used. All models must be constructed utilising any part of BIC Crystal Fine (Yellow) and Medium (Transparent) ballpens.

5 BIC Crystal barrels may be cut to shape or size, but each barrel must clearly show the Registered trade name BIC (as imprinted on the barrel). Where models are moulded by heat, there must be at least 10 parts where the BIC Registered trade mark is clearly shown.

6 Accessories other than BIC parts may be used *only* to make the model functional or to infer final design, i.e., wheels, transfers, cotton, string, paper, etc.

PRIZES

7 Prizes will be awarded to competitors who, in the opinion of the panel of judges, produce the most creative, unusual or skilful entry for each quarterly competition.

8 Quarterly prizes will be awarded as follows:
Senior section—first prize £25.
second prize £15.
third prize £10.
10 consolation prizes of £5 each.
Junior section—first prize £15.
second prize £10.
third prize £5.
10 consolation prizes of £2 each.

9 Models winning any of the three prizes in either Junior or Senior levels of any of the quarterly competitions will automatically be entered in the BIC National Championship Competition and the individual competitor whose model is selected by the judges to be of greatest merit will receive an additional cash prize of £250 together with the 1972 BIC Model-Making Trophy.

10 **Entrants should send their models to:**
The BIC Model-Making Competition,
c/o Montague House, 23 Woodside Road,
Amersham, Bucks.
Should a model be considered delicate for conventional postage, then a photograph (colour or black and white) may be despatched beforehand. This will be used for preliminary judgement. Entry forms should be clearly attached to each model or photograph entered.

11 No responsibility can be taken for the damage in transportation of any model received. Judges will, however, take into account such unfortunate circumstances and the model will still be eligible for participation within the contest.

12 Should participants require a model returned, then return postage must be included by way of enclosing the appropriate stamps.

RESULTS

13 The 1972 competition will be held during 3-monthly periods and results will be announced during August 1972, November 1972, February 1973.

14 Participants should ensure that their models are despatched to arrive by 1st June (for August judging), 1st September (for November judging) and 1st December (for February judging).

15 Any model received after this date will not be eligible for the relevant Quarter but will qualify for the next Quarter's competition.

16 Any prize winning model will become the property of Biro-Bic Ltd., and may be used in any way they think fit.

17 Employees, relatives or direct associates of Biro-Bic Ltd., Model and Allied Publications Ltd., as well as their advertising agents will not be eligible for this competition.

18 The decision of the Judges is final and no correspondence can be entered into in relation to prizes awarded or decisions made.

I understand and abide by the Rules

Name.....
(BLOCK LETTERS PLEASE)

Address.....

.....

..... Age.....

WHERE DID YOU COLLECT YOUR BIC PENS? .....

A.I.

.....

PLANS HANDBOOKS

15p each

Aeromodelling

128 pages featuring hundreds of working model aircraft, illustrated almost entirely by photographic reproductions of the actual models, plus span, brief description and graded for ease of construction. Also selected engine list with tabulated data; index to illustrated plans, X List of vintage unorthodox novel plans, many other classifications, useful articles, order forms. Also good selection of trade advertisements.

Model Boats & Cars

96 pages of plans of scale and semi-scale ships, tugs, lifeboats, submarines, paddle steamers, period ships, racing yachts, hovercraft, cabin cruisers, mostly illustrated, fully described, and classed for ease of building. Working model cars and usual vehicles are included and a large range of scale car drawings, racing cars ancient and modern. Index of drawings; useful articles on building; waterline plans; trade advertisements.

Model Engineering

96 pages of working model drawings for steam locomotives, traction engines, steam engines, petrol engines, workshop equipment from LBSC, Westbury, Evans, Maskelyne, Bradley, Hughes. Plus useful model engineering information, screwcutting tables, standard threads, letter and number drills, wire and sheet metal gauges, miscellaneous information.

Radio Control Models

96 pages of R/C models. There are 128 R/C aircraft, all illustrated, including S/C Sports Models and Trainers, Galloping Ghost Models, Competition Aerobatic Models, Multi-Sport and Trainers, Pylon Racers, S/C and M/C Scale Gliders and Soarers. 87 model boats suitable for radio control.

MODEL & ALLIED PUBLICATIONS LTD.,
13/35 Bridge Street, Hemel Hempstead, Herts.

RipMax for all your ACCESSORIES

⅛ SCALE PAINTED PILOT 39p
ditto, with visor 48p
1/12 SCALE PAINTED PILOT 39p
(with detachable visor)

FULL LENGTH PILOT

Seated position in regulation flying clothes. Unpainted for colouring as shown (or to choice).
⅛ scale ... 95p
1/10 scale 79p
Moulded in white plastic.

GRIP TUBES

A new positive type of binding for pushrod end fittings, etc., etc. Simply cut to length, slip on and heat-shrink in position.
Large Tube (18") 19p
Small Tube (18") 19p

PROFILED CLUNK TANKS

The ideal tank shape. Neoprene plug (3 holes can be used); durable silicone flex tube and aluminium pipes.

2½oz.	'Profiled' Klunk Tank	37p
4oz.	'Profiled' Klunk Tank	48p
6oz.	'Profiled' Klunk Tank	54p
8oz.	'Profiled' Klunk Tank	56p
10oz.	'Profiled' Klunk Tank	58p
12oz.	'Profiled' Klunk Tank	59p
11oz.	'Profiled' Extra Short	59p

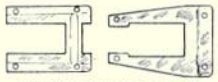
3/32" SILICONE TUBING (40" l'g)
Thinwall ... 42p Heavywall ... 42p

RIPMAX-KAVAN PROPS

6 x 4 16p 7 x 4 24p 8 x 4 32p
8 x 6 32p 9 x 4 39p 9 x 6 39p
10 x 4 45p 10 x 6 45p 11 x 6 49p
11 x 7¾ 49p
FIBREGLASS PROP 11 x 7¾ 54p

RIPMAX iron beech CONTEST PROPS (wood)

9 x 6	27p	11 x 7½	30p
9 x 7	27p	11 x 8	30p
9 x 8	27p	12 x 4	33p
10 x 5	28p	12 x 5	33p
10 x 6	28p	12 x 6	33p
10 x 7	28p	13 x 4	36p
10 x 8	28p	13 x 5	36p
11 x 4	30p	13 x 6	36p
11 x 5	30p	14 x 4	40p
11 x 6	30p	14 x 5	40p
11 x 6½	30p	15 x 4	44p
11 x 7	30p	24 x 8	£2.95



ENGINE MOUNTING PLATES

In heavy gauge high strength light alloy, in four sizes accommodating most engines.
0.06-0.12 ... 37p 0.29-0.40 ... 48p
0.15-0.19 ... 43p 0.45-0.61 ... 55p

STEERABLE NOSEGEAR

Single and twin leg designs with coil spring. Nylon steering arm and bulkhead mounting bearing. Complete with fixing bolts, etc.
09-15 size 79p
19-29 size 87p
35-45 size £1.21
49-61 size £1.33

DURAL U/C WITH AXLES

Heavy gauge high tensile metal.
0.09-0.15 model size 53p
0.15-0.40 model size 74p
0.45-0.61 model size 87p
MAIN U/C LEG WITH SEATINGS 79p

NYLON IN-LINE FUEL FILTER

Packet of 2 ... 30p

CAM LOCK WING FASTENER

Packet of 2 ... 89p

KWIK KEEPERS

Ingenious clip-on lock device.
Packet of 6 20p

PUSH-ON GLOW PLUG CLIP

Complete with lead. £1.07

PUSHROD EXIT GUIDES

Fully faired design in moulded plastic.
Packet of 2 17p

AILERON ADJUSTAHORN

Small (pr) 17p
Large (pr) 26p

ELEVATOR HORNS

Complete assembly with bushings.
Centre horn 22p
Offset horn 22p
Differential horn 22p
Suitable for control line or radio control models

NYLON C/L BELLCRANKS

2" 14p 2½" 17p 3" 19p

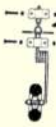
CONTROL HORNS, etc.

Graupner 90° Nylon Crank (2)	24p
Graupner 120° Nylon Crank (2)	24p
Bowden Cable with Links	38p
Adjustable Throttle Linkage	27p
Horn with Snap-on Link	37p
Snap-on Aileron Links (set)	42p
Klip-on Keeper	4p
Metal Bellcranks, Small 18p Large	24p

'RMA'TUF-TANKS ROUND CLUNK

½ oz.	33p
1 oz.	33p
2 oz.	33p
4 oz.	35p
6 oz.	37p
8 oz.	39p
10 oz.	43p
12 oz.	48p

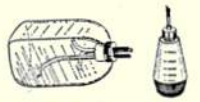
GRAUPNER ITEMS NOSELEGS



B'lkhead mounted ... £1.98
Belly mounted £2.34
(Both single leg steerable units).
L/W STEERABLE NOSEGEAR
Short or long £1.19
Noseleg bracket (2) 32p
Nylon Steering arm (2) ... 34p

RETRACTABLE UNDERCARRIAGES

MAIN U/C Nylon (pair) ... £3.95
NOSE U/C Nylon £3.95
MAIN U/C DURAL (pair) ... £10.50
NOSE U/C DURAL ... £7.45
MASTER RETRACT SERVO £8.75
AUXILIARY RETRACT SERVO £8.75



SEALITE SQ. CLUNK TANKS

4 ounce	72p	6 ounce 76p
8 ounce	80p	10 ounce 85p
	Large 14 ounce 90p	

Squeeze Bottle with Twist cap 49p

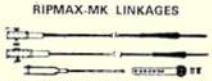
SCREW-UP FILTERS

Tank type ... 29p
Line type ... 29p

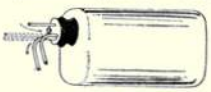
NOISELESS THROTTLE LEVER

Moulded nylon throttle arm gives freedom from noise on R/C models. Pack of 2 16p

RIPMAX-MK LINKAGES



Long Yoke K-Link (pkt 2) ... 34p
Set K-Links with Rods, etc. ... 43p
Pushrod Holder & Keepers (2) ... 34p
Nylon Kwik Link (packet 2) ... 22p



OVAL CLUNK TANKS

50 c.c. (1¾ ounce) Tank ...	74p
100 c.c. (3½ ounce) Tank ...	86p
150 c.c. (5¼ ounce) Tank ...	94p
220 c.c. (7¾ ounce) Tank ...	99p
320 c.c. (11¼ ounce) Tank ...	£1.05

SQUEEZE BOTTLE with Spout 29p

MINI CONNECTORS

Miniature plugs and sockets.
6-pin ... 30p
8-pin ... 40p

NYLON SPINNERS

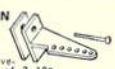
for 2-blade props.

1¾" dia.	64p
2" dia.	74p
2¼" dia.	76p
2½" dia.	84p
2¾" dia.	94p

ADJUSTA-HORN (for RUDDERS)

Pack of 2 15p
(for AILERONS)
Small (pair) 17p
Large (pair) 28p

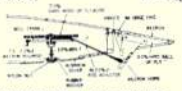
NYLON HORN (RUDDER)



True geometric design for equal movement. Packet of 2 10p

SCREW-ADJUST HORNS (AILERON)

Metal and nylon. For strip ailerons. Pair 32p



DIFFERENTIAL CRANK KIT

A complete kit for providing selectable differential movement on conventional inset ailerons. 46p

COCKPIT INSTRUMENTS

True to scale and fully detailed printed instrument panel gauges (including alternative forms where applicable).

5 mm ... 39p	9 mm ... 39p
7 mm 39p	12 mm ... 39p

PUSH ROD EXIT GUIDES

Semi-hooded type (2) ... 13p

JUSTIK CABLE ANCHORS

Self - adhesive base with metal arms bent to anchor cables, etc. Packet of 6 18p

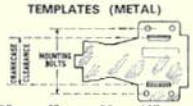
JUSTIK SERVO RAIL SUPPORT

Self-adhesive brackets for mounting servo rails. Packet of 4 18p

CAM LOCK FASTENERS

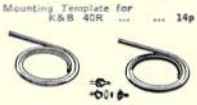
Complete with hardwood blocks and bolts, etc.
Small (pr) 44p
Medium (pr) 44p
Large (pr) 44p

ENGINE MOUNTING TEMPLATES (METAL)



OS		OS	60F
	10		60R
	15		
	19 all	ENYA	09 all
	30 14p		19 14p
	35		35
	45		45
	58		60

Mounting Template for K&B 40R 14p



Take-apart Fuel Filter ... 30p
Rubber Fuel Tubing (40") 16p
Silicone Fuel Tubing (20") 39p

RIPMAX NYLON

TENSILE NYLON in white, yellow, orange, red, blue and khaki. White 35p per yd. or 99p per 3 x 1 yd.: Colours 42p per yd. or £1.20 per 3 x 1 yd.
SUPALIGHT (white only) 35p per yd.; or 99p per 3 x 1 yd.
ECONOMY NYLON (white only) 29p per yard; or 82p per 3 x 1 yd.

Screw-Adjusting Aileron Horns 33p
Differential Aileron Horns (2) 49p
Flat Nylon Hinges (pkt. 10) 40p
Short Nylon Horn (pair) 15p
Medium Nylon Horn (pair) 16p
Long Nylon Horn (pair) 17p
Nylon Wing Fixing Bolts (2) 30p
Rubber Wing Seatings (pair) 39p

¼" Control Surface Fairing (32" long, pair) 24p
5/16" ditto (32" long, pair) 33p
⅜" ditto (32" long, pair) 40p

STANDARD AIRSPAN WHEELS

1¾" dia. pr. 68p 2" dia. pr. 76p
2¼" dia. pr. 85p 2½" dia. pr. 95p
2¾" dia. pr. £1.05 3" dia. pr. £1.18

WHITEWALL AIRSPAN WHEELS

1¾" dia. pr. 78p 2" dia. pr. 86p
2¼" dia. pr. 95p 2½" dia. pr. £1.05
2¾" dia. pr. £1.15 3" dia. pr. £1.28

STEERABLE NOSEGEAR

Short £1.63
Long £1.80

STEERABLE GEAR

with brake £2.25

NEW LOW-BOUNCE WHEELS

1¼" ... pr. 59p 2½" ... pr. 87p
2" ... pr. 61p 2¾" ... pr. £1.05
2¼" ... pr. 67p 3" ... pr. £1.23
2½" ... pr. 75p 3¼" ... pr. £1.40

GRAUPNER RECORD WHEELS

1¼" (30mm) 38p 2½" (60mm) 59p
1½" (40mm) 39p 2¾" (70mm) 78p
2" (50mm) 47p 3½" (90mm) £1.34

Ripmax 'PB' Aeroscale Airwheels

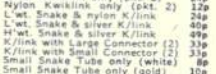
2½" ... pr. 97p 3½" ... pr. £1.50
2¾" ... pr. £1.10 4" ... pr. £1.80
3" ... pr. £1.25 4½" ... pr. £2.30
3¼" pr. £1.46 5" ... pr. £2.90

Ripmax 'KBK' Tru-Spin Airwheels

¾" ... pr. 16p 1½" ... pr. 39p
1" ... pr. 22p 1¾" ... pr. 44p
1¼" ... pr. 28p 2" ... pr. 49p
1½" ... pr. 34p

Nylon Hub Tru-Spin Airwheels

1½" ... pr. 47p 2½" ... pr. 63p
1¾" ... pr. 54p 2¾" ... pr. 79p



Black Kwiklink with 5" rod	14p
Silver Kwiklink with 5" rod	16p
Silver Kwiklink with 10" rod	20p
Nylon Kwiklink with 10" rod	8p
Black Kwiklink only (pkt. 2)	18p
Silver Kwiklink only (pkt. 2)	24p
Nylon Kwiklink only (pkt. 2)	12p
L'wt. Snake & nylon K/link	24p
L'wt. Snake & silver K/link	40p
H'wt. Snake & silver K/link	49p
K/link with Large Connector (2)	33p
K/link with Small Connector (2)	33p
Small Snake Tube only (white)	8p
Small Snake Tube only (gold)	10p
Large Snake Tube only (white)	12p
Small pushrod end cap (pkt. 2)	13p
Medium pushrod end cap (pkt. 2)	16p
Large pushrod end cap (pkt. 2)	17p

SILVERED NYLON SPINNERS

(1¼" UNF or 7mm thread)

1¾" dia.	54p	2" dia.	62p
2¼" dia.	70p	2½" dia.	79p

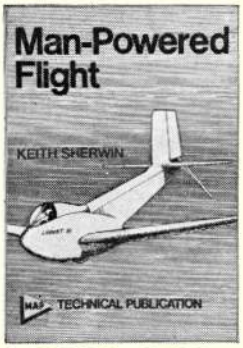
Tornado
PROPS FOR POWER PLUS!

	TYPE A			TYPE B			TYPE C			TOPFLITE NYLON			SUPER M MAPLEWOOD		
	5 x 3	11p	9 x 4	37p	5½ x 3	13p	5 x 3	26p	5¼ x 3	15p	10 x 3½	55p	9 x 6	42p	11 x 7½	48p
	5 x 4	11p	9 x 6	37p	5½ x 4	13p	5 x 4	26p	5¼ x 4	15p	10 x 6	55p	9 x 6	42p	11 x 8	48p
	5½ x 3	13p	9 x 7	37p	6 x 3	16p	6 x 3	28p	6 x 3	20p	11 x 4	67p	10 x 6	45p	11 x 8	48p
	5½ x 4	13p	9 x 8	37p	6 x 4	16p	6 x 4	28p	6 x 4	20p	11 x 6	67p	11 x 6	48p	12 x 6	53p
	6 x 3	16p	10 x 4	45p	8 x 6	45p	TYPE D		7 x 4	26p	11 x 7	67p	11 x 7	48p		
TYPE C	6 x 4	16p	10 x 6	45p	9 x 6	53p	7 x 8	43p	7 x 6	26p	11 x 8	67p		POWER (WOOD)		
3-bl. tractor	7 x 4	21p	11 x 4	53p	10 x 6	60p	8 x 6	64p	8 x 4	34p	12 x 6	82p	11 x 6, 7, 7½, or 8			48p
TYPE D	7 x 6	21p	11 x 6	53p	Types A, B,		8 x 8	64p	8 x 6	34p			RMA/SEMO NYLON			
TYPE A 3-bl. tractor	7 x 8	21p	11 x 8	53p	C and E yel-		9 x 6	75p	9 x 4	45p			7 x 4	14p	8 x 8	18p
2-bl. tractor TYPE E	8 x 4	29p	12 x 4	75p	low nylon		10 x 4	75p	9 x 6	45p			7 x 8	14p	9 x 4	21p
TYPE B 3-bl. pusher	8 x 6	29p	12 x 5	75p	Type D, alu-		10 x 6	75p	9 x 7	45p			8 x 4	18p	9 x 6	21p
2-bl. pusher 6 x 3	28p	8 x 8	29p	12 x 6	75p	minised nylon.							8 x 6	18p	all 2-blade	

SEE THEM ALL AT YOUR LOCAL MODEL SHOP!

MAP The Finest Range of Model Technical Books in the World!

155 MAN-POWERED FLIGHT



In this, the first book primarily aimed at the student of man-powered flight, Dr. K. Sherwin, of the University of Liverpool, analyses the problems of design structure and operation, adding his own theories for production of a practical 'pedal scooter'. Over 128 specially selected illustrations collected by Aeromodeller staff convey a pictorial history of progress and combined with more than 90 text diagrams, form a scientific reference work of great value to all students of aviation.

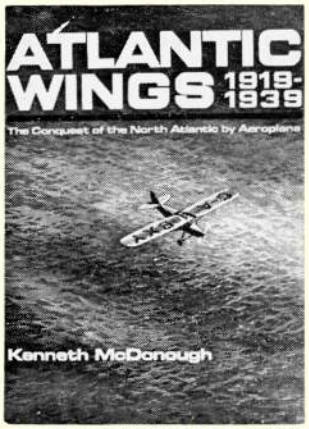
176 pages, 8¼ x 5¾ in. (International A5 size) with 2 lb. straw board covers, bound in Balacron with gold blocking on the spine. **£1.75**

4 MODEL AERO ENGINE ENCYCLOPAEDIA

Many of the world's engines are detailed in tabular summary with principal dimensions and advised propellers. Three extensive chapters deal with initial operation of a first engine, whether it be coil ignition, diesel or glow-plug. Advanced data on fuels, horsepower, speed controls, silencers and tuning of racing engines. Fully updated and revised.

8½ x 5½ in. 208 pages. Full bound in plastic cloth, with three-colour dust jacket, over 300 sketches, photos, data tables. **90p**

6 ATLANTIC WINGS



The authentic history of North Atlantic aerial crossing, 1919-1939. The Sopwith 'Atlantic', Lindbergh's 'Spirit'; Balbo's 'Savoia Marchetti'; Kingsford Smith's 'Southern Cross' and the famous French aircraft, the Breguet XIX 'Point d'Interrogation'; Levasseur 'L'Oiseau Blanc'; and Bernard 'L'Oiseau nari' are included.

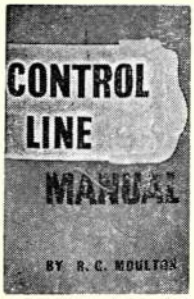
11¼ x 8¾ in., 172 pages, including 20 full-colour art plates. **£2.97½**

8 FLYING SCALE MODELS

All types of scale flying models are described in turn – glider, free-flight and control-line; Jetex, diesel, rubber or ducted-fan types. Much useful information is given on achieving highly realistic finished and detailed parts and there is a useful set of tables listing camouflage and insignia from 1914 up to date. Very large number of illustrations, including photographs, diagrams and scale plans.

8½ x 5½ in. Hard bound. Over 300 diagrams, sketches, photographs, illustrations, 74,000 words. **62½p**

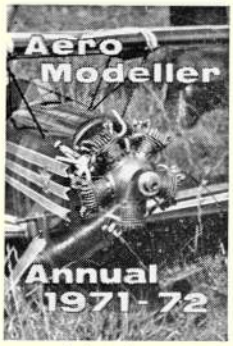
7 CONTROL LINE MANUAL



Main chapter headings. Why Control Line?; Basic U-Control; Basic Mono-line; Basic Flight Control; Learning to Fly; Aerobatics; Speed; Team Racing; Combat; Carrier; Cargo and Endurance; Scale Models; Jet. The engine in Control Line; Towards the indestructible; Looking after the Lines; Variations on the Theme, plus appendix.

8½ x 5½ in. Hardbound. Over 300 diagrams, sketches, photo - illustrations, 74,000 words. **90p**

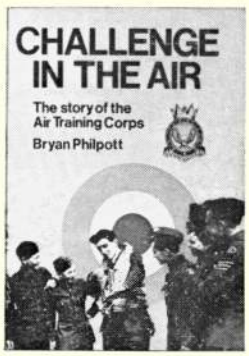
160 AEROMODELLER ANNUAL 1971/2



Four dozen of the top model aircraft designers culled from a dozen countries give a balanced appraisal of modern aeromodelling. Survey of free flight contest tactics; How to do aerobatics with control line models; Flying radio controlled thermal soaring gliders; Making sheet balsa models; The effect of altitude on model flying; Use of twisted wings; Towing a glider with a Power Model; Variable camber power models; Engine Fuels . . . plus countless hints and tips. This pot pourri of all that's best in 1971 will be extremely popular with a broad range of interests in Aeromodelling.

128 pages, size 8¼ x 5½ in. Coloured cover (photo) bound covers. **75p**

156 CHALLENGE IN THE AIR



The story of the Air Training Corps from its tenuous beginnings after the 1914-18 war, when the idea of a youth organisation with an aeronautical flavour formed in the minds of two young ex-servicemen – to its present position as the main source of recruits for the Royal Air Force. The story unfolds via the formation of the Air League's Air Defence Cadet Corps, through the difficult days of World War II – during which the Air Training Corps was formed – to the present day.

164 pages on antique wove paper and white glossy plates, size 6 x 8½ in., being 128 pages of text, and 35 pages of illustrations. Bound in Linson, with gold foil blocked title on spine and colour dust cover. **£1.75**

MAP

HOW TO ORDER. Ring round the reference number of the titles you have chosen. Carry out totals to cash column and then total up at the bottom. Please add 5p packing & postage for orders of 62½p and below, 7½p over 62½p up to £1. Above this orders are POST FREE.

4 · 6
7 · 8
155 · 156
160

Name.....

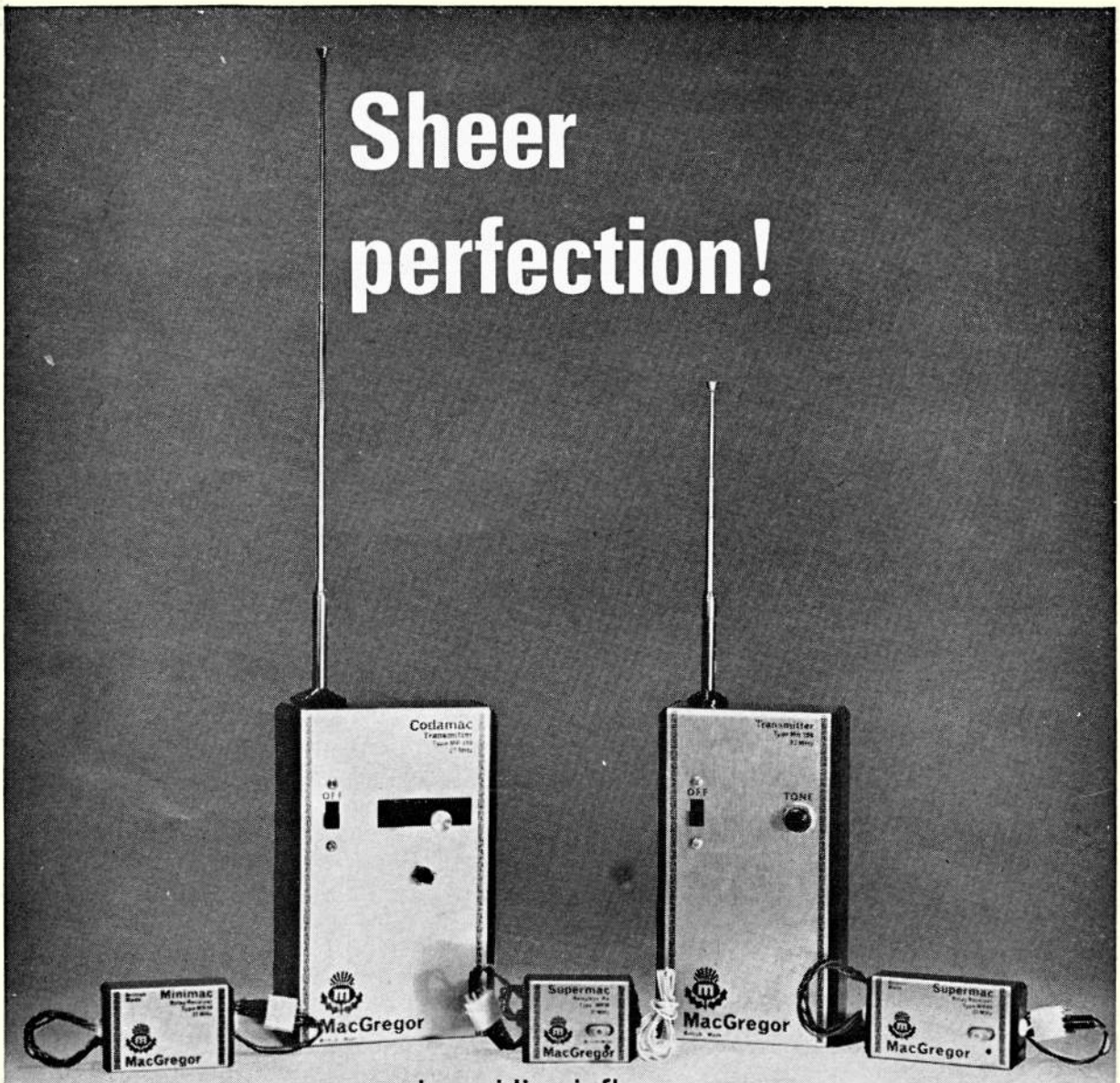
Address .....

.....

£

MODEL & ALLIED PUBLICATIONS LTD.
13-35 Bridge Street, Hemel Hempstead

Sheer perfection!



the guiding influence...

MR 300 CODAMAC
Fully automatic S/C transmitter. Does the thinking for you – electronically! "Out of sight" range with any MacGREGOR receivers, Escapements or Servos. (Quick Blip). **£13.50**

MR 200 POWERMAC
The same power-packed Tx as the CODAMAC but controls reduced to basic push button for manual coding. **£8.50**

MR 50 and 60 SUPERMAC
A truly revolutionary design in miniature superhet receivers. Maximum sensitivity, noise rejection and super selectivity with unique MacGREGOR facility of plug-in Crystals on 12 spot frequencies.

Relayless for escapements **£8.95**
Relay version for servos etc, **£10.50**
Prices include crystals.

MR 30 and MR 40 MINIMAC
Fully pretuned sub-miniature superregen receivers for the smaller budget where interference from other modellers is not a problem.
Relayless Version **£4.50**
Relay Version **£5.95**

Inclusive Combo Prices

* MR 360 Codamac Tx and Supermac Relay	£22.95
* MR 350 Codamac Tx and Supermac Relayless	£21.50
MR340 Codamac Tx and Minimac Relay	£18.50
MR330 Codamac Tx and Minimac Relayless	£16.95
* MR260 Powermac Tx and Supermac Relay	£17.95
* MR250 Powermac Tx and Supermac Relayless	£16.50
MR240 Powermac Tx and Minimac Relay	£13.50
MR230 Powermac Tx and Minimac Relayless	£11.95

** Includes matched pair of superhet crystals (extra crystals £2.75).*

Ask your model dealer or write direct to us for illustrated catalogue

MacGregor Radio Control,
Canal Estate, Langley, Bucks.
Sole U.K. Distribution by Ripmax Limited

Heard at the HANGAR DOORS

Two Johnnies in a Gondola might well be the description of this scene as A.M.A. President John Clemens and A.M.A. Exec. Dir. John Worth examine a WW.1 Zeppelin Gondola at the Paris Musée de l'Air. Over for the F.A.I. conference, the A.M.A. officials spent a few days in the U.K. during December, visiting Cranfield and Cardington.

F.A.I. DECISIONS at the Annual reunion in Paris, December 2/3rd were tempered largely by the '4-year freeze' in rules and sweeping suggestions for diminishing fly-off engine runs for power duration; for new judging systems and schedules in R/C aerobatics, and for reducing Pylon Racing speeds have all been referred back to the technical sub-committees for deliberation. Among the firm decisions in the provisional regulations are however:–

Coupe d'Hiver weight increased from 80 to 100 g.

Combat new starting procedures and changes of rules.

Wankel engines (Rotary pistons) are now accepted, based on the N.S.U. formulae for calculating capacity.

Starting points for free flight will permit the launcher a 5 metre radius of action.

Spectators at free flight events will not be allowed within 25 metres of the starting line.

Two important items which were accepted, subject to approval of the F.A.I. sporting aviation committee were:–

World Champions are to be eligible for entry into the subsequent Championship to defend their title even if not in the National Team.

Control Line Stunt Championships to be run on two round eliminator basis for selection of 15 finalists who go on to fly two rounds.

Details of the International Contest Calendar will be found on page 99 where it will be noted that France will introduce a European Championships in Radio Control as well as an Aeromodelling week of free flight – and will run the Scale Champs at Toulouse. Confirmation of the Indoor and Control Line Championships will be made (or the events cancelled) by January 31st. Austria hopes to run Free Flight, and Italy Radio Control in 1973.

EASTER EXPO at Sywell is being organised by Model and Allied Publications in conjunction with the *Barnstormers* Air Display. Marquee exhibition areas will house demonstration stands for all the prominent manufacturers and importers of radio control equipment while flying displays will run from 10.30 a.m. to dusk. On both Sunday and Monday, the Barnstormers will put on their thrilling two hour display of stunts so that the event becomes a wonderful day out for the whole family. Object of the central location of Sywell, which is close to the middle of England and very handy for the motorway network, is to expose radio control modelling to a large number of newcomers to the hobby. The event has been at an on-off stage twice in the last twelve months; but has now been firmly arranged after it became clear that the Esher Symposium could not be held at Brooklands Technical College, Weybridge.

COLLAPSE of Lines Brothers led to wide speculation as to the future of well-known subsidiaries in the hobby field. Happily Airfix came to the aid of Meccano by acquiring the Liverpool company. This marriage of plastics and die-cast models has an extremely sound future. Equally, another subsidiary, A. A. Hales Ltd., of Hinckley, have continued in normal business, and as of January 1st come completely under the financial control of Allan Hales, who has purchased the entire share capital from the liquidators of Lines Brothers, the former parent company. This great news deserves congratulations as well as the good wishes of the entire model trade for bright prospects under new management.

Celebrities at the opening of Mick Charles' Model Shop in Kingston, Al Mancini, of Film and Stage fame, and aviatrix Sheila Scott, congratulate Mick on opening day. Model in the foreground is his World Championship winning R/C scale Sirocco.

The designer with the latest version of the Lightning which is covered in lightweight yellow tissue with colour trim to help provide a low all-up weight.

