

# Aero Modeller

INCORPORATING  
MODEL AIRCRAFT

December 1974

20p

USA & Canada \$1



HOBBY MAGAZINE









# — WITH VERON KITS & SUNDRIES!

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## HAWKER TOMTIT

IDEAL FOR FOX 25, 29 or 35 R.C. MOTORS

(VINTAGE 1928/39)

SPAN: 25" (1,320mm)



THIS KIT CAUGHT THE ADMIRATION OF THE WORLD! Our best seller—both nationally and internationally—the first of the immortal series of 'HAWKER' Biplanes! Only 52" span (1,320mm), but ample area for powering from '23' up to '40' cu.in., with 4-channel Proportional Radio.

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IDEAL FOR FOX 15 or 19 R.C.

KIT PRICE £11-88



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## F.W. 190 A3

Control-line for 2-5 to 5cc. Combined flap and elevator. KIT PRICE £3-53



SPAN: 33 1/2"

ONLY ONE OF A GRAND C/L RANGE

## IMPALA

R.C. HILLSIDE SOARER

SPAN: 52" (1,320mm)

KIT PRICE £7-29

1 or 2-channel Radio Trainer

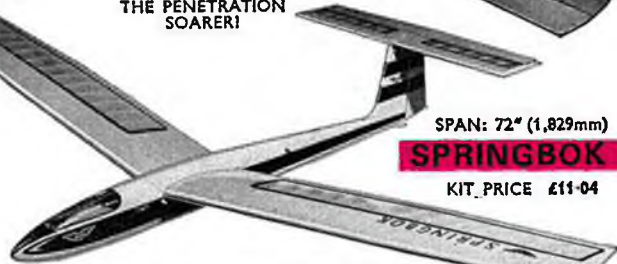


THE PENETRATION SOARER!

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ISLE OF MAN

# SOLARBO



*They've even tried all metal . . .*



Aeromodellers are ingenious people. Always looking for something better . . . or something different. Long after the pylon layout had established itself as the answer to power duration design, individual modellers kept on trying something different. Like pylon layout with a high thrust line. (And the model in the photo also shows an unconventional wing section!).

But the best results always come from the proven layouts. Which is why contest class designs all tend to look much the same these days. The same with materials. You can't do better than the best. Which is why aeromodellers stick to Solarbo Balsa.

They have even tried all-metal wing construction. But it was soon back to all-balsa again. Solarbo Balsa for best results. (But we will agree that foam plastic has its place here—especially if Solarbo balsa covered!).

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GOOD BALSA

## SOLARBO

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'SOLARBO' BY NAME

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# MacGregor puts you in the Pilot's Seat.

"If only I could give it a bit of up elevator!"

Haven't you ever thought that to yourself when that beautiful free flight model you've spent all winter building does a sudden flip or catches a gust of wind. Just imagine how much extra fun it would be if you could have control over your craft.

Well, you can. With a MacGregor Radio Control outfit, you can put yourself right there in the cockpit and fly your 'plane just like the real thing!

And it needn't be expensive. With more than ten years' experience of designing and manufacturing best selling, top quality model control gear we can today offer you

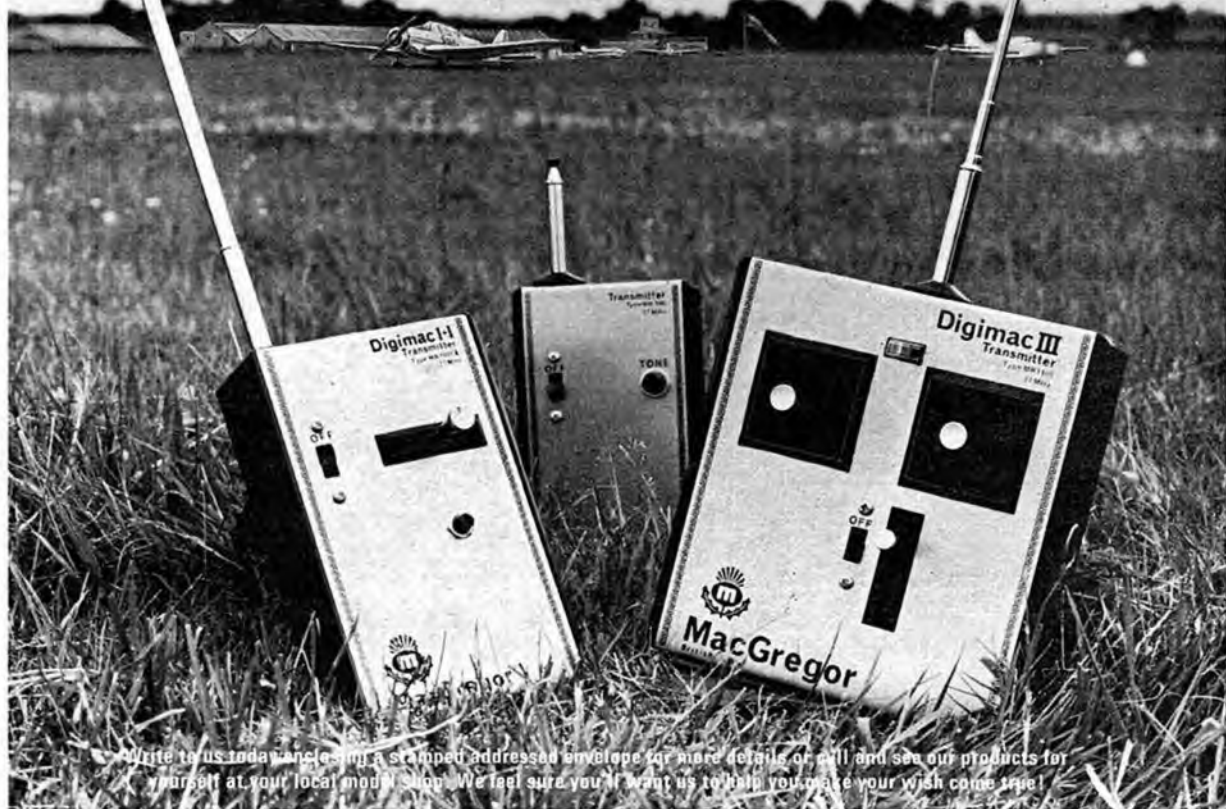
the finest, most comprehensive range of precision equipment in the world with something to suit every requirement and pocket.

A single channel outfit for instance with simple rubber driven escapements for both rudder and engine control can cost as little as £19! Or if you are more ambitious and desire more sophistication there are complete digital proportional outfits ranging from £42 right up to £150 or more, with a complete range of accessories and spares to suit any application. And of course all this is backed up by one of the finest and swiftest after sales organisations in the business.



Available from all Ripmax stockists throughout the UK

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Canal Estate, Langley, Bucks. SL3 6EQ



Write to us today enclosing a stamped addressed envelope for more details or call and see our products for yourself at your local model shop. We feel sure you'll want us to help you make your wish come true!

# Aero Modeller

INCORPORATING  
MODEL AIRCRAFT

December 1974

Volume XXXIX No. 467

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**HOBBY MAGAZINE**



ALSO MODEL BOATS . RADIO CONTROL  
MODELS & ELECTRONICS . MODEL ENGINEER  
MODEL RAILWAYS . SCALE MODELS . WOOD-  
WORKER, MILITARY MODELLING and GEMCRAFT

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**The Editor and Staff  
of Aeromodeller send  
seasonal greetings  
and best wishes for a  
happy and  
prosperous New Year  
to all our readers.**

### on the cover

*Bill Draper displays a brace of Kittyhawks — subject of this month's Plans Service Introduction — at the 1974 Nationals. Their distinctive appearance have been a common sight over the years at various control-line aerobatic competitions, which proves that the robust construction can take the strain of continual flying!*

### next month

Plans (by popular request!) of Eric Coates, De Havilland DH9 — free flight of course. More on finishing your model to a high standard with the least effort using professional techniques, and more on handling rubber motors. Kit reviews, regular columns and other features on all aspects of aeromodelling in the January issue — on sale 20th December.





# SUPER

**NEW!**

# STUNTER

MESSERSCHMITT

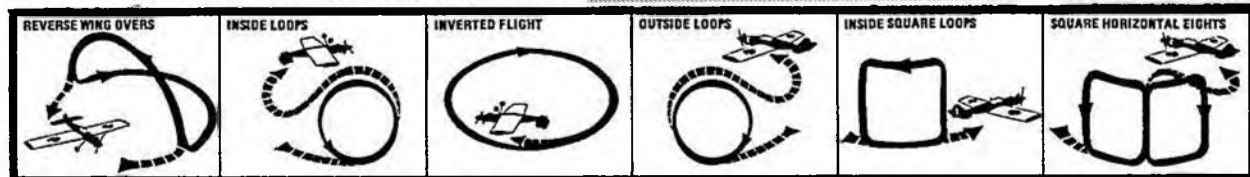
BF-109E



POWERED BY COX .049 ENGINE

- READY TO FLY IN JUST 10 MINUTES
- 30½" WINGSPAN

■ PERFORMS ALL THESE MANOEUVRES



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# READY TO FLY



## PT 19 TRAINER

Cox's all-time popularity winner, this is a superb air-plane for the beginning flyer. The PT-19 has trained more control-line enthusiasts than all others. Features exclusive adjustable thrust angle that can be set for super stability for the beginner and gradually increased for more advanced flying. Powered by a Cox .049 engine. Complete with student and instructor pilot figures, control handle and lines. Wingspan 22".

Full instructions for flying and maintaining these READY to FLY Models are supplied. Also a complete list of replacement parts. Treat it well and it will reward you with many hours enjoyment.

## Ju87d STUKA

Accurate in every detail, this ready-to-fly model carries all the features of this famous plane from the massive inverted gull wing down to the tiny propeller-driven generators. Cox's Stuka features sliding front and rear canopy, rear mounted machine gun, a simulated four inch bomb that can be dropped in flight plus detailed pilot and gunner figures. Comes equipped with easy-to-start Cox .049 engine with spring starter. Wingspan 23 1/2".



## READY-MADE PLANES WITH STARTER PACKS

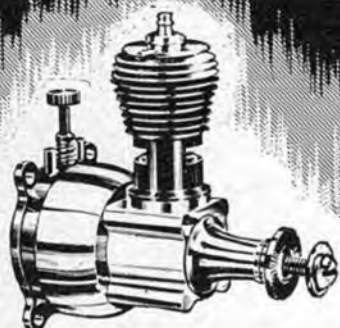
Starter Pack contains Cox fuel, Cox battery, Glowclip, wrench, control line, handle, control line

5464	Super Stunter	15.19
5564	P-40 Warhawk	15.44
5764	P.T.19	12.69
6464	Stuka	15.63
6964	P-51 Miss America	14.65
7664	P-51 Mustang	12.69
8064	Sopwith Camel	11.27
8164	Fokker D7	11.27
8364	Fokker Tri-plane	11.27
8664	Super Sport Trainer	13.67
8764	Bushmaster	14.21

## READY-MADE PLANE WITHOUT STARTER PACK (EX CANADA)

7800 Spitfire 12.69

All these Cox models and many others are available from Hamley's and most good Toy and Model shops.

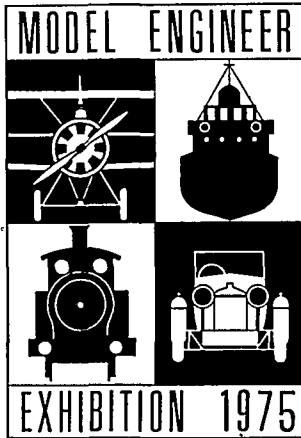


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HALES



# 44th. GREAT SHOW!

## SEYMOUR HALL, LONDON, W.1.

Seymour Place, off Edgware Road

31st December – 11th January 1975  
(Not Sunday)

Daily 10 a.m. - 9 p.m. last Sat. closes 7 p.m.