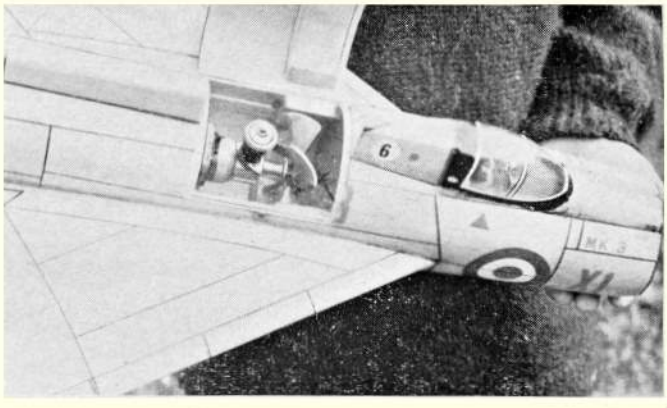
Spectacular 25 in. span semi-scale model using ducted fan propulsion via an .049 cu. in. engine

by FRANK BISHOP

ENGLISH ELECTRIC LIGHTNING

IF THERE IS one type of aircraft that is guaranteed to create interest on the flying field, then that is the ducted fan model. There was a great deal of interest in this form of power many years ago, when Veron introduced the famous *Lavochkin LA.17* and *Sabre* free-flight kits for small engines, and these kits even included an aluminium impeller. Although these models were very successful in the hands of experienced modellers and built up into really fine models, for the inexperienced or junior modeller success tended to be marginal. There has been a lot of development since those early days, mainly in regards to the fan and there is now a range of five fans produced by Veron to suit almost any engine, while the range of small easy starting glow engines that produce little vibration seem to be unlimited. With this in mind, my interest in ducted fan models was rekindled and in 1966 I designed and constructed a small model that resembled the English Electric *Lightning*. With a wingspan of 18 in. and powered by a Cox TD 049 engine driving a Veron Type B impeller cut down to 2½ in. diameter, the model tipped the scales at 7½oz. Owing to the very small impeller blades the engine used to turn over at about 25,000 r.p.m. Quite a head turner, this model made many spectacular flights, but owing to insufficient fuel proofing of the duct it became heavier and heavier, till at last it was *too* heavy! Various models were built after this, ranging from a small Cox Pee-Wee powered model to a large (36 in. span) model powered by a P.A.W. 2.49 driving a Veron impeller and equipped with an Otarion single channel receiver and a Fred Rising escapement to operate the rudder. Unfortunately, due to terrific vibration, I could not prevent the actuator from skipping (owing to my own lack of experience at that time), and the model subsequently made many flights free-flight, until one day it disappeared into the blue after filling the 4 oz. R/C tank to the brim! It was recovered two months later about five miles away. After that episode I built the first of the present series that was destined to resemble the *Lightning* using a Cox Baby Bee engine owing to its compactness in having its tank and engine mount in one. The resulting model weighed 8½ oz. and spanned 23 in., the only trimming required proving to be a small amount of weight added to the nose and a small vane in the tailpipe to give downthrust effect. This model was flown regularly for about 18 months and it is estimated to have made about 400 flights.

Model No. 2 was constructed after this and incorporated a few modifications – mainly an increase in fuselage length and cross section and improved appearance (as the previous model was given the name *Flying Drainpipe* by fellow modellers owing to its short cylindrical fuselage). A beam mounted Tee Dee 051 engine driving a Veron type impeller was fitted with a small team race fuel tank. A small cone was fitted behind the engine to smooth the air flow, and behind the fan eight flow straighteners were added. Again this model required very little trimming and it was soon apparent that the Cox TD 051 engine was producing more thrust than the Baby Bee. It had a much better climb and indeed it would climb in left hand circles till it was a mere speck in the sky, followed by a glide to the right. This model made about 40-50 flights until one Sunday afternoon it



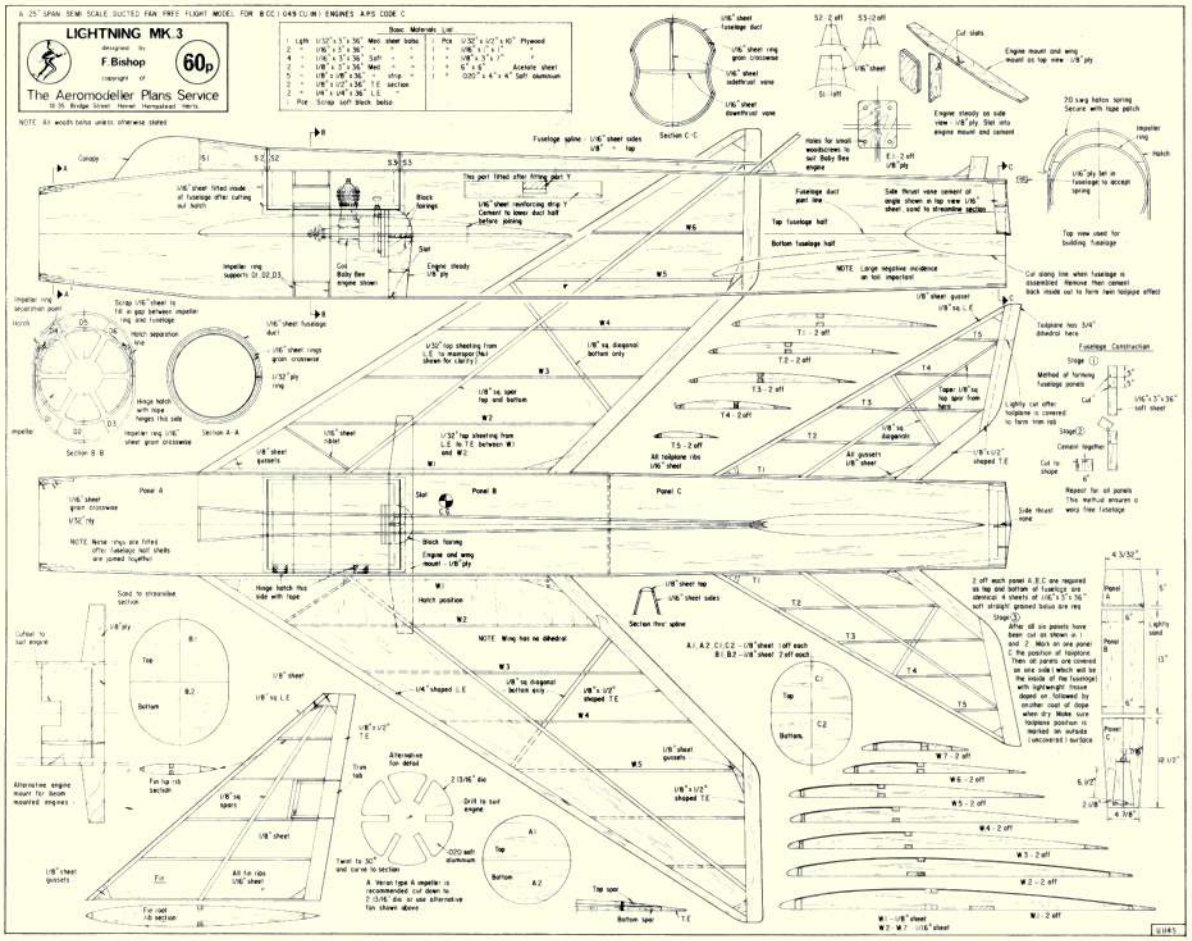
With the engine hatch cover opened for starting, the Cox Baby Bee engine is revealed, fitted here with a home-built fan unit. Much of the efficiency of the fan depends on the close-fitting of the duct around this item. Hatch must be securely fitted as all thrust would be lost should it become dislodged in flight.

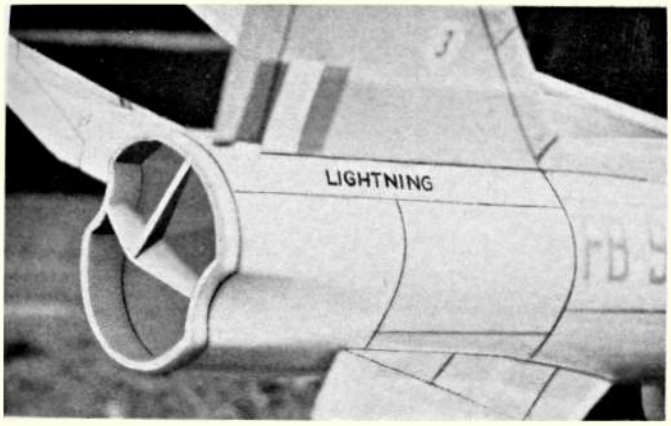
flew O.O.S. and has never been recovered. In June last year I completed the Mk. III (the model drawn here) powered by the old faithful Cox Baby Bee and incorporating all the design features of the Mk. I and Mk. II. It is a joy to watch in the air as it does not drag its tail in flight and has a surprisingly flat glide. No cone or flow straighteners are employed as they do not seem to offer any advantage with a long fuselage duct such as this (my own opinion only, of course). They also impair thorough cleaning of the inside of the fuselage of waste oil and dirt, which is most important with a model of this type. The model has been flown with various impellers, the Veron type A cut down to $2\frac{3}{16}$ in. diameter or the one shown on the plan seem best. If the Veron impeller is used it must be cord started with the pulley supplied, if the aluminium one is fitted it can be started with the starter spring or flicked with the fingers using a rolling motion on top of the blades which is the method I use (no, you will not hurt your fingers!). It is easy to build and fly and has no vices whatsoever but a word of advice to anyone wishing to experiment: do not try to fit a larger engine than a .051 in. or you will be disappointed! The only way a 1.49 c.c. engine can be fitted is to increase the fan diameter to at least $3\frac{1}{2}$ in. and this, of course, means increasing the fuselage diameter.

So if you are interested in joining the 'Jet Set' with this model, the first thing to do is visit your local model shop and purchase among, other things, four sheets of straight grained, soft $\frac{1}{16}$ x 3 x 36 in. balsa. This is most important as these four sheets are used to form the fuselage and so must be capable of bending. Take one sheet and cut a length 5 in. long, rotate 180° (see plan stage 1) then cut another length 5 in. long. Cement together to form a panel 6 x 5 x $\frac{1}{16}$ in. (this method of cutting ensures that the bending force will be equal on either side of the completed panels). When dry, this panel is cut to form panel 'A' $4\frac{3}{32}$ x 6 x 5 in. (see plan). The same procedure is used to form panels A, B and C – two off each are required. When this has been done you should have six panels (three pairs), mark them A, B and C 'top' and A, B and C 'bottom'. Do not, however, use PVA glue for butt joining the panels as it is not waterproof and we shall have to dampen the panels with water later. Balsa cement seems quite satisfactory provided you pin them down when joining to prevent warps.

Now take panel C 'bottom' and mark accurately the position of the tailplane – lightly sand off any cement lumps. One side of each panel is now covered in lightweight Modelspan tissue doped on – leaving a small overlap. Make sure the tailplane position is on the uncovered side of panel C. When dry cut off the

FULL SIZE COPIES OF THIS 1/6th SCALE REPRODUCTION ARE AVAILABLE AS PLAN No. U 1145, PRICE 60p + 5p POSTAGE FROM AEROMODELLER PLANS SERVICE, 13-35 BRIDGE STREET, HEMEL HEMPSTEAD, HERTS.





Rear end of the fuselage reveals deflector plates to provide side and down-thrust effects – these are finally glued in position after trimming flights have established their optimum settings.

overlap and apply another coat of dope and set aside to dry thoroughly. When dry you will notice they have a natural bend (tissue inside). Now cut out the half formers – one off each A1 and A2 and C1 and C2 and two off B1 and B2 from $\frac{1}{8}$ in. sheet. A candle should now be rubbed on the outside edge of each former to prevent the cement from sticking. Pin A1, B1 (two off) and C1 to the plan, fuselage top view, making sure they are square. Now take panel B and lightly moisten with water the outside surface, but not to the edges. Where the panels are cemented together leave about 1 in. Now place this panel over the half formers B1 (there should be half the thickness of the formers protruding as a guide for the other panels). Pin down in position, placing pins all along the outside of the fuselage to keep the panel in place. Take panel A and temporarily place between formers A1 and B1. This panel butt joints against panel B1 which you have just pinned down; it will be noticed that slight sanding and trimming will be necessary to obtain a good butt joint between panel A and B owing to the fact that the fuselage tapers towards the front. When you are sure it fits correctly, moisten with water and cement in place, again using pins along the outline of the fuselage to mould it in place. Panel C fits between formers B1 and C1 in the same manner; when dry remove from plan and repeat – you should now have two identical fuselage half shells. Lightly sand any cement lumps from the inside joints, and dope on a strip of tissue about 1 in. wide on the inside over the joints.

You must now decide which engine you intend to use because we must now construct the engine mount. The radial engine mount shown on the plan is for the Baby Bee (details are also given for beam mounted engines, see plan). Cut out the engine wing mount from $\frac{1}{8}$ in. ply, also the engine steady – sand to reduce drag. These are then slotted together and cemented. The engine mounting plates E1 (2 off) are also cut from $\frac{1}{8}$ in. ply. Mark position of engine mounting screws and cement in place, (notice the engine centre line is level with the top of the engine wing mount). The four corners between E1, engine steady and engine mount are filled in with balsa block and then sanded to form a streamlined section. When dry fit the engine to the mount with small woodscrews. Next pin formers in position in the lower fuselage half and cut slots to accept the engine mount on either side of the fuselage half and also a small slot at the bottom to accept the small lip on the engine steady. Place the engine and engine mount in position, then using former B1 align the engine so that it is both central and level. When satisfied, cement engine mount in position and leave to dry.

When dry, cement 1/16 in. reinforcing strips to the inside of the fuselage to strengthen the engine mount to fuselage joint, as shown on the plan. Remove engine and formers, cement half formers A1 to A2, B1 to B2, and C1 to C2 so that you have four complete formers. Scrap pieces of 1/16 in. sheet cemented on each side will help to strengthen them. You are now ready to join the fuselage halves. Pin the four formers in position in the lower fuselage half making sure they are central and upright. Now have plenty of pins and elastic bands to hand and place the top fuselage half on the bottom half. Check that the two halves come together. When satisfied cement together using plenty of bands and pins to hold in position. Check the joint for any gaps – these can be filled in with thin strips of balsa while all pin holes must be sealed with spots of cement to prevent fuel seepage. Now remove former A and cement the 1/16 in. sheet balsa rings and the 1/32 in. ply ring to the inside of the fuselage. Before the cement has dried try to find something tapered and round (I use a plastic drinking mug) and push inside the fuselage at the front to keep the front of the fuselage round until the cement has set. Remove former C and cut out the part shown on the plan, then cement back inside-out – this gives a twin tailplane effect. A layer of 1/16 in. sheet $\frac{1}{2}$ in. wide is cemented to the inside after sanding the forward piece to a knife edge. Cut out the hatch using a sharp blade, then cement part 2 and strips of 1/16 sheet on the inside of the fuselage to prevent air escaping when the hatch is closed. Hinge the hatch with tape hinges and make the hatch clip out of 20 swg wire – a small piece of ply is let into the fuselage. The hatch must snap shut and must not vibrate open when engine is running. The two remaining formers B1 can now be removed from the fuselage.

Fit impeller ring location parts D1-D8 checking that the impeller will revolve inside the ring – if another engine is fitted you will have to re-position D1-D8 accordingly. Note that parts D7 and D8 extend higher than the hatch line – they should extend to the top of the 1/16 sheet strips. Similarly D4 and D6 do not extend to the extreme edge of the hatch. Next fit the 1/16 in. impeller ring (grain crossways) and fill in with 1/16 in. sheet between impeller ring and fuselage side where the impeller ring separates when the hatch is opened. Now take a Veron A type impeller and using a pair of compasses, mark off a diameter of 2 13/16 in. and trim off using a pair of sharp scissors, or you can make an aluminium one as shown on the plan, filing off all rough edges and bending each blade so that it has a pitch of 30 deg.-40 deg. as well as curves to the section shown. Screw the engine in the fuselage – a very long screwdriver now becomes necessary – and add the impeller to the engine. You should have a clearance of about 1/32 in.-1/16 in. all round the fan, although I have never yet attained this perfection and usually find that the impeller catches on one side and I have a gap of about 3/32 in. or more in the other side! If you have this problem, the solution is to glue some sandpaper to a piece of dowel to form a round file and proceed to file away the impeller ring where it is catching – not to much though and don't forget to snap the hatch shut. Now cement a strip of 1/32 in. sheet (grain cross wise) to the impeller ring where you have a large

clearance and carefully sand with your makeshift file so that it blends in smoothly. The impeller should now have a gap of 1/32-1/16 in. all round. A slightly larger gap than this is permissible at this stage as the impeller ring is covered with tissue then doped and fuel proofed later on and this tends to reduce the clearance slightly, but on no account allow the impeller to catch.

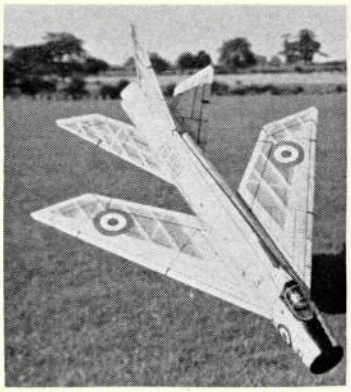
The wings are of conventional structure, but do try to keep them as light as possible by keeping to a light grade of wood, pin down the $\frac{1}{8}$ in. sq. bottom spar, shaped LE and TE and $\frac{1}{8}$ in. diagonal, then add the ribs, followed by the $\frac{1}{8}$ in. sq. top spar. The top spar is tapered so that top and bottom spar come together flush with the T.E. Add the $\frac{1}{8}$ in. sheet gussets. The wings are then covered between LE and Main spar with 1/32 in. sheet *top only* also between first and second rib again on the top only. The tailplane is built in the same manner as the wings except that the root rib is set at an angle, see plan. The fin is built over the plan but owing to the symmetrical section the L.E. and T.E. must be packed up when building. Sand the flying surfaces until quite smooth.

Cement the fin in position, making sure that it is central and upright. Using the butt joint in the top panels as a guide, the spine is built next. Cement formers S1-S3 in position leaving a small clearance to allow the hatch to open and close. Cement the 1/16 in. spline sides followed by $\frac{1}{8}$ in. sheet top, then sand to section shown, fit a cut down commercial cockpit and pilot.

The wings are cemented to the fuselage next. The wing tongues fit flush with the bottom of the wing and it will be necessary to cut away part of the bottom spar (viewed from the front) and make sure you have both wings at the same angle incidence. There is no dihedral on the wings. Next the tailplane is cemented in position – it helps if the root rib is slightly bevelled to accept the curvature of the fuselage. There is $\frac{1}{4}$ in. dihedral on the tailplane.

This should complete the airframe, the whole model is covered with lightweight Modelspan tissue, the wings tail and fin are covered first, watershrunk and given one coat of dope. The fuselage is covered next with the tissue being doped on. Strips of tissues about 1 in. wide are now doped on along the joint line on the inside of the duct stretching from engine mount to the rear fuselage – this is important to stop fuel seepage. Give the whole model another coat of dope (not forgetting impeller ring and engine mount). The finish itself is a matter of choice but only apply colour dope if you have a spray gun – the original was covered in yellow tissue to save weight. Roundels and letters are transfers while panel lines were represented by strips of black *Solarfilm* stuck on with Humbrol fuel proofer. When you are satisfied with the decoration the whole model is given a coat of Humbrol fuel proofer; coating the inside of the fuselage is best done first. A piece of dowel two feet long with a piece of sponge attached makes an excellent brush for the job. Lightly cement the down and sidethrust vanes in position as shown on the plan – their final positions will be established later.

The model is now complete (not difficult was it?) and so to the flight testing! The original weighed $8\frac{3}{4}$ oz. fully laden. Choose a really calm day for trimming and fly over long grass. The model requires a hefty launch compared with conventional free flight models, so with this in mind test glide into wind, and a fairly fast and flat glide should be

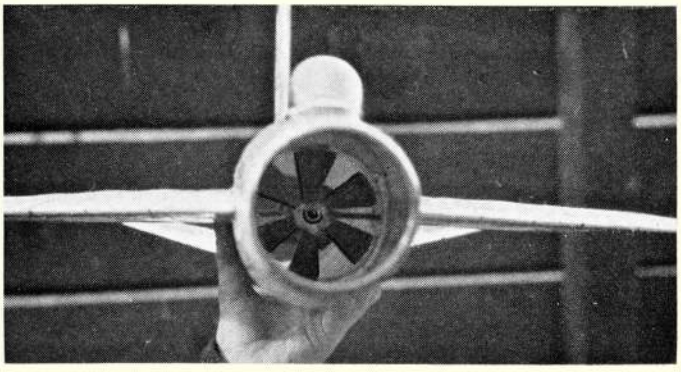


Lightweight yet robust construction is evident in this picture. Black trim lines consist of Solarfilm applied with Humbrol fuel proofer – quick and easy to apply.

the result. If it stalls add a small amount of Plasticine to the nose and if it dives cut the T.E. of the tailplane as shown on plan to form trim tabs and bend slightly up. There should be no tendency for the model to turn at this stage. When you are fully satisfied with the glide, try a powered flight. Start the engine as previously described and adjust for optimum setting and close the hatch (don't rush). The engine may tend to richen up when you close the hatch. If so open the hatch and close the needle quarter of a turn then quickly close the hatch again, when the engine should now continue to run correctly. When satisfied, launch level into wind (calm day remember) and the model *should* climb away in left hand circles followed by a glide to the right. If the model stalls under power increase the downthrust effect by means of our downthrust tab, if the model refuses to climb less downthrust is required. The model can be trimmed to fly either right or left under power by adjusting the sidethrust vane, although a left hand turn seems best under power as the torque effect holds the nose down and prevents power stalling. When the model is trimmed out, cement trim tabs, down and side thrust vanes securely and your model should stay in trim.

A word of advice here – after every three or four flights the rear end of the fuselage duct must be cleaned free of oil (a piece or rag on a length of dowel is the ideal tool) if the model is flown on a brisk day launch the model slightly to the side of the wind giving the model time to gain height before being blown downwind, finally of course don't forget your name and address, this model can travel an awfully long way as the designer found to his cost!

Head-on view shows the power source within its tightly fitting duct. Note also dihedralled tailplane but 'flat' wing layout.



topical twists

by 'Pylonius'

illustrated by 'Sherry'

'He's taking no chances with the Builder of the Model rule'.

Points of View

When astride your own hobby horse, and going at full gallop, it is not always easy to see the other fellow's point of view, unless, of course, your blinkers happen to slip.

'*What on earth does he see in that*?' you ask, as the multi operator performs his hair-raising arabesques overhead. You pick up your chuck glider, breathe heavily on the starboard wing, and wander back to the launch point to nurse what could be a dislocated shoulder. Meanwhile, the multi flyer, deftly recovering his model from a spin, goes inverted at zero feet, misses the park warden by a few inches and climbs quickly to avoid an emaciated A/2 glider.

'*Must make 'em of matchsticks*', he mutters, '*Still, can't blame 'em, considering the price of balsa these days*'.

'*Noisy brute*,' observes the A/2 flyer in his turn, '*pity he doesn't take up real aeromodelling instead of making a nuisance of himself with dangerous toys*.'

The control line flyer, watching all the free space antics, says, '*Silly capering. The only real form of model flying is by direct piloting. Why take up all that space for what you can do more cheaply and excitingly on two wires*?'

'*Modern planes, phooey*', quoths ye vintage flyer, '*give me something with a bit of old-fashioned substance – something that looks like a model plane*'.

'*Just a lot of kids with toys*', comments the spectator.

Native Wit

Mainly the difference between an underdeveloped and a so-called developed country is a model flying one. In the underdeveloped country you have acres of model flying space and no model flyers, whilst in the developed country you have thousands of model flyers but precious little flying space.

'*Ah*', says the native, emerging from his mud hut to gaze upon the run-wild-run-free expanses, '*if only we poor people were rich and prosperous, what fine model sport we would have*'.

But here he would be deluding himself. By the time his country could afford to buy its own wood he would have found those run-wild-run-free expanses covered with more barbed wire than they used on the Western Front. After finding just enough room to swing a *Hellcat* he is pushed to one side by a housing estate, or brought to earth by a line of marching pylons.

Nothing for it, then, but to join the local Radio club, that is if he is really wealthy (a worker in a powered rickshaw factory, for instance), and pay rent to fly on part of the land that used to be his own front garden.

Hi-Fli

If there is one sound which, seemingly, the human ear cannot tolerate, it is that of the model aircraft engine. Jet engines, road drills, open-exhausted motor bikes, yes, but the insistent buzz of the model i.c. engine, no – it just sends people stark bonkers, particularly if they happen to live within earshot of a flying field. And not only is the human ear allergic to this sound it is remarkably sensitive in picking it out from all the other noises that emanate from what we call civilised modern life. Whereas cavity walls and double glazing might exclude the roar of a jet engine, the thin wail of a model engine penetrates like a thermic lance, cutting through concrete, steel and the insulating thickness of the Sunday paper, to send 'local resident' near berserk.

The answer to the problem, since the silencer only cuts down the acoustic range by a few miles or so, would be to fit noise converters. These would alter the quality of the noise emitted to a more acceptable form. Thus 'local resident' would not hear that maddening buzz but a highly euphonic police siren, or equally appetising low-flying jet.

Another answer would be to equip every flying field with a machine that emits sound in the upper sonic register. This would not be audible to the human ear but would set all the dogs in the neighbourhood barking furiously. Under that barrage of sound it might be possible to operate the model engines without detection.

Soaring Costs

The worst of living in an affluent society is that everything costs so much. In fact, much of the affluence is illusory in that you are spending a lot more money getting that which was better and much cheaper when we were poverty-stricken peasants.

Take one thing: club fees. When I started modelling, back in the days when models flew backwards, you were only expected to cough up a modest sixpence per month, and that was extracted more in sorrow than desperation. But now the club fees have soared to such an extent that many treasurers have not yet heard of new pence. Not that it is their fault. The cost of a meeting room per two hours is roughly what you would have bought it for in more civilised times. And, since the type of model the average member owns is too noisy and dangerous to fly on free pasturage, a field must be hired at an astronomic rent. If that isn't enough to de-affluence you, there is the 30-mile journey to the field to consider.

AIRCRAFT DESCRIBED No. 211

Photographed at an Experimental Aircraft Association's 'Fly-In', Ralph Tenham's 125 h.p.-powered 'Tiger', built in 1964 at a cost of $2,200 and many hours' work. This machine has a maximum airspeed of 170 m.p.h., cruises at 150 m.p.h. and lands at 70 m.p.h.

THORP T-18 "TIGER"

a popular American all-metal sport airplane, designed to combine performance and simplicity for the home builder.

THE ORIGINAL DESIGN conception from which the *Tiger* arose, was for an open cockpit, two seat, all metal light plane which could be easily constructed by the amateur enthusiast. A machine that would be *fun* to fly while costs were minimised was envisaged, and so for this reason it was designed to use any one of four Lycoming engines, ranging from 235-360 cu. in. displacement (115-205 h.p.). These engines were readily available from U.S. Government Surplus supplies at a very low cost, being used as the motive force for Ground Power Units as well as being rescued from various scrapped Pipers. The 'hot rod' type enthusiast could obtain the biggest Lycomings from defunct Brantley or Hughes helicopters.

The basic airframe is aerodynamically 'clean' despite the great attention paid to ease of construction, and even the least-powerful Lycoming provides ample performance. Features such as pressure cowlings and bubble canopies, which are particularly difficult for the home-builder, are not essential (although they boost the performance considerably) and these options can be added to the 'basic' aircraft by the constructor at a later date.

Performance combined with simplicity clearly rates highly in John Thorp's eyes and this is reflected throughout the *Tiger* design. For example, although a tricycle undercarriage is preferable for ground handling, it poses constructional difficulties combined with a large increase in drag, the result is a 'tail dragger'. Windshield and canopy are as small as possible, to cut down drag, at a slight penalty of forward vision, which a generous downslope of the upper cowling compensates. A thick-gauge roll-over bar is incorporated around the windshield as a worthwhile precaution.

External skinning is predominantly .025 in. thick 2024 T-3 Alclad aluminium. The fuselage is only complicated by a steel tube A-frame landing gear which carries the basic engine mount. No suspension is provided in the undercarriage, all 'spring' is taken by the tyres and inner tubes and the flex of the steel tubes – a good incentive for smooth landings!

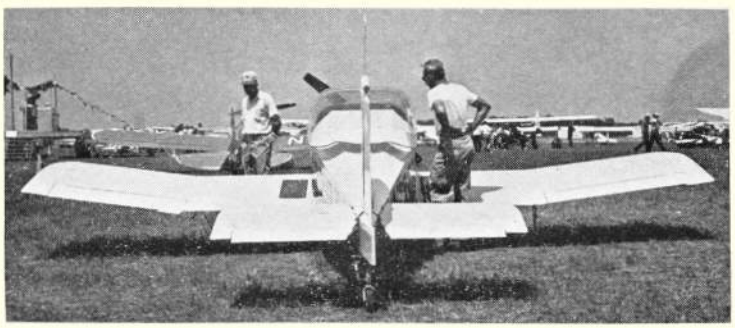
Fuselage side skins are cut from one 5 ft. x 15 ft. sheet – this sheet being split down the middle so that both sides are cut and drilled in one operation, minimising labour yet ensuring symmetrical construction. For those unable to obtain sheets larger than 4 ft. x 12 ft., a flush splice is made ahead of the tailplane position.

A 29-gallon fuel tank is mounted forward of the instrument panel, and while this obviates the need for a mechanical pump, it does cause trim changes as the level goes down. The engine itself is mounted to provide 3° right and 5° downthrust so that there is no noticeable torque effect at any power setting.

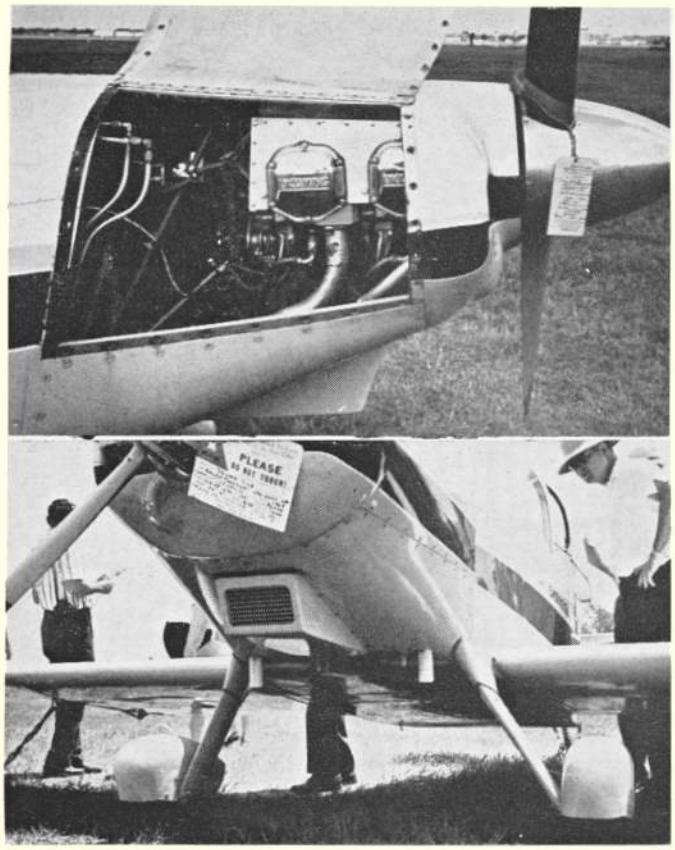
Wing skins are all 4 ft. wide (only the spar extends through the fuselage) and wrap from trailing edge to trailing edge without recourse to skin laps. They are all cut from standard 4 ft. x 12 ft. sheets.

Assembly of the whole machine may be accomplished without the use of jigs, using Cleco fasteners to hold the panels while rivetting by a hand-operated 'Pop Rivetter', thus making it possible for a person working on his own to complete the project.

Provision for quick and easy removal of the wing has been made so that the *Tiger* may be stored in a



Gentle tip dihedral and small-size evident in this picture. Note the straight taper of the fuselage sides aft of the cockpit area – easy for both the full-size builder and the scale modeller to reproduce. 'Tiger' would make an ideal modelling subject in any form.



Left, highly polished Lycoming 125 h.p. engine is bolted to the undercarriage 'A' frame at the rear. Note the closely-fitting spinner. Not all versions have this attractive cowl – less skilful builders can have exposed cylinders. Neat instrument layout shown at right reveals dual controls. Stout roll-over bar is incorporated around wind shield. Interior design depends on preference/pocket of builder. Nicely faired, unsprung undercarriage. Legs complete with wheel spats evident at left, as are the radiator grille and twin exhaust stubs. Underside is flat-bottomed.

garage – theoretically a great saving over paying hangarage fees. This is achieved at little expense in either weight or cash, and is effected by using self-locking pins in lieu of bolts at the fuselage attachment. A lightweight bomb-hoist type arrangement then lowers the wing, complete with the control sticks and aileron control system, still fully rigged, to the ground. The aircraft can then be rolled forward off the wing. By mounting the wing fore and aft over the top of the fuselage, the Tiger may be towed behind a car tail first. The wing is light enough to be handled by two people.

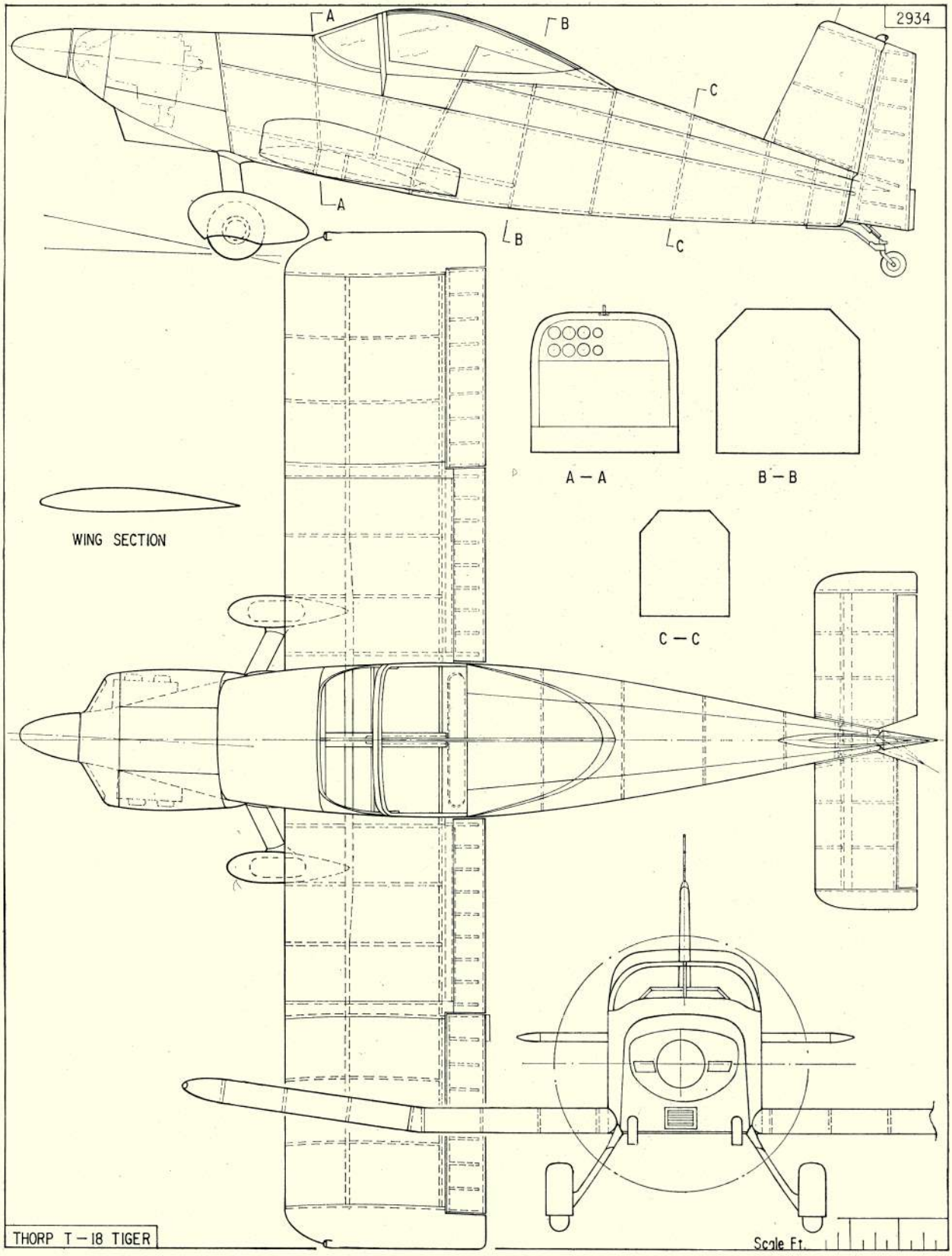
As with many home-building enthusiasts, there is a high degree of co-operation between budding T-18 owners, and it is often that a builder who has gone to the trouble of making a mould for glass fibre components (in preference to the original metal fittings) will turn out extra samples to help others. This 'mutual aid' extends mainly to wing and tail tips, as well as glass fibre fuel tanks, seats and certain cowling parts.

The first John W. Thorp-designed *Tiger* took to the air on May 12th, 1964, having been built by fellow-Californian Bill Warwick. This was rather a 'hot rod' special with a Lycoming 180 h.p. 0360 engine turning a 66 in. Hartzell controllable prop. This weighed an additional 47 lb. in the engine compartment, which required 13 lb. of lead in the tail to counteract it. In addition, his N96752 registered aircraft has an attractive cowling, sliding cockpit canopy, wheel spats and appropriate paint scheme for a fast, snappy fun-plane.

As with all homebuilt aircraft from plans, each one varies according to the skill, pocket and taste of the builder. Hence each aircraft is in reality, unique. Thus one finds distinctions in cowling shapes, air intakes, wheel spats and canopies. That drawn is Ralph Tenham's 125 h.p. version, originally flown without spinner or canopy and NOT fitted with the flaps as drawn. These are an optional feature, fitted to some subsequent Tigers.

REPRINTS OF THIS FEATURE PLUS FULL-SIZE DYE-LINE PRINTS OF THE 1/16th SCALE ORIGINAL ARE AVAILABLE AS PLAN PACK 2934, PRICE 50p FROM AEROMODELLER PLANS SERVICE, 13-35 BRIDGE STREET, HEMEL HEMPSTEAD, HERTS.

Sliding cockpit canopy is another 'optional extra' fitted by Tenham – original design called for an open-seater. The aircraft is ideally suited to 'hot rod' or 'customiser' enthusiast builders, hence no two aircraft are exactly the same.


2934
A
B
C
A
B
C
A – A
B – B
C – C
WING SECTION
THORP T – 18 TIGER
Scale Ft.

AN INTRODUCTION TO RADIO CONTROL

by Trevor Faulkner

in which the author describes an ardent free-flighter's approach to minimal cost R/C flying.

The author's wife displays his second R/C glider fitted with its alternative large-area surfaces, providing a wingspan of eight feet. Kick-down elevator control is used in addition to rudder – which has quite a large area.

THERE MUST be a considerable number of modellers who, while basically Free-Flight adherents, sometimes wonder what kind of recreation followers of radio controlled flying enjoy. Despite the proliferation of R/C in recent years, the enthusiast in another sphere can remain in complete ignorance of how he is likely to react to this version of the sport. Of course, should he make the decision to embark on a R/C project, he quickly discovers for himself . . . sometimes to his regret! In addition to this basic question, I was interested to know how much of a 'carryover' existed from free-flight to simple radio control, other than the acquired skills in construction and material selection that comes with the years.

My personal circumstances have lately dictated that little time can be spent on the free-flight 'competition circuit' – indeed its recent unabashed thermal-catching and lift-poaching activities are entirely discordant with my personal preferences. However, having flown both A/2 and Wakefield classes sufficiently to enjoy the thoroughbred qualities of these models, it was intriguing to ponder whether any equivalent qualities was available in a R/C device. As I have a strong dislike of noise, particularly in the countryside where most of my flying is done, my thoughts were of necessity directed towards gliders. A further thought was that in retrospect, I had seen a large number of undistinguished models, marginally airborne under R/C guidance which I could not envisage giving me the slightest feeling of reward or satisfaction. Fortunately one or two models had registered mental approval over the past three or four seasons, most of them single channel and all flown by ex F/F modellers! Perhaps this link between the alien spheres did exist after all.

One final personal question remained to be solved; as only occasional competition flying was envisaged, what was to be gained by trying to evolve a competitive type of machine, indeed, what would this be, pylon racer, general purpose spot-landing model, or an aerobatic flier? Looking through advertised events indicated consistency in only one direction . . . thermal soaring. This class of model appeared to avoid emphasis on the electronic aspects, and did seem to allow some degree of single channel parity in competition. It seemed therefore that should other factors favour an excursion into R/C, a model inclining towards the thermal soarer type would allow some degree of competition participation, should this be possible.

The financial side of R/C flying has never seemed particularly well-defined. On opening any magazine devoted to the hobby, the novice is subjected to a mass of advertising concurrently intimidating and encouraging and, at first, quite confusing! After all, should one aspire to be a National celebrity in chuck glider, there exists a financial ceiling above which no possible benefit can accrue. Similarly with F/F classes (other than Power) assuming that one doesn't include time as a factor when costing the product. But in R/C the range is awe-inspiring; bargains at £90 reduction, manuals which may be your only insurance

on Lord-knows how much equipment, etc., etc., down to ultra simple super-regen, which would have very limited use in popular areas.

To accommodate the factors discussed above, the following criteria were thus formulated:

a. An existing F/F model to be converted, and to be flown in conditions similar to those for which it was designed.

b. Second-hand, single-channel equipment would be employed to reduce cost to the very minimum.

c. A halt to be called should the 'FUN/£ factor' not be high enough. (Having seen so many members of modelling and photographic Clubs attempting to *buy* success and merely evoking expensive frustration, this was considered the most important factor of all.)

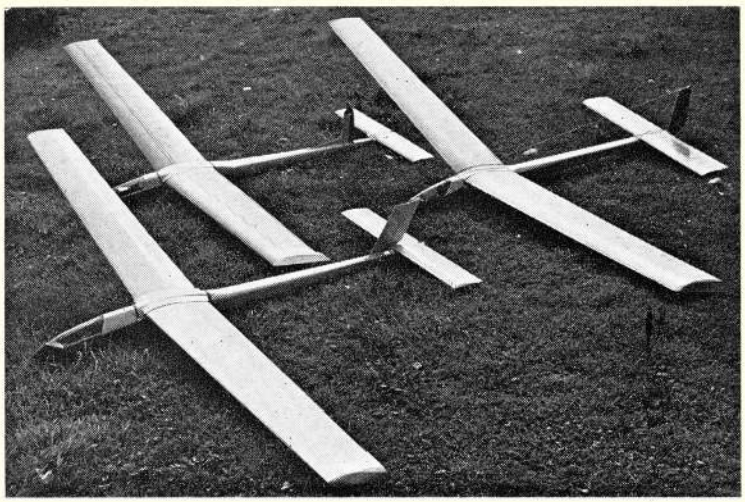
My club colleagues were very considerate about this rush of blood to the head, and answered specific questions very readily. I detected the feeling that I was now assumed to have left F/F for good, and a body of opinion held that it would be cheaper in the long run to buy multi-channel proportional gear from the beginning. To be fair to these chaps, most of them had started with single channel, moved to propo. equipment and subsequently either sold or left unused their S/C sets. In addition, most of these modellers fly in conditions which I find distinctly unpleasant, although the extra degree of response given by their equipment probably saves crack-ups in turbulent conditions and the local stone-wall-encrusted landing areas.

One piece of advice did have my careful consideration in direct contrast to my second factor. Should I build a kitted set and, as a result, fly single channel proportional from the start, with the added advantage of being able to 'build up' further functions as experience required? (To offset this, it should be explained that my efforts with a soldering iron, if properly equated, resemble the antics of a pig with a musket, and the producer of the most economical high performance kit did not appear to offer a rapid servicing facility as far as I could discover.)

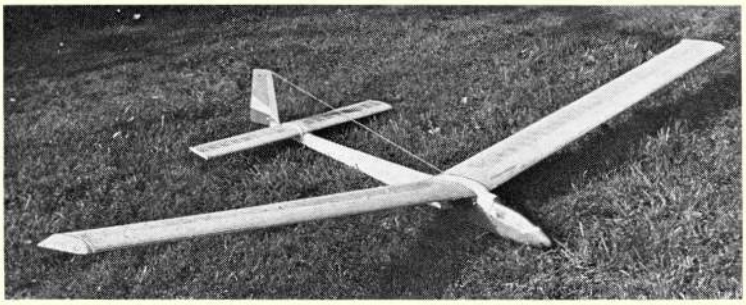
The die was cast when the local model shop proprietor rang to say that he'd had some S/C gear brought in as part exchange two weeks after selling it, the original buyer having now bought a proportional kit. Naturally, the guarantee was void, but the equipment seemed in first class shape. I suppose that a risk is always attatched to second-hand buying, but my experience of this particular shop was that it was being run by an active modeller with a developed understanding of model-builders' needs. So a superhet MacGregor along with battery box, batteries, plus two linked servos, (Mini-mite & Mini-mo) was purchased for a very reasonable £18. The reputation of this make was good amongst many of my acquaintances, one of whom had paid a visit to the Works and been most impressed by what he saw.

The model for conversion had been chosen from my large stable of magnet-steered soarers . . . a rear-fin job, based on the very successful design reproduced in the Jan '70 issue of *Aeromodeller*, and incorporating developments not materially adding to the prototype's performance. Certain other factors influenced this choice, chief amongst them being the foam wing and tail, both balsa sheeted, and the accessibility to the interior which would ease installation of the airborne gear. The plug-in fin and rudder unit were replaced by rule of thumb counterparts, the magnet-mount stripped out, and the 1/16 in. square pushrod replaced by a hard 3/16in. square equivalent. Only the rudder servo was installed at this time because of fuselage dimensions; I also reasoned that as I intended to fly this model myself from the start, the less complication the better. All surfaces were carefully keyed to avoid trim changes. With the equipment in place, I took the dealer's advice and put in some 'hearthrug' practice (that is, with the model in a variety of positions in relation to the operator, various signals to obtain the correct direction of turn were pulsed). I found as a result that only very rarely did I give an incorrect signal . . . something of which I had heard other beginners frequently complain.

First hand-glides were as for a slightly under-elevated free-flight model, and then the first slope launch was essayed. At about 50yds from the slope a left turn seemed to be building up, so a correcting (2 pulse) right turn signal was given. Probably excitement plus inexperience increased my practiced pulse rate as the model increasd its left turn! Fortunately, this was the kind of eventuality I had anticipated, and by leaving the button entirely alone, the model was able to land itself as a good free flight glider always should. A second flight demon-



Trevor's line of development is evident in this picture. In the foreground is the original magnet-steered glider, based on that drawn in the January 1970 issue. Behind is a near-identical machine converted to single-channel radio control operation, while in the rear is the purpose-built R/C model. An attractive design in any form with its 'full-size' appearance accentuated by the fitting of a cockpit.



The author's seven-foot span purpose-designed 'floater', designed for late evening flying sessions, and indeed the one which Trevor prefers when 'going for a walk'. Beats a dog anytime!

strated the difference in upwind and downwind turns; the model never having heard of the 'goldfish in the bowl' theory, seemed disinclined to turn from its approach to the slope until well over and behind the crest, and another free-flight landing resulted! Actually, the failure to achieve quicker downwind turns was laid at the door of insufficient rudder movement. As a result, rudder throw was increased a notch, and a number of fair, but over-corrected flights enjoyed. Landings were still crude, unless the model was headed into wind and then allowed to get on with the touchdown, and the substitute plug-in fin had developed a degree of sloppiness which ruined any niceness of control.

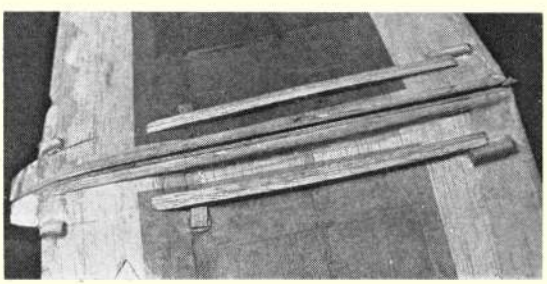
The following session witnessed great improvement. The necessary anticipation in signalling, the release of control before it became visually imperative, and the instinctive pulsing rate which made control selection much more positive, all resulted in a steadier flight pattern than before. At one point in the day, the model hooked into an enormous thermal, and was allowed to travel an imprudent distance downwind. I decided to spiral the model out of the lift, but found no response to neutral for the pull-out. The spiral ended 6in. below ground level, with some minor damage to the fin and a displaced servo mount. The 20-minute repair time gave an opportunity for the fault to be analysed, this (as usual) being mechanical rather than electrical. (The back pressure on the push rod in the spiral had allowed the short 'keeper' to over-ride one of the servo disc lugs in such a way as to lock it in position. An alteration to the keeper to ensure adequate clearance was possible using thin-nose pliers, and a further two hours were spent without mishap. Eventually the 3/16in. push rod was replaced by one of ¼in. square and the model has remained basically the same since then.)

By now, it was fair to say that the rudiments of single channel had been learned with no outside help, and that quite a lot of fun had been had in the process (fun is directly proportional to success in my book!). A modest increase in investment was approved with a view to later saving . . . the purchase of DEAC cells for Tx and servo power in fact, proved to be wise. The simplest type of charger was also purchased, an encapsulated model described as inefficient and quite lethal by some knowledgeable Club-mates, and which has functioned admirably!

It was decided to take the model along to the Luton Club's Slope Soaring Meeting at Ivinghoe, at which I was to fly my 'real' models anyhow. Lack of lift in the first round plagued most participants, and although a second round flight of exactly the Target time was made (by a complete fluke), my first R/C competition had allowed in theory, 4 minutes airborne time. By contrast, free-flight had 6 rounds, with 16 minutes possible, and ensured a day of flying rather than spectating. The fly-for-fun after the competition was, from my point of view, much more entertaining. Had the single channel competition itself been the sum total of the day's recreation, it would have been debateable whether the 300 mile round trip was worthwhile.

Shortly after the Ivinghoe meeting, I noticed some diminution of the effective range of the control equipment. Dealer (not manufacturer) tuning cost £1.75 with no permanent improvement. The set was then returned to MacGregors, who, for £1.00, tuned it to perfection in rapid time, even promising to repair and return it in time for a weekend competition should I need the equipment quickly. I have nothing but praise for this manufacturer's interest and help over the successful operation of their sets. The confidence this gives to someone with literally no knowledge of Radio is invaluable. For instance, in a telephone conversation to this firm, I was advised that not all sets gave a proportional range reading with a retracted aerial, and that it was worth the effort to carry out a full range check to establish the individual characteristics of my unit. This eventually proved to be almost ½ mile on the ground, whereas the collapsed aerial range was a meagre 20 yards. I was also told that if the set were to be held with the aerial at 90 degrees to the model and 45 degrees to the ground, the maximum signal strength would result. Since this information was passed on, user error has drastically diminished.

One lucky escape did highlight the value of a particular precaution . . . that of trimming for a gradual turn to avoid direct fly-away trouble in the event of control failure. The reason this time was the displacement of the receiver battery clips. Slight jarring when landing ('arriving'?) had caused some movement of these components from the optimum position, giving bad contact and limited receiver performance. Fortunately the model completed a large circle, landed in a tree, and was dislodged with the help of kindly



Keyed flying surfaces avoid trim changes from session to session – important to an ardent free-flight modeller! Note also the modification (strips cemented on the wing underside) to allow an undercambered wing to seat on a flat mount.

Alternate wing surfaces on Trevor's model permits an immediate, and accurate, comparison of flight characteristics. Larger wing has flat-bototmed wing section for higher airspeed.

visitors to the club's two-day event. We now double check these contacts each flight, and wrap with rubber bands for good measure!

Based on the original design, a seven foot span 'floater' was drawn up to allow me to take advantage of calmer evening sessions after work. I think that these are the most pleasurable times to fly as a rule, and find that one or two colleagues enjoying an evening's 'lift hunting' as being more challenging than standing on an escarpment in 'guaranteed' lift and flying anything. This model caused me to buy a second Minimite, with which the elevator servo was connected. The correct pulsing of this control was the most difficult manipulative skill I had yet attempted to master. As the control is for emergency (thermal) use in the main, it is quite feasible to follow one of two courses . . . either have a second attempt if the first fails, or to hold on the elevator control to give a slowly oscillating surface with a mean point of travel between 'glide' and 'down' settings. This model has proved to be a splendid flier in conditions such as those described. One setback to its career was caused by using a very critical trim, a patch of turbulence on launching causing a low level stall across an obstacle, breaking the fuselage. The repair gave an opportunity to nylon cover this component in place of the original tissue, and to splice-in a series of spruce inserts in the locality of the fracture. Further strengthening of the nose with glass-fibre moved the C.G. forward to 50 per cent from the original 60 per cent giving a less critical trim without much loss in performance.

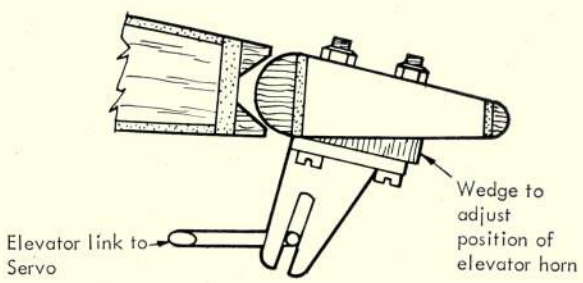
This model is my favourite 'go for a walk' flier. I enjoy fixing a target point to be reached by both model and myself, as this involves me in a continuous search for lift over changing terrain. The chance to fly in this way is probably the most therapeutic exercise I've yet discovered as it combines a modest physical activity with the normal pleasure of flying! The model also behaves quite well on the bungee type launch, although the fag of laying out and re-winding a line is rather tedious amongst rough grass and bracken, particularly when a good slope is at hand. When using the tow-hook, the climb on tow can be made to appear terrifyingly steep by slowly adjusting its position rearwards as confidence is gained.

The basic characteristics of this second model made me curious to know whether it would be capable of development to give similarly satisfying performance but to fly a little faster. This prompted the construction of a flat-bottom wing section (something I had never done before) of increased span (8 foot), along with a matching tailplane (again with a kick-down elevator). These surfaces were intended to be mounted as alternatives, not replacements, for the originals, and so the modification to the wing-mount was made as shown. The tail plane chord was increased, and to bring the hinge line of both versions within a small margin, the elevator chord was increased proportionally. The object was to allow both tailplanes to use the kick-down linkage without any adjustment to the push-rod length being necessary. Each tailplane incidence packing is cemented to the surface concerned, *not* to its mount: this I had always found to be essential when alternating tailplanes to suit varying conditions in magnet-flying competitions. By packing the central horn slightly, it was possible to give the desired neutral position of elevator in conjunction with the minimum amount of shimming, as shown in the diagram.

The C.G. adjustment was effected by a piece of removable ballast fitting the nose-compartment snugly to avoid involuntary shifting. The only other alteration was to the dihedral employed . . . the choice being for flat centre with steep outboard panels. The only reason being to try to avoid the rather steep banking turns of its predecessor. I once had a Wakefield which could be trimmed for a tight glide circle and yet showed no detectable lowering of the inside wing; this had a similar dihedral set-up whereas polyhedral equivalents could never be trimmed the same way. Anyhow, plug-in arrangements are much simpler in this fashion. Test flying of this model *has* shown a slight increase in flying speed and a great improvement in turning attitude. The kick-down is very positive, but as familiarity with its use has grown, errors have diminished in selecting the control required.

After some six months of R/C flying the primary doubts in my mind have been resolved, i.e. it is possible to teach oneself simple control techniques if the model is inherently stable; previous experience in F/F certainly facilitates rapid assimilation of basic technique; it is possible to buy equipment at the bottom end of the price scale which is good enough to let one concentrate on the model, and finally, manufacturers obviously exist who are courteously helpful to the beginner.

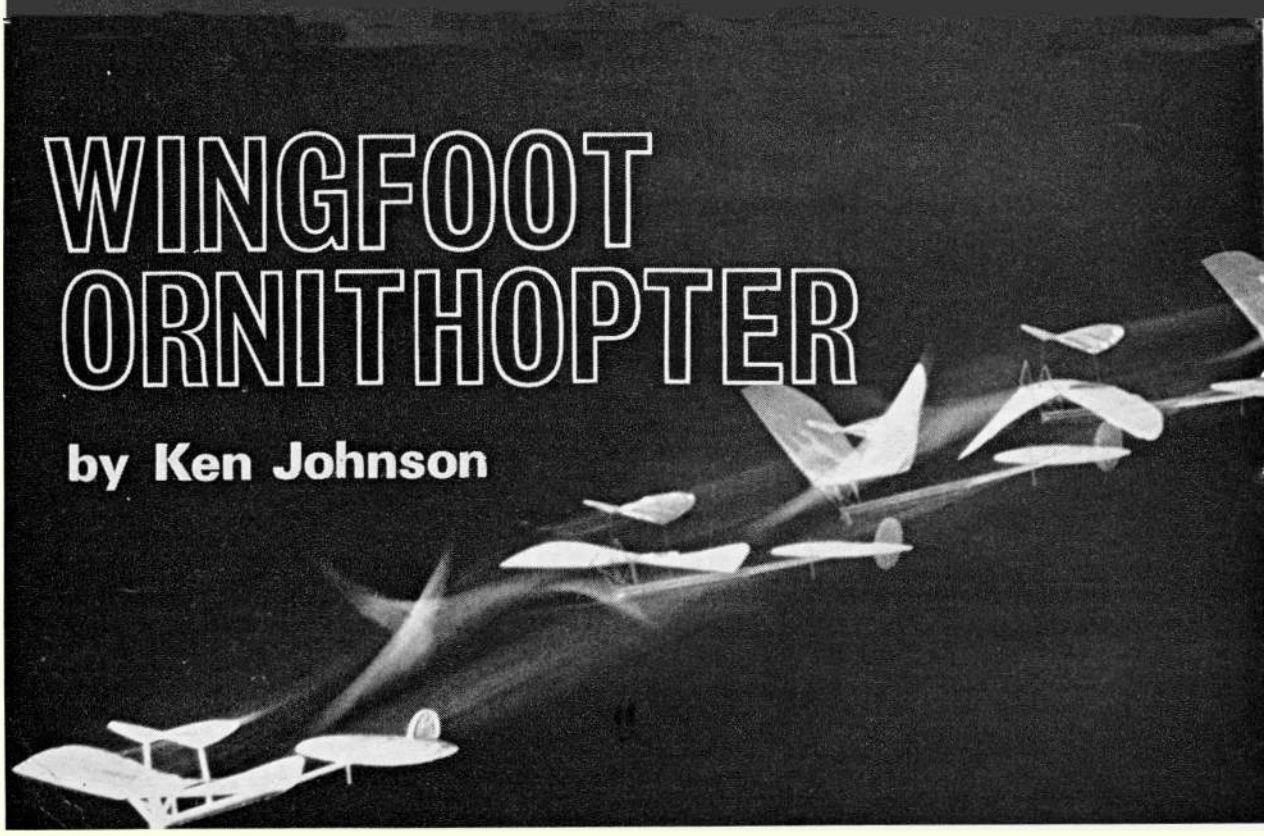
The models described need neither strong winds nor steep slopes for satisfactory flying, which does make the choice of its site less critical. Their operation has provided considerable pleasure and relaxation – which is what it's all about!



MODIFICATION TO WIDE-CHORD TAILPLANE

WINGFOOT ORNITHOPTER

by Ken Johnson



THE AUTHOR of this feature, Ken Johnson, first took an interest in ornithopters around 1964. His 'flapping-wing' machine was quite conventional in that it featured a single pair of wings to provide both lift and propulsion, plus a conventional tailplane and fin to stabilise the flight pattern. The wings were covered in tissue, and in general the craft was rather crude – consequently no one was surprised when it was found to be not over successful with a flight of just 26 seconds. A few more mediocre models followed, until eventually a new design direction was established.

He reasoned that an ornithopter cannot behave like a bird, with its constantly variable incidence and camber on its wings, plus the added benefit of opening its feathers on the downstroke (have you ever seen a sparrow tip-stall?). The flapping wing of an ornithopter contributes very little lift, its principal function being to provide the forward motion, so Ken instituted the use of a large pylon mounted wing to carry the responsibility for lift. He also felt that one large flapping wing either side of the fuselage was not too efficient, as a whipping action takes place midway along this flapper spar. This motion wastes power, while the spar itself is of a relatively large diameter at the root to prevent it from breaking, and hence is overweight. For these reasons, small bi-plane flappers were used.

The first model of this new series looked something like a paper covered duration model except that instead of a propeller, it had two sets of small flapping wings directly underneath the stationary wing. First test flights revealed that the fixed wing was too far forward as the model stalled badly. The wing was then re-located just behind the flapping wings and the test flights were much improved – 2 minutes 10 seconds were obtained from this new concept.

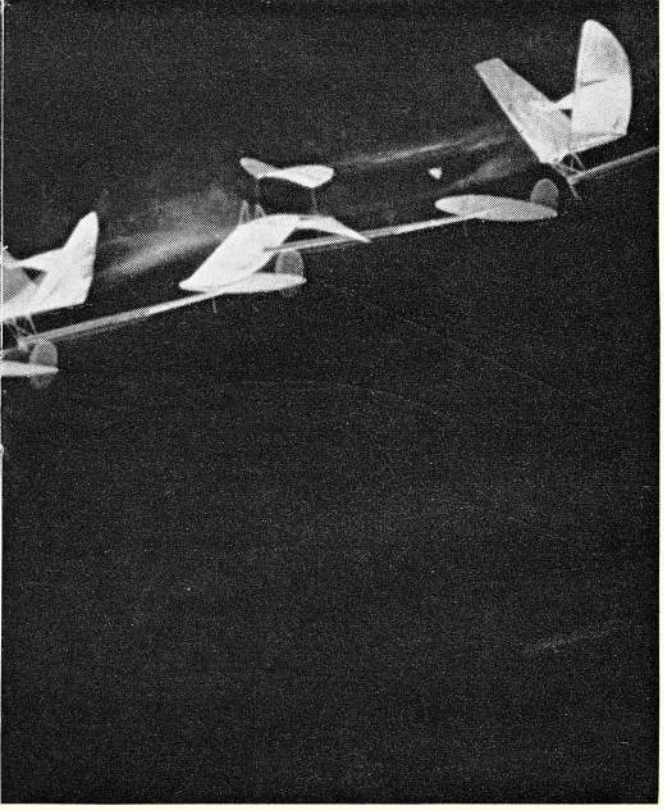
Many more models were built, trying new linkages and new materials, each flying a little longer than its predecessor. Then, early in 1968 a new plastic covering material became available called MicroLite, which was lighter than condenser paper, and much stronger. Several models were built using this material on the fixed wing, fin and tailplane. A contest held at a Goodyear 'Blimp' Hangar at Wingfoot Lake, near Akram, Ohio presented an ideal opportunity to try out this material. The ceiling in this building is about 95ft.

Several 3-3½ minute flights were made with four other ornithopters, then the new, untested MicroLite covered model was flown. It weighed .050oz., (yes – twenty of these models would weigh just one ounce!). After a 3½ minute flight, on .080 in. Pirelli rubber which resulted in a broken flapper spar, the model was repaired and wound to 1,400 turns on a .075 in. motor. The flight lasted 4 minutes 35 seconds. A longer motor of .075in. Pirelli was then 'broken in' and wound to 1,600 turns.

The air was warm and buoyant and the machine climbed to about 60 feet before beginning its cruise. Then a glue joint between the tailplane and rear fuselage boom broke, allowing the tail to flap up and down. Luckily, the wire rigging held it together for the remainder of the flight, the model touching down with the watch reading 5 minutes 15.2 seconds – a new AMA duration record for ornithopters flown under a 100ft. ceiling. The same model also holds the AMA record of 3 minutes 30 seconds for the under 35ft. ceiling.

Over 40 ornithopters had been built between 1964 and 1968 when these latter records were established.

Naturally with such a specialised craft, where weight is at an absolute premium, this model is definitely **not** for the beginner. Only experienced modellers, preferably with previous Indoor experience, should attempt this type of construction. Suitable materials, including the MicroLite covering, are available from Laurie Barr who stocks Micro-X Indoor accessories – see Classified Advertisements in this issue.



Superb action shot of an earlier, single flapping wing ornithopter by Ken Johnson shows the complete 'power' cycle. A smaller double-flapper arrangement saved weight in these vital components while preventing the spar from flexing and wasting power.

Fuselage and Flapper Mount

Select a piece of light (4½lb.) C-grain balsa .016in. thick for the motor stick and a length of .008, 4lb., C-grain balsa for the tailboom. Cut both lengths of balsa to the sizes shown on the plan.

The motor stick form is 1in. in diameter and 12in. long. Tape a 4in. x 10in. piece of light bond paper along the length of the form, avoiding wrinkles in the tape. Soak the motor stick wood in the warm water for 5 minutes, then blot between paper towels. Place the balsa blank on the paper, against the motor stick form and carefully roll the balsa up in the paper, around the form. Tape the ends and middle of the roll to the form.

Cut a 4in. x 10in. strip of condenser paper and wet along the long edge – place this edge against the tailboom form. Soak the tailboom blank in warm water and place it on the condenser paper against the form before rolling it around the form. Tape the end of the condenser paper to the form.

Now, preheat the kitchen oven to 325°F and put both forms inside the oven for 10 minutes. Remove and carefully cut the tape strips away from the paper, then unroll the paper from the forms taking care not to crack the wood. Remove the wood.

Starting at one end of the wood, hold it together with finger and thumb of the left hand and begin to glue the wood together into a tube. Cement about ½in. at a time and allow to dry – this technique is then repeated with the tailboom. Insert a small balsa web (grain vertical) into the front and rear of the open motor stick tube then close the front end with a bulkhead of .020in. balsa sheet. Insert and cement formed wire (rear motor hook) into back end of the motor stick.

With the glue seam on the bottom, notch the front of the tailboom, glue and insert 1/16in. inside back end of the motor stick. Check the alignment of motor stick and tailboom with each other, as they dry.

Flapper Mount

Sand about six 6in. lengths of 1/16in. square balsa (medium soft) to a round shape, with a piece of medium fine sandpaper. Hold the folded sandpaper between thumb and forefinger of the left hand and rotate the wood to the left and to the right while drawing it back and forth through the sandpaper. Now drill a 1/16in. diameter hole on top of the motor stick just behind the front bulkhead, and another hole 3⅝in. directly behind the first. Insert a ⅝in. length of round balsa into each hole and cement. Check to make sure that they are both vertical and in alignment with each other.

Cut two 3in. lengths of round balsa and place a small ink mark exactly in the centre of each. Put a small dot of cement on top of each vertical post and put one of the 3in. lengths on top of each post. The ink mark will set directly on top of the glued post. These two 3in. lengths of balsa will be horizontal and at a right angle to the motor stick, looking from the top. Check for alignment and squareness.