## Model Aircraft, Locomotives Boats, Traction Engines Military Models, Crafts

### COMPETITORS

£300 in prizes . . . some 30 cups, trophies and other awards. Championship Cups for permanent retention. A win confers 'Expert Status'! Edgar Westbury Memorial Challenge Trophy.

### ENTRY CLASSES

Examples of every form of modelmaking activity on show. Model Engineering masterpieces, locomotives, traction engines, aircraft, boats, yachts, cars . . . simple plastic creations . . . Classes include Military Models (four classes) and Craft entries (furniture, jewellery, glass-fibre, etc.).

### WHAT WILL BE ON DISPLAY

OPEN PLAN arrangement of the MAIN HALL provides excellent access and viewing, whilst retaining the central concourse. A slight change in S.M.E.E. WORKSHOP will allow spectators better viewing without blocking a door. 'Bill' Carter will again be in charge of the S.M.E.E. PASSENGER RAILWAY with non-stop service during opening hours for young and old. The team of experts from the Society will be providing practical work and advice to visitors.

LARGE FLYING CIRCLE — balcony to balcony — again in operation with even more exciting and expert models, and operators. All-electric models that do most of the things that i.c.-powered control-line models do. It gets better every year.

TRADE STANDS — We have increased numbers this year in view of increasing demand from exhibitors. These are in MAIN HALL; further trade and DEMONSTRATION STANDS in BRYANSTON ROOM will show construction techniques and use of tools.

Introduction of a MODEL ENGINEER WORKSHOP manned by the S.M.E.E. proved immensely popular and will be increased in size and scope, again with experts from S.M.E.E. in charge and assisted by M.E. consultants. Working models under compressed air and I.C. engine testing.

BRYANSTON ROOM will be devoted to display of model boats, yachts, sailing craft, both working and miniature, together with some TRADE STANDS and SOCIETY DISPLAYS.

LECTURE HALL will contain demonstration stands, craft displays, and some SOCIETY STANDS together with special features. BALCONY AREA will be devoted to militaria, both static displays in show cases, including dioramas, and will also provide largest yet WARGAMING AREA. Adjacent COMMITTEE ROOM will house larger diorama displays.

BOATING MARINA: Timed sessions will be held. TRADE DEMONSTRATIONS of RADIO-CONTROLLED BOATS will be welcomed (please let us hear early), which will be varied with CLUB EVENTS (mainly in evening) and STAFF EXHIBITS. There will be no selling at the poolside, but demonstrations can be announced and suitable display cards shown advising visitors where products obtainable and information given. Club features or displays specially invited — drop us a line!

GALLERIES provide sitting-out space for several hundred persons, and offer best view of model aircraft flying. There will also be club exhibits displayed and entries in our BOYS' EXHIBITION, and other displays.

### SOUVENIR GUIDE

Another CHRISTMAS EXTRA issue of *Model Engineer* will be coming out 2nd Friday in December with entries, trade stands, articles galore to assist the visitor and solace the stay-at-home.

### PRIZE POOL ALLOCATION

Classes attracting six or more entries will enjoy prizes to value of: 1st £5; 2nd £3; 3rd £1. With over 12 entries: 1st £7; 2nd £4; 3rd £2; 4th £1. Classes under six will have 1st and 2nd only, or at discretion of the judges, may be combined with other classes.

### REFRESHMENTS

Restaurant Service (licensed) available on ground floor. Parties may book in advance. Also soft drinks, cakes, sandwiches.

### ADMISSION

Price of admission at the door will be: 35p adult, 20p child inc. V.A.T. A child is regarded as anyone still at school. Children under five who have not started school and are accompanied will not be charged.

Reduced admission charges for pre-booking as under:

Single and small number pre-booking tickets available from these offices.

Adult 27½p, Child 15p. Parties of more than 10: Adult 22½p, Child 12½p.

Teachers i/c parties free — one per 10 in party.

A combined family ticket can also be bought in advance.

**Advance Bookings and details from:  
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**KIT 906  
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**KIT 902  
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24 in. span



Kit No. 031

£1.56 retail **MESSERSCHMITT Bf 109E**

18 in. span

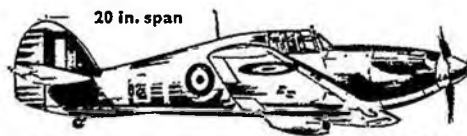
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span 23 in.  
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32" SES .. £9.45  
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20 1/2" span 'Beginners'	42" Ringmaster ..	£5.90
Spitfire ..	40" Yak 9 ..	£5.90
Thunder Jet ..	30" Ringmaster Junior ..	£3.95
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Eindecker ..	21" Baby Ringmaster ..	£2.65
Shoestring ..	24" P-38 Lightning ..	£2.95
Thunderbolt ..	36" P-38 Lightning ..	£5.90
Cherokee ..	52" Spitfire ..	£14.75
Fokker D-7 ..	42" Winder ..	£4.70
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## Heard at the

# HANGAR DOORS

**AGE BEFORE BEAUTY!** Man-powered flight is not confined to the younger generation! This was proved at the *Royal Aeronautical Society's* Stand at the Farnborough Exhibition 1974. An ergometer (basically a bicycle mounted on a frame) recorded horsepower that is needed by a 'pedal aeronaut'. Professor Wilkie of University College, generously lent the machine which he developed for physiological research on students. In contrast to the poor performance of most of the young people, three men in their early fifties put up an outstanding show. These were: B. M. Lambe, of Cherry Rivet Division, of Townsend, California, U.S.A.: 0.6h.p. for 20 minutes. Bill Bedford, ex-Hawker Siddeley Aviation test pilot: 0.4h.p. for 9 minutes, John Motum, Director of the Air League: 0.5h.p. for 11 minutes. All three were producing more energy than would be needed to fly a man-powered aircraft round the Kremer Competition figure of eight course, for which a £50,000 prize is offered.

**THE NATIONAL FREE FLIGHT SOCIETY** is soliciting papers for the 1975 NFFS Symposium to be held at the 1975 U.S. Nats. Papers will be published in the 1975 Symposium volume whether or not the author is able to present his paper personally at the Nats. Papers should cover some aspect of the science or art of free flight models, including technical studies, practical design and engineering as applied to models, new or unusual model aircraft developments, or historical items. Both indoor and outdoor free flight modelling developments are to be included. Please send proposed papers to: W. Hewitt Phillips, 310 Manteo Avenue, Hampton, Virginia 23661, U.S.A. Send title of proposed paper together with an abstract of 200 words or more, or a complete paper if it is available. To be considered, abstracts should be submitted by 15th March, 1975.

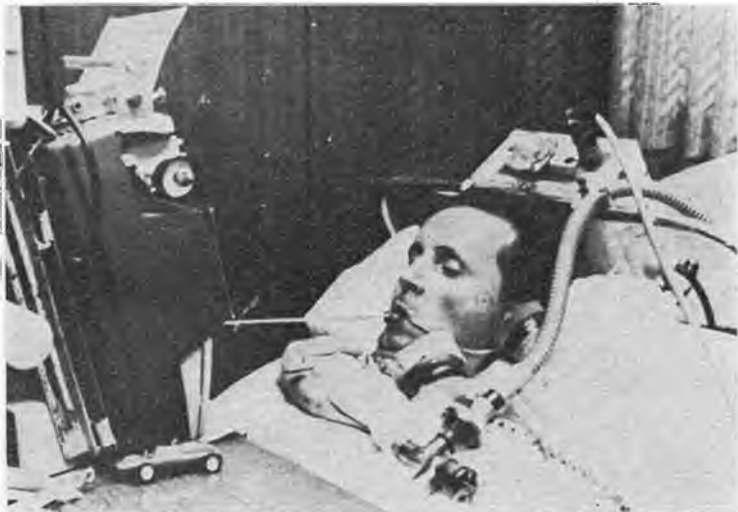
**VINTAGE FLIERS** awake! By permission of Col. C. E. Bowden, it is intended to organise a contest during 1975 for vintage power models along the lines of the original Bowden Contest, to be called the *Bowden*

*Vintage Trophy*. Anyone interested in entering this event, should write to John Haggart at 86 Kings Road, London Colney, Herts. HL2 1EP, for details. Please enclose a stamped addressed envelope. Date and venue will be announced at a later date.

**RULE CHANGE** for control line speed fliers: All speed models (with the exception of the F.A.I. class) together with control systems, lines, handles and safety straps, will be subjected to a pull test of 40 times the weight of the model ready to fly. This test will take place on the flight circle immediately prior to flight and will be of 10 seconds duration. This rule will come into force from January, 1975, and has been introduced to cope with the higher speeds being reached, and for the first time includes the safety strap in the pull test.

**MEMORIAL TROPHY.** The fund for the *Alan Woodrow Memorial Trophy* will close on 31st December. Trustee, Steve Blake, has approached the S.M.A.E. with a view to donating this trophy for a speed event at the Nationals, and last minute donations should be forwarded to him at 108 Ash Road, Luton, Beds.

The late Ron King edited Australia's *Airborne* magazine despite the terrible handicap of complete immobility and total dependence on a respirator—he is seen here typing via a probe held between his teeth. He played a major role in Australian aeromodelling over the years, although few who wrote to him or spoke to him on the telephone had any idea that he was a paraplegic. We offer our sincere sympathies to his wife Shirley, who courageously supported him in his activities, and also to his children Paul and Gail.



**AEROMODELLER.** As from the January, 1975, issue the cover price of *Aero Modeller* will be increased to 25p (annual subscription rate being adjusted accordingly to £3.90, \$U.S.11.00) – the ever increasing spiral of increased costs having overtaken us once more. If it is of any consolation, we should perhaps remind you that a copy of *Aero Modeller* is probably the cheapest of your vices . . . compare the cost of a packet of cigarettes, a pint of Newcastle Brown, etc., and you must agree that *Aero Modeller* takes you longer to consume – and we trust is equally enjoyable! Should your particular 'weakness' be the opposite sex, then you must agree that there is no comparison in costs. . . .

**WITH GREAT SADNESS** we learn of the death of Ron King, editor and driving force behind Australia's *Airborne* magazine. It was an even greater shock to learn that for years Ron had been a complete paraplegic after having suffered from polio, and that he could move no part of his body other than his head. Consequently he did all his own typing with a probe held between his teeth, his wife performing the majority of the layout and paste-up of the magazine. His courage fought above this incredible handicap, he even visited practically every model meeting around Sydney in a specially converted van which could carry his bed, and lately he began to fly R/C with a buddy box system operated by mouth. Regrettably he developed a respiratory infection and died six weeks after entering hospital.



**Bill Draper's**  
**54 in. span**  
**semi-scale**  
**control line**  
**stunter for**  
**0.35 - 0.45 cu. in.**  
**motors**

AFTER DESIGNING and building a succession of purely aerobatic models, I decided to try a semi-scale model which would not be too badly 'distorted', whilst still providing an aerobatic performance. Consequently I required a prototype which featured a short moment arm, long nose, plus generous wing and tail areas. The *Kittyhawk* filled these requirements; the fuselage was not too bulky, whilst the almost complete lack of wing leading edge taper would make for easy building. The wing tips are sufficiently rounded to prevent turbulence and offset the lack of wing taper, while it is easily recognisable by the public, particularly when finished in combat colours - I chose the desert colours of 112 Squadron of the R.A.F., since these are especially distinctive and well known.

The model has been designed for toughness, and will take the 'rough and tumble' of club flying - in my view too many stunt models have been designed by experts just to be flown by experts. They often do not have the ability to take the 'knocks' which are regularly metered out by the average flier on his local field, and consequently soon crack up.