Drill 1/16in. holes for the four diagonal supports at the front of the flapper mount and glue in place. Next cut several lengths of aluminium 1/16in. wide by 2in. long from .004in. sheet and drill a .005in. dia. hole (or punch in with a small sewing needle) 1/32in. from one end. Cut the aluminium to a 3/16in. length. Make four of these. With the .004in. hole to the outside, cement one aluminium piece to the front face of each end of the two horizontal members of the flapper mount; the .004in. hole should be 1/32in. out beyond the end of each balsa horizontal member.

The bellcrank hanger is cut from .012in. aluminium sheet and is 1/16in. wide, ¾in. long. Drill a .016in. hole 1/32in. from each end and file the corners of the aluminium blank round. Make a 90° bend 3/16in. from each hole to form a U-shaped hanger.

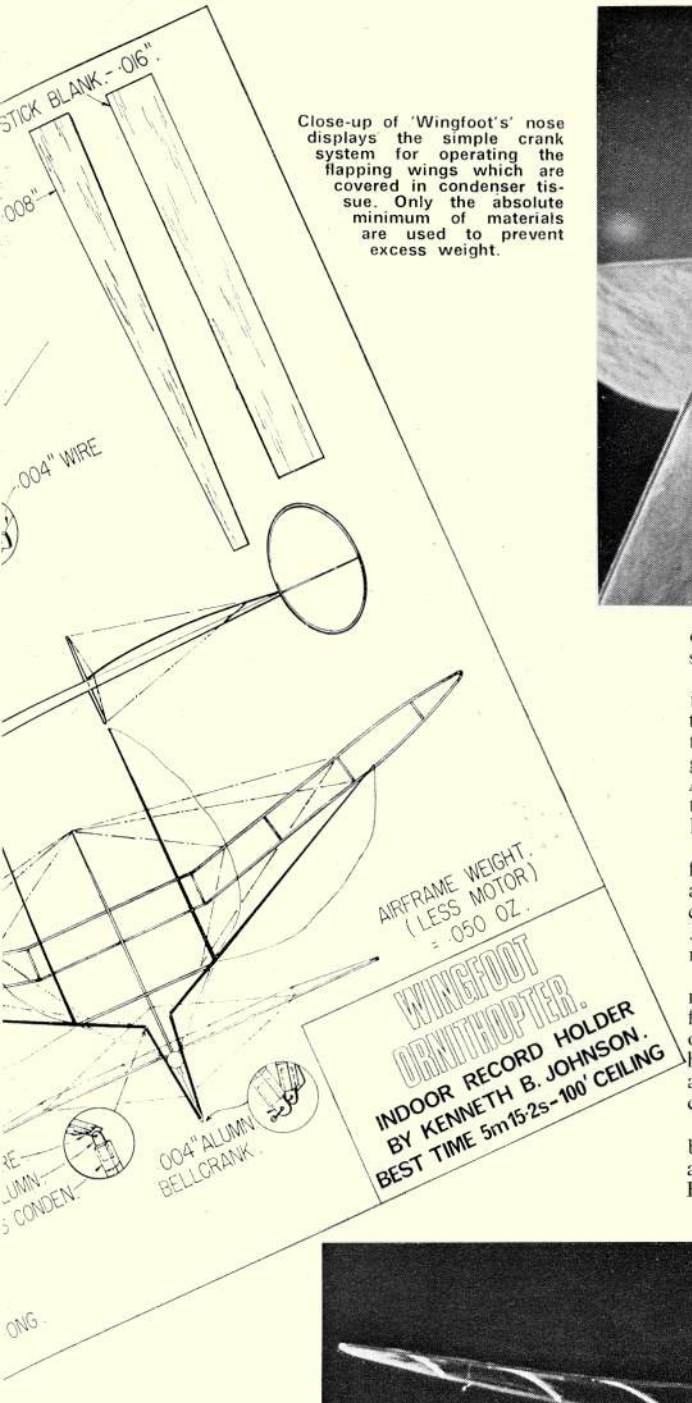
Cement the hanger to the underside of the front of the motor stick. A diagonal .010in. wire strengthener is cemented to front of the hanger and to the motor stick. The bellcrank is made from .015in. piano wire. Start by bending an open loop at one end, then, starting from the rear of the hanger, insert the bellcrank wire through the holes – the loop to the rear. Insert a teflon washer onto the wire from the front, followed by a small glass bead, which is epoxied onto the shaft. With needle-nosed pliers, make a 90° bend in the wire (just in front of the glass bead). Measure 1in. from the bend and make another 90° bend in the opposite direction. Measure out 3/16in. and snip off the wire.

Flapping Wings

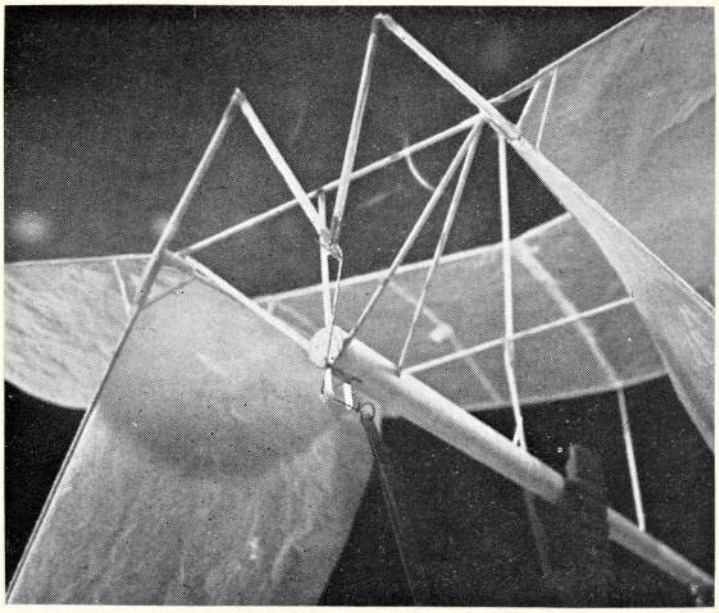
Select four 5in. lengths of medium 1/16in. square balsa matched for similar strength. Sand each round, then taper from 1/16in. diameter at the root to .020in. at the tip. Select and sand round two additional 3½in. lengths of 1/16in. square balsa. Place one tapered spar over its drawing on the plan and do likewise with its right-angle support arm (1/16in. round). Cement together where they meet and cement in 1/32in. square balsa diagonal support. Turn flapper spar on edge and cement the other spar in position (at 35° angle) before inserting and cementing two

The designer has plenty of opportunity to watch the flight characteristics of his ultra-lightweight birds as the forward velocity is very low. Sudden movement of a person standing this close could seriously affect the flight!

PLANS NOTICE
FULL SIZE COPIES OF THIS 1/4th SCALE REPRODUCTION WILL BE AVAILABLE FOR A LIMITED PERIOD, THROUGH AEROMODELLER PLANS SERVICE. ORDER AS 'WINGFOOT'. PRICE 50p INCLUDING POSTAGE



Close-up of 'Wingfoot's' nose displays the simple crank system for operating the flapping wings which are covered in condenser tissue. Only the absolute minimum of materials are used to prevent excess weight.



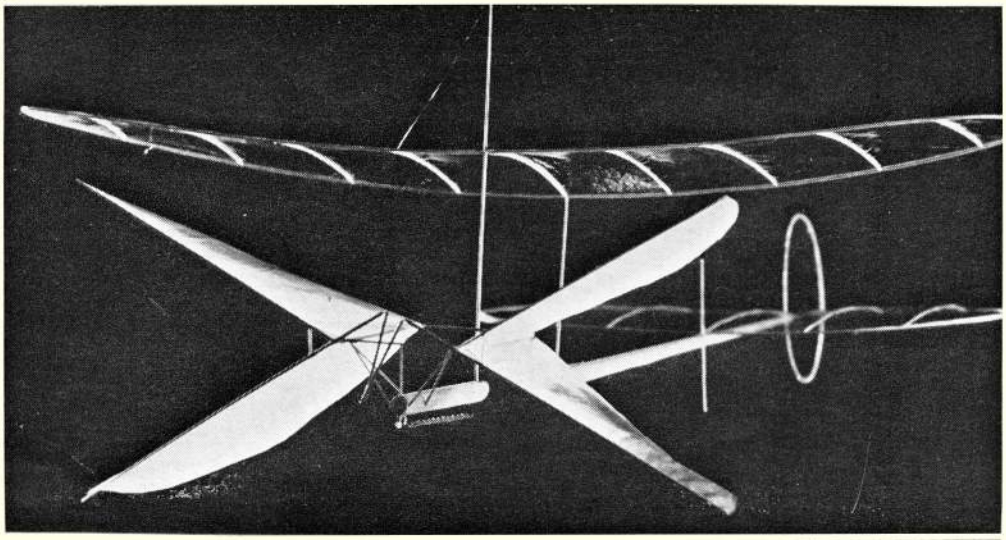
other diagonal braces. Build the other flappers in the same way.

To cover the flappers, cut four 5½in. squares of ironed condenser paper and lay one in position over the plan. Coat one spar and right-angle support with thinned white glue (4 parts water to 1 part white glue) and press it down onto the condenser paper. Allow to dry and carefully trim away excess paper, then cut along curved line for rear outline of flapper. Repeat with other flappers.

Cement a ⅜in. length of 1/32in. square balsa to the front of the right-angle flapper support arm. Cut a 1/32in. wide notch through this ⅛in. piece, at the centre. Repeat for other flapper. Cut four lengths of .004in. steel wire ½in. long and cement one at the rear of each flapper allowing 3/16in. overhang.

Cement two remaining lengths of wire across the notched piece of 1/32in. square wood at front of flapper. (Cement wire to wood at the front of notch only.) Now insert the wire pins (on flapper) through holes in flapper mounts. Next, cement wire to wood, aft of 1/32in. wood notch. Place dot of glue on to end of wire at rear of flapper.

The flapper extension arms are of 1/16in. medium balsa glued to lower flapper spar on each side. These arms should almost touch at centre of flapper mount. Flapper linkage arms are medium 1/16in. square balsa



'Wingfoot' captured in flight gives the appearance of modern art form rather than an intricate, specialist flying machine. The MicroLite covering of the flying surfaces contrasts strongly with the condenser tissue covered flappers.

two ⅛in. long and the wood is slotted at both ends. A small piece of aluminium (1/16in. x 5/32in.) with a .005in. hole on the exposed end, is inserted into the slot on each end of the arm. The slot is glued and wrapped with condenser paper and again glued.

The flapper extension arm is connected to the linkage arm with a U-shaped pin of .004in. wire, inserted through the hole in the linkage arm aluminium, and cemented on the front and back side of the end of the flapper extension arm. The hole in the other end of the flapper linkage arm is enlarged to .016in. and the front end of the bellcrank is inserted into this hole on each flapper linkage arm. A large drop of glue is used to retain the linkage arms.

Now rotate the bellcrank by hand to test for smoothness through the flapping cycle. If it works smoothly, select a motor of about .030in. rubber and wind it on the model. A few hundred turns on this weak motor will work the flappers for several minutes so that you may study them from broken glue joints, amount of stroke, etc.

Stationary Wing and Tailplane

Cut a cardboard (1/32in. cardstock) template to the shape of the wing and tail and mark each rib position with a line. Choose a sheet of 4½lb. C-grain balsa about 16in. long x 1/32in. thick. Cut about 12 strips of 1/32in. square and set the smaller ones aside for the tailplane. Select two strips for the wing outlines, and wet them. Wrap one around each tip of the template and tape the ends of the wood with small strips (¼in. x ½in.) of masking tape. Place in the oven for ten minutes. Remove from the oven and take off the tape at ends of wood. Cut a V-shaped notch at the front and back of each rib position, on the cardboard template.

Pin down the wing template over waxed paper and pin outline wood around template. Add small centre sections of wing outline front and rear, then cement together. Now cut an aluminium template for the ribs (6° arc of a circle). Cut ribs from 4lb. balsa 1/32in. square by making cut on wood along a template, then moving template 1/32in. and making another cut. Cut a few extra ribs and select the best ones to use. Cement the leading edge of each rib in place, then trim off at the inside of the trailing edge and cement. When dry, carefully separate the wings from the template. Repeat this technique for the tail.

Fin

Cut template to outline on the plan. Select a 'thin' length of 1/32in. wood, then moisten, tape around form, and heat in oven. On drying, remove from the template, pin down, and add the 1/64in. square brace.

Covering

First, the static electricity must be removed from the MicroLite. Wad the plastic up into a small ball, then, very carefully, unfold the ball and smooth the plastic out flat with both hands. Lay the tailplane

on top of the MicroLite upside down – it is best to cover this first as it is small and easy to practice the covering technique on.

Rubber cement or white glue may be used as a covering adhesive, but rubber cement is lighter. This is the technique: Put a small amount of rubber cement on a No. 2 water colour brush and touch it to the MicroLite just under the outline of the tailplane. Rinse the brush in thinner and work the drop of cement that's on the plastic out to the left and right, thinning it as you go. After the brush touches the wood and plastic, press down gently on the wood to press the cement into it – follow this procedure all around the outline. Trimming the plastic away from the frame must be done *very* carefully and with a new-sharp razor blade.

The wing is covered in the same way (and covered flat). After drying, the dihedral breaks are nicked and glued. The plastic is cut beforehand and cemented to the rib.

The wing mounts are 1/16in. round balsa (the front one is tapered). The rear post is cemented into the motor stick, while the front mount is cemented to the vertical post of the rear flapper mount.

Starting on leading edge of right wing panel, the wing is braced with .001in. nichrome wire. Build in ¼in. wash-in for the left wing. Cement tailplane to the tailboom and insert bracing post through tailboom, then brace the tail. Cement rudder on to the end of the tailboom with ¼in. left offset.

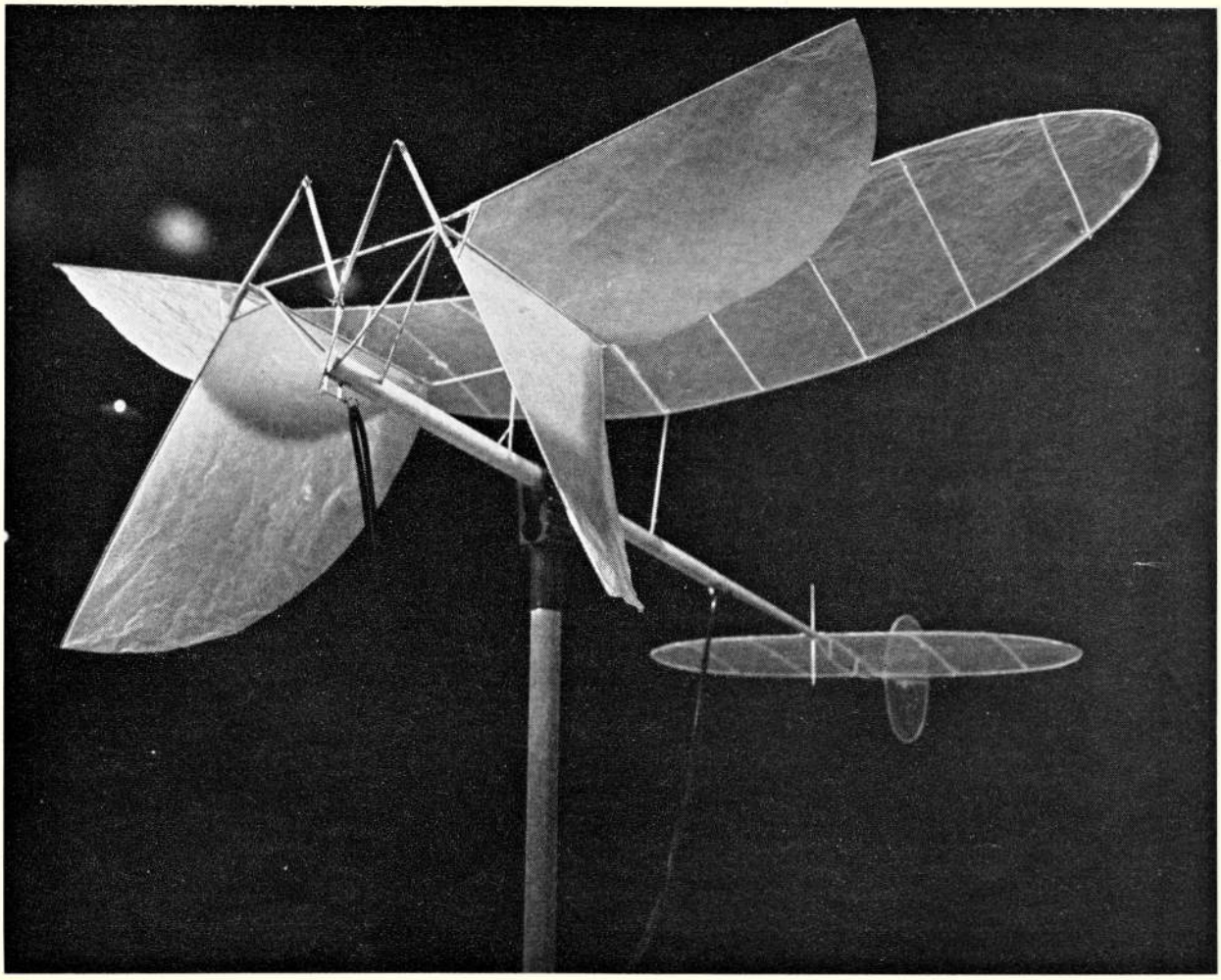
Flying Procedure

Testing is begun with a light motor to check the cruise and to troubleshoot for broken glue joints, etc. – model should turn in a 40 foot diameter circle to the left.

The winding technique is important and should be practiced. The thumb and forefinger of the left hand should be around the wire loop of the bellcrank to hold the rubber motor tightly. The right hand is guarding the rubber as it is wound in. After the last winds are put in, the right hand pinches the rubber, just ahead of the knot. The knot is removed from the winder hook and looped over the rear hook on the model.

Here is the tricky part! Now the left hand must be rotated around, from in front of the bellcrank, to the hook behind it. Then the left hand is slowly released being careful not to touch the now beating wings. The nose of the aircraft is raised 3°, and the right hand opens, and lets the ornithopter fly out. It has been found that if the model is held fully wound, for more than a few seconds, the flight will be somewhat shortened.

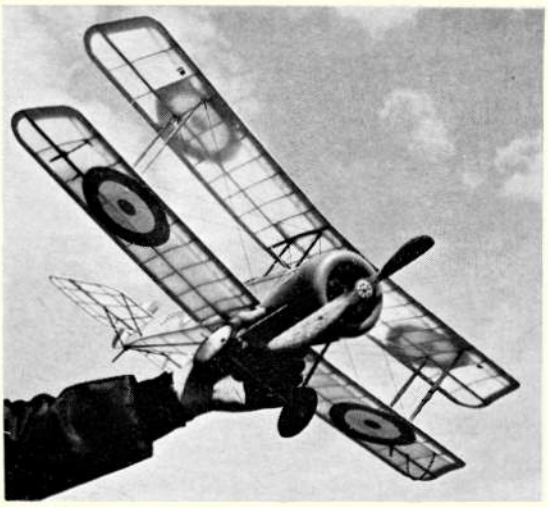
Opposite page shows the author applying cement via a syringe to his model in order to avoid excess weight – can't be too careful! Note the da Vinci sketch for inspiration. Below 'Wingfoot' mounted on its 'run-down' stand reveals the basically simple construction – but this is not one for the beginner!



FLYING SCALE MODELS

by Eric Coates

Part XII: Contests



Photographed against the sun a Bristol Bullet displays its structure. The APS Plan FSR 226 for a 37 in. model was primarily designed by Eddie Riding as a rubber powered model, but the plan includes detail of conversion for 1 c.c. engines. Price is 30p.

IN MY LAST ARTICLE I covered the initial stages of trimming the model which I consider best accomplished whilst the model is in an unpainted state. When the model emerges from its final trimming session it should be complete in every detail. In its finished condition of course it will be several ounces heavier than when it last flew, and will therefore fly somewhat faster when gliding and under power. It will also be somewhat more vulnerable to damage; especially with regard to detail work. However we are armed with the knowledge that the beast *will* fly and is unlikely to strike the ground with a sickening thud on its first flight.

Final Trimming Flights

Again as outlined in Part XI, carry out a thorough pre-flight check on the model before proceeding to the field. Check all surfaces for warps - there should be none in the tail surfaces. Any warps in the wings should correspond to those on the previous outing; reference to the log book should verify this. Set the control surfaces exactly to the positions recorded during the initial test flights and bring the C.G. back to exactly the position also recorded, by either removing ballast from the tail (if you are lucky) or adding weight to the nose (if you aren't). Do *not* attempt to fly with the C.G. further aft than previously, even if you have to stuff 3 ozs. of lead in the nose. Finally run the engine up again to check that the jet is not blocked with paint, and everything functions as before.

Typical scene at an AEROMODELLER ALL - SCALE RALLY at Old Warden is this launch of a Bucker Jungmeister. Modellers usually choose to make the in-line engine version as APS Plan FSP 807, but in this instance the blistered radial cowling is well represented.

If the long grass is still handy it is worth having a few hand glides over it to check that the trim is basically the same. Minor correction to the elevators is in order at this time, but do not touch the rudder before the first power flight. If the long grass is not handy, then I do not recommend a test glide over short grass as this can do more harm than good. Very little is to be gained from hand glides once the model is in reasonable trim.

Start the motor to give sufficient power for a long powered glide; allowing it to warm thoroughly before hand launching over grass well away from the runway. Make sure there is enough fuel for at least 20 secs run. Observe that the flight pattern appears to be following a slight turn to the left or straight ahead – if there is any tendency to turn to the right apply a little left rudder, while similarly any slight stalling tendency can be damped out with a little down elevator. Slowly increase power and by very small adjustments of the tail surfaces, trim for optimum power and glide performance. This can take a considerable time, but do not be satisfied with a tight left climbing turn and a tight turn on glide. Aim for a wide, shallow, left hand climb and a very wide circling glide; even if it means making yet another engine mounting plate to get the engine thrust line/rudder combination correct. Some models, the Jungmann being a good example, possess weathercock stability on the glide. If trimmed with only a very slight glide turn and the engine cuts with the model's head within 45° into wind, it will weathercock all the way down. With experience it is surprising how often this flight pattern can be repeated. If there is a breeze blowing it confers a double advantage: (a) you don't have far to walk for it and (b) the landing speed, relative to the ground, is very much reduced.

A word now about propellers and developed engine power. It is most noticeable how much more power the fully finished model requires to fly it compared to when the initial trimming is carried out in a 'stark' condition. In fact, if one is a bit marginal on engine size and you have laid the paint and detail work on with a trowel, you may find the engine is hard put to it to develop sufficient power to fly.

Now the propeller which seems to extract the most power from an engine on a test bench will not necessarily be the best for the model. A Mills ·75 will give its best output on a 7″ x 4″ but if the cowling of the model is 5 ins. diameter the 1″ of blade sticking outside the periphery is not going to be much good, is it? Here the long stroke Mills comes into its own for it will turn a 9″ x 4″ or 10″ x 3″ quite happily developing far more usable power in the model than with the 7″ x 4″. This is of course what makes the modern ·049 glow motor so useless for scale work – offered a 10″ x 3″ it wouldn't be capable of turning it fast enough to keep the plug warm! Similarly the Mills 1·3 develops most power on a 9″ x 4″ but will swing a 12″ x 4″ or even a 12″ x 6″ if you want it to. The power output at 2000 r.p.m. isn't too good though! Generally a 1·3 in a two seater of about 45–50 ins. span performs best on a 10″ x 4″ or 10″ x 6″. Quite often we don't want the full power from the engine for realistic flight so it is, therefore, better to load up the engine with a courser pitch propeller than running it under compressed. In the latter condition there is always the danger of the engine gaining power as it heats up, and it is not a very nice sight to see your pride and joy turning in a tight left bank with the wing tip 6 ins. above the tarmac. It is surprising though how many scale models will hold height in this attitude. The reason being unlike a turn to the right, the gyrocouple is dragging the nose up all the time whilst the torque reaction is digging the wing in.

When changing propeller sizes beware of the trim change that will occur due to the change in torque reaction. The more torque the engine develops the greater will be the tendency to turn left. As stated previously this is usually safe; the danger lies when one changes to a propeller with less torque reaction and the model turns right.

For all trimming flights use a nylon propeller but once you have got the model flying consistently, change to a wooden one. It looks so much more realistic on the model both when the engine is stationary and running.

Once the model is trimmed it is worth locking the elevator settings with balsa cement blobs in the hinge groove. Check when it has set though that shrinkage has not altered the setting – I do not think it worth while locking the rudder setting as this item gets a lot of bumps during nose overs and it is better if it moves. Before *every* flight, however, measure the rudder setting with a rule and straight edge. It is a small chore that is likely to lengthen the flying life of the model tenfold.

The Bristol Monoplane Scout is a popular APS Plan (FSP 759 Price 50p) and has a span of 46 in., taking engines up to 1.5 c.c. This excellent version appeared at 1971 All-Scale Rally at Old Warden. Note the date for this year – June 18th.

There were many pre-war kits for rubber driven scale models of high quality among them this Hawker Demon by Keelbild, which Doug McHard has made to his own inimitable standards. Those ailerons are painted on with airbrush effect.

Contest Flying

If it is intended to enter the model in contests it is advisable to limit the amount of flying the model does during its contest life. When the model is trimmed to perfection, and this can involve maybe 30 or 40 flights, I would recommend only making a couple of test flights, to check the trim, prior to each contest. Although free flight scale contests are not as well supported as they used to be (entries of 25 were not unknown in the 1950's and early 60's) quite a number are still held making it worth while building a model to do the 'rounds' with. Apart from the *Super Scale* event there is the oldest standing F/F scale competition, for the *E. J. Riding Memorial Trophy*, organised by the N.W. Area; the *Selby Trophy* event, usually at the Northern Gala; the S.M.A.E. *All Scale* meeting and the *Aeromodeller Scale Day* at Old Warden in June.

Like any other contest flying, it is essential to be organised. Two essentials are required to enter a free flight scale competition: (a) a well trimmed model and (b) scale documentation. An immaculate specimen of a model is not essential, indeed I have seen many a contest won with a well trimmed model that was far from perfect whereas the immaculate job which has 'I have never flown' written all over it has pranged at the first attempt. All models must fly for at least 30 secs to qualify and as about 40% of the total marks can be obtained for the flying performance it can be seen that the flying is of paramount importance. If documentation is not presented to the judges then your model cannot be judged for scale appearance. Kind judges may give you marks for workmanship but it is unlikely you will overcome the opposition; unless yours is the only model to fly! Therefore a good folio is essential, and this should be presented in the form of a folder containing, as a minimum: An accurate scale drawing of the subject; to a minimum of 1/72 scale. Three photographs of the subject aircraft, at least one of which should be in the colour scheme and

An unusual subject is the Martinsyde Elephant, chosen here by Vic Driscoll who is well known for his excellent Westland Wapiti.

Another Free Flight specialist of long standing is John Palmer, seen attending to his SE5A in the foreground while the lesser-known UFAG awaits his attention at rear.

markings of the model reproduced. Extra photographs showing details of the aircraft can be presented and indeed are desirable but do not overdo it and confuse the judges. Remember their time is strictly limited and there may be a lot of aeroplanes to judge.

One has two attempts to make each of two competition flights. The highest flight score is aggregated to the scale and workmanship points, therefore one has in effect four attempts to make a flight of 30 secs. Not very difficult. At each attempt one has a maximum of 3 minutes to get airborne, and if the flight does not last 30 seconds then it is classed as an attempt. If you know that the model is capable of taking off, one should always attempt an R.O.G. at the first attempt. If it fails to do so, hand launch the model at the second attempt and record a score. Both attempts of the second flight then can be made as an R.O G. As the take off accounts for something like 10% of the total marks it is essential that the manoeuvre is scored at all costs. Many a contest has been lost due to an ineffective take off performance.

The appearance of the model in flight is assessed, as is the glide and approach to landing. The actual landing is not marked as the model invariably tips up – it is only luck if the model happens to land into wind on a runway. Time spent trimming to get the flight pattern attractive will pay off when the flight is being marked. A low flying speed, if appropriate, is also well received.

Above all in contest flying, do not get harassed. You have plenty of time and plenty of attempts, so if you fail at the first, go sit back and take stock of the situation, religiously check all the control surface settings and let the engine cool off before you try again.

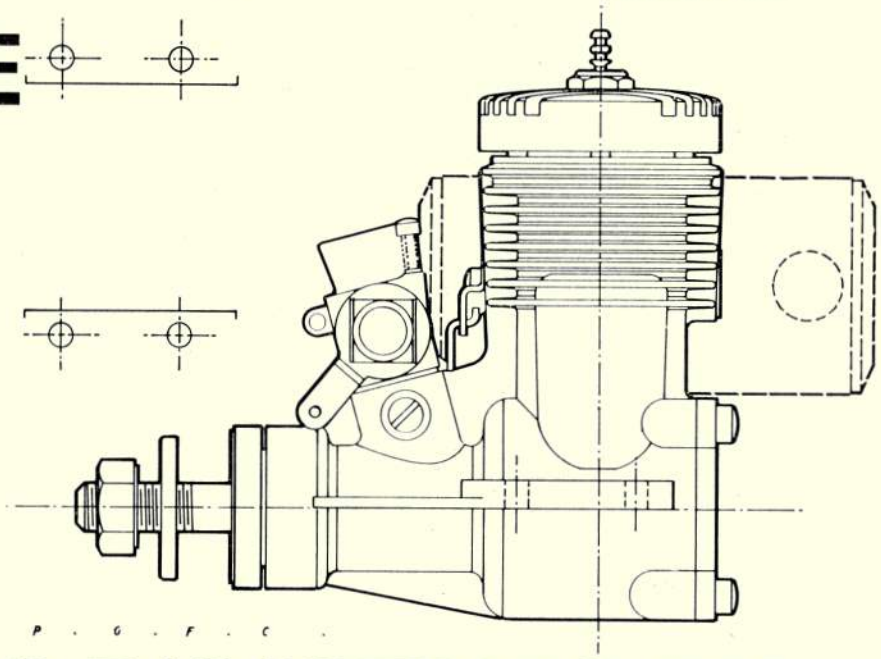
The serious contest modeller has horses for courses. The biggest enemy of the F/F scale model is wind. On a calm day the large slow flying model is the most impressive, but on a windy day it can be a bit of a handful, particularly at take off. A smaller, more heavily loaded model, such as the *Nimrod*, is a better bet in such conditions as its faster flying speed enables it to 'punch' the headwind better and it is not so upset by gusts. The smaller model is also less likely to be damaged during fast downwind landings. I have seen big lightly loaded models flown in windy conditions, but it is usually prudent to hand launch though. I won the 1968 *Super Scale Trophy* with the S.E.5a flown in a 20 knot wind – only one other competitor managed to get airborne. Needless to say that man was T. Manley, Esq.!

Properly trimmed a good scale model will fly in quite severe winds; it is the landings which are the tricky part. It is just luck whether you touch down at 0 m.p.h., into wind, or 40 m.p.h. downwind. Flying in such conditions is not much fun, but worth the risk I think in competitions, especially if you use an old model.

My output is about one F/F scale model per year, but I do build other models I hasten to add. I try and have it trimmed out by April, or early May at the latest, in good time for the 'Super' at the Nationals. It is then kept solely for contest work the remainder of the season, and if the next year's model turns out not so good, then it may have to last two seasons of contest flying. If the new one *is* O.K., then it gets dropped to reserve and is flown quite a reasonable amount as a sport model but still kept looking fairly decent in case of need. By its third season it is used purely as a sports model. After that it is living on borrowed time! Four to five years is about the average life span for one of my scale models although some have managed as much as seven. The S.E.5a has taken on a new lease of life in the past year with proportional gear and an OS-30. Complete with Glow Plug engine!

Pioneer aircraft often form the subject for rubber driven or small engined power models, as this example, seen at Old Warden, on our windy All-Scale Day in 1971 – those small tail surfaces must give the owner difficulty in getting the right trim!

ENGINE TEST



by
Peter Chinn

VECO 19 R/C "SERIES 71"

THE CURRENT 'SERIES 71' Veco 19, as manufactured by the K&B company of Downey, California, is a development of the 'Series 200' twin ball-bearing Veco 19 introduced in 1964 which, itself, was a redesign of the original ('Series 100') plain bearing equipped Veco 19 first produced in 1955.

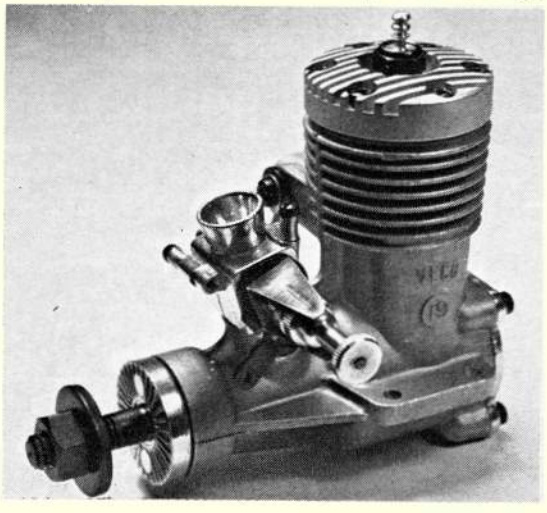
The main differences between the Series 71 engine and the previous model are to be found in the new cylinder-head and modified main casting. The new head has a shallow hemispherical-shaped combustion chamber instead of a flat one and is outwardly identified by its square-cut machined fins and matt finish. The older diecast head had a tumbled finish. With the exception of the main casting and the cylinder-head, most parts are interchangeable between the '200' and '71' models.