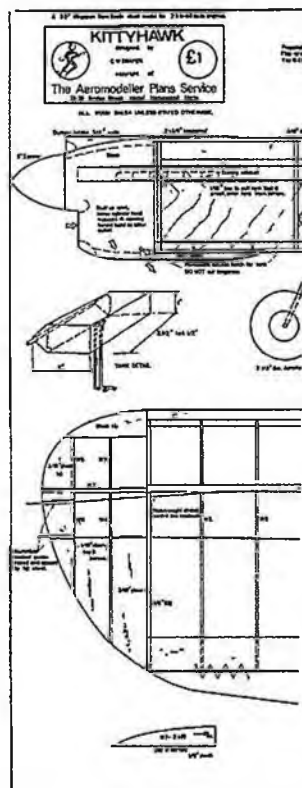
Using the construction and nylon covering as shown, there should be no difficulty in building the finished model at 50 to 52oz.; not a lightweight agreed, but the model is fully aerobatic and strong. At these weights, one of the more powerful 35's such as Merco, Enya or OS

will perform comfortably, but for a less powerful motor, then a little lightening down to 45 to 48oz. may be of advantage, but with some loss of ruggedness. For instance, covering in tissue instead of nylon would save about 1½oz. while Solarfilm on the wing will save even more, but a scale type finish is then much more difficult to achieve.

Do not try to lighten the wing centre section. This area is under great stress, particularly when performing fast manoeuvres in a high wind when the distributed load on



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the wing may reach 150-200 pounds at the bottom of the manoeuvres, and about 60 per cent of this is supported by the centre section. The undercarriage positioning will give good take off and landing characteristics on grass without tending to nose over, whilst still allowing smooth landings on tarmac. The long torsion bar will forgive that extra large lump of grass without ripping the undercarriage from the wing.

Now for some comments on construction. Although designed for the club flier, it is fair to assume that this class of model would not be chosen as a first attempt, and that the builder has a reasonable degree of building experience.

### Wing

Using carbon paper, transfer the outline of wing rib W2 onto a piece of  $\frac{1}{8}$ in. ply as a template. Cut ribs W2 from the template, remembering that the extreme outer ribs are  $\frac{1}{8}$ in. thick. The four W1 centre section ribs, and the half ribs can also be cut using the same template, but will then require trimming down a further  $\frac{1}{8}$ in. ahead of, and  $\frac{1}{8}$ in. behind, the main spar to allow for the extra sheeting thickness.

Lay the inboard wing ribs on the plan and mark the position of the leadout on each rib. Cut out the leadout clearance holes - the centre ribs will require  $\frac{1}{8}$ in. long slots, to allow for the leadouts pulling closer together as the bellcrank rotates. This slot length can be progressively reduced along the length of the wing to a nominal  $\frac{1}{8}$ in. hole at the tip. Mark and cut the centre section ribs and half ribs to take the undercarriage mounting plate.

If the leading edge, main spars and trailing edge cannot be made in one piece units (46in.), then any joints should be carefully spliced, using epoxy, to ensure accuracy and strength, and the positions of the joint staggered along the wing.

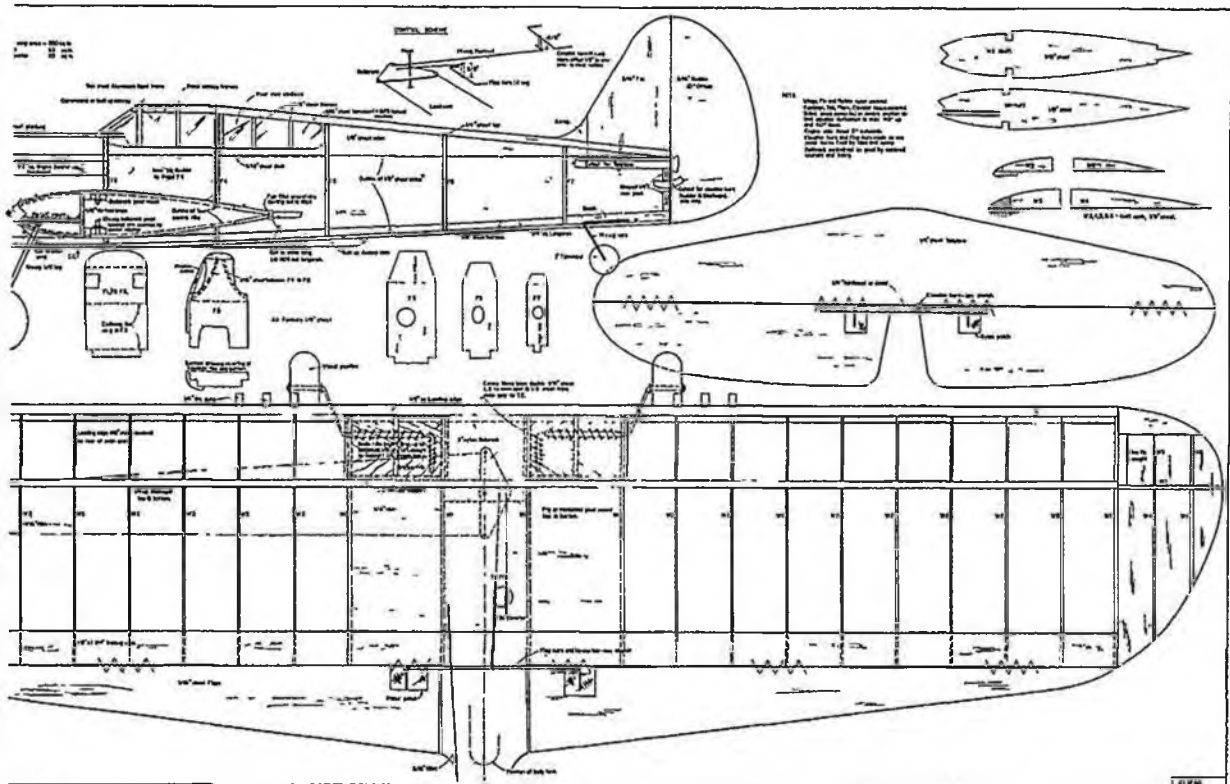
Mark the rib positions on the main spars, leading and



trailing edges. Pin down the bottom main spar to the building board, using  $\frac{1}{8}$ in. packing beneath the spar. Glue the ribs in position, ensuring that they are vertical and correctly aligned, with their trailing edges at equal heights. Glue the bottom and top halves of the trailing edge to the ribs, using packing to ensure alignment. Fit and glue the top spar, and finally add the  $\frac{1}{8}$ in. square leading edge.

Bend the undercarriage legs to shape from 10swg wire, with the brass support tubes in place on the wire. Bind and glue the undercarriage securely to the plates using nylon thread and either balsa cement or epoxy resin, then epoxy the plates in the wing. Fit the bottom sections of the ribs and half ribs below the plate, followed by the vertical support plate.

Fit the sheet wing tips and pieces W7, plus the leadout tubes, then attach the leadouts to the bellcrank. Fit the bellcrank pivot supports and mount the bellcrank. Now sand the flaps, and trailing edge smooth; ensure that the joint between the top and bottom of the trailing edge is sealed. Attach the flaps using nylon thread and 'V'



stitching. Stitch as shown leaving outer 3in. of flap 'clear' so that this can be used as a trim tab if required. Fit the flap horn and then connect push rod from horn to bellcrank.

Sheet the centre section top and bottom with  $\frac{1}{8}$ in. sheet, forward of the main spar, then add the top  $\frac{1}{8}$ in. leading edge sheeting. Add the bottom leading edge sheeting in two halves, joined at the centre line. Prior to fitting, cut small holes for the undercarriage legs, then slide over the legs and glue in place using PVA glue.

Cut the elevator push rod to half the required length, and fit to the bellcrank. Add the top centre section  $\frac{1}{8}$ in. sheeting aft of the main spar, cutting clearance holes for push rods. Do not sheet the underside until the wing has been fitted to the fuselage. Finish the wing tips, leading edge and tip sanding, then add the outboard tip weight.

### Fuselage

Cut out the sides, formers, doublers, etc., and glue doublers to the sides. Epoxy the engine bearers to formers F1-3, ensuring assembly is square. Now attach the fuselage sides, then shape the tail post and cut for push rod clearance. Fit the remaining formers and glue the sides together at the tail post, being careful not to warp the fuselage.

Pre-sand the tailplane and elevators, and hinge using nylon thread or metal hinges before adding the elevator horn. Prior to glueing into position, assemble wing and tail to fuselage and check their alignment, marking their positions.

Fit wing to the fuselage sliding the half elevator push-rod through the clearance holes in F4 and F5. Make up the rear half of the elevator push rod, allowing 1in. overlap and attach to elevator horn. Add the tailplane, sliding in from rear and glue.

Set the alignment of the flaps and elevators accurately at zero, bind the overlapping push rods with fuse wire, and solder securely using Bakers fluid. Clean the joint afterwards and check that the controls are free, then fit stops in the centre section to limit the bellcrank movement to provide 40° up and 40° down on the elevator (approx. 25° each way on the flaps). Complete sheeting on underside of the wing then glue the fuselage cutaways in position below the wing and fit the  $\frac{1}{8}$ in. sq. longerons. Fit the block at the rear of the fuselage and mount the tail wheel.

Add the  $\frac{1}{8}$ in. cockpit and the deck between F4 and F5 - cut and steam curvature in the  $\frac{1}{8}$ in. sheet behind rear view windows between F4 and F5, and glue in place.

Glue the fin in position with scrap block on either side, up to F7. Plank and sheet the fuselage top and cockpit sides and fit soft  $\frac{1}{8}$ in. sheet top to rear fuselage from F4 to tail. Shape the top rear of the fuselage then fit the rear window frames and epoxy in the cockpit windscreen frame.

Install the engine mounting bolts, with  $\frac{1}{8}$ in. dural plates top and bottom of bearers. Add the nose topblock and dummy air intake - the hardwood insert provides a useful skid to reduce damage in the event of an inverted landing. Fit the rudder, and fillets to the wing and fin.

Add the bottom sheeting then carve the corners round. Make the tank from tinplate - the 3 $\frac{1}{2}$ in. length will suit the run of 35s with the greater length for larger, more thirsty motors. In fact I use a commercial 100cc. tank with the pipework modified to that shown on the plan.

Build the tank box from  $\frac{1}{8}$ in. sheet - the tank enters from below and is removable, located by a bicycle spoke passing through the fuselage sides, and a piece of brass tube soldered to the tank. Make the removable hatch below the tank. Build the cowl from sheet and scrap

block - it slides in from the front. Vertical location is by pegs at the bottom-rear, and the cowl is held against the front bulkhead by a bicycle spoke through both sides of the cowl, passing behind the engine and touching the crankcase rear.

Add all final fillets and filling, make up dummy tank below the fuselage from  $\frac{1}{8}$ in. soft sheet, round off and sand the entire model smooth. Give one coat of 50 per cent thinned clear dope, and sand again. Cover the model as required - the original had nylon covered wings, fuselage and fin, with lightweight tissue on flaps, tail, elevators and rudder. Make the dummy exhaust stacks from  $\frac{1}{8}$ in. square balsa - mount these and wing guns after covering.

Give entire model two coats of 50 per cent thinned clear dope and one coat of unthinned dope, sanding between coats. Paint the cockpit interior and fit the cockpit canopy and rear view windows. Bend the windscreen from clear sheet.

Finish in the desired colours, with two coats, well brushed out (I used ordinary household paint and Humbrol enamels), then fuel proof the entire model giving a second coat to the engine bay and tank compartment. Add main wheels and hardware. Balance as shown - if the C.G. is within  $\frac{1}{8}$ in., try flying the aircraft before adding weight.

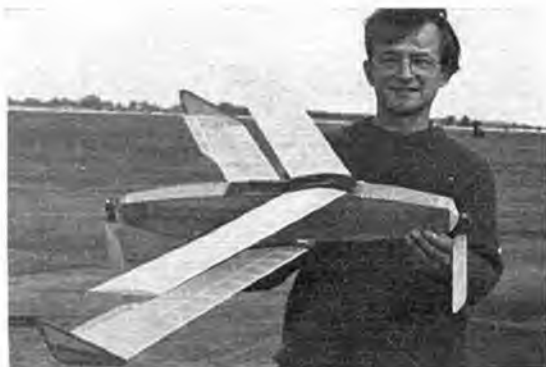
### Flying

Control line aerobatic models must be accurately built and carefully trimmed for best results. Small building errors not obvious to the eye can show up in flight. With elevators, flaps and thrustline accurately aligned and the C.G. properly located, the only other trimming which is likely to be required is to adjust for equal line tension on inside and outside manoeuvres. Some fliers twist the flaps, but I prefer to use the outer 3in. of the outboard flap as a fixed trim tab, although this was not required on the original.

Fly on 60 to 65ft. lines according to motor size and weather. The model flies quite fast and does not suffer from line tension problems. However, if there is a tendency to lose tension on the outside half of a horizontal eight, or the top half of a vertical eight, then set some down trim on the outboard tab, and vice versa. Adjust for optimum results. Good luck when flying your *Kittyhawk* - avoid the violent accident and it will provide years of service.

'Umm . . . these silencers taste lovely!' Bill's model, finished in the distinctive desert colours of the R.A.F.'s 112 Squadron is a refreshing change at the contest site, and is perfect for display work.





# FREE FLIGHT COMMENT

by John O'Donnell

John Pool with a new shape in tailless rubber models, a push-pull biplane. Intended as a small field sports model, but do not tell the F.A.I. — they might like it...

TO MANY FREE FLIGHT enthusiasts the Trials to select the British World Championship teams are the only important contests of the year. Certainly, they regard many other meetings as little more than a prelude to their efforts to secure a team place. The effects can often be seen in reduced attendance, interest, and participation in contests held shortly before the Trials — particularly if these other events suffer from inclement weather. These factors have certainly not 'cramped my style' this year, as I made a 'policy decision' to miss the Trials for the first time in well over twenty years.

The Northern Area Rally held at Elvington on 1st September was far and away the 'biggest and best' of this year's 'public' rallies — at least as far as free flight was concerned. Admittedly, the Northern Area were lucky with the weather — but there is obviously more to the story than that. Attendance was encouraging, and much of the flying was very good.

Elvington is famous for its two-mile-long runway, and for rarely having the wind along its length! On this particular occasion the wind varied somewhat, but generally blew across the field, which meant that free flight was located at the upwind edge of the large concrete dispersal area — a position rather hard on untrimmed models!

The early morning was uninspiring with rain, but this cleared up soon after the contests officially started. As the day progressed the sun came out, the breeze started to drop, and lift became both plentiful and strong. Later in the afternoon conditions became almost calm, but much cloudier, and thermal activity declined noticeably.

Not surprisingly there was plenty of flying, and most events were decided by fly-offs — one notable exception, however, was the combined F.A.I. event, flown on a five-flight basis. This was predominantly an A/2 event, with power models conspicuous only by their absence — there were some about, but very few featured in the results list. The event was topped by Terry Dilks

who started with four tactical maxs, but dropped on his last flight by nearly a minute, which compared with the reverse sequence by runner-up Nigel Walton. Third spot was filled by Tony Cordes despite, or because of, D/Ting early on three flights. These results would have been different if Ron Pollard and Barry Kershaw had not had their final Wakefield flights disallowed for launching a few moments after 'time'. Flying well downwind, they failed to hear the official hooter.

Of the various fly-offs, only that for Open Glider had obvious thermal activity, with the three participants all getting lift. Phil Owen was first to tow and released in good air, with Brian Baines quick to follow, but not cowering as well in the thermal. Terry Dilks flew later and appeared at first to have found even better air, but his final time was only enough for second place, half a minute behind Phil's 4:16.

The Rubber fly-off saw Phil Ball and Russell Peers launch almost together, with Phil gaining sufficient extra height to clinch the results (Russell retrieved his model intact, only to have it damaged when a farmer snatched it out of his hands!). Mike McAskie took third only a couple of seconds out of being runner-up, whilst Julian Hopper was fourth. Gerry Ferer saw his chances disappear when a wing folded on launch.

For once, Power was a 'David and Goliath' affair, with top places going to the smallest models in the fly-off. Short or rough motor runs eliminated all three of the forty-powered participants, leaving the field open to Julian Hopper and David Miller. They made no mistakes, Julian winning with a shade under five minutes, using his TD 09 '½A size' model after experiencing all sorts of problems with the larger version he intended to fly. The runner-up was the OS Max 15 *Climax* combination still favoured by the Millers.

Combined Mini was flown to the still controversial 'K' factor, a system that works better than is admitted. The factor was also used for the fly-off — and produced a very close result. The ½A power



Left: John Watkins was one of the few competitors to travel to Cranfield for the South Midland Area rally as well as to brave the elements. Reward was third place in the Open Glider event — this is his reserve model.



At right is Phil Ball preparing his Open Rubber model at Cranfield for its one and only max — eventually D/T'd into orchards at the end of the 'drome. Some model won rubber fly-off at Northern Area Rally three weeks earlier.





Julian Hopper assists his wife Linda in the Open Rubber fly-off at the Northern Gala—she placed third, while Julian himself won.

models were allowed seven seconds engine run and thus enabled Ray Monks and Jim Moseley to manage 2:32 and 2:27 on their fly-offs. I was the 'third man', flying my delayed prop release Coupe d'Hiver and did 1:59 actual time, giving me a 'score' of 2:24. I would reckon that the factor gives me (or, indeed, anyone with a good 'Coupe') the best chance of a place in the fly-off — if only because rubber is so easy to fly tactically; on the other hand, the potential performance of a  $\frac{3}{4}$ A model on seven seconds gives it the advantage in a late afternoon fly-off!

There were a number of other events in the programme, including categories rarely seen nowadays. The extreme example was Jetex, with Ian Dowsett proving an easy winner, thanks to my suffering considerable trouble with non-inflammable wick. Another novelty was Tailless, topped by Mike McAskie with a single max. His opposition came only from John Pool, whose entry was very far from his usual style — being a push-pull tailless biplane intended for small field flying!

Hand-launch glider was poorly supported with but eight entrants. Top by over a minute was Ewan Jones, while my clubmate Dave Yates narrowly beat Mike McAskie for second place. Ewan managed a double victory by also winning the Vintage event with a treble from his Mercury *Mallard*. Second was Mike Sanderson with 8:55 from a Keil Kraft *Competitor*, over a minute ahead of third-place man Doug Scott with a *Pylonius*. From what I hear, quite a number of flyaways occurred in this event.

Prizes at this rally were generous by present-day standards, and comprised monetary awards augmented by a choice of tools donated by Stanley Tools Ltd. — an encouraging practice that has now continued for some years.

Just one week later the 6th S.M.A.E. Area Centralised Meeting had very windy weather throughout the country. From reports received, it seems that success went to those with plenty of determination rather than it being the usual case of those with the best weather.

The Team Power Contest for the Keil Trophy reflected the struggle between Southampton and Norwich for the overall club championship (otherwise the *Plugge Cup*). Paradoxically, Southampton won the Keil but lost ground in the *Plugge*. The actual team totals were close at 24:01 to 23:10 — well ahead of Leeds, who totalled 16:14 for third. As these scores were out of a possible 36 minutes, it is obvious that conditions were somewhat arduous! If this needs underlining, then consider that there were no entries from East Anglia in the other contests and that none of the Southampton fliers got more than two flights from any one model.

Top individual score came from Southampton's John Hook, who managed an exceptional 8:50. Second best was only 7:13, from Nev. Willis — flying on his own as the Norwich 'B' team. This, of course, explains the paradox mentioned earlier! Incidentally, most of the Norwich fliers were using 1.5cc-powered designs, recording a surprising number of flights around 2:50. Third individual was Tom Hargreaves of Leeds, and top scorer at Elvington with 7:11. All in all, there were but two dozen entrants.

A/1 Glider was surprisingly well supported in comparison with only two less competitors. Overall winner was John Hanson of Liverpool, who managed a very respectable 9:42 at Chetwynd. This was way ahead of Julian Hopper, who did 8:27 for second (flying at Bassingbourn). Third place went to Pete Scrivens, who arrived at the Western Area venue at 2 p.m. when the wind had dropped to 10–15 knots. He thought conditions were tolerable —

those who broke models in the morning said 'terrible'!

Being but a fortnight prior to the trials undoubtedly affected the entry in Wakefield — there being but half a dozen scores recorded in the entire country. Only John Cooper and I persisted to the 'bitter end' of seven flights apiece — I 'completed the course' with one model still flyable, and first place. Surprisingly, a majority of my flights were between two minutes and 2:20 — a pattern not normally seen in rough weather. I gather that runner-up John Cooper had a more typical series of good and bad flights. Third place went to Henry Tubbs with an eight-minute total from only four flights.

Apart from any trophies that might be involved, the only awards for these events are small S.M.A.E. plaques for the top three positions — providing there are at least ten entries; if less, then the awards are curtailed. This situation is scant encouragement to prospective fliers experiencing adverse weather, and wondering if the 'other end' of the country is basking in calm sunny conditions. To economise on such trivial prizes smacks of penny-pinching!

The weekend of September 14th–15th had originally been scheduled for the First Trials, but these were postponed to avoid clashing with the *Europa Cup* in the Saar. Interest in this European Championship seems to have been stimulated artificially, and is primarily due to the venue's relatively close proximity — after all, the similar status Power Championship in Yugoslavia fails to arouse serious consideration. The late discovery that the entry fee for the Saar contest was over £30 per head did little to encourage attendance, and I understand that there were some difficulties in finding a glider team.

September is a popular month for competitions, and the new date for the Trials had already been chosen by the South Midland Area for their annual rally at Cranfield. There has been surprisingly little reaction to this 'ruining' of a popular and long-standing meeting — perhaps the time has come for the 'Open' enthusiasts to become as vocal as those who prefer F.A.I.?

As I had decided against attending the Trials, I went to Cranfield, but regrettably I cannot pretend to have been impressed with what I found at free flight. These events were run by Brian Perks and Gerry Ferer, both of the Midland Area! There was, in fact, no South Midland representation at free flight since 'everyone' had gone to the Trials — moreover, it transpired that the stand-ins had only been recruited by telephone on the Thursday before the event! For the host area to behave in this fashion is inexcusable. The S.M.A.E. (or, rather, the F/F Sub-Committee) were responsible for setting the scene, but the South Midland Area should have faced the situation, and either found an adequate solution or simply cancelled the whole F/F side of the rally. The latter might sound drastic, but would certainly have been justified.

Understandably, attendance was meagre compared with its usual level. Furthermore, as the day started quite windy and soon got worse, there was not a vast amount of flying, and the volunteer organisation was able to cope more than adequately. Those able to 'get away' in the wind were able to record good scores — but not all were able to come back for more! It took me most of the day to make and retrieve three glider flights (plus an attempt off a broken 30 lb. towline). As it turned out, I need not have made a third flight as the opposition ran into trouble as the day progressed. Pete Scrivens placed second on only two flights, the first of which was

S.M.A.E. Treasurer, Ted Roycroft about to launch his ETA 29 powered Open model at Cranfield, timed by S.M.A.E. Secretary, George Lynn. Unfortunately he started too late to complete his flights.





Doug Scott uses electric starter on his Rossi 15 F.A.I. model – placed third in Northern Gala fly-off.

a max, while third was John Watkins just a few seconds ahead of Gerry Fener. Even these fliers had difficulties with towing in the conditions.

The Power event started off well with a number of good first flights, but people soon ran out of either time or models. Re-entering after a 'false start' with his Tee Dee -09 model, Julian Hopper made no mistakes with a smallish Super Tigre G15 model to take an easy first place. Runner-up was John Godden, who spent most of the day searching for his F.A.I. model after its initial max. After recovering it, he flew with very conservative D/T settings so as to complete his three flights. As it turned out, this was an easy way to secure second place, well ahead of Tony Abrams, who only managed two flights from his 1/4 A design.

Rubber saw little activity after a very early max from Phil Ball, who lost his Open model – this flight stood as the *only* score for so long that in mid-afternoon I put motors into my Wakefields. This prompted Tim Gray to follow suit and make a couple of flights – one with each of his Wakefields (he broke one on landing, and then lost the other). I decided to enter and fly as late as possible in the hopes of catching possible imitators 'on the hop' – and launched both my Wakefields one after the other in the final moments of the contest. Both flights were respectable and gave me first place. It was 'close' in every sense, especially as Phil Ball only just failed to prepare his reserve model in time.