The engine with which we are dealing in this report is the standard throttle-equipped version. The Veco is also available with the R/C type carburettor replaced by an ordinary intake venturi. The same spraybar assembly fits both versions. Alternatively, it may be obtained with the head fins running from side-to-side, instead of fore-and-aft. The engine is sold in this form for radio-controlled model racing car use.

As supplied by the American factory, the Veco 19 R/C comes equipped with a semi-rotary exhaust valve coupled to the throttle. However, for use in this country where silencers are obligatory, the U.K. importers, Irvine Engines, offer a cylindrical expansion chamber that can be fitted instead. Since removal of the exhaust valve leaves a $\frac{1}{4}$ in. dia. hole at each end of the exhaust duct, Irvine Engines also include a pair of alloy plugs with which the user can seal off these holes.

The Irvine silencer is of generous volume and has a large bore (35 sq. mm. cross-sectional area) outlet stub. Consequently, back pressure is minimal and the silencer causes little or no power loss at normal operational speeds and only about 4 per cent b.h.p. at the peak of the power curve.

The Veco 19 is both heavier and more expensive than its competitors in the up to .20 cu. in. (3.27 c.c.) group but, unlike most of them, its specification includes a ball-bearing mounted crankshaft. A feature is the special large i.d. Fafnir rear bearing that has enabled a bigger crankshaft journal to be used than would otherwise be possible and this, in turn, has permitted the induction passage through the shaft and the valve port area to be made larger than average,



Veco 19 R/C is suitable for beginner and intermediate type R/C models. Conversion to standard type for F/F and C/L is simple.

SPECIFICATION

Type: Single cylinder, air-cooled glowplug ignition two-stroke with throttle control. Crankshaft-type rotary-valve induction and dual ball bearings.
Bore: 0.634 in.
Stroke: 0.633 in.
Swept Volume: 0.1998 cu. in. (3.274 c.c.)
Stroke/Bore Ratio: 0.997:1
Checked Weights: 194 grammes – 6.84 oz.
232 grammes – 8.18 oz. (Less exhaust baffle, with Irvine silencer)

General Structural Data

Pressure diecast aluminium alloy *crankcase/cylinder/main bearing housing* with drop-in steel *cylinder liner*. Detachable pressure diecast aluminium alloy *crankcase cover* secured with four screws. Hardened steel *crankshaft* with 12 mm. main journal, 11/32 in. bore gas passage and 3/16 in. dia. crankpin, supported in 12 x 24 mm. 9-ball steel-caged ball journal bearing at rear and ¼ x ⅜ in. 8-ball brass-caged shielded ball journal bearing at front. Lapped cast-iron *piston* with baffles annular stiffening rib above gudgeon-pin holes. Fully-floating 5/32 in. dia. tubular *gudgeon-pin* with PTFE end pads. Machined extruded aluminium alloy *connecting-rod* with bronze bush and oil-hole at big-end. Machined aluminium alloy *cylinder-head* secured to cylinder casting with six screws. No head gasket. Pressure diecast aluminium alloy *prop driver* keyed to shaft with 1/16 in. square-sunk key. Pressure die-cast aluminium alloy *carburettor* body with ground steel throttle barrel, brass spraybar assembly and adjustable air bleed and throttle-stop. Throttle barrel linked to semi-rotary exhaust baffle. Beam mounting lugs.

OPTIONAL EXTRAS

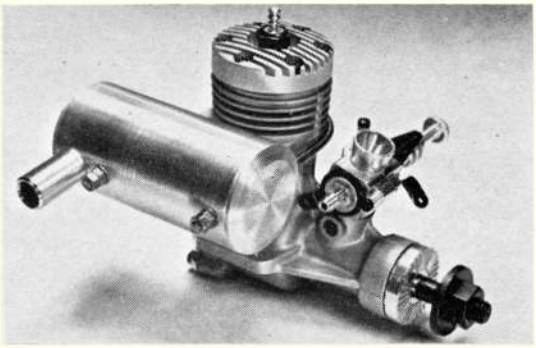
(i) High performance cylinder-head, part no. 6721
(ii) Irvine machined aluminium alloy expansion chamber-type silencer with side outlet.

TEST CONDITIONS

Running time prior to test: 4 hours.
Fuels used: (i) 70 per cent methanol, 30 per cent Duckhams Racing Castor Oil (Running-in).
(ii) 5 per cent pure nitromethane, 70 per cent methanol, 25 per cent Duckhams Racing Castor Oil (Performance tests).
Glowplug used: K&B long-reach bar-type as supplied.
Air temperature: 20 deg.C (68 deg.F).
Barometric pressure: 30.00 in.Hg.
Silencer: Irvine expansion chamber type.

with consequential benefits in top end performance.

The rest of the motor is of conventional design and construction. A lapped cast-iron piston runs in a drop-in steel cylinder liner with orthodox crossflow scavaging and the crankcase, front housing and cylinder casing are made in a single unit with the usual beam mounting lugs. The carburettor is a barrel throttle type with adjustable airbleed for controlling the idling mixture strength. A standard spraybar passes through the throttle barrel and rotates with it, and therefore calls for the use of a soft non-hardening type of fuel tube between engine and tank.



The Veco 19 R/C Series 71 as tested. The Irvine silencer caused negligible power loss.

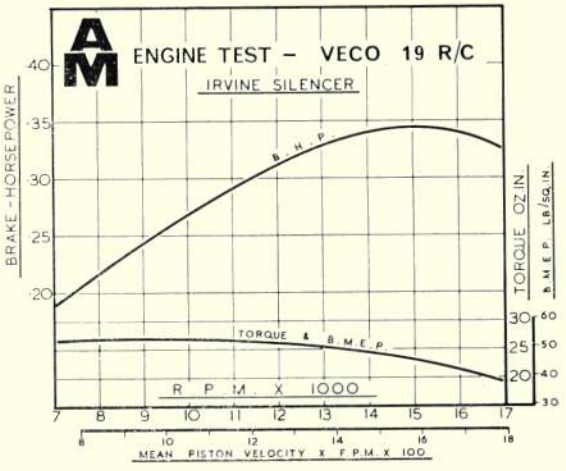
Performance

For running-in the Veco we omitted the silencer and used a straight methanol/castor-oil fuel mixture with a generous lubricant percentage. Our test sample took quite a long time (over three hours accumulated in short runs) to reach the point where it would hold a fully leaned-out setting. The fuel was then changed to our standard 5 per cent pure nitro mixture and further performance checks were made before fitting the silencer.

Once the engine had been sufficiently run-in, running qualities were good. Vibration was at a reasonably modest level and the engine ran evenly on a wide range of prop sizes.

To get reasonably near its peak performance in the air the Veco would need to be fairly lightly loaded (e.g. 9x4, 8x6 or 8x5 props) but it nevertheless proved capable of turning much heavier loads without distress. For example, it lugged an 11x6 Power-Prop quite happily at a static 7,500, rising to 8,250 on an 11x5 Power-Prop and 8,900 on a 10x5 Punctilio. Moving up the scale, a 10x3½ Top-Flite was turned at 10,900 r.p.m., a 9x4 Punctilio at 11,000, a 9x4 Keil-Kraft nylon at 11,700, an 8x6 Power-Prop at 12,800

continued opposite



and an 8x5 Power-Prop at 13,800 r.p.m.

Maximum torque was developed at 9,000-10,000 r.p.m. and, on plotting the performance curves, a maximum b.h.p. of nearly 0.35 was determined at around 15,000 r.p.m. This is very good indeed for a .20 cu. in. motor on 5 per cent nitro fuel and confirms the Veco as one of the most powerful R/C engines currently manufactured in this displacement group.

In general, starting was, we thought, just a trifle less easy than we experienced during tests of two earlier models. Cold starts were usually quick but re-starts were apt to be a little less positive. When hot, the engine seemed to respond best following a single preliminary choked flick of the prop and with the throttle open.

Although the carburettor of the Series 71 is basically the same as that fitted to the Series 200 engine, the newer engine reacted better to the throttle control than our test sample of the older model. We obtained a lower idling speed (a safe 2,700 on a 9x4 nylon prop) with improved intermediate operation. We found it easy to establish the airbleed setting to obtain this performance.

As an optional extra, the manufacturer offers a special 'High Performance' cylinder head for the Veco 19. This incorporates a squish band and, after completing tests on the engine in standard trim, we fitted one of these heads and ran some further performance checks. Only a very slight increase in power at the peak of the power curve was determined with this head, however, and it is felt that the needs of most users will be more than adequately met by the performance of the motor in standard trim. If more power is needed, a switch to a higher nitro content fuel would be more effective. For example, 25 per cent pure nitromethane or 40 per cent commercial blended nitro will put 800-1,000 r.p.m. on the engine's top end performance.

During the next few months the K&B-built Veco 19 will be joined by a European version made under licence in Germany. We understand that this version, too, will be available in the U.K. from Irvine Engines.

Power/Weight Ratio (as tested with Irvine silencer): 0.67 b.h.p./lb.

Specific Output (as tested with Irvine silencer): 105 b.h.p./litre.

F.A.I. INTERNATIONAL CALENDAR

WORLD CHAMPIONSHIPS

Mid July	***Helsinki**, FINLAND. Control Line Championships, F2A, F2B, F2C.
August 2-7th	**Montaudran**, Toulouse, FRANCE. Scale Championships, F4B, F4C.
August 25-28th	***Cardington**, Bedfordshire, U.K. 'C.S. Rushbrooke Memorial Trophy', F1D (Indoor).
September 22-25th	**Vrsac**, YUGOSLAVIA. 1st World Championships for Space Models; Parachute duration; Boost Glide duration; Scale Model Rockets.

CONTINENTAL CHAMPIONSHIPS

May 20-21st	**Mauberge**, FRANCE. European Championship Radio Control, F3A.
August 11-14th	**Otocac**, YUGOSLAVIA. European Championships, Power F1C.
August 26-27th or Sept. 2-3rd	**Homburg**, Saar, GERMANY. Europa 1972, Glider, Wakefield, F1A, F1B.

OPEN INTERNATIONAL EVENTS

February 2nd	**Helsinki**, FINLAND. VLK Winter Contest, Free-Flight F1A, F1B, F1C.
March 25-26th	**Viotte del Monte Bondone**, ITALY. 'G. Fraffer' Radio Control F3A.
April 1-3rd	**Hradec Kralove**, CZECHOSLOVAKIA. Control Line F2A, F2B, F2C.
April 14-16th	**Zell am See**, AUSTRIA. Coupe des Alpes, Free-Flight F1A, F1B, F1C.
May 5-7th	**Slanic Prahova**, RUMANIA. Indoor-Slanic F1D.
May 11-14th	**Kraiwiesen**, AUSTRIA. Criterium Control Line F2A, F2C.
May 13-14th	**Rozendaalse Heide**, NETHERLANDS. Coupe d'Amsterdam Cup, Free-Flight F1A, F1B, Power 300 gr/cc.
May 20-22nd	**Koblach**, AUSTRIA. Coupe Rhine R/C, F3A.
May 20-22nd	**Mauberge**, FRANCE. Criterium du Nord, Free-Flight, F1A, F1B, F1C, F3D.
May 21st	**Verona**, ITALY. Benaco Trophy, Radio Control F3A Hydro.
May 27-28th	**Brno**, CZECHOSLOVAKIA. International Combat.
May	**Dubnica**, CZECHOSLOVAKIA. Criterium d'Europe, Scale Rockets.
June 2-4th	**Rieti**, ITALY. Europa Cup, Radio Control F3B.
June 10-11th	**Karlovy Vary**, CZECHOSLOVAKIA. Scale, F4C.
June 10-11th	**Drover Heidi b/Duren**, GERMANY. Eiffel Cup, Free-Flight, F1A, F1B, F1C.
July 8-11th	**Pecz**, HUNGARY. 'Meczek Cup' Control Line F2A, F2B, F2C.
July 24-27th	**Alicante**, SPAIN. 'Garcia Morato' Free-Flight F1A, F1B, F1C.
August 4-6th	**Piestany**, CZECHOSLOVAKIA. Radio Control, F3A.
August 11-13th	**Kraiwiesen**, AUSTRIA. 'Igo Etrich' Cup, Radio Control F3A.
August 19-20th	**Munich**, WEST GERMANY. Free-Flight, F1A, F1B, F1C.
August 21-29th	FRANCE. Int. Free-Flight Week.
August 26-27th	**Marigny-le-Grand**, FRANCE. Huitième Criterium Int., 'Pierre Trebod' Free-Flight F1A, F1B, F1C.
August 25-27th	**Wiener Neustadt**, AUSTRIA. 'Kolibri' Int. Cup.
August 26-27th	**Monte Tomba**, ITALY. Europa Cup, F1E Magnet Glider.
August 27-28th	***Cranfield**, U.K. F.A.I. Pylon Racing Trophy, 'Sopwith' F3D Pylon Racing.
August 26-27th or Sept. 2-3rd	**Homburg**, Saar, GERMANY. Europa Cup Free-Flight, F1A, F1B, F1C.
September 8-10th	**Rana u Loun**, CZECHOSLOVAKIA. Radio Control F3B.
September 15-17th	**Bucarest**, RUMANIA. 'Inter-Aero' Control Line F2A, F2B, F2C, F2D.
September 17th	**Lugo di Romagna**, ITALY. F.A. Gold Cup, Control Line Team Racing.
September 21-24th	**Lienz**, AUSTRIA. Int. Dolomites Cup, Radio Control F3A.
September 23-24th	**Perchez Gyor**, HUNGARY. 'Coupe Raba' F1B, Wakefield.
September 24th	**Pfaffikon** (Zurich), SWITZERLAND. Int. Competition, Radio Control F3A.
Sept. 29-Oct. 1st	**Lesce Bled**, YUGOSLAVIA. Beld Cup, Radio Control F3A.
October 6-8th	**Nyiregyhaza**, HUNGARY. 'Nyirseg Cup', Control Line, F2A, F2C, Radio Control F3A.

*TENTATIVE – to be confirmed.

F1A, Glider; F1B, Wakefield; F1C, Power; F1D, Indoor; F1E, Magnet Glider; F2A, Speed; F2B, Aerobatics; F2C, Team Race; F2D, Combat; F3A, Multi; F3B, R/C Glider; F3D, Pylon; F4B, C/L Scale; F4C, R/C Scale.

CONTROL LINE NEWS

Current World Aerobatic champion Bill Werwage is all set to defend his title this year, having topped the U.S. Team Trials with his usual immaculate machine – now silencer equipped.

Goodyear – Experts and Novices

ANOTHER IDEA this month from John Horton aimed at increasing interest in team racing, concerns the problem of maintaining the enthusiasm of novices to the Goodyear class. This event, although very popular, has not yet established 'top experts' to the degree which F.A.I. racing has, so *now* is the time to give it a fresh injection of competition for the less experienced fliers, without causing too much hardship for the organisers.

John's scheme is simply to run a 'Novice's Final' at each contest in addition to the normal Final. As soon as the three fastest times have been selected to form the true Final, the three fastest 'Novices' are selected for their final. This will provide the 'also rans' with another target to aim for, yet will not become dominated by the same four teams, as under John's 'rating scheme' no team may win more than four of these events without acquiring 'Expert' status, thus the system will continuously make room for others to have a go in this secondary Final.

The rating system is based on awarding the top three men with 6, 5 and 4 points respectively, while the Novice Finalists receive 3, 2 and 1 point each. As soon as a team has acquired 10 points or more they are awarded 'Expert' status.

There may be some unforeseen loopholes (apart from the obvious one of team changes, i.e. Haworth/Horton would *not* qualify as a novice team) in this system, but the only way to find out is to give it a try. Success or failure will result largely in the degree of co-operation which John receives – all contest organisers, please send full results of your Goodyear Comps to John at 10 Lawn Avenue, Burley in Wharfedale, Ilkley, Yorkshire LS29 7ET.

The accompanying table shows that to date only 12 teams rate as experts, which means that there are at least 80 teams of novices somewhere, apart from any newcomers.

'Goodyear' Racing League Points

Team	Club	1970	1971	Total
Expert Teams (more than 10 points)				
1. Haworth/Place	*Wharfedale*	12	23	35
2. Johnson/Shaw	*F.A.C.C.T.*	4	30	34
3. Clarkson/Daly	*Stockport*	0	26	26
4. Dixon/Radcliffe	*Feltham*	0	25	25
5. Harknett/Smith	*Felt./Hayes*	17	6	23
6. Carson/Hamilton	*Felt./Hayes*	16	4	20
7. King/Rudd	*Felt./Hayes*	11	6	17
8. Horton/Kirton	*Wharfedale*	10	6	16
9. Coote/Small	*S. Bristol*	15	0	15
10. Cooke/Everitt	*Chester*	0	13	13
11. Skitt/Ward	*M.A.R.S.*	0	12	12
12. Heaton/Ross	*Leigh*	0	11	11
Novice Teams (Less than 10 points)				
13. Jones/Taylor	*Rolls Royce*	9	—	9
14. Brewster/Langworth/ Muncaster	*W'dale/Novo*	—	8	8
15. Ansell/James	*Cosmo*	5	—	5
Forest/Walker	*Cosmo*	—	5	5
Gray/Lopez	*Feltham*	—	5	5
Heaton/Woodside	*Leigh*	—	5	5
Shaw	*F.A.C.C.T.*	5	—	5
20. Brewster/Inkester	*W'dale/Leeds*	—	4	4
Evans	*S. Bristol*	4	—	4
Hardcastle/Skitt	*M.A.R.S.*	—	4	4
Haworth/Horton	*Wharfedale*	—	4	4
Johnson	*F.A.C.C.T.*	4	—	4
Morgan/Rippengale	*Finchley*	4	—	4
Pittaway/Skitt	*M.A.R.S.*	—	4	4
27. Davy/Devenish	*Wharfedale*	—	3	3
Jones/Woodside	*Leigh*	—	3	3
29. Barker/Kirton	*Wharfedale*	—	2	2
Pickles/Rhodes	*Wharfedale*	—	2	2
31. Crampton/Gray	*N. Sheffield*	—	1	1

F.A.I. Combat

Should a combat contest produce a winning individual, or a winning team? Should the final result depend entirely on the skill of the pilot, or is an able pilot plus an efficient team of mechanics the best solution?

In this country, where it is fair to say that there has been the greatest experience in flying 2.5/3.5 c.c. powered combat models, emphasis has always been on teamwork, and *our* rules consequently have made this clear. What use is it to be the best pilot in the world if someone else cannot start your motor? Again, if the pilots are evenly matched then it is frequently the mechanics who determine the winner.

The F.A.I., however, think differently. The original set of proposed rules were over-involved in general, but more important, began the shift in emphasis away from teamwork. Their scoring system gave much greater importance to streamer cuts, while they took away the advantage of a quick initial start by making the pilots fly two laps together before the 'match' began. These reductions in the duties of the pit crew will now be further implemented, following the latest C.I.A.M. decision concerning the starting of the match. Pilots will be allowed to start their motors and warm them up, while the contest itself begins two minutes after this initial warm-up. The motor *need not be stopped* before the contest begins, so the models are to be simply released when the 'let battle commence' whistle blows.

While the F.A.I. may be right in wishing for an individual sport, in our opinion it cannot succeed in this case as the pit crew must still exist, and no matter how much their duties are diminished, will still form a factor in the eventual results. The problem which concerns British fliers is that we are committed to following the F.A.I. proposals. Do we *really* want to conform to this ever increasing jungle of rules? Life was so simple when we flew to the dear old S.M.A.E.

Ducted-Fan models are rare these days, particularly in control line form. One enthusiast though is Mr. Nelson of Derby, seen here with a 1/12th scale Viggen which weighs 4½ lb. for its 34½ in. span and 53½ in. length.

Starting the Viggen's K&B 40 requires the use of a pulley cord, access being gained via a hatch. Model flies on 40 ft. lines, and could benefit from even more power.

rules . . . pity that other countries would not accept them as they were!

Glass Fibre Propellers

It was interesting to see Mr. Stapleton's comments concerning Glass Fibre propellers under the *Readers' Letters* section last month. While agreeing with him that such a propeller could certainly cause damage to a person under unfortunate conditions, perhaps the other side of the coin should be examined. We have personally seen nylon propellers lose at least one blade, plus wooden propellers shattering when starting or throwing a blade in flight, but have never ever heard of a similar incident involving a G.F. item. When starting and tuning an engine it is probably easier to keep one's fingers out of the way than it is to keep one's eyes out of the arc of the prop – a thrown blade is unpredictable and happens *very* quickly. Nylon props can also make a nasty mess of one's digits, and *they* won't break under such circumstances either.

On balance, we would find the glass fibre item safer *provided* that it is properly made, with the glass strands travelling the full length of the prop and not relying purely on the epoxy for strength. As for the situation when a model hits a third party, it is generally immaterial whether the prop is turning or not – the model's kinetic energy tends to be the greatest source of real damage.

Heartbreaking result of 'roll up the lines' for Keith Hamilton's Goodyear racer – making its maiden flight. Note how the Bartels glass-fibre prop has fared somewhat better than the Moki TR6 motor. . . .

Bochum International

Thanks to a brief note from Clemente Cappi, long-time member of Italian aerobatic teams, we have details of the International Meeting at Bochum, West Germany from September 25th-26th. The weather was very kind, with plenty of sun and just light winds, which must have suited the competitors from some 10 nations.

Team race was the best supported event with 28 entries, of which eight recorded sub-five-minute times, and in general these were better than those recorded at the Pecs meeting, although Clemente reports that these are not a true reflection on ability as the judges permitted fairly generous whipping. However, despite this, overall winners, the Metkmeyer brothers from the Netherlands recorded consistently good times to beat many experienced teams, including Pecs winners Fischer/Straniak of Austria as well as the strong German representation of Schwarz/Maikis, Lenzen/Rumpel and Bader/Kaul. Surprisingly Geschwendnter/Hasling finished no higher than 12th with 5:21.

In Speed, it was once more a battle for the best Rossi 15 – all the top men using this motor. The team from Switzerland did surprisingly well with second and third placings, plus Bilat at fifth, despite the presence of such experts as Wamper (Germany) and Toth (Hungary). The latter, presumably using a Moki, recorded a best flight of 216 Km./hr.

Aerobatics proved to be a victory for Clemente himself, flying his recently-renovated *Mustang* design – the model he flew at the 1967 Bierset International. He headed a list of well-known International pilots who were closely grouped behind him – there being little to choose between them, particularly between fourth and seventh positions.

Results

F.A.I. Team Race

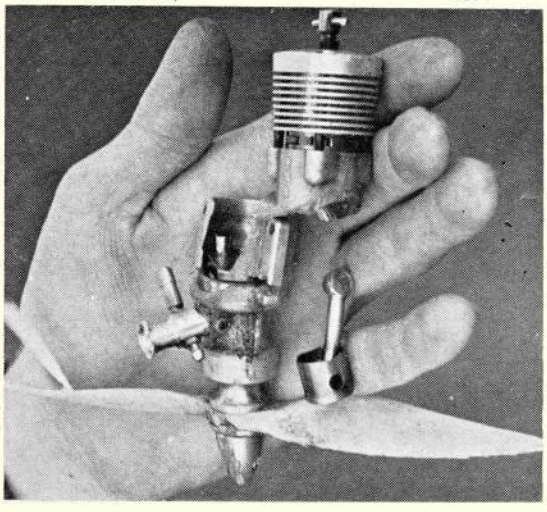
	Rd. 1	Rd. 2	Semi	Final
1. Metkmeyer/Metkmeyer (N'lands)	—	4:32	4:35	9:13
2. Mohai/Markotai (Hungary)	4:50	4:32	4:28	9:23
3. Schwarz/Maikis (W. Germany)	—	4:54	4:43	9:31

F.A.I. Speed

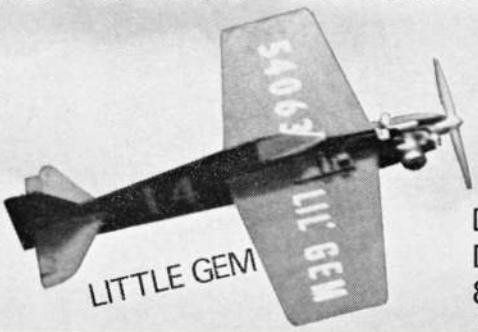
	Rd. 1	Rd. 2
1. Fröhlich (W. Germany)	233 Km/hr.	229 Km/hr.
2. Kulnis (Switzerland)	220 Km/hr.	232 Km/hr.
3. Brecket (Switzerland)	226 Km/hr.	—

Aerobatics

	Total best 2 flights
1. Cappi (Italy)	1911
2. Egervary (Hungary)	1870
3. Billon (France)	1866



YOUR TWO FREE PLANS !



Designed by
Dave Clarkson
& John Daly

a pair of control-line Goodyear class team racers for 2.5-3.5 c.c. engines, with a proven contest performance

The Cassutt 'BooRay'

The full-size *BooRay* is a Jim Cassutt design, built and raced by Marion Baker, in whose hands it has proved to be the fastest *Cassutt* built to date. The builder removed many of the curves from the basic design which is why this particular *Cassutt* has been selected for control line racing. The basic three-views used to build this model were found in the *Racing Planes Annual* for the Cassutt I.I.M. and these have been modified to *BooRay* after studying the numerous photographs of this aircraft in this publication.

Three replicas of this model have been built by fellow club members and all proved to fly very sweetly off the club field, which consists of short grass, when a conventional mono-leg undercarriage was used (as shown on the *Little Gem* plan). However, future development of this very successful model proved that pit-stops could be improved by fitting a rearward wheel and prop. skid, and this arrangement is shown on the plan. When this undercarriage layout is used, it has been found that cutting the motor (via the fuel shut-off) three-quarters of a lap from the pit man, the model can be 'greased-in' half a lap out, then an application of full down elevator quarter of a lap out moves the model firmly on to the outboard tip and nose skid. This slows the model considerably as well as stabilising it on the ground so that it arrives at the pitman firmly and at a comfortable speed – no danger of taking his hand away! However, the designer stresses that while take-offs and landings are trouble-free in calm weather, an experienced pilot could be a considerable asset under inclement conditions. If you lack this confidence, then you would be better advised to fit the *Little Gem*'s forward-raked unit.

'Little Gem'

Originally built by Jim Miller in 1949 as the *Miller Special*, it was subsequently re-built to its present form after a major crash. As the *Miller Special* (and later known as *Little Gem* and *Ole Tiger* as re-named by different owners) it has proved to be one of the fastest Goodyear midgets ever built. As *Ole Tiger* it has appeared with a slightly higher fin and for this reason the *Little Gem* plan has been selected. The basic three-view used is also from the *Racing Planes Annual*, increased over-scale to bring it it line with the current S.M.A.E. rules.

Construction

Two forms of wing construction are shown following the designers' personal preferences. Both feature buried leadouts and controls to give a 'clean' appearance and also to allow the unconventional 'catch' mentioned later.

The *BooRay*'s wing is assembled using a $\frac{1}{2}$ in. x $\frac{1}{4}$ in. spruce leading edge, a 1 in. x $\frac{1}{4}$ in. hard balsa trailing edge and medium $\frac{1}{4}$ in. sheet in between. The lead-out ways should be cut out from top to bottom before shaping the wing. The centre portion of the wood cut out should be removed and the top and bottom pieces re-installed together with the lead-out guide tubes. The wing is now shaped to a semi-symmetrical section using a razor-blade plane and sandpaper – care should be taken not to make the leading edge too sharp. After shaping, install the lead-outs and the circular bellcrank and cover the centre section with 1 mm. ply, leaving suitable holes for the pivot bolt and the pushrod. Glue on 1 mm. tip protectors and dope lightweight tissue on to the top and bottom surfaces.

The *Little Gem* wing is built-up using a $1\frac{1}{2}$ in. x $\frac{1}{8}$ in. trailing edge, a $\frac{1}{4}$ in. square spruce plus $\frac{3}{4}$ in. x $\frac{1}{4}$ in. medium balsa leading edge and ribs cut from $\frac{1}{4}$ in. x $\frac{1}{8}$ in. strip. Glue in the lead-out tubes and the 1/16 in. ply bellcrank mounts and when dry install the lead-out wires, bellcrank and pushrod. Make sure that the controls are completely free and then sheet top and bottom with 1/16 in. sheet balsa. Shape to a symmetrical section as previously, then tissue cover. When dry epoxy into place the tin-plate tip protectors and the tank.

Fuselage construction on both models is identical. A strong 'core' of two $\frac{1}{2}$ in. x $\frac{3}{8}$ in. hard balsa strips and one $\frac{3}{8}$ in. x $\frac{1}{8}$ in. spruce strip is used, to which the bearers are glued. The profile is achieved by adding soft $\frac{1}{8}$ in. sheet. The fuselage should be built in two halves split at the wing to allow the fuselage halves to be securely glued on to the wing. The nose block is now glued into place and 1/16 in. ply doublers are added. A scrap sheet inboard side cheek is shown, this makes the front end very rigid. The cheek/wing joint should be a very good one to preserve this rigidity throughout the life of the model. Now shape the fuselage, rounding off all the edges and tapering the width at the rear to $\frac{1}{8}$ in. wide using the razor-blade plane and sandpaper. The tail and fin may now be installed together with the 14 swg wire tail skid. The fin and tail are made from $\frac{1}{8}$ in. medium sheet with hard $\frac{1}{8}$ in x $\frac{3}{8}$ in. strip glued across the core grain for strength and to prevent splitting. Cover both with lightweight tissue before glueing into the fuselage.

Finishing

The purpose of the next task is to impart an attractive, durable, yet light-weight finish to the model. It is recommended that all surfaces should be sealed with three or four coats of clear dope, rubbing down between each coat with wet or dry paper. When the surfaces have been adequately sealed and smoothed, colour may be applied. Two well rubbed down coats of car-type enamel paint should be sufficient to give a proper coverage. Now apply trim and numbers and fuel proof thoroughly. Remember that the SMAE rules call for an attractive scale like finish with scale height numbers (1½ in.) in the correct places.

When the finish has hardened-off properly (it takes two to three days in a warm room), connect the push rod giving equal amounts of up and down, form the lead-out loops to be equal at neutral elevator, bolt on the undercarriage (single 10swg leg, 1-1½ in. diameter wheel and doubled tin-plate clips soldered onto the leg), install the fuel cut-off and connect the cut-off to trip between 10 deg. and 20 deg. down elevator. Now bolt on the motor (and tank for *BooRay*) and test the centre of gravity.The most rearward CG position allowed is 15 per cent mean chord, add lead to the side cheek via the engine bay to give this. *BooRay* should not require the addition of lead, but *Little Gem* certainly will.

Hardware

MVVS 2.5 TRS motors have been used up to date. The only tuning performed has been to free the shafts and to use an 8mm i.d. venturi. Delaquering after each competition (as described in the Heaton/Ross article. July 1971 *Aero Modeller*) is essential.

Both suction and pressure feed have been used, both have advantages and disadvantages but the end results have been similar. The suction tank shown for *BooRay* is a conventional 'uniflow' tank of 30cc capacity which gives 60 or more laps. The pressure tank shown for *Little Gem* is of the 'Marriott's Bottle' type and has a 58cc capacity which should give more than 100 laps. These designs have been adopted to ensure constant motor runs with these relatively large tanks.

For the MVVS 2.5TRS a 7 in. x 6 in. Tornado nylon prop is recommended, and as long as the model all-up weight does not exceed 20 oz., an airspeed of over 85 m.p.h. should result.

And so to the flying site

Both planes are easy to fly provided that a close-coupled handle is used and also provided that the C.G. is in front of the position stated. Because both models sit nearly parallel to the ground, take-offs are trouble-free and little or no bouncing is experienced even on high speed landings.

Catching these models at pit-stops did give great difficulty until the *inboard* wing catch was adopted. Once the necessary mental adjustments had been made, missed and slipped catches disappeared and now catching is trouble-free. One advantage of the inboard wing catch is that the natural tendency of the plane to slide through the hand away from the body is prevented by the fuselage meeting the hand.

These two models are distinctively different from the two most popular contest designs (*Jinny* and *Shoestring*) in that low-aspect ratio wings are used. Experience has indicated that low-aspect ratio wings are no disadvantage to flying, gliding or pitting and that the reduced frontal area of these models does confer a significant speed increase, given the power.

READERS LETTERS . . .

Dear Sir,

I feel that the letter by D. H. Stapleton published in the January issue regarding 'glass fibre' props must not go unanswered.

The letter is, unfortunately, couched in the most exaggerated sensational terms, which give an inaccurate impression of the situation. It only needs the lay press to pounce on such a letter to create adverse publicity.

The sensational and exaggerated terms to which I refer are, of course, 'razor sharp, harder than steel, finger removing tools' and 'suitable surgical instrument', a most unfortunate choice of words which are completely untrue. *'Razor sharp'* – does D.H.S. shave with one? *'Harder than steel'* – which grade of steel? Must be a poor one, and one which I hope I never come across. I really must be present when D.H.S. cuts through a bar of *mild* steel with a G.F. hacksaw blade! *'Finger removing tool'*, etc. – from his portfolio of case histories, perhaps D.H.S. would quote a few instances of this actually happening. Please, Mr. D.H.S., let us stick to the *facts*.