Even Chuck Glider was poorly supported with but half a dozen entrants. The winner proved to be Peter Woolvin, with nine seconds' lead over Alan Sopp – for once, Pete Bayram had to be content with a lowly third.

In comparison with the foregoing, the Northern Gala held at Rufforth on Saturday, September 28th, is likely to appear a very nice, quiet and uneventful affair! Even though blessed with pleasant flying weather, the attendance was low – apparently, many modellers dislike Saturday events, pleading difficulties with work, shopping, and other distractions. It is interesting that the two-day F.A.I. events are seldom criticised on the same grounds.

Considering the weather, the level of flying was not particularly impressive, and the fly-offs needed to settle the events were smaller than might well have been expected. In fact, there were only a dozen trebles recorded in the whole of the three Open events – Power had half of these trebles, even though the day had been enlivened by no less than three lengthy overruns, terminating just below cloud base. The models were recovered with surprisingly little delay! Gliders suffered the most from the weak patchy lift – with only three trebles despite much patient tactical flying. The S.M.A.E. rule that a line tangle is an attempt (compared with the F.A.I. option of a repeat without counting as one of the two allowed attempts) cost one flier his chances when he had two successive 'line crosses' trying for his second flight. Counting the better score from the two attempts was academic, but unquestionably incorrect.

The actual fly-offs were held in fairly calm and relatively listless conditions in a Power, Rubber, Glider sequence. The Power fly-off saw Russell Peers notch up another win with his K & B 40 'Nats' winner. Unexpected opposition came from a new name, Harold Wright of Liverpool, who came second with a much modified *Dixielander* motivated by an Enya 15. Doug Scott was third with a Rossi F.A.I. model, just a little off pattern when it mattered most. The outcome could have been different if Alan Cooper had not suffered a V.I.T. failure on his Americanised K & B 40 model which

climbed well and did 3½ minutes with the tail in the 'Power' position. Rubber was a relatively close fight between Jeff Anderson and the Hopper family, as both Julian and his wife Linda had maxed out with little apparent difficulty. Their only trouble in the fly-off was that of sharing a winding tubel! Final result was a win for Julian, with Linda having to settle for third. Runner-up was Jeff Anderson with an anglicised version of John Gard's *Supreme* design – published in *American Aircraft Modeler* and there claimed to have a 15-minute dead-air potential. Jeff's version seems underpowered and lacks sufficient height to use its good glide.

The Glider fly-off saw Colin Hickmott tow up with little delay, closely watched by tactical exponent Terry Dilks and myself. Some minutes later Terry decided to tow, and took his model off to the side, away from me – the way that Colin had gone. I tried the opposite tack and towed as much the other way as I could. This paid off, as I eventually found just a trace of weak lift to record 2:44 to Colin's 2:27 and Terry's 2:02. These scores may not match fashionable performance claims, but they appear very much in keeping with the current state of the art. Subsequent to the contest, I re-weighed my nine-year-old A/2; it now weighs 16oz.1

Other attractions at this Gala were a Junior Kit contest, and a Northern Area (as distinct from S.M.A.E.) Mini event. Both were flown on a five-flight basis. The Junior event saw another win for D. Baldwin with a 6:32 total – a little less than his score at Elvington earlier in the month. Runner-up on this later occasion was Mark Gibson, whilst Andrew Godden was third.

In Mini, I managed to max-out with my D.P.R. Coupe d'Hiver, whilst the 1/4 A models of John Godden and Jim Moselay could only manage four maxs out of five. With the K factor of 1.3, my model only needs to do 1:33 to count as a 2:00 max, so I fly it appropriately – the main concern being to avoid downdraughts.

Finally, it should not go unrecorded that the Northern Area added cash prizes to the S.M.A.E. trophies and plaques – financed out of the 'gate' proceeds.

Some months ago, I mentioned that I received many newsletters and offered to publicise any that wished to increase their circulation. I had exactly one reply – from Trevor Grey, present editor of the S.E. Area *Seadog*. The content of this publication embraces news and results from the home locality, articles of general aeromodelling interest, and a sprinkling of plans, photos, etc.

*Seadog's* policy is one of expansion, so both subscribers and contributions are welcomed. Publication is bi-monthly and a year's subscription costs 75p. If interested, contact Trevor Grey, 20 Offham Road, West Malling, Kent ME19 6RA.

## RESULTS

### Northern Area Rally – Elvington, September 1st, 1974

**Open Rubber** (3x3 min., 7 trebles) – 1. P. A. Ball (Grantham) M+5:34; 2. R. Peers (Falcons) M+4:52; 3. M. McAskia (C/M) M+4:50. **Open Glider** (3x3 min., 3 trebles) – 1. P. Owens (Liverpool) M+4:16; 2. T. Dilks (Falcons) M+3:41; 3. B. Balnes (RAFMAA) M+3:25. **Open Power** (3x3 min., 5 trebles) – 1. J. Hopper (Stanstead) M+4:57; 2. D. Miller (Royston) M+4:51; 3. P. Harris (Evesham) M+2:20. **Combined F.A.I.** (5x3 min.) – 1. T. Dilks (Falcons) 14:08; 2. N. Walton (York) 13:55; 3. A. Cordes

*continued on page 690*

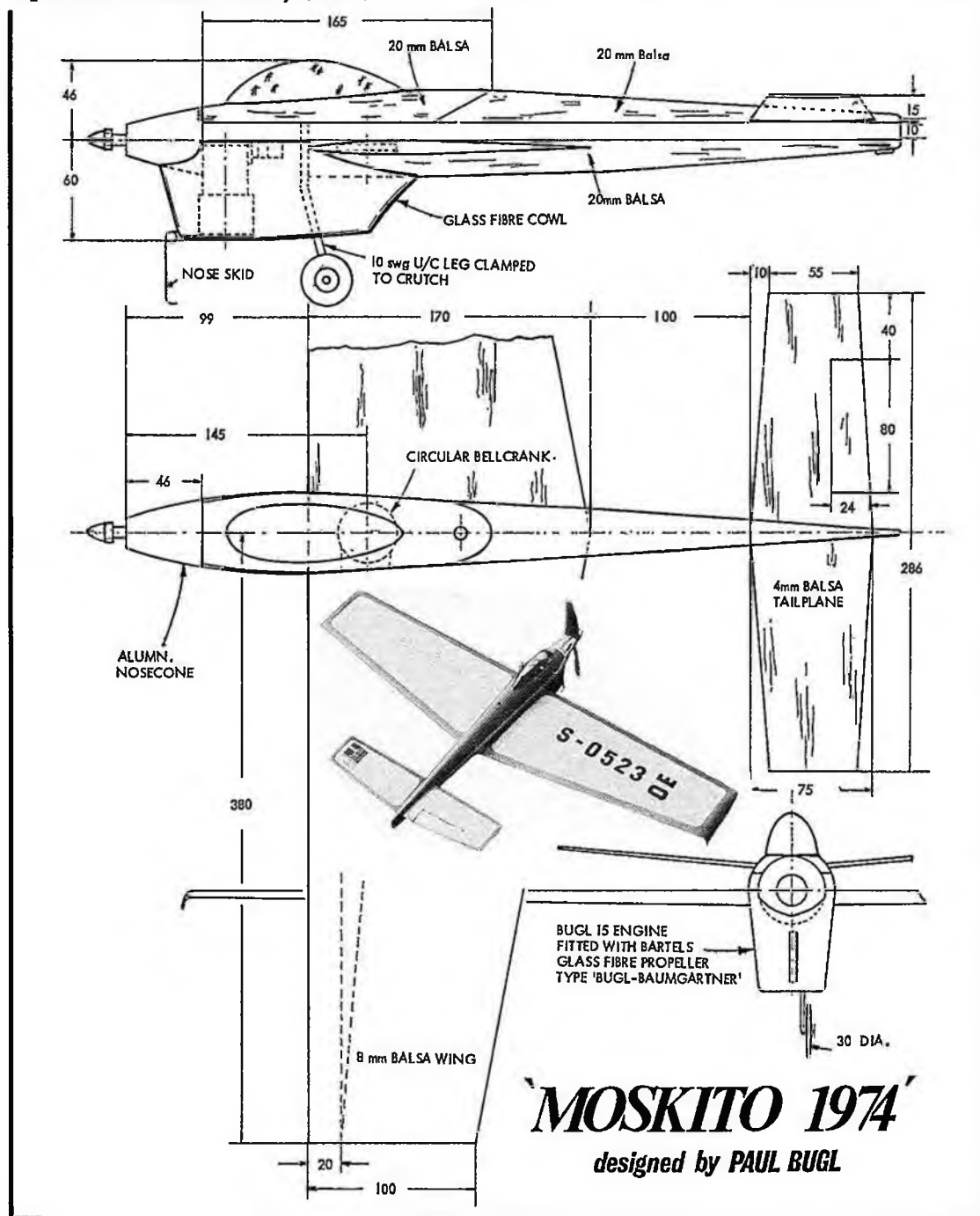
Keith Harrison prefers a 'digit' starter – lighter, cheaper and never gets left behind! Note attractive continental-style tissue trim.



# BETWEEN THE LINES

with Dave Clarkson

Drawn below is engine designer/manufacturer Paul Bugl's F.A.I. class team racer. This model placed second in the recent World Championships, but the same design has also met with great success in the hands of fellow Austrians, Fischer/Nitsche and Gürtler/Baumgartner. In addition there are 'replicas' to be seen in virtually every country where team racing is practised! Heart of the model is a 10mm deep full length crutch machined from aluminium to which the engine and tapered aluminium nose cone is bolted. The glass fibre cowl is retained to the crutch by springs, and the crutch is epoxied to the wings and tailplane. Result is a strong, quickly built model of reasonable weight (approx 490 grammes). All dimensions quoted are in millimetres. Suitable full length crutches are not commercially available.





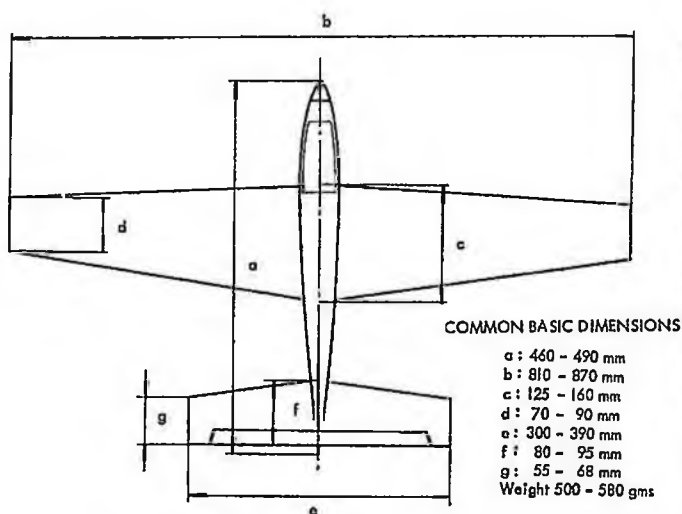


Figure 1. Most favoured dimensions employed for F.A.I. class racers at 1974 World Champs.

AS TEAM RACE Circuit Marshall for the 1974 World Champs, Jaroslav Lnenicka was in the ideal position to take careful notes of the equipment used and performances recorded. The following are the results of his observations which provide interesting reading.

#### Technical Information from 1974 World Champs

In general, the most favoured model layout was one featuring trapezoidal planform wings and tail, with an average weight of between 500 and 580 grammes - surprisingly heavy. Figure 1 shows the most popular dimensions employed.

As for the three finalists, it is interesting to note that in each case the fuel tank was undersized (Onufrienko/Sapovalov 6.2cc, Straniak/Bugl 6.4cc, Amodio/Fontana 6.4cc) which means that they could have carried approximately 9 per cent more fuel - sufficient for an additional three-four laps. As will be explained later, this would have helped the Austrian team in the final, as it would have eliminated an extra pit stop - they normally pitted after 37 laps, whereas forty is the critical number for a final.

Special attention was paid to the race strategies employed, and the results analysed were as shown in Figures 2, 3 and 4 (the actual results of the semi-finals and finals are given in Figure 5). When studying these figures, bear in mind that:

- total time  $T_t$  is the time taken to cover the complete 10km race distance.



Honour of fastest heat at World Champs went to Malcolm Ross (left) with pilot Derek Heaton. Their teamwork has always appeared immaculate, and according to Mr. Lnenicka's stopwatch, they are among the fastest in the world. Character on the right is of course that 'King-size' (sorry Richard!) leprechaun, Dave Rudd!

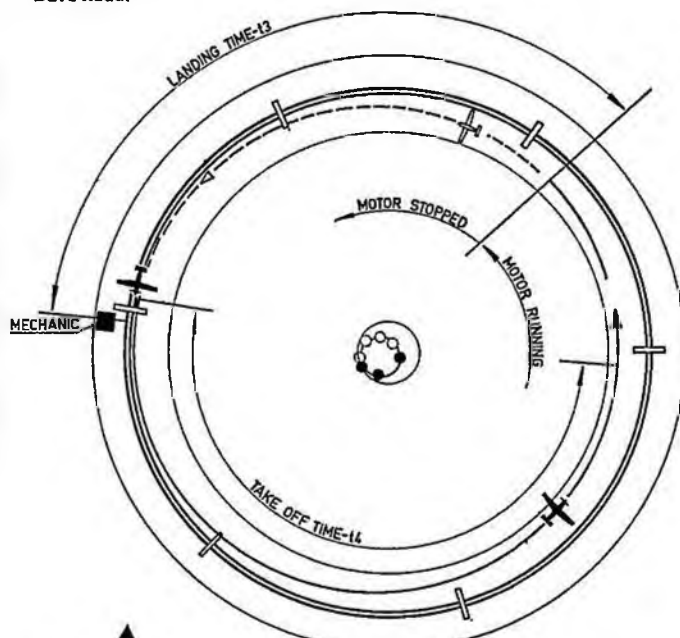


Figure 2. Explanation of symbols used in formulae - note ideal positioning of model when motor cuts for quick pit stop.

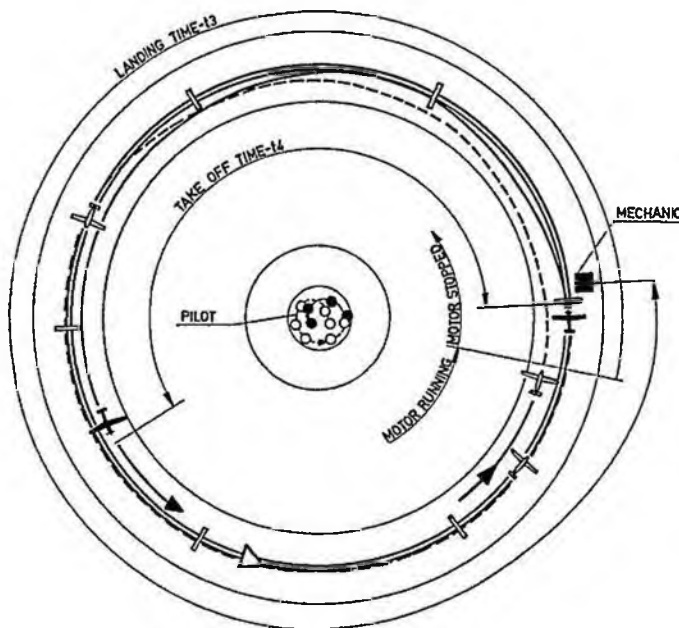


Figure 3. Explanation of symbols used in formulae - model in poor positioning for rapid pit stop (note distance taken to land; expressed as time of  $t_3$ ).

- time  $t_1$  is the time taken to complete 1km (10 laps) with a steady engine run.
- time  $t_2$  is the time measured from the moment the engine cuts until the mechanic catches the model.
- time  $t_3$  is the time taken to refuel the tank, start the engine, take off and fly approximately 30 metres (by which time the model has regained maximum speed).
- number of intermediate pit stops (i.e., not including the initial take-off) is referred to as  $m$ .

Thus, the times quoted for a race (Figure 4) are not exactly a true reflection, as it does not take into account the time taken at the race start (nor the acceleration time to top speed). Also, of course, a consistent setting of the engine cannot be guaranteed, while special factors concerning the pilot's activities cannot be measured - i.e., overtaking, being baulked, whipping, etc.

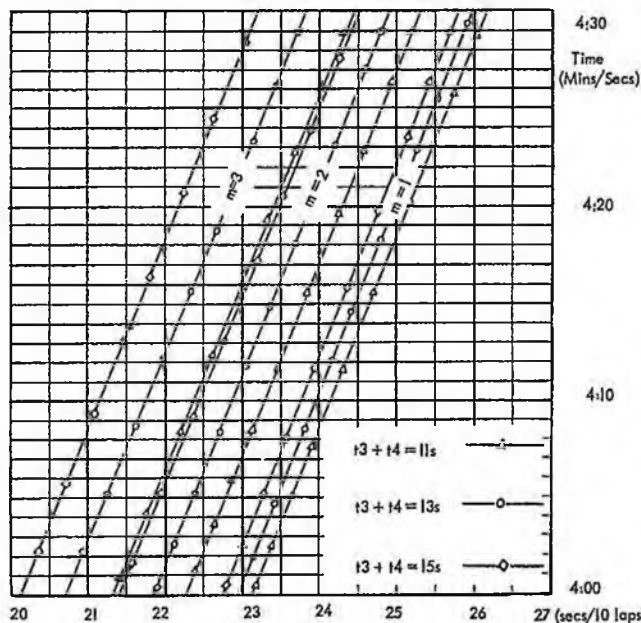


Figure 4. Relationship between number of pit stops (m) and speed (secs/10 laps) on total time.

Therefore, a more accurate estimation of a heat time (100 laps) can be expressed by the formulae:

$$T_t = 100 - m t_1 + m (t_2 + t_3) + k / \text{seconds}$$

The value K relating to the aforementioned variables, and which can vary from 2-10 seconds, and even greater in less favourable circumstances.

All teams that qualified for the finals produced practically identical times in their second heats as for the semi-finals. The fastest heat time (4:04.5) was put in by Heaton/Ross - they made two pit stops (m=2) and their average time values were  $t_1=23.2$  seconds,  $t_3+t_4=5.6$  seconds. They were obviously most unlucky not to reach the final - the inboard wing broke during the semi-finals.

Below are a couple of items from Maple Models (108 Ash Road, Luton, Beds.). Propeller is a 180x180mm Sintex, moulded in glass-filled nylon and extremely stiff. Shape is very close to that of the MVVS wood team race props, and the price is only 35p each. The team race pan is the same used by the Tribe brothers on their models, cast in aluminium. Supplied in rough cast form only they naturally require finishing and lightening before use - retail price is £1.75. Supplies of both items are limited.

At right - an historic score board? As can be seen, three teams recorded sub-four minute heat times at the Italian Coppa D'Oro meet.

TEAM	t1	t3 + t4	m	T
<b>FINALS</b>				
Onufrienko - Sapovalov	24.0	6.2	4	8:26.1
Straniak - Bugl	24.0	7.5	5	8:42.5
Amodio - Fontana	24.1	7.0	6	8:44.0
<b>SEMI FINALS</b>				
Onufrienko - Sapovalov	23.2	8.0	2	4:08.4
Straniak - Bugl	23.5	7.0	2	4:05.5
Amodio - Fontana	23.5		3	4:12.5
Ross - Heaton	24.0		1	Disq.
Nore - Ekholm	23.5		4	4:31.8
Maslov - Plocins	23.5	8.0	2	4:15.1
Baumgartner - Gurtler	24.0		1	Disq.
Drazek - Trnka	23.5	6.0	3	4:12.5
Raskov - Tinev		7.0	3	4:19.3

Figure 5. Performance details from semi-finals and finals.

Trnka/Drazek of Czechoslovakia similarly had their chances spoilt.

The fastest measured pit stop ( $t_3+t_4$ ) was recorded by the Austrian's Fischer/Nitsche in the second heat - 3 seconds! The time loss for this team's three pit stops was a total of just 13 seconds - but other troubles kept them out of the semi-finals. Figure 5 shows how the finalists fared - each sacrificed a little in speed for the sake of economy - only the Russians achieving the optimum number of laps (41) per tank. The values of  $t_3+t_4$  achieved by this team were also very good - below their pit stop times are compared with second placed Bugl/Straniak of Austria:

<b>Onufrienko/Sapovalov</b>				
1st	2nd	3rd	4th	
5	5	6	9	seconds
<b>Straniak/Bugl</b>				
1st	2nd	3rd	4th	5th
4	7	8	8	10

This World Championship proved that the best results are achieved by teams that possess efficient, reliable engines, suitable and efficient propellers, light, stiff models, skilful flying, and rapid refuelling and starting of the engines - and, of course, experience of competing in big sporting events.



Rossi rear valve motors at last! Irvine Engines are expecting deliveries of both diesel and glow engines shortly – these samples loaned by Maple Models of Luton who are currently building up their specialist lines. Diesel engine features two-part contra piston, and cylinder porting appears changed from previous examples. Prices will be £41.65 (diesel) and £45.50 for speed engine with pipe.

### Faster and Faster Yet!

A brief note from Paul Bugl reveals that team race times are tumbling so fast that it is proving difficult to keep abreast of the news! Firstly, the Italian Coppa D'Oro event proved unique, as it was probably the first time ever (and certainly so in the West) that three teams recorded sub-four-minute heats. Paul himself was using new groupers, tape/tube variety, with the 'flags' size 4x4mm, and in his 3:59 race Straniak had to make a not-too-quick compression adjustment at the first stop. Airspeed was 20–20.5 seconds/10 laps – i.e., 110 mph! Unfortunately, in the semi-final both he and Fontana/Amodio 'made a mistake' (4:17 and 4:12 are mistakes!) and Gurtler/Baumgartner recorded their third consecutive sub-four-minute time – see results below.

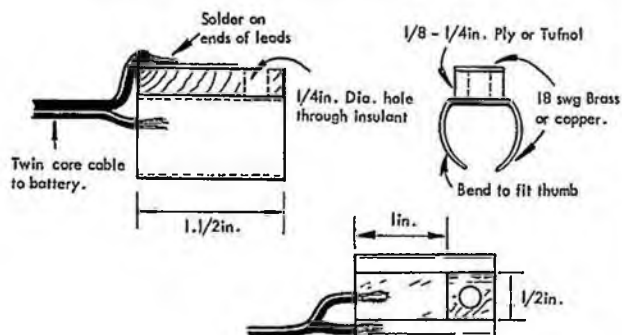
	Heat 1	Heat 2	Semi-Final	Final	
1. Gurtler/Baumgartner (Austria)	3:52	3:51	3:59	8:12-4	Bugl
2. DeAngellis/Massari (Italy)	4:22	4:14	4:08	8:20-2	Bugl
3. Fischer/Nitsche (Austria)	4:04	3:54	4:08	8:28-6	Bugl
4. Bugl/Straniak (Austria)	3:59	—	4:17	—	Bugl
5. Fontana/Amodio (Italy)	4:11	4:32	4:12	—	Bugl
6. Velunsek/Allic (Yugoslavia)	—	4:23	5:19	—	Bugl
7. Fischetti/Cherardi (Italy)	4:32	4:45	4:57	—	Bugl
8. Macchi/Nocentini (Italy)	—	5:03	6:19	—	K&B
9. Voghera/Menozzi (Italy)	6:00	—	—	—	Rossi

And there is more! At the Italian Champs, Fontana/Amodio won with heat times of 4:00 and 3:56 with a final time of 7:57! Their Bugl motor was giving them an airspeed of 110 mph for just 10 laps – so their pitwork is, shall we say, pretty slick!