In referring to glass fibre props, I assume that D.H.S. really means glass fibre reinforced plastic props. Glass fibre is silky soft, and I know of no method of making this into an airscrew without the addition of a resin.

GFRP is a complete material – consisting of strands of glass fibre in a matrix of what are usually cold-setting polyester or epoxide resins. The function of the resin, which is of relatively low mechanical strength, is to transfer the stress from one filament of the fibre to another, and to give form to the product.

What D.H.S. is in reality objecting to is the resin content of a GFRP prop. Whether the laminate contains glass fibre, carbon fibre or any of the other materials used, such as cotton, linen, paper, asbestos, rayon, etc., is beside the point. I assume it is the hard, unyielding nature of these materials that is giving cause for concern. We must therefore include other materials, such as resin-impregnated wood, Tufnol and some of the harder nylons, which virtually eliminates all except the soft, flexible nylon and wooden prop, which could be said to be hard and unyielding!

Why use GFRP props? Simply because the modern engines prefer high rpm and this alone has rendered some materials obsolete. In the search for efficiency a more rigid material is advantageous. Nylon props are noted blade shredders – quite a hazard, Mr. Stapleton – when I see anyone using a nylon prop at 19-20,000 I keep out of the line of fire! GFRP provides the necessary tensile strength to make the risk of blade shredding virtually nothing, and this is a big step forward.

With any airscrew on a motor, there is risk to both operator and spectator. As far as the operator is concerned, the choice of prop is entirely his, and he must accept the risk – he has no one to blame but himself if he sticks his fingers in the way, if we are to have all elements of risk removed, where do we draw the line? At the i.c. engine itself?

As far as the risk to spectators is concerned, since GFRP props are in question, let us restrict ourselves to this aspect only. It is of no use to make mild assumptions without facts – let us have from the Society a categorical and proven list of injuries to *spectators* involving the use of a GFRP prop, where, *without any doubt, the injuries would have been minimised or avoided had the prop been in another material*. Props in this material have been used in sufficient numbers for long enough for any menace hazard to have become obvious.

As might be expected, I use and like GFRP props, and I do not want to have the choice of prop material dictated to me. The odd injuries I have sustained with these props have been of a mild and superficial nature. My worst incident, requiring three stitches, was when running a vintage McCoy 19 at 17,000 r.p.m. on a *nylon* prop.

I am aware of the injuries which Ray Collins suffered, and he has every sympathy. At the same time, I am sure that Ray would not wish to deny the use of such props by others. Should an individual decide that the risks are not acceptable, then the choice is his, and his alone – after all, no one forces anyone to fly powered models.

It is an unfortunate trend these days for a minority to attempt to enforce their opinions upon the activities of others, when quite often the minority are non-participants, and I would welcome the end of this cult of *'minding the other person's business'*.

It would be interesting to know of D. H. Stapleton's aeromodelling activities – the types of model he flies, the motors he uses, their operating r.p.m. and, more pertinent, the type of props that are used.

Jim McCann
Blaydon-on-Tyne, Co. Durham.

TRADE NOTES

LATEST MANUFACTURER to produce a fast curing epoxy resin (arguably the greatest invention since the balsa knife for the aeromodeller) is the well known **Bostik** company with their new *Quick Set* epoxy. This two-part adhesive hardens in 5-10 minutes at a normal room temperature (60°F), and thus has a slightly longer 'pot' life than some of its competitors, which can be an advantage when some 'fiddling' together of parts is necessary. After 20 minutes a bond strength of 200 lb./square inch is claimed when the temperature is increased to 75°-80°F, while a 500 lb./square inch bond is achieved in one hour. Full curing time takes 24 hours – a considerable saving over the 2-3 days normally associated with the more 'traditional' epoxies. Of course, when building a model, the joint is perfectly sound to handle after 20-30 minutes at a normal temperature, thus speeding assembly enormously – no more leaving bearer assemblies, etc., to set overnight. Price for the two part pack is 35p – and the adhesive is available from all normal Bostik stockists.

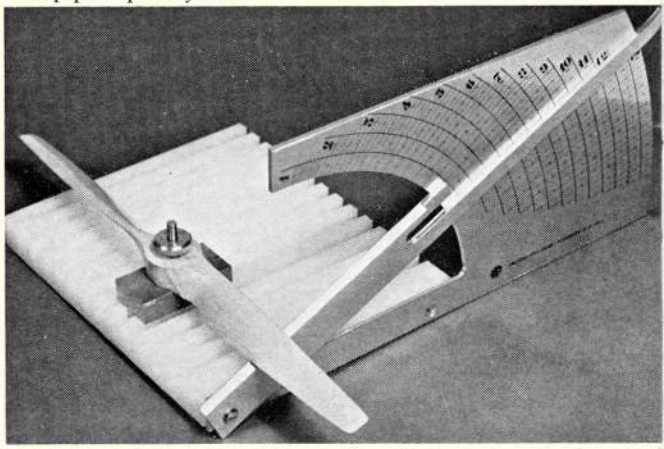
Latest 'rapid curing' epoxy resin on the market is the Bostik pack, which comes complete with plastic mixing spatula.

An accessory aimed at the performance-hungry contest enthusiast rather than the average modeller is the *Propeller Pitch Gauge* marketed in this country by **Irvine Engines** of 31 The Fairway, New Barnet, Herts. This consists of a machined nylon base plate to one edge of which is mounted a metal gauge clearly marked in various stages and pitch measurements. The instrument enables one to simply and quickly read the actual pitch of a prop throughout its blade length rather than rely on the manufacturer's nominally stated dimensions. To use this instrument one merely bolts the prop hub onto a machined metal block which slides in the grooved base plate – the various slots being for each 'stage' of the prop length. With the prop thus mounted on the block, the metal pointer is then raised so that it is parallel with the underside of the blade surface – moving the prop up or down the slot to achieve this. The pitch is then read off the scale for the appropriate station. For example, if the block is in the fifth slot from the front edge of the base plate, then the fifth station graduation on the gauge is read, and so on for the remainder of the blade length.

What help does such an instrument provide? For models where engine performance is not critical, then this information is rather superfluous – if the engine is happy with any particular propeller, then leave it as it is. However, if flying such events as power duration free flight or control line speed, then a propeller may be modified and each blade checked to see that it is *aerodynamically* balanced. Also, if you wish to washout the tips to gain higher r.p.m., then this device enables this to be done accurately, taking all the guesswork out of such modifications. It also explains why some propellers rev higher than their competitors – the actual pitch may be lower than that stated!

Silk is a covering material largely replaced by nylon or more modern mediums these days, but for certain applications it just cannot be beaten, particularly when it comes to covering compound curves. It is also very light, and as recently described by scale maestro Eric Coates, can be applied over the tissue covering on scale models to reproduce the covering material used on early aircraft. A sample of *Esaki* lightweight silk received from **Henry J. Nicholls & Son Ltd.** (308 Holloway Road, London N7) proved to be of very high quality and with none of the flaws that can occur in this material. Cost of this material is 50p per square yard.

At right, the propeller pitch gauge, as marketed by Irvine Engines, seen in operation. The pointer having been laid parallel with the underside of the blade reveals the pitch opposite station 5 on the scale, as the metal block is situated in the fifth groove. Below, the Esaki lightweight silk sold by Henry J. is really light and is available in red, yellow or white.



FREE-FLIGHT COMMENT

by John O'Donnell

Angela Jay (Miss Aeromodelling '71 – also Miss Industry '71, etc.) with J. O'D's 'Maxine 4'. Has a 3 oz. basic structure, 5.4 oz. rubber and 24 in. x 30 in. folding prop. Take your pick as to which model this specification fits – a clue is the use of Melinex reflectors on the 'body' for added visibility!

DURATION EVENTS have been stereotyped for so long that the traditional procedure for conducting contests is scarcely questioned. A number of flights is allowed, to a stipulated maximum, and any ties settled by a fly-off. Different events call for different numbers of flights, whilst some cases have a low max to suit their expected performance. Rounds are sometimes employed, mostly in connection with F.A.I. events. Really these differences are merely variations upon a theme – as the same basic ideas still apply.

From time-to-time, suggestions for rule changes are made, and even adopted. Almost invariably these alterations are concerned either with 'tightening' model specifications with the intent of reducing performance, or with increasing the number of flights and/or amending the max. The most helpful example of the first approach is, of course, the increasing of the all-up-weight for Coupe d'Hiver models from 80 to 100 grams.

The usual reasons advocated for changes are that the model's performance is too high, and that the fly-offs are too crowded or unsatisfactory. Naturally enough, Open Rubber is the category that is cited most often – although other events could well be mentioned. Few of the 'solutions' offered over the years have attracted enough interest or support to be tried out in practice. I could enumerate an assortment of past suggestions and discuss their pros and cons – but it is probably more profitable to review some recent developments.

By apparent coincidences, towards the end of the 1971 contest season there were three meetings that included at least one event held under 'experimental rules'. The ideas behind these contests varied somewhat – but all were directed towards the overcoming of some drawbacks of conventional contests.

The first of these meetings saw me involved in more ways than one. My club are convinced that the flying of free-flight contests on a knock-out basis is a scheme with much to offer. We ran such a contest once before (in March 1969) and, despite atrocious weather, were able to prove that our basic rules were fundamentally sound. A repeat edition was organised on October 17th 1971 at the N.W. Area's venue of Chetwynd near Newport, Shropshire.

The knock-out system is that competitors fly together in pairs with the winner (or both if they each max) going forward to the next round. The max can be set to suit the weather and we did not intend it should be low enough to be easy.

As the whole idea is for models to be flown against each other, it follows that they *should* be launched as nearly together as is possible. To achieve this in practice we held a draw to decide who flew against whom, and in what order. The first pair were then told *when* they must fly, with the rest following at short intervals. Rubber and power models were allowed a one-minute period in which to launch. Gliders had 20 seconds to start towing, but a further six minutes to continue. Late launches were penalised – glider the most heavily – by deducting score *before* applying the max.

To co-ordinate all the foregoing obviously demanded *real* organisation, complete with a loudspeaker to broadcast the necessary announcements, time signals, count-downs, etc. This requirement is, in fact, the real difficulty with the K.O. system, especially as the free-flight movement has become accustomed to a very casual and D.I.Y. approach to contest administration.

The contest itself was very unlucky with the weather. It was bright enough, even sunny at times, but it was so windy that few fliers would have contested an ordinary event. Like the round system, knock-outs effectively force people to decide right at the start of the contest whether they are

Margaret Kent with Roger Melville's F.A.I. Power design which has Baumann areas, Koster 'Cream' sections and fuselage construction based on a 'Night Train'. The G.15 peaks at 20,000 rpm on a 7½ x 3¾ prop.

Sue Miller of Cambridge with her O.S. 15 powered APS Climax Open model, which uses a weighted drag tab on the starboard wing à la San de Hogan for glide turn.

going to fly or not. Reasons aside it was noticeable that the percentage participation was very high from amongst those attending.

Glider naturally attracted the largest entry, and hence demanded the most flights. Consequently it was started first, in what was to prove the worst of the wind. Several people's models and/or towing techniques could not cope with the wind – and the casualty rate was high, both on and off the line. There were also thermal flights and several lost models. It took five flights to resolve the glider contest, with the final bout being between Brian Picken and Dave Barnes. Both flying their second models, Brian having towed in one model and Dave losing his *Accipiter* in a downwind wood. The result was quite decisive with Brian finding weak lift for a good three-minute odd flight whilst his *Junior* opponent caught the adjacent downdraught. The winning model had *Humplehound* flying surfaces mounted on a rather unusually shaped pod and glass-fibre rod fuselage. Originally both the pod and underfin extended until they all but met with the object of increasing the side area and hence improving visibility. As glass-fibre is more flexible than balsa, the latter tended to crack between wing and tail, and was eventually cut away to leave completely separate but underslung pod and fin.

Rubber and Power had considerably less entries than Glider, and only needed two 'rounds' (or flights) apiece. In both cases the final was a three-way affair that automatically resolved the top three places. It was at this stage that the penalty scheme of deducting score for late launches became decisive and materially affected the outcome. Russell Peers won both events through other contestants losing score by not getting away on time.

In Rubber both Russell and Pete Harris did exactly the same score of 3:32, but Pete launched three seconds after the end of the period and was relegated to second in consequence. It has become obvious that the time taken to wind a modern open model is much longer than commonly supposed, and more than one flyer simply started winding too late. Russell's model was a fairly substantial 300 sq. inch design, of admittedly modest performance but of proven reliability and good visibility. Both it and Harris's model were lost behind woods – but were found and reported by 'the public'.

Power saw Russell make a 3½ minute flight in helpful air with his usual ETA29 *Woodpecker* design. In comparison, Mike Duce found positive lift with his TD.049 ½A model, and was clocked off O.O.S. at around 3:45. His launch, however, had been delayed by engine starting troubles and he lost 40 seconds and top position in consequence. Pete Harris made up the power trio – and ended the day with two thirds and one second place.

This meeting seems to have convinced N.W. Area members that the K.O. approach is both viable *and* attractive. It also served to highlight one, but only one point, not covered adequately by our rules. With a suitable amendment now incorporated the rules would seem a convenient starting point for anyone desirous of trying out this type of contest. To cover all eventualities takes much space, so I do not propose to present (or attempt to précis) the rules in *Aero Modeller*. However, copies may be obtained by those who care to write and ask for them.

Interesting conversion of a moped into a powered glider winch, seen by Howard Boys in Czechoslovakia. 'Pilot' sits on the wooden seat above the rear wheel/winch drum controlling power via the repositioned twistgrip.

To cater for local interest the rally included conventionally run chuck glider and C/L combat events. The former provided Brian Picken with his chance to secure a double win, and he topped chuck glider with 4:46 total for his best five flights from nine launches. His models are unusual in having their fuselages cut from triangular T.E. section material. Roy Roberts and Tony Slater were second and third. Prizes for the meeting included some of Whitefields' ex-Lancs M.A.S. trophies – to be held for 12 months only, I would hasten to add!

The following Sunday, October 24th, saw the Northern Area run a rather impromptu meeting at Topcliffe. This was staged to cater for those indisposed to travel to Odiham for the Southern Gala. For once I wasn't able to attend *either* event, so will have to rely on what I have heard second-hand.

The **Topcliffe** meeting is noteworthy principally because of the rules used for the Glider and Rubber events. The former was held to Gerry Abbott's non-tactical rules. In essence the requirements are that only one competitor can fly at a time, and that both waiting and towing times are limited, launching must commence from a designated area – but the competitor can still attempt to 'pick the weather' as he is allowed the choice of when to request to fly. Allowance must be made for others who may be waiting!

Winner of this event was Bob Bailey of St. Albans – now a 'regular' with the Northern Area since his job took him up to Scotland. He managed 13½ minutes out of a possible 15 minutes. West Lancs fliers Brian Picken and Norman Duncan were second and third, followed by Arthur Wharrie – the only Northern Area member in the top seven.

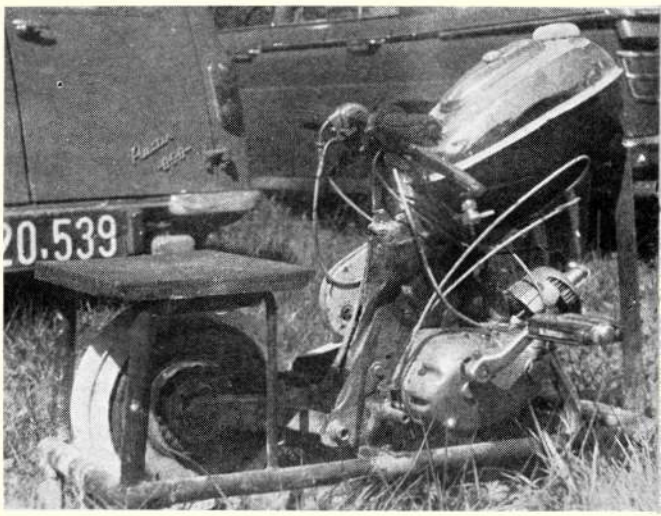
The Experimental Open Rubber contest involved the N.E. Area in both the ideas and the providing of the *Warrender Cup* for the winner. The procedure was to have three flights, flown in very short (15 minute) rounds, and with a high max decided just before *each* round. Sufficient time for retrieving, etc., was allowed between each round.

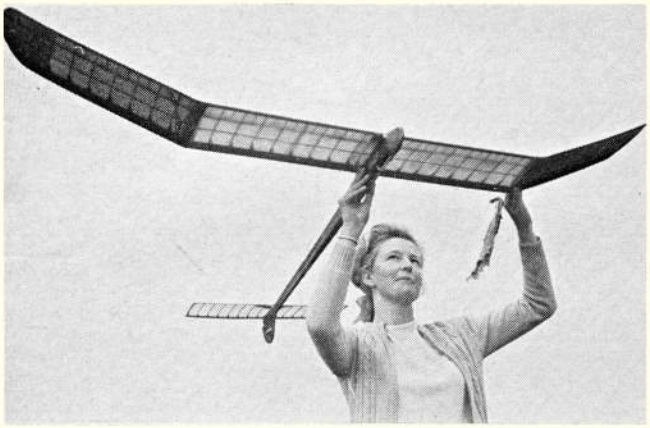
Conditions were calm but hazy at the start, but a five minute max was decided. Ron Pollard managed this by dint of flying his enormous 360 sq. inch open model, but Alan Jack went O.O.S. 10 seconds early with an ordinary size model. John Turner also managed a good flight in the 4½ minute region. The second round was a little breezier so the max was 'cut' to four minutes. This gave no bother to the top three.

With the wind decreasing the max for the third round was set back to five minutes. Nobody managed the five although both Alan Jack and John Turner approached it, and secured the top two positions. Ron Pollard found bad air and dragged to third.

Although the competition worked out well there seems to have been doubts regarding the difficulty of raising sufficient timekeepers to cope with a large entry, and apprehension about what might happen in windy weather. The short rounds with intervals is certainly considered an improvement on the 'normal' lengthy rounds that would apply to a *three* flight contest. One obvious advantage is the ability to select a much lighter max than would be the case if longer-term weather variations had to be accommodated.

The third meeting to incorporate a new idea was the gala held at **Chobham Common** on November 14th. Although only the name of the Richmond Club was associated with the advance announcements the meeting was, in fact, run in





Lyn Worthington with her husband Brian's 'Humplehound', a Mike Reeves design. Mike won both the KMAA and Northern Area F.A.I. events with his version. Several North Western Area members have used these surfaces on own-designed glass-fibre rod fuselages – with considerable success.

conjunction with the North Surrey Aeromodellers.

Innovations were restricted to the Open Rubber event. Qualifying for the fly-off at most contests means doing three three-minute maxs – and this is often regarded as a tiresome formality in *good* weather. There is certainly some measure of truth in this outlook – so for the contest in question the organisers had decided to accept the premise *and* its logical consequences. In short they decided to dispense with the contest and merely hold the fly-off. This gave a one-flight contest with no maximum. To reduce the luck element flights were to be made during a stipulated ten-minute period in late afternoon and the timekeepers were permitted to use binoculars.

There was obviously much speculation through the day as to how this rather radical concept would fare. The day was fine and bright – but with a cold, stiff breeze (that felt stronger than it really was). The announced time for flying was advanced by an hour – a move necessitated by overlooking our reversion to G.M.T. Entries came with a rush right at the deadline, as modellers decided that the weather was calm enough for them.

Several entrants had commenced winding before the starting signal, and their models were launched quite close together. Russell Peers was probably the first away with his 300 sq. inch visibility special, and found appreciably better air than those who followed immediately afterwards. Dave Hipperson was last to enter and flew towards the end of the period, and drifted appreciably slower for a 6½ minute flight and second place. A horse bit the fin off the model before someone got to it! This was a rather old 300 sq. inch model.

Winner, however, was John Blount who managed nearly a two minute lead – being seen for 8:20 and apparently nowhere near the limit of the binoculars in use. I saw neither the model nor the flight so cannot add anything further. This score contrasts strongly with the four and five minute odd flights recorded by the majority of the participants, not to mention the few that fared far worse. With all respects to those concerned it was commented that some models appeared incapable of a treble – but could still have caught lift in the single-flight comp.

Thermal assisted fly-offs seem to be anathema to many modellers. There is a commonly voiced theory that somehow or other the model's intrinsic performance should be evaluated and used as the sole criteria for contest success. Should such a situation ever come into being I am sure that entries would decline rapidly, and soon comprise only those 'experts' prepared to go to the necessary extremes. There are classes of model (indoor and some control line) where objective evaluation is possible – and serious entries are rathed limited. In outdoor free-flight events the English weather usually plays a major part, and it is only appropriate that this effect extends to the fly-off. At least it keeps up everyone's interest by giving them the chance of an occasional win.

At the meeting being reported I cannot see that the outcome was at all unfair. Blount's model made the longest flight by far – and it secured first place. Certainly the event could not have been held any later in the day. As it was some participants were still well downwind when it went pitch dark!

It would be unkind not to mention the more conventional events also held at the same meeting. There was plenty of lift and glider maxs were commonplace at first. The pace soon slackened and only three trebles were recorded. This provided the only genuine fly-off and resulted in a tie between George Walsh and Brian Chapman, both of whom recorded 2:13. This situation is not covered by the usual (S.M.A.E.) rules but was satisfactorily resolved by another fly-off. The winner was George with exactly a minute lead.

Open Power attracted much more interest than it has done of late. However, it had a rather mixed standard of flying and saw several spectacular crashes. The only treble max was achieved by Fred Chilton. Runner-up was Tony Child, whilst Russ Peers came third by but a single second's margin over John Hook flying an OS40 version of Russell's design.

Coupe d'Hiver was another thermal picking event with winner Mike Fantham only misjudging conditions on one flight out of five. His 'exhibition' model (1971 *Model Engineer* exhibit) disappeared into the blue after a claimed 15 minutes on its final flight when it failed to D/T. Dave Digby took time off from organising to take second place. Tony Grantham was third.

It might be presumptious to draw any final conclusions from the contests described. Nevertheless I am sure that the knock-out system has much to offer provided it is organised well enough – and that the other ideas covered are better than many I have heard. There is plenty of 'food for thought', and lots of alternatives to the often-heard cry of scrapping open and going all-F.A.I.

Results:

WHITEFIELD KNOCK-OUT CONTEST, Chetwynd, October 17th, 1971

Open Rubber (2 rounds – last round scores given) 1. R. Peers (Falcons) 3:32, 2. P. Harris (Evesham) 3:29, 3. J. Carter (Spitfires) 2:10. **Open Glider** (5 rounds – last round scores given) 1. B. Picken (West Lancs.) 3:21, 2. D. Barnes (Liverpool) 1:37, 3. P. Harris (Evesham) 0:00. **Open Power** (last round scores given) 1. R. Peers (Falcons) 3:19, 2. M. Duce (Liverpool) 3:05, 3. P. Harris (Evesham) 1:11. **Chuck Glider** (aggregate scores) 1. B. Picken (West Lancs.) 4:46, 2. R. Roberts (Wigan) 4:34, 3. A. Slater (Leatherhead) 4:30.

NORTHERN AREA IMPROMPTU EVENTS, Topcliffe, October 24, 1971.

Non-Tactical Glider (5 x 3 – 17 scores) 1. R. Bailey (St. Albans) 13:33, 2. B. Picken (West Lancs.) 12:18, 3. N. Duncan (West Lancs.) 11:57. **Experimental Open Rubber** (7 scores) 1. A. G. Jack (Tynemouth) 13:32, 2. J. Turner (Darlington) 13:07, 3. R. Pollard (Tynemouth) 12:02. **Mini Comp** (5 scores) 1. D. Lansberry (York) 7:51 2. J. Turner (Darlington) 6:42, 3. F. Elton (Leeds) 3:53.

CHOBHAM RALLY, November 14, 1971

Open Rubber (One Flight, 13 entries) 1. J. Blount (Croydon) 8:20; 2. D. Hipperson (Croydon) 6:30; 3. R. Peers (Falcons) 5:59. **Open Power** (19 entries) 1. F. Chilton (Crookham) 9:00; 2. A. Child (Brighton) 8:43; 3. R. Peers (Falcons) 8:37. **Open Glider** (28 entries) 1. G. Welsh (Crookham) M+2:13+2:56; 2. B. Chapman (Hayes) M+2:13+1:56; 3. P. Williams (Richmond) M+2:00; **Coupe d'Hiver** (13 entries) 1. M. Fantham (Richmond) 9:47; 2. D. Digby (North Surrey) 9:31; 3. A. Grantham (East Grinstead) 8:51.

FALCONS GALA, Chetwynd, December 5, 1971

Open Rubber (14 entries) 1. U. Wannop (C/M) M+7:17; 2. J. O'Donnell (Whitfield) M+7:02; 3. J. Carter (Spitfires) M+5:31. **Open Glider** (35 entries) 1. C. Wyatt (Ashton) 8:35; 2. P. Scrivens (Cheltenham) 8:15; 3. U. Wannop (C/M) 8:10. **Open Power** (13 entries) 1. D. Pymm M+5:07; 2. P. Perry (Birmingham) M+4:40; 3. R. Peers (Falcons) M+4:33. **Chuck Glider** (14 entries) 1. B. Kershaw (Wigan) 3:58; 2. I. Allen (Spitfires) 3:54; 3. E. Higham (Liverpool) 3:51. **Junior** (agg. all events) 1. K. Lord (Syke) 12.50; 2. C. Wyatt (Ashton) 8:08.

Croydon's Don Thompson returns from the down wind area of R.A.F. Wyton clutching both his own and Pete William's A/2s at the London Gala.

S.M.A.E. CONTEST PROGRAMME

(provisional) 1972

March 19th — **1st AREA CENTRALISED MEETING**

AREA VENUES

F.A.I. Glider	K.M.A.A. Trophy (PL) (S)
Open Power	Frog Senior
Open Rubber	(J)

March 19th — **1st CENTRALISED CONTROL LINE MEETING**

Stunt
Class B Team Race
Combat
Speed

April 1st/2nd — **CENTRALISED F.A.I. MEETING (INCLUDING TRIALS FOR EUROPEAN CHAMPIONSHIPS)**

F.A.I. Rubber	Premier Shield
F.A.I. Power	Aeromodeller Power Bowl
F.A.I. Glider	Aeromodeller A/2 Cup

April 2nd — **R/C AEROBATICS**

April 9th — **R/C PYLON RACING.** F.A.I. and Formula 1

April 23rd — **2nd AREA CENTRALISED MEETING**

F.A.I. Power	Halifax Trophy (PL) (S)
Open Rubber	Gamage Cup
Open Glider	(J)

May 27-29th — **BRITISH F/F NATIONALS & R/C THERMAL SOARING**

R.A.F. STRUBBY, LINCS.

1st Day	F.A.I. Glider	(13.00-19.45 hours)
2nd Day	F.A.I. Rubber	(09.00-19.00 hours)
	F.A.I. Power	Flyoffs 1915 hrs. onwards
3rd Day	Open Glider	Thurston Cup (S)
	Open Power	Sir John Shelley (S)
	Open Rubber	Model Aircraft Trophy (S)
	A/1 Glider	
	Coupe d'Hiver	
	½A Power	
	Tailless	Lady Shelley Cup
	Vintage	

(Flying on 29th will be from 09.00-18.00; flyoffs 18.30 onwards)
Frog Junior and Women's Cups awarded on performances in any of the events on 29th by Junior and Women members.
R/C Thermal Soaring Event to F.A.I. Rules from 13.00 27th-18.00 29th.
(Three rounds if possible. Number of entries may require line length and maximum time reduction to allow this.)

May 27-29th — **BRITISH R/C & C/L NATIONALS**

R/C Aerobatics	
R/C Scale	
R/C Pylon (F.A.I.)	
C/L Aerobatics	Gold Trophy (28th & 29th)
C/L Scale	Knokke No. 2 Trophy
Handicap Speed	Model Aircraft No. 1 Cup
½A Team Race	R.A.F.M.A.A. Trophy
B Team Race	Davies B Trophy
F.A.I. Team Race	Davies A Trophy
C/L Carrier	

June 11th — **3rd AREA CENTRALISED MEETING**

AREA VENUES

F.A.I. Rubber	Weston Cup (PL) (S)
Open Power	White Cup (J)
Open Glider	

June 11th — R/C Aerobatics

June 25th — **TEAM TRIALS FOR SCALE WORLD CHAMPIONSHIPS R/C & C/L**

July 2nd — **R/C PYLON** F.A.I. & Formula 1

July 9th — **4th AREA CENTRALISED MEETING**

AREA VENUES

Team Glider	M.E. Cup (PL) (S)
F.A.I. Power	Astral Trophy
Coupe d'Hiver	(J)

July 9th — R/C Aerobatics

July 16th — **2nd C/L CENTRALISED MEETING**

½A Team Race
F.A.I. Team Race
Goodyear Team Race
Speed

August 6th — **5th AREA CENTRALISED MEETING**

AREA VENUES

Team Power	Keil Trophy (PL) (S)
F.A.I. Rubber	Gutteridge Trophy
A/1 Glider	(J)

August 6th — **R/C PYLON** F.A.I. & Formula 1

August 20th — **R/C AEROBATICS**

August 26-27th — **1st FREE FLIGHT WORLD CHAMPIONSHIP TEAM TRIALS**

1st Day	F.A.I. Glider (10.00-18.30 hours)
2nd Day	F.A.I. Rubber (09.00-18.15 hours)
	F.A.I. Power 1 hour before lunch each day

September 10th — **6th AREA CENTRALISED MEETING**

AREA VENUES

Team Rubber	Farrow Shield (PL) (S)
F.A.I. Glider	S.M.A.E. Cup
½A Power	(J)

September 10th — **R/C PYLON** F.A.I. & Formula 1

September 17th — **R/C AEROBATICS** Middle Wallop

September 24th — **ALL SCALE MEETING**

R/C Scale	RipMax Shield
C/L Scale	
F/F Scale	Super Scale Trophy

September 24th — **C/L TEAM TRIALS FOR CRITERIUM OF EUROPE**

Stunt, F.A.I., Team Race, Speed

September 30th — **2nd FREE FLIGHT WORLD CHAMPIONSHIPS TEAM TRIALS**

October 1st

1st Day	F.A.I. Glider (10.00-18.30 hours)
2nd Day	F.A.I. Rubber (09.00-18.15 hours)
	F.A.I. Power. Flyoffs 18.30 onwards

October 8th — **R/C AEROBATICS**

No Dates Fixed — **SOUTHERN GALA**

Open Rubber	Flight Cup
Open Power	Short Cup
Open Glider	Pilcher Cup
½A Power	Quickstart Cup
Chuck Glider	
C/L Aerobatics	
F.A.I. Team Race	
Goodyear Team Race	
Combat	
R/C Event	

NORTHERN GALA

Open Glider	C.M.A. Cup
Open Power	Hamley Trophy
Open Rubber	Caton Trophy
F.A.I. Team Race	Wharfedale Trophy
B Team Race	Budapest Trophy
½A Team Race	E.T.A. Trophy
R/C Event	

Explanation (PL) Plugge Cup Events
(S) Senior Championship Events (Thurston Trophy)
(J) Junior Championship Event (Heather Cup)

(Note: Claims for Senior and Junior Championships based on specified events to be sent to Competition Secretary by October 1st with times.)

C/L Championship	Knokke No. 1 Trophy
R/C Individual Championship	Sid Allen Cup

Note: There are no team trials for R/C World Championship. Selection will be on all performances at Centralised Meetings in accordance with R/C sub-committee's memoranda.

CONTEST CALENDAR

May 7th — **STAFFORD HURRICANES SCALE R/C AIR DAY.** Class II rules, 10.30 a.m. start. Pre-entry (25p) and details from D. Martin, The Laurels, 58 Mount Road, Stone, Staffs. Venue Hixon Airfield, 4 miles E. of Stafford, on A.51.

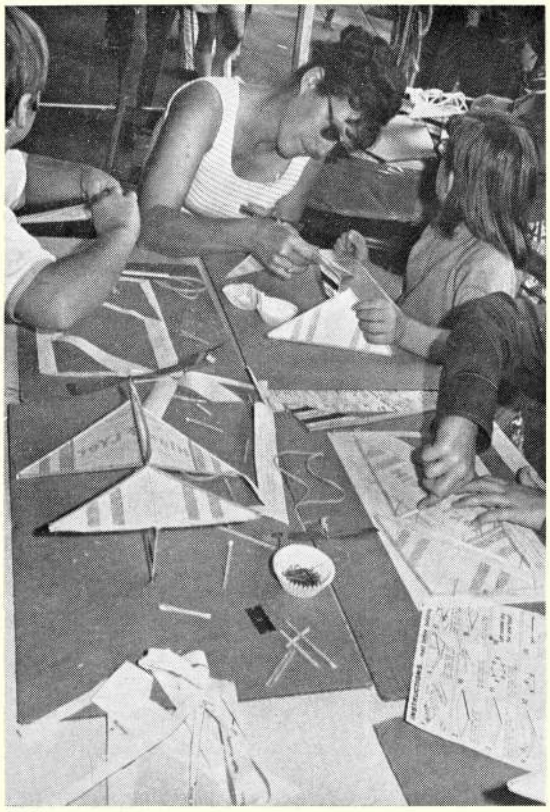
June 18th — **AEROMODELLER / SCALE MODELS / R.C.M.&E. ALL SCALE RALLY** at Old Warden, Biggleswade, Beds.

September 17th — **SOUTH MIDLAND AREA RALLY.** F/F, R/C, and C/L classes. Venue Cranfield, Bedfordshire.