### Make It Easy – the 'Hot Thumb'

First seen in use by John Dixon in 1970 (who was, at that time, beating everyone out of sight in Goodyear) is the 'Hot Thumb'. Now copied by many who want to supply sparks to their glow motors quickly and conveniently – still mostly 'Goodyear' men – this little device is deserving of space in all glow-users' model boxes; indeed, I wonder why no manufacturer has ever brought out a commercial version. The accompanying sketch reveals all – dimensions given are approximate and can vary, depending upon the size of your motor (and, of course, your thumb!).

Operation of this device is quite simple and is, in fact, completely



'automatic' on side-mounted engines, in that when you grip the model around the motor, the centre terminal of the glow plug goes into the 1/8 in. diameter hole through the insulant and therefore contacts the thumb grip, and when you straighten your thumb the cylinder head touches the top contact, completing the circuit and giving the glow! For convenience, the accumulator (anti-spill types only) should be strapped to your forearm, thus allowing very short leads for a good hot 'glow'. The ultimate sophistication which allows direct observation of your plug condition – such as no current (blown plug), low current (dry motor), or high current (wet motor) – is to mount a 0–5amp ammeter in the circuit and this is conveniently done, depending upon the type of ammeter, by making a metal strap that connects one of the ammeter terminals to one accumulator terminal. The hot thumb leads are then connected to the free accumulator terminal and the free ammeter terminal. With a bit of cunning bending of the ammeter strap, the ammeter dial can be arranged to fall within your 'starting position' range of vision – no having to glance away from the motor to see the amps.

Whilst this set-up is of particular use for Goodyear men, it is also very applicable to pitmen for Combat and 'B' Team Race (imagine a 'B' pitman with hot thumb and pressure refuelling – besides having a 'hot thumb', he may have a very heavy arm . . . and even a rather crisp one!).

Latest range of propellers from Punctilio are the cuffed root 'Super Speed' series – these being 7x6in., 7x7in. and 7x8in.





Eric Coates'

# FLYING SCALE COLUMN

Jack Sheldon's superb R/C *Tipsy Nipper* has been bringing him much contest success recently. Choice of a small sport-flying prototype is ideal for modelling as all the 'fiddly' detail becomes comparatively large! Only handicap is a large bulky fuselage.

IN CONTRAST to the traditional pattern of English weather, the dry, calm, autumnal spell we have come to expect in September and October just has not happened this year – instead, we have suffered week after week of deluge and gale! Many rallies suffered during this vile period and probably the worst casualty was the S.M.A.E. Autumn Scale Meeting at Little Rissington on 6th October.

Four brave souls entered and flew in the control line event (run by the Heswall club) in the morning when the wind was around 20 knots, but at least it was dry. Quite a number of the regular free-flight participants were present at the airfield but by mutual agreement this competition was abandoned.

Eleven entries were forthcoming in the Class 1 Radio event for the *Ripmax Trophy*. Unfortunately, only five entrants managed to make a qualifying flight in the deteriorating conditions before the heavens opened, shortly after noon, making any further flying impossible. The contest had, therefore, to be decided on the basis of the lucky five. Of these Jack Sheldon's *Tipsy Nipper* was far and away the finest model and this coupled with the best flight score gave Jack a runaway victory. It was a pity that the P.51.B. *Mustang* of Vaughan, the *Fulmar* of Taylor and the *Moth Minor* of Melleney were so cruelly eliminated, as all these models, well flown, could have given the *Nipper* a good run for its money.

## Results

Control Line		Flight	Static	Total
1. E. Robinson	<i>Mosquito T.T.35</i>	644	547	1,191
2. B. Sambrook	<i>Mustang P.51.D</i>	871	309	1,180
3. M. Tilbury	<i>Dornier D.O.215</i>	428	420	848
Radio Class 1 (Ripmax Trophy)		Flight	Static	Total
1. J. Sheldon	<i>Tipsy Nipper</i>	395	496	891
2. S. King	<i>Magister</i>	363	221	584
3. A. Bull	<i>F.4.U Corsair</i>	330	164	494



Not surprisingly, in view of the recent weather, most discussions held recently amongst the free flight fraternity have centred on indoor matters – the vexed issue of British Peanut rules being the major talking point. This miniscule model class seems to be dividing the scale builders and fliers in much the same manner as does the Class 1/Class 2 argument amongst the R/C fliers. One extremity sees the event as a duration contest for machines vaguely resembling scale models, the other regards it as another scale event for miniature models in which duration should play little part, other than for a basic qualifying flight. Probably the majority of potential 'Peanutters', for want of a better expression, would like to see a competition in which duration and scale appearance have approximately an equal share in the pointage system. This is almost impossible to achieve unless some form of maximum time is imposed, otherwise the event is always at the risk of a runaway victory from an ultra lightweight 'duration' model, as occurred at this year's Cardington Indoor Nats.

The S.M.A.E. will be holding an informal experimental Peanut Competition, to the following rules, at Cardington on 8th December.

## 1. Static Score

Fidelity to Scale and Construction.

Fuselage K=6

Wings K=4

Tail K=2

Overall finish colour and markings K=6

Maximum static score attainable=180

## 2. Flying

Three flights with two attempts per flight. Hand launched.

A flight is scored when more than five seconds is recorded.

Maximum flight time recorded=60 seconds.

Maximum flight score attainable=180

## 3. Qualification

In order to qualify for the event a minimum static score



Cessna C37 from the Comet kit (imported by Modellers Den Import Associates) as built by Terry Manley for a Brown Junior CO<sub>2</sub> engine. Flew very well in calm conditions, and should perform satisfactorily with rubber power, for which it was designed.

Close up and flying shots depict the Comet 'Aeronca K' as built by our columnist. Nose section was modified to utilise conventional nose block which provides ample scope for thrust line adjustment, while dummy engine cylinders were made from Williams Plastic units. Flies really well when fitted with more suitable propeller and respectable amount of rubber. Construction is very light – all up weight is around one ounce.



of 50 shall be attained and a minimum aggregate flight time of 50 seconds recorded for the three flights.

#### 4. Proof of Scale

The minimum documentation required is as follows: Either a general arrangement drawing of at least 1/144th scale, plus one photograph of the aeroplane reproduced, or a coloured 3-view (i.e. *Profile Publication*) to a minimum of 1/144th scale.

5. The winner will be determined by the highest score attained when the scores of the qualifiers of Parts 1 and 2 are added.

After the event it is intended to hold an informal discussion amongst the participants of the competition and the judges to see if the basis for a provisional set of rules can be arrived at. A wonderful opportunity for all interested parties to make their views known to the rule-makers.

\* \* \*

Last December I reviewed the latest range of Comet flying scale rubber powered kits. These all featured geodetic wing construction, producing rather a heavy model which resulted in a relatively poor flight performance. 'Comet' are one of the oldest of American kit manufacturers and have a vast range of kits (some dating back to the war years) and these are categorised in series according to size i.e., *Series A* – around 15in. span, *Series B*, 25in. span, etc. A selection of the most suitable flying subjects are being imported into the U.K. by the Modellers Den Import Associates, and should by now have found their way into certain model shops, along with a range of very simple beginners kits.

Three examples of the scale models were supplied to me for review earlier this year – all have now been built so here goes with another of the infamous, no-nonsense, *Flying Scale Column* reviews!

**Porterfield 65 (15in. span, *Series A* kit) retail price in U.K. – 75p.**

This kit was built up by Dave Clarkson of the Blackburn Aircraft Club. A very clear plan is included, but the construction is rather 'beefy' for such a tiny model. The timber provided in the sample kit was rock hard, which does not make the finished model any lighter either. A pre-formed wire undercarriage and prop shaft are provided, together with a plastic nose button. The 3½in. diameter narrow-bladed plastic prop is very inefficient – a 5in. *Kaysun* (as provided in the *Cessna* kit) chopped to 4½in. diameter would be far more suitable. The power unit, a 6in. long rubber band, is about as efficient as the 3½in. prop! The plans call for the model to be finished all-yellow, although only white tissue is provided, and it is felt that a coat of yellow dope would be just



too much for an already heavy model. Dave covered the review model with lightweight yellow Modelspan tissue, and reported construction to be very simple and straightforward but, as expected, the finished product was too heavy for top performance. This was born out by the rather fast and furious flight I witnessed in the Cardington hangar last April.

**Aeronca 'K' (25in. span, *Series B* kit) retail price in U.K. – £1.25.**

I built this model myself, and thoroughly enjoyed it! The design dates back to 1945 and the plan shows the machine mounted on floats with no alternative wheel arrangements. However, considering that the Cardington Shed floor would soon reduce tissue covered floats to something resembling shredded liquorice sticks, I spent an hour or so looking through the 1938 edition of *Flight* in the R.Ae.S. library for a suitable picture of the new Aeronca 'K' on wheels. This was copied and my *Aeronca* drawing modified accordingly.

In contrast to the *Porterfield* kit, the *Aeronca* construction is beautifully light; chiefly ¼in. square. The stripwood supplied was again hard, but necessarily so on this model, while the printed sheetwood was of excellent quality although the clarity of the printing was a bit 'foggy' (not surprising after 29 years!). The propeller provided, a 5in. *Kaysun*, was woefully inadequate, so I substituted one of the excellent 6in. diameter paddle-bladed *Tern* props. (Incidentally these props are available from John Stennard at 12p. each and I can thoroughly recommend them to all miniature scale model builders. You can modify them easily to whatever shape you like and while an expert may be able to carve one as good, it would be nothing like as strong.) The plan shows the prop shaft passing through a detachable wooden nose button – a system which prevents any thrust adjustment, so I modified the front end to take a

conventional noseblock, into which was epoxied a nylon nose bush. The dummy engine I built up from a pair of  $\frac{1}{8}$ in. and a pair of  $\frac{1}{16}$ in. scale Williams plastic cylinders, each chopped in two and joined together, while the wheels were turned from three laminations of  $\frac{1}{8}$ in. balsa, as described in the March 1974 column. Again the plan called for an overall yellow colour scheme so, lightweight yellow Modelspan was substituted for the 'regulation kit' white tissue. To improve the appearance, a light air-brushing of yellow dope was applied overall. No decals are supplied in the kit, but two sets of black registration letters are printed full-size on the plan. As these are rather thick to glue on to the model, a double layer of black heavyweight Modelspan was placed under the plan and one set of letters cut out – the two sets of tissue letters ensuing were then doped on the wing. Even after all this detail had been added, and with four strands of  $\frac{1}{8}$ in.  $\times$   $\frac{1}{16}$ in. rubber fitted, the all-up weight was barely an ounce.

The flying performance outdoors is very good. I trimmed it out in around a 7 knot wind (a gale in small rubber model terms) and found the stability to be excellent. A classic rubber model trim resulted: right-hand power climb widening out to a wide left-hand glide. Flights of 40 seconds on 400 turns are commonplace; in calm weather with around 600 turns, a minute should be feasible.

It is not an easy model to construct but should present no difficulty to anyone who has built a couple of rubber models before, and the result is well worthwhile. Cessna C.37 (20in. span, Series A kit) retail price in U.K. – £1.56.

Terry Manley built this kit up more or less as standard but modified the front end to take a Brown CO<sub>2</sub> motor.

This is a more deluxe kit than the other two, having die cut sheet parts, and as with the *Porterfield*, the structure is on the beefy side – aided and abetted with 'rock of ages' stripwood. Very heavy hardwood wheels all go to make up a hefty rubber model, although the generous wing area helps to carry the load. The usual preformed undercarriage and prop shaft are provided together with a 5in. *Kaysun* prop, and the usual detachable wooden noseplug. Again I would recommend replacement with a 6in. *Tern* prop and conventional noseblock. With these modifications it should make a good, solid, easily constructed first scale model. With the Brown power unit installed, Terry's machine wasn't

too bothered about the weight and it flew very well in calm conditions. Lateral stability was a bit marginal though for windy weather flying, and dihedral had to be increased.