CLUB SECRETARIES:

Please forward details of your forthcoming contests or rallies as soon as possible to avoid duplication of dates and/or interests in next season's Calendar. Items for insertion in the Calendar must be received at this office by the 20th of the month for publication in the next immediate issue. Details should be brief but explicit, and include exact location of venue.

CLUB NEWS



A feature of the static display during the World Radio Championships at Doylestown was the 'Instant Construction Contest' for youngsters making the AMA Cub rubber powered design from publicity packs. Parental and club leader guidance kept several building tables fully occupied for three days.

IN SPITE OF THE distressing situation in Northern Ireland, at least the aeromodellers there seem to be keeping an admirable cool. No reference to bombing and shooting in the **Belfast M.F.C.'s** *Nitro*, but a few pertinent comments by editor, Iain Whyllie, on the apparent ignorance of the model trade to the existence of the lowly free-flight modeller. He suggests that if the trade concentrated less on luxurious superfluities for the radio modeller and a bit more on the modern requirements of the free-flighter, they might have a rich market. Perhaps so, but I, timid soul, am thankful for such small mercies as rubber strip and D/T fuse, although a really cheap clockwork timer would come in useful. The newsletter recounts a harrowing story of the pursuit through the mail order jungle of just such an item. John Hamilton put up a great struggle but was beaten by a combination of sheer incompetence and cynical indifference. Question: *Where do model flyers go in the winter?* Counter question: *Where do they go in the blinkin' summer?* Recommended here that some of those who air their views at the club meetings should try airing a model for a change, even in winter. Join, for instance, the A/2 Winter League. Two rounds have been flown so far, with Iain Whyllie and Colin Doyle sharing the lead. News here of a new event, the Stuart Trophy, for Stunt flying, to be awarded on a points basis over the year.

A report from Noel Adams, P.R.O., of the **Bath M.A.C.**, tells of the Western Area Inter Club Championships, held at Merrifield last October. Members Jim Litster and Stuart Lodge won the 'A' Rat Trophy for the second year in succession. They put up a team time of 4 mins. 47 secs over 100 laps, and a final time of 9 mins. 43 secs over 200 laps. Power used was a Super Tigre 2.5 cc. Bath's other teams, Jim and Ernie Burles (Father and son) and John James/Richard Coleman. Both teams had the misfortune to crash in the second heat.

Reports at the A.G.M., of the **Nottingham M.A.C.**, made for pleasant and reassuring listening, according to a letter received from Secretary, Maurice A. Kidby. Club membership is a healthy 36, and not just a paper statistic either, for they participated in eight national events, flown in nine club contests and given five displays in the Nottingham area. In addition to these glad tidings the Treasurer hinted at a comfortable bank balance (the club's of course). New committee comprises Chairman: Mr. H. C. Hewitt, Secretary: Mr. M. A. Kidby, Treasurer: Mr. D. Orange, and P.R.O. Mr. C. W. Draper.

Undoubtedly one of the best produced 'roneo' magazines is *Free Flight News*. For the afficiendo of free-flight the plans of top contest models give an insight into the finer nuances of advanced design, although I would say that the similarity of many of the models is so marked that the vital difference must be in their handling and trimming. Even so, these outwardly simplistic models carry a wealth of technology in construction and gadgetry. Far from being overwhelmed by radio the free flight scene is as lively as it ever was, and good evidence of this was to be seen at the Southern Gala at R.A.F. Odiham last autumn. There were no less than 89 entries in Glider, 43 in Open Power and 39 in Rubber. If you are seeking a soothing change from the anxieties of radio flying why not try a free-flight model? The *Aeromodeller Plans Service* has plenty of plans to offer.

Mr. G. Sayell, Editor of the **Warwick Model Flyers** newsletter sends us a copy of the latest issue. The club, he informs us, covers the whole spectrum of model flying interests, which take expression on the two club flying grounds: R.A.F. Gaydon – available only for limited multi and control lining – and the local race course for more general flying, catsmeat permitting. The newsletter contains an off the beat article by Barry Clay on the role of radio models in industry and entertainment. Quite a workhorse the radio model has become, though it has its moments of film star glory. But whether an aspiring radio star, or just a fly-for-fun weekender, Mr. Sayell thinks the club has much to offer to the new member. Why not contact him at 15, Field Close, Warwick.

Congratulations to the **St. Albans M.A.C.**, – 25 years old this year and still going strong. News of the Silver Jubilee and the celebrations attending are given in the November issue of *The Thermal*. Going back over the years the newsletter recalls the earlier days of the club when it staged the *All Britain Rallies* at the Handley Page field at Radlett. Older flyers will remember those colourful meetings with a pang of nostalgia, although the organisation was perhaps too much for one club to sustain. Since the club went over to free flight from its tethered beginnings, it has become one of the leaders in this field with countless contest successes to its credit, and, from 1960, a club member in every World Championship. Currently the club is having trouble with its Nomansland flying ground – read all about it in the local paper – due mainly to the noise problem. Radio models, it is alleged, even fly over the local houses, and outside the restricted hours of flying. Free lancers, using the site, blithely ignore the rules to everyone's detriment. I like, however, the last word of a protester: 'We won't put up with much more of this stalling'. It is suggested in the newsletter that the Normansland furore is just a symptom of the increasing crowding in this part of the country, and with this knowledge in mind the club has been promoting that less controversial form of radio flying: Thermal Soaring. If nothing else this does give you another flying option. Only drawback with this, as with all radio comps, is that your day's flying is limited to the comp flights. Could not some more scope be allowed?

The **Maidstone M.F.C.'s** newsletter discusses how to carry on a fruitful model flying life during the dark Winter months. Personally I don't differentiate between the seasons; it is either flyable or not. Of course, you can't go evening flying in the winter, and it is here perhaps you wish you had some indoor variant to fall back on. The Maidstone solution is r.t.p. flying. The club has an electric pole and invites anyone with a multi reaction to try a cool circuit or two with a nifty scale model. These can be any commercial kit of appropriate size, and the beauty of this style of gentle flying is that your heart stays where it should be instead of in your mouth. But whether there will be indoor flying at the

hostelry where the club hopes to hold its social, is another matter, for we are told there are 11 different sorts of draught.

When it comes to dishing out the end of the season hardware, the **Leicester M.A.C.** is a one-club-model movement. No less than 13 trophies, covering most things from R/C Scale to Vintage, were distributed to deserving members. Oddly enough, the best supported club event, the Winter Building Contest, carried only a certificate. Problem with club trophies is that changing fashions and shifts of emphasis tend to leave certain trophies high and dry, as it were. A possible answer is to leave the cup allocation open rather than specific to a particular event. The Chairman's report, featured in the newsletter, gives the membership figure as varying between 75 and 95, of which 19 are juniors. Little wonder, then, that there is a good turn out at the Wymeswold flying field each weekend. And, finally, a triumph for the traditional values: the Aero part of the club title has been restored.

According to the **Flying Druids M.A.C.'s** newsletter, the Druids have not been all that Flying of late, nor Druiding in any other way, judging by the poor attendance at club meetings. It has been left to the hardy nucleus to keep the windsock flying, and the phantom members are asked to give substance to their membership status by materialising. Yet, in spite of that complaint, the turnout for the end of the season multi events carried a fair measure of enthusiasm. More than fair, in fact, which is more than can be said for the weather: members opting to fly in conditions that called for models sealed in firmly locked cars. More pleasant was the nice word of thanks from the C.O. of R.A.F. Abingdon for the display given at the Battle of Britain day. Next big event is the Military Air Trials. This is a reconstruction in model scale form of the famous 1912 Larkhill gathering of early aircraft. Two line drawings of the veterans are available, and prize money already amounts to around £50.

'If you can't beat 'em join 'em', seems to be the motto of Mrs. Godden of the **Morley & District M.A.C.** Mr. Bob Ashby, the Hon. Sec., writes to tell us that the good lady doesn't allow the model game to push her into the background; she competes with husband and son both on the building board and flying field, and can tow a nifty line, apart from the washing one. Mr. Godden, incidentally, leads the senior contest section, whilst his son, A. Godden, does likewise in the junior department. And with only one comp to go in the 1971 season it looks very much like a family victory. Championship trophies for both sections have been donated by the Chairman, Mr B. Judge, and the recipients will receive, in addition, a year's free membership. Mr. Ashby goes on to say that the club has plenty of variety to offer the new member in a friendly, co-operative atmosphere of shared interests, be they Free Flight, Radio or Control Line. You can contact him at 99, Dark Lane, Batley, Yorks.

Frank A. Smart writes to say that many people look at his club's models and ask, 'Where is Glevum?' It is then explained that Glevum is the Roman name for Gloucester, a city which, at the moment is being redeveloped (ugly thought). Many interesting things are being dug up, but nothing of specific value to the **Glevum M.A.C.**, such as Copeman Olivers. You still have to dig into the pocket for those. Generally, redevelopment is not something that favours model flying, and the club is learning this the hard way in the loss of flying amenities to the insatiable demands of the infernal combustion engine. Already a motorway has been pushed right through the centre of Moreton Valence, to render it non-operational, and access to the Sunday morning Rugby field site has been made difficult by works on a new bridge over the Severn. But, undismayed, the committee has foraged around for alternatives, and with the sports ground at Dowty, facilities are now available for most branches of the hobby, except those which demand a spot of tarmac. A sad farewell to Allan Chatfield, the club Chairman, who is moving to Woking, where it is felt he will be a great asset to the local club. Just now the club is blowing its trumpet rather lustily for its highly successful Combat team. Composed of five regular fliers it has achieved a formidable list of placings in its tour of the major rally spots: 4 firsts, 2 seconds and 3 thirds. But look out 1972, for the club has an aggressive line up of 16 Copeman Olivers waiting to scramble.

Preoccupation with the full-size stuff does not bring people to disdain the humble model; rather does it stimulate interest in the miniature arts. Thus we receive from Mr. John Hanlan a letter informing us of the existence of the **British Aircraft Corporation Model Aircraft Club.** Total membership is 65, but interest is only really strong in the ten man committee. In order to raise the general level of enthusiasm a club magazine has been produced which is in addition to the monthly bulletin sheet. Called the *Airlog* the magazine has a well-balanced content with a good leavening of technical stuff as befits a journal with such a background. The drawings are particularly well produced, covering radio, Wakefield, chuck glider and electric r.t.p. A very useful article on the latter included, giving advice on the suitable kinds of kit and where and how to obtain the electric motors. We look forward to hearing more of this club in the future.

Stacks of contest news in the latest **Three Kings Aeromodellers' news sheets.** The Carrier Event is but one of a number of well-documented events which is covered. Weather was kindly, and the line up of a dozen carrier models on the deck was the most impressive yet seen. Seems it takes a slow flying model and much finesse to achieve a hook up. And it's tricky to the point of impossibility when it's blowing. Wal Cordwell, therefore, was perhaps lucky to get his winning Corsair flight in before the wind got up. A Stunt event, run at the same time, was won by S. Blake, currently the top Stunt man around. Later came the Three Kings Goodyear team race at Croydon. Three team heats and a 160 lap final. Won by K. Gardner/D. Bird in a time of 16 mins. 23 secs. Prize was the Dave Woods Trophy. A raffle for a set of Man in Flight coins failed to produce a winner. Possibly a case of a man in flight. Model of the month: Mick Harvery's purple *Ares* Stunter. Polyurethene finish, with wheel spats on a torsion bar undercart. In the running, Wal Cordwell's *Falks Rivets*, finished in red, yellow and silver.

Pete Smoothy is a name that crops up repeatedly in the **Buckaneers Model Club's** *Scimitar*. An ex-control liner, who once gave up modelling for girl friends, he is now one of the leading radio lights, winning the club multi event run on 31st October. He has a few things to say of spectator appeal – not the dolly birds looking on, but the sort of model performance to which the public responds. He thinks, and rightly so, that people are no longer excited by hairy models doing the same old schedule, but demand something more spectacular on the lines of limbo and baloon bursting. All very well, but it does put a strain on the model flyer who becomes as good as his inventiveness.

Looking through *Flight Lines*, the club magazine – and a very good one – of the **Hamilton M.A.C.**, of New Zealand, I noticed a reference to a P.A.A. Load contest. These events, designed to restrain Power Duration from its rocket-like inclinations and to encourage a semi scale realism in the models, went out of vogue in Europe quite some time ago, and it's curious to see them perpetuated in other parts of the world. Also a reference here to *Peanut Scale* – these are small scale indoor models of about 12 in. span. A number of suitable kits are obtainable, but the art of high flight times lies in locating a machine, or rather scale drawings of same, that has a nice breadth of wing area and not too much lumpy detail.

Still from the land of the model mags and kiwis comes the *South Island News*. Question here discussed is the hoary old 'builder of the model' rule. This is a bone of contention with radio flyers who are very much the products of our highly processed civilisation. It does seem rather contradictory to expect the model to be hand built when the engine, radio gear and other furbishings are of necessity shop bought. It is a sign of the times that the B.O.M. rule may have to be scrapped – and a very regrettable one. On the other hand a lot of fine workmanship is going into model craft still. Witness a Swedish Wakefield plan in the magazine. Such a model calls for highly specialised work with a minimum of commercial aid.

Also good coverage of the scene down under in Ron Magill's **New Zealand Newsletter.** Mr. Magill has taken delivery of some new printing equipment, resulting in a more clearly printed mag. Comment upon the New Zealand effort in the last World F/F Champs cast some doubt upon the value of proxy flying. Fine trim adjustments on full power can be pretty dicey, but must be undertaken in order to get top performance, and it is too much to ask of the proxy flyer that he puts the model at risk in this way.

Finally, from New Zealand comes the **Christchurch M.A.C's** *Torque*. A contributor has observed that free flighters smoke rather more than their Radio brethren. Is this true, or has he been confused by all that burning D/T wick? If true, does it apply here? There is the point, of course, that the free-flighter can still afford to.

Your reports and newsheets always welcome.

Clubman.

THE MIDLANDS LEADING MODEL SHOP – WORLD-WIDE MAIL ORDER SERVICE

S. H. GRAINGER & CO. CALDMORE MODELS

108 CALDMORE ROAD, WALSALL WS1 3RB, STAFFS.
(1 MILE FROM M6 MOTORWAY JUNCTION 9) TEL. WALSALL 23382

RADIO CONTROL

Simprop Propo	from	£82.00
Gem Propo	from	£34.00
Skyleader Propo	from	£75.00
Sprengbrook Propo	from	£75.00
Futaba Propo	from	£109.00
Remcon Kit Propo	from	£98.00
MacGregor S/Channel	from	£11.95
MacGregor Proportional	from	£36.00

All types servos, actuators, deacs, etc.

ENGINES
Merco
Super Tigre
O.S. P.A.W.
Enya
K&B E.D.
Rossi OPS
H.P. Veco
Davis Charlton
Webra

KITS
KeilKraft
Graupner
Topflite
Sterling
M.F.A.
Goldberg
Aviette
RipMax
Helgi

BOAT KITS
Aerokits
Billings
Veron
Monday
Graupner
E.D.
Norstar
Mainstream
Simplas

ACCESSORIES
Micro Mold
X-Acto
M.F.A.
DEACS
Electric Motors
Chargers
Boat Fittings
Tanks
Wheels

MATERIALS
Solder
Balsa
Humbrol
Fibreglass
Solarfilm
Nylon
Fuel
Paints
Buoyancy Foam

Fibre-glass Marine Models including the popular 1/12th scale Surfury and Cigarette Mail Order catalogue 10p. Discount deals from £25. Paybonds accepted. Part exchanges.

EVERYTHING FOR THE AEROMODELLER

MACGREGOR RADIO CONTROL

Single Channel Handbook 8p post paid
Digital Handbook 13p post paid

NEW 1971 KEILKRAFT HANDBOOK 23p post paid

K.K. Gyron R/C	£5.95	K.K. Conquest Glider	85p
K.K. Mini Super R/C	£8.95	K.K. Competitor Rubber	99p
K.K. Radian C/L	£1.90	K.K. Talon C/L	£2.75

Mercury GNOME Glider 85p Mercury SWAN Glider £1.25
Mercury TIGER MOTH F/F Kit £3.50

Send for our new ENGINE LIST. S.A.E. please.
Please add postage for prompt return of goods

JONES BROS. OF CHISWICK

56-62 TURNHAM GREEN TERRACE, CHISWICK, W4 2QZ
(Phone 01-994 0858)

(1 min. from Turnham Green Station) Established 1911
Hours: Mon., Tues., Wed. and Sat., 9 a.m.-6 p.m.
Fri. 9 a.m.-7 p.m. Closed all day Thursday

ENGINES		ENGINES	
O.S. 60F R/C	£25.29	D.C. SABRE	£5.06
H.P. 61 R/C	£21.95	SPITFIRE	£4.77
ENYA 35 R/C	£11.90	MERLIN	£4.02
15 R/C	£7.62½	DART	£5.06
09 R/C	£5.45	WASP	£2.91
Cox Pee Wee R/C	£5.70	FROG 150	£4.75
Babe Bee	£3.60	100	£4.15
Medallion 049	£6.25	VENOM	£3.85

Plus full range of Kits, Balsa, Fuel and accessories.
WORLDWIDE 'BY RETURN' MAIL ORDER
Post & Packing extra up to £5. Over £5 free (UK only).

JOHN W. BAGNALL LTD.,

18 SALTER STREET,
STAFFORD.
Est. 1936 Tel: 3420

MICHAEL'S MODELS OF FINCHLEY

RADIO

MacGREGOR DIGIMAC RADIO. THREE-CHANNEL PROPO. MR 800 TX AND MR 80 RX. AP04 RECHARGEABLE POWER PACK, SWITCH, HARNESS AND CHARGER. £37.50

SINGLE-CHANNEL PROPO. MR 900 TX AND MR 90 RX. CRYSTALS AND DRY CELL BATTERY PACK WITH SWITCH AND HARNESS. £19.75

MR 10 Digimac Propo Servo. £10.50

SKYLEADER CLUBMAN

3 Tx and Rx	£48.65
4 Tx and Rx	£59.20
6 Tx and Rx	£71.70
FB3 Servo	£11.95

NEW ITEMS!

Kavan Silencer	£3.50
Adaptor plate, fits most engines from .35s upwards	70p
Badger Air Brush complete with adaptor	£4.40

Special 'soft surface' building boards:
16" x 36" 60p
24" x 48" £1.20
Callers only, please

CHEMICALS to callers only

Methanol	60p per gal.
Nitromethane	£1.35 500 ml.
Amyl Nitrate	61p 100 ml.
Isopropyl nitrate	43p 500 ml.
Castrol M	60p quart
Castrol M	£2.10 per gal.
Ucon LB 625	80p 500 ml.
Glow Super 20-80	£1.00 per gal.
Nitronol 10% Nitro	£2.16 per gal.

ACCESSORIES

Micro Mold, Solarfilm, Devcon, P.B. R/C Racing Car Kits, Stabilit Kavan P.B. Low Bounce Wheels, Veco, MK. Exacto, Solarbo Block, Sheet, Strip, Ply, Tissue, Silk, Nylon, Paints, etc.

NEW!

Veron Fournier powered R/C glider £11.75

Jolly Roger (Super) £13.22

Micro D.B. Barnstormer 72. A really superb kit £16.87

A complete range of Keil and Mercury Kits always in stock.

Also available: Flight Link, Futaba K & B, Veco, Fox, Cox, Merco, PAW, O.S. Enya, Mercury, Contest Kits, Ripmax, Performance Kits, Graupner, Top Flite, etc.

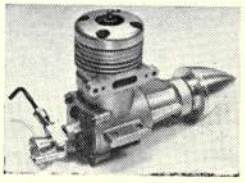
Send S.A.E. for our list. Barclaycard and Paybonds most welcome. P&P 5p per £1, over £5 free except overseas.

646-648 High Road, N. Finchley, London N12 0NL
Tel: 01-445 6531

CLOSED ALL DAY MONDAY EASY PARKING

SUPER Tigre

THE NAME THAT STANDS FOR SPEED & POWER



G15 RV Glow £15.40

SUPER TIGRE ENGINE

Description	Retail
G.20/15 Diesel	£9.35
G.20/15 Diesel R/C	£11.50
G.20/15 Glow	£9.35
G.20/15 Glow R/C	£11.50
G.15 W/Spinner	£11.90
G.15 RV Diesel	£14.76
G.15 RV Glow	£14.76
G.20/23 G	£9.35
G.20/23 R/C	£12.37
G.21/29 Lapped R/C	£14.39
G.21/29 RV ABC	£18.91
ST 35 Stunt (PB)	£9.97
ST 35 S R/C	£12.94
ST 35 Combat	£9.97
G.21/35 BB	£11.79
G.21/35 Lapped R/C	£14.58
G.21/40 Std.	£12.47
G.21/40 R/C	£15.29
G.21/46 R/C	£16.07
ST 51 BB R/C	£16.11
ST 56 BB R/C	£17.26
ST 60 BB R/C	£18.22
G.60 Racing RV ABC	£28.78
G.60 FI R/C	£23.02
G.71 FI R/C	£23.50

SUPER TIGRE ACCESSORIES

Silencers	
S15 fits G.20, 15, 19, 23	£2.70
S29 fits G.21.35, 40, 46	£3.30
S35 fits ST35S, ST35C, ST35 R/C	£3.30
S40 fits G.40	£3.30
S56 fits ST51, 56, 60	£3.30
S71 fits G.60 FI & RV & G.71	£3.75
Glow Plug Standard	36p
Glow Plug R/C	68p
Spinners G.15, G.29, G.60	£1.25
Screw on 2¼" dia.	£1.75
Tank Mount fits ST51, 56, 60	£2.40
Radial Mount	
For G.20/15 & 23 G.15	£1.87
G.20/29,35, 40 & 46	£1.87
ST51, 56 & 60	£1.87
Needle Valve fits all sizes	15p
Needle Valve & Spray Bar	50p

To Commonwealth Dealers, Importers and Wholesalers – We are the agreed suppliers for Super Tigre engines and parts. Just drop us a line for copies of our latest price schedules. We give the fastest possible delivery.

STOP PRESS

G.40 R/V R/C A.B.C. wins F.A.I. Pylon Event 1971 Nationals.

WORLD ENGINES LIMITED

97 TUDOR AVENUE, WATFORD, HERTS
PHONE WATFORD 42859

VISITORS BY APPOINTMENT ONLY, PLEASE
TRADE ENQUIRIES INVITED S.A.E. WITH ENQUIRIES, PLEASE

CLASSIFIED ADVERTISEMENTS

PRESS DATE for March issue, 1972, 24th January, 1972.
Private rate 2p per word (minimum 40p).
Trade rate 3p per word (minimum 60p). Display box rate £2.50 per single column inch.
Box Numbers 15p extra.
Box replies to be sent care of Advertising Department, 13-35 Bridge Street, Hemel Hempstead, Herts., England. Copy received after first post on 24th January will be held over until the next issue, unless cancelled in writing before 15th of the following month. There are no reimbursements for cancellations.

The Advertisement Manager reserves the right to refuse or suspend advertisements without giving any reason. Every care is taken to avoid mistakes, but the publishers cannot be held liable in any way for clerical and printing errors or omissions. Receipt of 'copy' for publication implies acceptance of these conditions by the advertiser. Whilst every care is taken to exclude advertisements from doubtful sources, no responsibility can be accepted by the publishers for the bona fides of advertisers.

R, S & V ENGINES

We will buy all types of engines for cash. Send us your used or unwanted engine for best quotation by return. Spark ignition and all early British engines urgently required. Send S.A.E. for our list.

Racing, Sport & Vintage Engines

646-648 High Road, N. Finchley, London N 12

Tel: 01-445 6531
PAYBONDS ACCEPTED
BARCLAYCARD WELCOME
Closed all day Monday · Easy Parking

FOR SALE

165 Aeromodellers 1952-72; 78 Model Aircraft 1949-65; 1970 editions 'Engineering'. All 5p-8p each; P.A.W. 2.5 c.c., v.g.c., £4; D.C. Merlin, £1.50; A.P.S. 'Skiffler' plus Merco 35, £6. All plus p.&p. Many plans. Send s.a.e. to Bond, 27 St. Peters Crescent, Stanley, Wakefield, Yorks. N.

Oliver Tiger Mk. 4, £8. Enya 09 Mk. 3, £4, accumulator and extras. Both in excellent condition. West, 29 Forton Avenue, Bolton, Lancs. N.

O.S. 15 R/C and Enya 15 R/C, almost new, £5 each. Frog 100 Mk. I, very good condition, no spraybar, £4. U-Reely handle 100 ft. Laystrates, £3. K.K. 4 in airwheels, £1. Unused Lindsey tuned pipe, suit 2⅘, £1.50. 6v. fuel pump, £1. Little used 6v. accumulator, £1.50. Polaroid Swinger II camera, £3. Miller, Redcot, New Street, Glemsford, Sudbury, Suffolk CO10 7PY. N.

MICRO-X Indoor Supplies

Amazing quality Balsa (from .008") – Pirelli, wire, bearings, Microfilm, starter kits, etc. All you need including expert advice if required. Send 3p stamp for new price list and save cost and time by ordering direct from

Laurie Barr
4 HASTINGS CLOSE, BRAY, Berkshire

Free-Flight Enthusiasts. Two G.15 Tigres c/w E.D. pipes – Super Tigre Pipe, two Tatone timers, A.M.15 Dixielander plans, parts – modeller's stock for disposal. Tel. Peterborough 240170 – D. J. Oldham. N.

Orbit 10-reed Tx & Rx, £20. Merco-powered flying model complete rudder, elevator, aileron, engine, M.K. Servos, DEAC, £15. Graupner Foka sailplane complete rudder, elevator, elevator trim servos, DEAC, £10. Five extra servos, £2 each. Collier, 40 Myrtle Avenue, Ruislip, Middlesex. Tel. 01-868 7826. N.

BALSAWOOD

Selected top quality balsa soft/medium/hard. All sizes strip and sheet at reduced prices plus special offer packs. S.A.E. for detailed price list:

DIRECT MODEL SUPPLY COMPANY
67 High Street, Battle, Sussex

NOW YOU'VE BUILT A MODEL

Why not build a full size aeroplane ?

Join the British Amateur Aircraft Industry: **THE POPULAR FLYING ASSOCIATION** and learn how to build your own flying machine
Read **POPULAR FLYING**, bi-monthly, specimen copy 20p

POPULAR FLYING ASSOCIATION,
2 Waldens Park Road,
Horsell, Woking, Surrey, England
Woking 62621

Nordec .60 Glow, flywheel, £11.50. 10 c.c. engines required, also early British diesels and petrols. Details and price required to Box No. 897, Aeromodeller Office, 13/35 Bridge Street, Hemel Hempstead, Herts. N.

New unflown K.K. Spectre with flaps and brand new O.S. 19, £11 o.n.o. Leedham, Broomfields, Netherseal, Burton-on-Trent. Tel. Overseal 256. N.

1940 Vintage flying scale models by Aer-o-Kits (Sheffield). Plan, printed wood and new instruction sheet 15p each model. p.&p. 5p up to 3 models. Set of 8 in 2 original boxes, £1.25 post paid U.K. U.S. $5.00 shipped airmail. Master, Vildebeest, Moth Minor, Fury, GA Cygnet, Harvard, Battle, Wellesley. Materials to complete can be found in your scrapbox. They're fun, they fly. Reproductions of 1935 vintage Megows plans 10p each post paid. Douglas Obs., Curtiss Falcon, Vought Corsair, Fairchild 45, Fokker Triplane, BA Eagle, Polish Fighter, Waco Cabin, Tipsy, Messerschmitt M29. U.S. $1.50 for 5, $3.00 for 10 shipped Airmail. Other vintage items. S.A.E. list (free with orders). Tissiman, 8 Greystones Grange Crescent, Sheffield S11 7JL. N.

Staveley Tonelock Tx & Rx with Elmic compact and switch harness, £22. Free with above, 'Half Tone' plane powered by Cox Babe Bee. Tel. STD 0789 3335. N.

T/R. F.A.I. and ¾A. Alloy Crutches incorporating upper nose cowl. **55p** as cast, **80p** polished, **95p** polished and tapped (for most popular engines). Please state engine in all orders.

Whorton,
148 Lazy Hill Road,
Aldridge, Nr. Walsall, Staffs.

Something to sell ? . . .

Then try a classified advertisement

GIG

EIFFLAENDER REBORING SERVICE
CHESTER ROAD, MACCLESFIELD
FOR IMMEDIATE P.A.W. SERVICE
ALL SPARES ALWAYS AVAILABLE
REBORES: £1.40 including post.
C.O.D. (Pay Postman) 70p extra (U.K. only)
*** Service on other makes is discontinued ***
*** Enquiries, spares list, stamped SAE please ***

A Gliding Holiday in Historic Northumbria

The Northumbria Gliding Club Ltd., offers weekly gliding courses for beginners or experts throughout the 1972 season.
Brochures available from Course Secretary, **D. A. Wilson, Aken House, 6 Kepwell Bank, Prudhoe, Northumberland**

TRADE

Historex catalogue listing all the kits in this fabulous range of Napoleonic 54 mm. figures, together with details of pyrogravure and Funken books, etc., for 40p inc. postage from Historex Agents, 3 Castle Street, Dover. (Trade Enquiries invited.) N-O.

Control Line Plans, Cavalier, attractive stunt biplane, flies the contest schedule plus, 36 in. span for .35 engines. Plans, 60p. Sperry Messenger, easy to build scale biplane for 1-1.5 c.c. engines, 20 in. span, plans, 45p. Prices include postage. More plans coming soon. Dominic Plans, Redcot, New Street, Glemsford, Sudbury, Suffolk CO10 7PY. N.

Fibre Glass Tubes: a) usual A/2, 42 in. long, £1.20 each plus 40p p.&p. up to 6. b) new A/1, 42 in. long, £1.20 each plus 40p p.&p. up to 6. c) pygnet, 48 in. long, £1.50 each plus 55p p.&p. up to 4. d) chuck glider, 20 in. long, 30p each plus 12½p p.&p. up to 12. e) new chuck glider, 27 in. long, 40p each plus 25p p.&p. up to 6. f) new large open glider/slope soaring tubes can be supplied upon demand, e.g. 6 ft. long, 1 in. dia. tapering to ½ in. dia. at £2.25 each plus postage, but other sizes available. Enquiries welcome for any tubes, and advice given with pleasure. Contact – Ronytube, 23 Ivy Road, Newcastle Upon Tyne NE6 4PU or tel. 0632 623735. N.

Advertising pencils. Superb Ball Pens, Combs, Brushes, etc. Raise funds quickly, easily. Details: Northern Novelties, Bradford 2. G-S.

Top prices paid for good condition vintage engines. Must be before 1950. Wolverhampton Models & Hobbies, 3 Bell Street, Manders Centre, Wolverhampton. T/C.

BOOKS

Free-Flight News – a subscription for 1972 cost £1.50; also available is J. Malkin's Airfoil Section Book, 75p. 11 Parkside Road, Sunningdale, Berks. N.

American Magazines by annual subscription. 'Flying Models', £4.30, 'Model Airplane News', £2.90, 'American Modeller', £4.00. Send stamp for complete list. Willen (Dept. 1), 61a Broadway, London E15 4BQ. T/C.

Aeromodeller back issue mart, vast stocks of back issues held in stock. Beaumont, 11 Bath Street, London, E.C.1. H.ALT/TC.

HOLIDAYS

Harry Stillings Model Flying Holidays in Devon. 4, 5 and 6 berth caravans with all amenities. Write for details. S.A.E. appreciated. Harry Stillings, 17 Regents Park, Exeter, Devon. MNO.

Gliding holidays at Cambridge for beginners and others. Training in best aircraft by qualified instructors. Details: Course Secretary, 54 Brampton Road, Cambridge CB1 3HL. N.

WANTED

Wanted. Man to represent Fox Motors in England on a part-time basis. Should be sales and promotion oriented. Must have experience in all phases of modelling with emphasis on Radio Control. No money required. Send enquiries to: Duke Fox, Fox Manufacturing Co., 5305 Towson Avenue, Fort Smith, Arkansas 72901, U.S.A. N.

GLIDING HOLIDAY

Six nights in a village inn with five days of glorious gliding over the beautiful Cotswolds. Ridge, Wave and Thermal, all for your delight. Professional instructors. Winch or Aerotow.

Write to **Course Secretary, Department C, Bristol & Gloucestershire Gliding Club, Nympsfield, Stonehouse, Glos.**

Model Shop Directory

ALDERSHOT
Tel: 26825

CONCORDE MODELS
134 VICTORIA ROAD

R/C Models – All Accessories – Mainstream and Merco Area Agents

AMERSHAM
Tel: 4030

R. E. HADDOCK
(R.E.H. Photography)
61 SYCAMORE ROAD, AMERSHAM, BUCKS.

R/C equipment, aircraft and boat kits and all modelling accessories.
Cameras taken in part exchange.

AUSTRALIA
Tel: 637424

RIVERSIDE HOBBY CENTRE
3 PRINCE WALK, MELBOURNE 3000

Radio Control Equipment Kits, Engines, Accessories, M.A.P. Plans, Books.
FAST MAIL ORDER SERVICE

AUSTRALIA

SEMAPHORE HOBBY CENTRE
12 HART STREET, SEMAPHORE SOUTH, S.A. 5019
M.A.P. Plans, Books, Kits, Engines, Accessories, etc.
Radio Control Equipment
Free Price Lists

AYLESBURY
Tel: 85752

TAYLOR
& McKENNA
46 FRIARS SQUARE

BARKINGSIDE
Tel: 01-500 2007

PAGE'S OF BARKINGSIDE LTD.
M.E.T.A.
19 BROADWAY MARKET, BARKINGSIDE ILFORD, ESSEX
Why go to town?
We can supply all your needs at Ilford's largest Model Shop

BARNSLEY
Tel: 6222

DON VALLEY SPORTS
28 DONCASTER ROAD, BARNSLEY
Model Aircraft, Boats, Cars, Railways
All makes of Engines
R/C Equipment
Postal Service

BATH
Tel: 60444

CYRIL HOWE'S
CHEAP STREET, BATH, SOMERSET
The Model Shop of the West for all your modelling requirements. Aircraft, boats, engines, radio control. Expert advice available
M.A.P.

BIRMINGHAM
Tel: B'ham Highbury 3237

KINGS HEATH MODELS
5 YORK ROAD
KINGS HEATH, BIRMINGHAM 14
KeilKraft, Veron, Airfix, Monogram, Frogflite, Cox, Aurora, Diesel and Glow engine, Accessories, etc. Also Boats, Railways, Slot Racing cars, etc.

BIRMINGHAM
Tel: 021-772 4917

BOB'S MODELS
520-522 COVENTRY ROAD
SMALL HEATH, BIRMINGHAM 10
MODEL CENTRE OF THE MIDLANDS
RADIO CONTROL SPECIALISTS
Friendly help and Advice backed by over 20 years' experience

BIRMINGHAM
Tel: 021-554 8760

ARTHUR PENN'S MODEL SHOP
18 COLLEGE ROAD, HANDSWORTH, BIRMINGHAM 20
KeilKraft, Veron, Ripmax, Aircraft and Boat Kits, Engines and R/C outfits, Balsa wood, etc.

BIRMINGHAM
Tel: EAST 0872

POWELL'S MODEL CENTRE
769 ALUM ROCK ROAD, WARD END
BIRMINGHAM 8

Personal attention of G. & F. Powell

BIRMINGHAM
Tel: 021-373 5945

TOYLAND
DAVIS & DAVIS
332 MARSH LANE, ERDINGTON
BIRMINGHAM 23
We stock everything a modeller needs to build and fly a Radio Control Aeroplane, and advice

BIRMINGHAM
Tel: 021-458 4239

TURNERS MODELDROME
NEWSAGENTS
24 TEVIOT GROVE, KINGS NORTON

Radio Control equipment, KeilKraft, Veron, Airfix, Frog, Ripmax, Engines, etc.

BRADFORD
Tel: 26186

MODELDROME
182 MANNINGHAM LANE
BRADFORD 8

Radio Control Equipment, Aircraft and Boat Kits and all Modelling Accessories
Mail Order by return

BRIGHTON
Tel: Brighton 418225

HARRY BROOKS
15A VICTORIA ROAD
PORTSLADE, SUSSEX

The best stocked model shop in the South – You want it, we have it

BRISTOL
Tel: 47505

MODEL HIGHWAYS
85 GLOUCESTER ROAD, BRISTOL 7

Keil, Veron, Topflite
Fuel by the gal. Balsa, etc.
CLOSED WEDNESDAY

BURTON-ON-TRENT
Tel: 0283 64240

J. & N. MODELS
22 DERBY STREET, BURTON-ON-TRENT
Largest model stockist within 25 miles. Kits and Accessories for Aircraft, Boats and Railways. R/C equipment. Books, Plastic Kits.
Easy parking – Paybonds Agents.

CAMBERLEY

MODEL WORLD (CAMBERLEY) LTD.
Mike Young & Nev Coombs, proprietors
75 HIGH STREET, CAMBERLEY, SURREY
Comprehensive stock of Kits, Engines, Radio Control Equipment, Spares, etc.

CARDIFF
Tel: 29065

BUD MORGAN
The Model Aircraft Specialist
For KeilKraft, Mercury, Veron, Ripmax, Simprop R/C and Mainstream products.
PAYBONDS ACCEPTED
S.A.E. stamped please for assorted lists
22 & 22A CASTLE ARCADE, CARDIFF CF1 2BW

CHICHESTER
Tel: 83592

PLANET MODELS AND HANDICRAFTS
108 THE HORNET, CHICHESTER, SUSSEX
Aircraft and Boat Kits. All Accessories, Balsa Wood, Engines, Fuels, Finishes, etc. Model Railways & Racing Cars.
Personal Service Mail Orders

COLCHESTER
Tel: 45984

SATURN MODELS
(Cliff Goater & Pete Giles, Prop.)
20 SHORT WYRE STREET, COLCHESTER, ESSEX.
ANGLIA'S NEW MODEL SHOP.
SPECIALISTS IN RADIO CONTROL FOR AIRCRAFT AND BOATS.
PROMPT MAIL ORDER SERVICE

DERBY
Tel: ODE 2 62771

SUPER MODELS
3 CHAPEL SIDE, SPONDON, DERBY
(7 mins. off M1. Exit 25)
The leading shop for ready-built Airframes. Quality R/C gear. Delta Skyleader. Main Service Agents for Skyleader in Midlands and North.
Fantastic selection of Solarbo Balsa Wood 2", 3", 4" & 6" wide 4' & 3' long

DEVON
Tel: 2685

THE MODEL SHOP

56 FORE STREET
BRIXHAM

We think we are
THE BEST IN THE WEST

DONCASTER
Tel: 62524

B. CUTTRISS & SONS

MODELS AND HANDICRAFTS
40 DUKE STREET

Call and see our Shop

DUDLEY
Tel: 57045

ACE MODELS

20 FOUNTAIN ARCADE, DUDLEY

For KeilKraft, Veron, Mercury, Revell, Riko, Frog, etc.
CLOSED WEDNESDAY

ENFIELD
Tel: 01-804 1804

JENNINGS STORES LTD.

244 HERTFORD ROAD
ENFIELD, MIDDLESEX

THE No. 1 MODEL SHOP

FAREHAM
Tel: 4136

G. M. H. BUNCE & CO. LTD.

206 WEST STREET, FAREHAM

Aircraft, boats, engines, radio control Engineers/woodworkers tools and machinery

FARNWORTH
Tel: Farnworth 74688

JOYCRAFT

29 HALL LANE, MOSES GATE
FARNWORTH, BOLTON

The shop for all your modelling needs. Balsa Wood specialists, materials, engines, aircraft and boat kits, R/C equipment. S.A.E. for reply. Postal service. We are here to serve 'YOU'.

GLASGOW
041-632 8326

RIDDELL BROS.

61 MOUNT ANNAN DRIVE
(Facing Mount Florida School)
GLASGOW, S.4

VERON KEIL BILLINGS AIRFIX
Accessories, Balsa, etc.

HARLOW
Tel: 20213

At last, a specialist modelling shop at

ROD'S CYCLES & TOYS

109 THE STOW, HARLOW, ESSEX

KeilKraft, Ripmax, Solarbo Balsa, Engines, Fuel, Solarfilm, Billings Boats, Airfix, Tamiya, Pyro, Aurora, etc.
Early closing Wed. Open Sun. morning

HAVERFORDWEST
Tel: 3175

MODELCRAFT

15 CARTLETT, HAVERFORDWEST
PEMBS.

At last a specialist model shop in West Wales. All popular makes always in stock. Mail Order? Certainly. S.A.E. for lists please. R/C accessories, Aircraft and Boat Kits, etc.

HEMEL HEMPSTEAD
Tel: 0442 58963

HEMEL MODEL CENTRE

61 WATERHOUSE STREET

Specialists in Radio Control. We supply equipment by most leading manufacturers, including Staveley, Flight Link, Simprop, Futaba, etc.

PART EXCHANGES WELCOMED
MAIL ORDER A SPECIALITY
EARLY CLOSING WEDNESDAY

HEMEL HEMPSTEAD
Tel: 53691

TAYLOR
& McKENNA

203 MARLOWES

HONG KONG

FAR EAST MODELS

P.O. BOX 76, SHATIN,
NEW TERRITORIES, HONG KONG

We specialise in highly competitive Japanese aircraft and boat kits, R/C Equipment, Engines and all accessories. Reliable mail order service. All currencies accepted.

HONG KONG
Tel: K-680507

RADAR CO. LTD.

2 OBSERVATORY ROAD
TSIMSHATSUI, KOWLOON

The most complete stock in the Far East. Agents for Veron, Solarbo, Keil Kraft, M.K., Pilot. Sole Agents for Graupner, O.S. Prompt mail order service.

HORSHAM
Tel: 65133

MODEL CORNER

30 NORTH STREET, HORSHAM, SUSSEX

Comprehensive range of Kits.
Veron, Keil, etc. P. & P. extra.
Overseas enquiries invited

HULL
Tel: 43701

REG. BEAUMONT

150 CHANTERLANDS AVENUE,
HULL, E. YORKS.

Mainstream, Veron, etc.
MAIL ORDER SERVICE

HUNTINGDON
Tel: 0480 3328

HUNTS ANGLING & SPORTS (MODELS)

18/19 HIGH STREET, HUNTINGDON

Everything for the Modeller, Kits, Engines. Parts. Materials, R/C equipment. Specialist Engineers. Postal services. Open 9-6 Mons/Sats. 5 minutes A1.

ILFORD
Tel: 01-554 9142

AVIACOLOUR

MODEL SUPPLY SPECIALISTS
Specialists in Radio Control

466 EASTERN AVENUE, ILFORD, ESSEX
(1 min. from Gants Hill Central Line tube station)

KENT
Tel: Dartford 24155

MODERN MODELS LTD.

49/51 LOWFIELD STREET
DARTFORD, KENT

For all that's best in Model Aircraft and Boats, including Radio Control

American Kits and Accessories a speciality

KINGSTON UPON THAMES
Tel: 01-546 4488

MICK CHARLES MODELS

124 CANBURY PARK ROAD,
KINGSTON-UPON-THAMES, SURREY

All leading makes stocked.
Personal service. Mail Order.

LEEDS
Tel: 27891

THE MODEL SHOP

38 MERRION STREET
(Nr. Tower Cinema)

Model aircraft—boats—cars—railways, all makes engines. Every accessory, R/C equipment. Same day postal service

LEICESTER
Tel: Leicester 21935

RADIO CONTROL SUPPLIES

52 LONDON ROAD
Mail Order Specialists
Closed Monday
Open until 8.30 p.m. Friday
The Showroom of the Midlands with full R/C service facilities

LEYLAND

Think of MODELS

TERRA, AQUA & AIR
also everything associated with them
and you think of

"TERRAQUAIR"

64 CANBERRA ROAD, LEYLAND

Coming by M.6? from North or South, 2 min. to run Off/On. Turn left at 'Damps Canberra Service Station' and you're here. With 'Off the Road' parking areas provided.

LINCOLN
Tel: 25907

MODEL CENTRE

24 NEWLAND

THE ENTHUSIAST'S SHOP

Big Stocks of Kits, Engines, Balsa, Accessories, R/C Gear, etc.
MAIL ORDER

LONDON
Tel: 01-520 4565

BRIDGE MODELS

1/2 STATION PARADE,
HOE STREET BRIDGE
WALTHAMSTOW, LONDON E.17

LARGEST SELECTION OF KITS IN LONDON

LONDON Tel: 01-808 5668

TOTTENHAM MODELS AND RACEWAY LTD.

367 **High Road, Tottenham, London N.17.** Come to THE Centre and try our track. **KING** 155 feet per lap – and all the latest merchandise in slot cars, model boats, static kits, radio cars, aircraft, military vehicles. Open 6 days per week – Closed Mondays Open Sunday afternoon

LONDON Tel: 01-228 6319

E. F. RUSS

101 BATTERSEA RISE, LONDON S.W.11

Plastic Kits, Model Boats, Aircraft and accessories. All leading makes in stock.

Friday open until 7 p.m.

Early closing Wednesday

LONDON Tel: 01-560 0473

RADIO CONTROL SUPPLIES

581 LONDON RD., ISLEWORTH, MIDDX.
Mail Order Specialists

Open each weekday and until 8.30 p.m. Fridays
Largest R/C stockists in the country
Own R/C service centre

LONDON Tel: 01-788 6497

J & D's HOBBIES

118A UPPER RICHMOND ROAD
Nr. East Putney Tube Station

Closed Thursday

Open until 7 p.m. Friday

LONDON Tel: MIL 2877

H. A. BLUNT & SONS LTD.

MILL HILL CIRCUS, LONDON N.W.7

Complete range of model aircraft, engines and accessories, boats, cars and railways

LONDON Tel: 01-692 6292

D. BRYANT

MODEL SUPPLIES
328 BROCKLEY ROAD, S.E.4

For Futaba R/C equipment and all other leading makes, Keil, Veron, Frog, Airfix, etc. Expert advice on scale problems.

LONDON Tel: GRA 2471

A. G. HERMITE
(MODEL SUPPLIES)

633 BARKING ROAD, WEST HAM, E.13

Aircraft—Boat—Car—Plastic Kits & R/C
Saturdays 9 a.m. to 6 p.m.
Postal Service

LONDON Tel: 01-485 1818

AERO NAUTICAL MODELS

39 PARKWAY, CAMDEN TOWN, N.W.1

Main Agents for RIPMAX · GRAUPNER
Full range of Timbers stocked and cut
ALL KITS AND ACCESSORIES FOR AIRCRAFT AND BOATS
MAIL ORDER SERVICE
1 min. from Camden Town Tube Station, Northern Line.
LONDON'S LEADING MODEL SHOP

LONDON Tel: 01-852 2637

LEWISHAM MODEL CENTRE

45 LEE HIGH ROAD, LEWISHAM, S.E.13

A good selection of KeilKraft, Veron, Graupner, TopFlite, Gillons, etc., always in stock. All types of Engines, Accessories and Spares; also single and multi R/C equipment. Late night Friday. Mail Order a pleasure
Paybonds and Barclaycards accepted

LONDON Tel: WELbeck 8835

W. & H. (MODELS) LTD.

14 NEW CAVENDISH STREET, W.1
(Five minutes from Oxford Circus)

LEADING WEST-END STOCKISTS OF ALL QUALITY MODEL AIRCRAFT KITS, BOATS, RAILWAYS, MAIL ORDER

LONDON Tel: 01-607 4272

HENRY J. NICHOLLS & SON LTD.

308 HOLLOWAY ROAD, N.7

We stock only the best for AEROMODELLERS

Specialists in Radio Control

LONDON Tel: 01-703 4562

MODEL AIRCRAFT SUPPLIES LTD.

207 CAMBERWELL ROAD, S.E.5

Business Hours:
Monday to Wednesday, 10 a.m. to 6 p.m.
Saturday 9 a.m. to 6 p.m.
Late night Fri. 7.30 p.m. Closed all day Thur.
Postal Service. Parking Facilities

LONDON Tel: 01-445 6531

MICHAEL'S MODELS

646-8 HIGH ROAD, N. FINCHLEY, N.12

Comprehensive stock of KeilKraft, Mercury & Veron kits. Good selection of engines and a full range of accessories and woods. Specialists in secondhand engines.
MAIL ORDER A PLEASURE
Closed all day Monday Easy parking

LONDON Tel: 01-850 4324

ELTHAM MODELS

Ian and Ray Stilling
54 Well Hall Road, Eltham, London S.E.9

The Model Shop with the friendly atmosphere.
Full range of Aircraft & Boat Kits, Engines, Balsa, Dope, etc.

LUTON Tel: 23182

AEROMODELS (LUTON)

20 GORDON STREET
LUTON, BEDS.

Model Aircraft, Cars, Railways and Boats for the beginner and expert.

MAIDENHEAD Tel: 21769

E. WALTON

61 KING STREET

Wide range of Modelling Kits and Accessories
Engines and R/C Equipment
Railways, etc.
Established 1932

MAIDSTONE Tel: 51719

J. F. CARTER & SONS LTD.
(THE MODEL SHOP)

19-23 UPPER STONE STREET
MAIDSTONE, KENT

Complete range of modelling equipment and accessories, including R/C.
MAIL ORDER

MANCHESTER Tel: BLA 3972

THE MODEL SHOP

13 BOOTLE STREET
MANCHESTER 2

THE UP-TO-DATE SHOP WITH THE COMPREHENSIVE STOCK

Mail Orders by return

MIDDLESBROUGH

MODELDROME

265 LINTHORPE ROAD
MIDDLESBROUGH, TEESSIDE
Tel: Saltwells 3212

Radio Control Equipment, Aircraft and Boat Kits and all Modelling Accessories
Mail Order by Return

NEWCASTLE Established 1924

THE MODEL SHOP
(NEWCASTLE UPON TYNE) LTD.

18 BLENHEIM STREET Tel: 22016
NEWCASTLE UPON TYNE, ENGLAND

Pioneers of modelling
Our Expert Staff are at your service
MAIL ORDER

NORTHAMPTON Tel: 31223

THE MODEL SHOP
(Super Model Aircraft Supplies)

230 WELLINGBOROUGH ROAD, NORTHAMPTON
Established 1937

Full range of model supplies, Skyleader, Ripmax, MacGregor and Futaba Digital.

NOTTINGHAM Tel: 281903

PEGASUS

171 BRAMCOTE LANE, WOLLATON, NOTTINGHAM

— Nottingham's new model shop —
Paybonds accepted.

NOTTINGHAM Tel: 50273

GEE DEE LIMITED

40 GOOSE GATE
NOTTINGHAM

Everything for the aeromodeller at Nottingham's leading shop.

OLDHAM

THE HOBBY LOBBY

86 MARKET STREET, SHAW, LANCS.
(between Oldham and Rochdale)

Model Aircraft Kits, Accessories, Cars, Boats, Railway, Plastic Kits.
Postal service. Send for 'Bargain Bulletin'. Lots of interesting items.

POTTERS BAR HERTS. Tel: 59355

HENRY J. NICHOLLS & SON LTD.
8 SOUTHGATE ROAD, POTTERS BAR, HERTS.

Try the Hertfordshire Department of the well-known hobby shop for all your modelling needs.

READING Tel: Reading 51558

READING MODEL SUPPLIES
5 CHATHAM STREET, CAR PARK OXFORD ROAD, READING, BERKS.

BERKSHIRE'S SPECIALIST MODEL SHOP FOR KITS, ACCESSORIES, ENGINES, RADIO EQUIPMENT.
H.P. Terms available.
You can drive right to us.

READING Tel: 50074

G. SLEEP LTD.
22/24 KINGS ROAD, READING

For over 30 years we have had one of the largest Model Stocks in the South of England

ROMFORD Tel: ROM 44508

HOME & HOBBY STORES
144 NORTH STREET, ROMFORD, ESSEX

We stock all that's best in modelling. Kits, engines, radio. Part exchange. Mail order by return. Paybonds agents. Open 7 p.m. Fridays. No parking problems.

ST. ALBANS Tel: Bowmansgreen 2442

HOBBIES & SPORTS
5 HASELDINE ROAD, LONDON COLNEY, HERTS.

Aircraft, Boats, Model Railways, Wargaming stockists. Comprehensive stocks of Plastic Models. R/C equipment.

SHEFFIELD Tel: 581197

MODELS & HOBBIES
117 LONDON ROAD, SHEFFIELD

Main Agents for R/C equipment, Staveley, Sprengbrook, Skyleader, Kraft, etc. Main Agents for True-Line styro wings. Aircraft and Marine accessories. We do any repairs to any make of radio. Mail order. H.P. available. Easy parking.

SINGAPORE

SHING FATT RADIO
1340 UPPER CHANGI ROAD, SINGAPORE

Latest in Japanese R/C equipment and kits. Fresh stocks of M.K. Custom kits. Servos, Accessories, Digital R/C, Hinode, Enya, O.S. Send for lists. Prompt service our speciality.

SOLIHULL Tel: SHI 3374

SHIRLEY MODEL SUPPLIES
62 STRATFORD ROAD SHIRLEY

Triang, Scalextric, Airfix, Balsa Kits, etc. Personal attention and advice to young modellers.

SOUTHAMPTON Tel: 0703-25565

R.G.L. MODEL SHOP
R. G. LEWIS (SOTON) LTD., 17 HANOVER BLDGS., SOUTHAMPTON

Specialist in
BOATS – CARS – AIRCRAFT
RADIO CONTROL EQUIPMENT

SOUTHAMPTON Tel: 25919

HOBBY LOBBY LTD.
52 COMMERCIAL ROAD

CALL – WRITE – OR PHONE

Paybonds accepted.

Open 6 days a week
8.30 a.m.-6 p.m.

STOCKPORT Tel: STO 5478

THE MODEL SHOP
280 WELLINGTON ROAD SOUTH (BRAMHALL LANE CORNER)

Aircraft, Boats, R/C Equipment, Engines, Railways, Car/Racing, Plastic Kits Postal Service.

SUTTON Tel: 01-642 8291

E.L.S. MODEL SUPPLIES
9 EAGLE STAR HOUSE, HIGH STREET, SUTTON, SURREY

SURREY'S HOBBY CENTRE
BY RETURN POSTAL SERVICE
Complete stock of all Aeromodelling requirements.

WALKDEN Tel: 061-790 6707

ROLAND SCOTT LTD.
85 BOLTON ROAD, WALKDEN

MOST ITEMS IN THIS MAGAZINE IN STOCK NOW

SECOND FOR SECONDHAND LISTS

WALSALL Tel: 23382

S. H. GRAINGER & CO.
CALDMORE MODELS 108 CALDMORE ROAD

Everything for the Modeller
Aircraft – Railways – Boats – Electric Cars – Repairs – Overhauls – Spares – Radio Control – Part Exchanges – Paybonds accepted.

WATFORD Tel: Watford 43026

MODEL EXCHANGE
71 ST. ALBANS ROAD WATFORD, HERTFORDSHIRE

The shop with stock and expert advice. Free radio and engine testing service. S/H engines and radio bought and sold any time. 'Performance spoken here'.

WELWYN

H. A. BLUNT & SONS LTD.
38 FRETHERNE ROAD WELWYN GARDEN CITY, HERTS.

Complete range of model aircraft, engines and accessories, boats, cars and railways.

WESTON-SUPER-MARE Tel: 21031

BILL EVANS
WESTON MODEL AERO & ANGLING SUPPLIES 1 OXFORD STREET

The best in Radio Control for 25 years! All the main agencies. Open till 8 o'clock, 7 days per week for your convenience. 'By the Enthusiast for the Enthusiast'

WIGAN Tel: 83208

TONY'S MODEL CENTRE
10 CHAPEL STREET, PEMBERTON, WIGAN

Radio Control equipment, Aircraft, Rail and Boat Kits and all your modelling requirements. Personal attention assured.
IT WILL PAY YOU TO VISIT US
Easy parking
MAIL ORDER SPECIALISTS

WOLVERHAMPTON Tel: 26709

MODELS & HOBBIES
BELL STREET, MANDERS CENTRE WOLVERHAMPTON

EXPERTS COME TO US
VISIT US AS WELL
WE HAVE ALL THE BEST IN MODELLING

WORCESTER Tel: 0905-26697

R.G.L. MODEL SHOP
(R. G. Lewis Ltd.)
6 FOREGATE STREET

Specialist in
BOATS – CARS – AIRCRAFT
RADIO CONTROL EQUIPMENT

WORCESTER PARK Tel: 01-337 0983

THE TOY HAVEN & WORCESTER PARK MODEL CENTRE
16/18 CENTRAL ROAD, WORCESTER PARK, SURREY

Mon. to Sat. 9 a.m. to 6 p.m. For the enthusiastic Modeller. Plastic Kits. The best toys. Mail Order. Nearby Parking

WORKSOP Tel: 2855

MODEL CENTRE
RYTON STREET

Main agencies for all Kits, Engines and Radio Control equipment. Mail Order Service

YEOVIL Tel: 21083

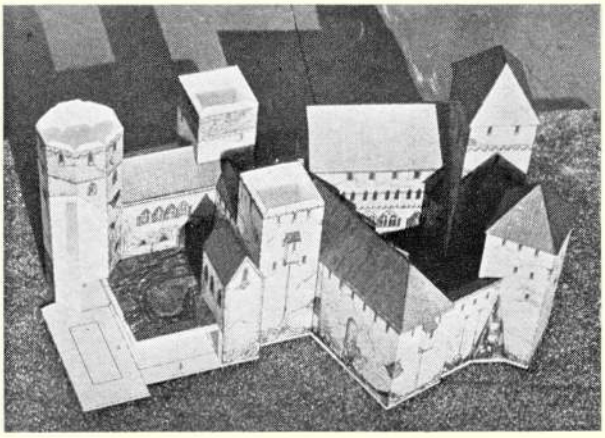
THE DIGI HANGAR
79 PRINCES STREET, YEOVIL, SOMERSET

THE NEW MODEL SHOP FOR THE SOUTH WEST. FOR RADIO, ENGINES AND KITS – AIRCRAFT AND BOATS

MODEL SHOPS EVERYWHERE

Get on the Aeromodeller map with your name and address in the directory.

13-35 Bridge Street, Hemel Hempstead, Herts., England



Castles in card – a traditional hobby in Germany – is now spreading world wide. February SCALE MODELS has an introductory feature on these cut-out models and carries a colour picture on the cover to show just what can be done. Luftwaffe camouflage is described in the first of a new series on this fascinating subject and an 'in depth' review of the new Airfix 1/24th scale Messerschmitt Bf 109e provides coupled interest. Latest in decals and book references; a Soviet destroyer in detail, and all that's new from the kit distributors are in this varies issue, on sale January 14th.

All Humbrol quality enamels are available in separate tinlets or in tinlet palettes—attractive and convenient interlocking plastic trays with space for brushes and accessories.

Skill, patience and Humbrol

Or should it be Humbrol, patience and skill? Either way, these are the three most important qualities for successful modelling.

Skill and patience—well, most serious modellers have them, Humbrol is the quality they all need. Used by modellers the world over, Humbrol enamels (matt or gloss, lead free and non-toxic) are the best value for money on the modelling market . . . only 7p for 15ml. Research has established that craftsmen prefer model paint in tins which keep the paint in good condition, are unbreakable and much safer than any other type of container—this is why Humbrol is packed in handy sized tinlets.

You'll find the colour you're looking for in the Humbrol range.
Ask for Humbrol by name . . .
available from all leading Model and Toy Shops.

No. 1 Main adhesive 77 POLYSTYRENE CEMENT used primarily for sticking plastic models, medium tube retail price 6p.
No. 2 Main adhesive 66 Balsa cement used primarily for sticking balsa models, medium tube retail price 6p.
No. 3 Main adhesive 55 white PVA used primarily for sticking wooden models, medium tube retail price 10p.

Humbrol will be pleased to send you—*FREE*—colour cards and leaflets giving you full details of the extensive range of enamels and other Humbrol quality products for the modeller. Write today to Mr. H. Stewart, Modelling Division, Humbrol Limited, Marfleet, Hull.

HUMBROL
HULL·YORKSHIRE

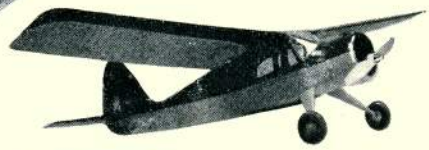
KEILKRAFT

THE GREATEST NAME IN MODEL KITS

FREE FLIGHT POWER

SNIPE £1.89
Ease of both building and flying make this model very suitable for beginners. Takes .5-.8 c.c. motors. Wingspan 40"

HALO £1.89
PAA-LOAD and general sports flier with a superb performance. A very clean design for 1-1.5 c.c. motors. Wingspan 42"



LADYBIRD £2.62
Attractive semi-scale cabin model for general sport flying with motors of about 1 c.c. Very tough. Wingspan 42"

HOME OF THE WORLD'S GREATEST MODEL KITS & ACCESSORIES

JETEX

Hi-jet
21" span

(Jetex 50 motor included)

RUBBER POWER

Ajax 83p
30" span

RADIO CONTROL

Outlaw
45" span

£5.79

GLIDERS

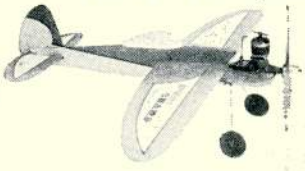
Space-jet
18" span

68p

Dolphin 68p
30½" span

CONTROL LINE

Champ
£1.46 20" span



See details of these and over 200 other fabulous kits in the latest KEILKRAFT Handbook.

KEILKRAFT Handbook

From all model shops 20p or direct E. Keil & Co. Ltd., Wickford, Essex. 20p, plus 5p postage.

The latest edition. As full as ever with 90 pages of news, how-to-do-it articles, hints and tips on all aspects of modelling.

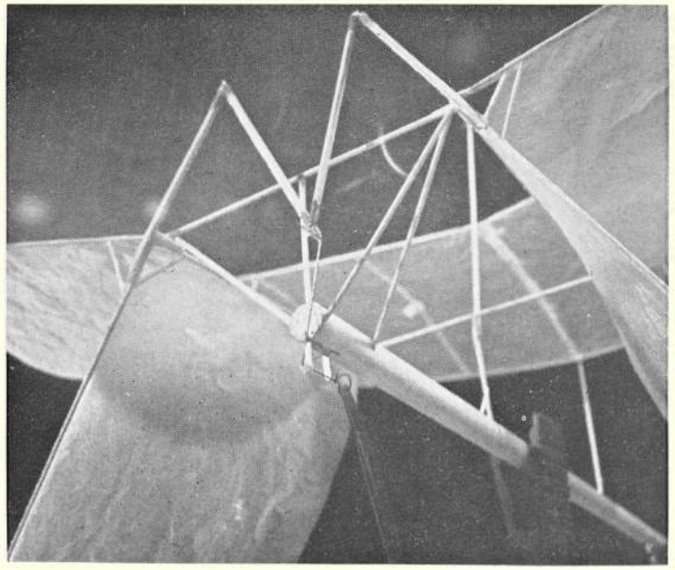
Written by experts for beginners and experienced modellers alike. Literally hundreds of illustrations! Complete section of all KEILKRAFT kits, accessories and associated items. A *must* for all modellers.

OBTAINABLE AT KEILKRAFT AGENTS.

The designer has plenty of opportunity to watch the flight characteristics of his ultra-lightweight birds as the forward velocity is very low. Sudden movement of a person standing this close could seriously affect the flight!

PLANS NOTICE
FULL SIZE COPIES OF THIS 1/4th SCALE REPRODUCTION WILL BE AVAILABLE FOR A LIMITED PERIOD, THROUGH AEROMODELLER PLANS SERVICE. ORDER AS 'WINGFOOT', PRICE 50p INCLUDING POSTAGE

Close-up of 'Wingfoot's' nose displays the simple crank system for operating the flapping wings which are covered in condenser tissue. Only the absolute minimum of materials are used to prevent excess weight.



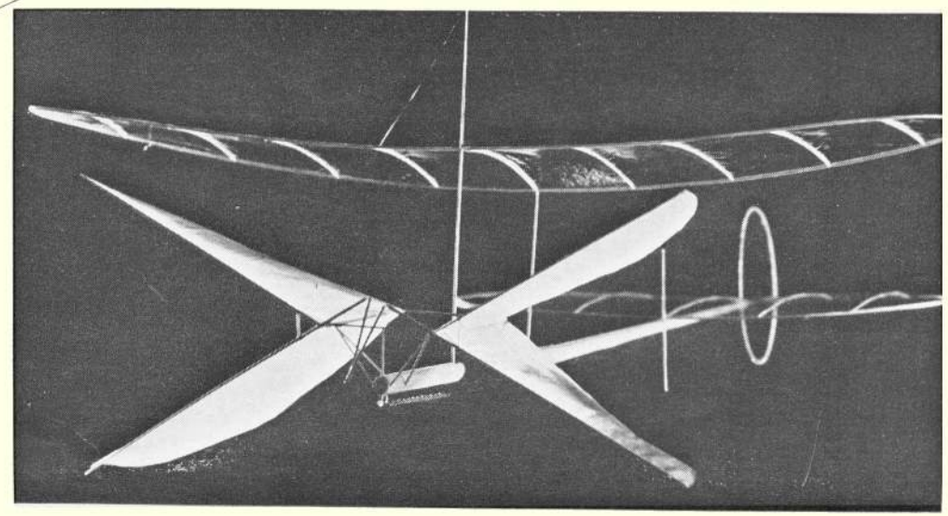
other diagonal braces. Build the other flappers in the same way.

To cover the flappers, cut four 5½in. squares of ironed condenser paper and lay one in position over the plan. Coat one spar and right-angle support with thinned white glue (4 parts water to 1 part white glue) and press it down onto the condenser paper. Allow to dry and carefully trim away excess paper, then cut along curved line for rear outline of flapper. Repeat with other flappers.

Cement a ⅜in. length of 1/32in. square balsa to the front of the right-angle flapper support arm. Cut a 1/32in. wide notch through this ⅜in. piece, at the centre. Repeat for other flapper. Cut four lengths of .004in. steel wire ½in. long and cement one at the rear of each flapper allowing 3/16in. overhang.

Cement two remaining lengths of wire across the notched piece of 1/32in. square wood at front of flapper. (Cement wire to wood at the front of notch only.) Now insert the wire pins (on flapper) through holes in flapper mounts. Next, cement wire to wood, aft of 1/32in. wood notch. Place dot of glue on to end of wire at rear of flapper.

The flapper extension arms are of 1/16in. medium balsa glued to lower flapper spar on each side. These arms should almost touch at centre of flapper mount. Flapper linkage arms are medium 1/16in. square balsa



'Wingfoot' captured in flight gives the appearance of modern art form rather than an intricate, specialist flying machine. The MicroLite covering of the flying surfaces contrasts strongly with the condenser tissue covered flappers.