To sum up then, the construction of these models varies considerably from very heavy to quite lightweight – depends what you like and how much experience you have! All are woefully underpowered – a fault very common to rubber powered kits manufactured on both sides of the Atlantic. Perhaps they are not up to the standard of the latest and best kits coming from the U.S.A., but they are considerably cheaper, leaving a fair sum over to buy a suitable propeller, more tissue, etc.

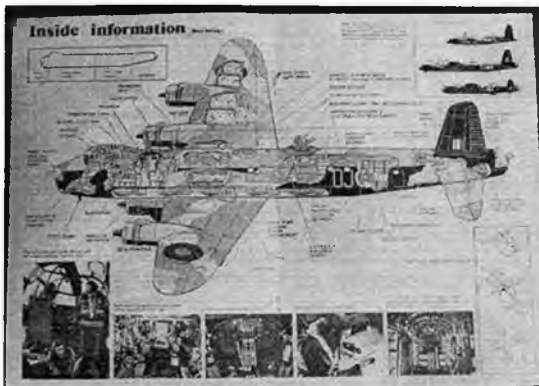
Although not a 100 per cent scale modellers publication I can recommend the reprints of the Frank Zaic Yearbooks also available from the Modellers Den. The 1938 editions contains come very informative gen on aerodynamics and stability which are very pertinent to all builders and flyers of F/F scale models. The reproductions of all those old-timer drawings are pure nostalgia for modellers born the wrong side of the war.

\* \* \*

A new series of aeronautical publications has just been launched by Visual Art Productions Ltd., whose *Data Plans* series, launched last year, I enthusiastically reviewed some time ago. The new series under the generic title, 'Air History Series' is launched with *Short Stirling Remembered*. This series is not so much aimed at the technically-minded scale modeller, but to the nostalgically-minded air historian – for anyone contemplating building a model of a Stirling, however, it is essential reading. No scale drawings are included other than a rather crude silhouette and a cutaway surrounded by a fine collection of pictures of the crew stations. The twenty-page booklet is printed on very fine quality paper measuring 11 $\frac{1}{2}$   $\times$  8 $\frac{1}{2}$ in. and in all, fifty-six photographs are presented of the Stirling in its various guises, from the half-scale wooden prototype of 1938 to the Mk. V, used as a transport in the immediate post-war years. One cannot help but compare this publication with an earlier one on the same subject, still in print I believe: *Profile Publication No. 142*. In the 'Profile' one gets a reasonably accurate five-view general arrangement drawing in full colour, plus twelve coloured side views of various Marks, in their respective squadron markings. In the *Air History* publication there is no colour but the photographs are infinitely better and reproduced to a much larger size, enabling much more detail to be extracted from them. To prospective Stirling builders you need both publications, as they are really complementary to one another, plus a good scale drawing from where I know not, other than the long out-of-print *Aircraft of the Fighting Powers*, Vol. VI of 1945!



Visual Art Productions Ltd. latest venture is a new series of booklets for air historians. The first concerns the Short Stirling, and contains many detailed black and white photographs of this aircraft – the centre pages shown at right gives an impression of the information presented. Available from usual retail outlets at 80p, or direct from Taurus Press, Ferry Hinksey Road, Osney Mead, Oxford.





# Glow~Motors For Combat?



Is the diesel engine still supreme for combat flying?

Messrs. Lismore, Hammersley and Strudwick of the CANNOCK OUTLAWS M.A.C. think not!

DURING THE PAST six years, *Cannock Outlaws M.A.C.* have flown glow motors in combat competitions and forsaken the traditional diesel. There were many reasons for this, but particularly they were as follows:

(1) Top quality ball-race diesels were becoming expensive to buy as an initial outlay, and also required frequent rebore, con-rods, etc., whilst against this the glow motors were considerably cheaper to buy and lasted a lot longer. For example, one of the motors now being used by the Club is in its fourth season, and has had no significant replacements of parts.

(2) Diesels, although consistent, need a good deal of sorting; that is to say, not every example was as good as its predecessor.

(3) It was felt by several members of our Club that we needed something new, and when Mick Davis first obtained a Cox Special 15 Mk 2 we felt that this would be the answer. We flew Cox Specials for two seasons, but these were, to put it mildly, a financial embarrassment – requiring new pistons and con-rods every two competitions, so the change to Super Tigres was inevitable.

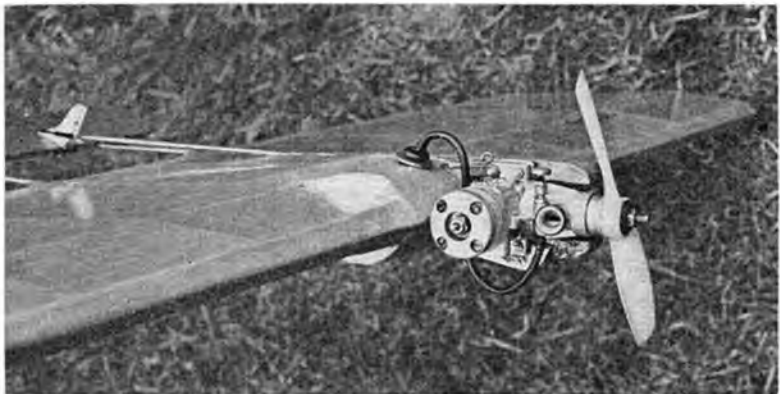
However, here it must be stated that despite the Cox Specials being 'fragile', they are a far more consistent motor than the Super Tigre.

## Development

The original thought behind the use of glow motors for combat was initiated after a Club ½A combat competition. We reasoned that in view of the fact that a Cox Special was of a similar weight to a PAW 1.49 and Oliver Tiger Cub, and produced about double the power, one of these in a ½A combat model would be the answer. However, this was not to be, as for some inexplicable reason the set-up was a dismal failure and the Cox Special was put on the shelf for a long time, until one day we saw in an American magazine the plans for *Splinter*, a very high aspect ratio (42×6in.) combat model. Mick Davis was the first to build one of these and used with it the pacifier tank that we now take for granted.

This arrangement was an immediate success and further development in this field led us on to better

Heading picture: John Hammersley displays a tissue covered 'Banshee' (with boom-mounted elevator) together with a Solarfilm covered 'Ironmonger' which has now superseded it, proving ideal for glow engines if the weight is kept to a minimum.



Right: typical glow motor installation –note the large 'pod' to carry the pacifier type fuel tank, and cut down nylon propeller to allow engine to reach maximum rpm.



Yes, that is a baby's dummy, blown up to around 2½ in. diameter! Make sure that the filler bottle is strong enough to reliably hand out this sort of pressure without splitting.

model designs. The biggest problem we found – and, in fact, still find – is making the models light enough and yet strong enough to withstand combat bouts. After a couple of seasons with Cox Specials, we turned to using Super Tigres, both G 20/15 and G 15's. These motors are exceedingly well made, being reasonably easy to use and require no tuning whatsoever, apart from opening up the venturi to its maximum possible diameter. We are now experimenting in the use of MVVS glow motors, but these may possibly wait until next season.

### Fuel Systems

We originally tried all our motors on suction and pressure tank systems and soon found that none of the high-performance glow motors would run on suction feed, and we had a limited amount of success with pressure tanks. We then discovered the pacifier system – a very convenient and simple method of obtaining consistent runs. This system consists of a baby's pacifier (dummy) made up on to a piece of rubber tubing as shown in *Figure 1*. (It is a source of great amusement when walking into a chemist shop and asking for half a dozen dummies!)

Pacifier bound to rubber tube with elastic bands.

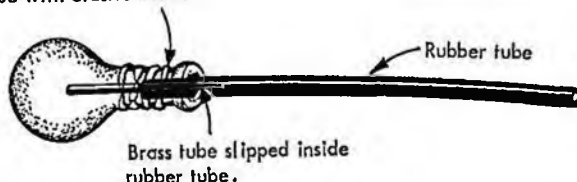


Figure 1, 'Pacifier' fuel tank.

Once the dummy has been manufactured, a good strong bottle is required to blow it up. We have experimented with pumps and syringes, but have always returned to the old-fashioned bottle. The dummy is blown up to approximately 2½ in. diameter (which is sufficient for an engine run of about five minutes) and the rubber tube crimped whilst the squeeze bottle is removed. The rubber tube is connected on to the spray bar, the motor started on a prime and the rubber tube released when the

motor is running on the prime. This operation requires a little practice to perfect, but used often enough is not very difficult. Engine runs with this system are very consistent as long as the motor is set as rich as possible on the ground and thoroughly warmed before launching. The system we use in contests is to start the engine at the beginning of the one-minute warming-up period, and leave it running till the launching time.

### Fuel, Props., Plugs, etc.

We have experimented with many kinds of fuels and props. Cox Specials all have 15 per cent nitro-methane fuel and Frog 7×6 in. nylon props – used in 13oz. models, every motor would give 97 mph. We tried one of these combat models on 60 per cent nitro-methane and a cut-down Frog 7×6 in. prop. in a speed competition, and before blowing the engine up recorded 105 mph, enough to place third at the competition!

Super Tigres, however, are a little more difficult when it comes to selecting props and fuel. We run all our Super Tigres on 10 per cent nitro-methane fuel, but each motor has its own individual propeller requirements. Basically, we run on Tornado 7×6 in. and Keil Kraft 8×4 in. suitably cut down, but no doubt some Super Tigres run better on other props.

We do experience from time to time problems with plugs; mainly with the ceramic seals blowing out of the plug, but a good *Fireball* or *Taylor* plug will last a whole competition.

### Models

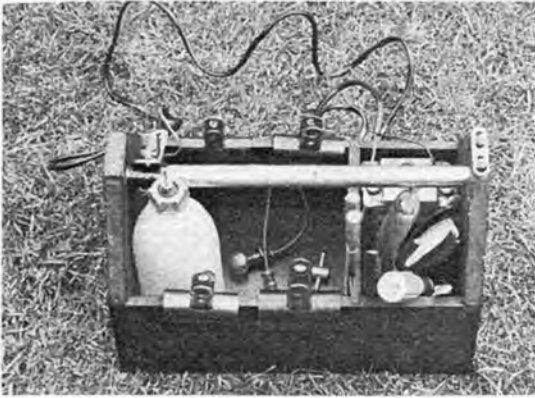
As stated earlier, in the early days of our flying glow motors we made *Splinters*. After various attempts with each design, we manufactured models that were basic 32×8½ in. wings with 2 in. booms which we called *Banshees*. These were very efficient with Cox Specials, but being tissue covered and weighing 12–13oz. were very vulnerable. When we started using Super Tigres, we kept to the same layout, but nylon covered them and had a stronger construction. These were reasonable, but after being out-manoeuvred and out-flown by a taper wing design, flown and constructed by Mick Tiernan, we decided this could be the thing to build! Mick Davis modified the basic Mick Tiernan design by increasing the wing area, and was very successful – so successful, in fact, that one continental flier wrote to Mick Tiernan and asked him if he could obtain the plans of the 'Model Type Mick Davis'! However, in the latter part of last season we borrowed a Richard Evans *Ironmonger* and constructed one of these. We bolted in one of our G 20/15's and, hey presto, success!

Built for an all up weight of around 14oz., we have yet to find a better design than the A.P.S. *Ironmonger* (Order No. CL1175, price 40p), but with model development over this winter we hope to come up with something slightly tighter-turning.

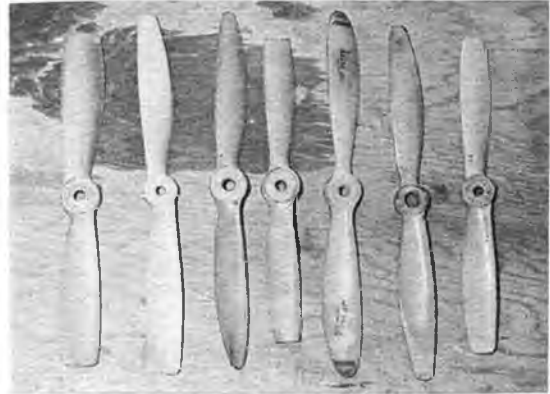
### Flying

Combat flying is rather difficult, using a glow motor. Very few diesel-powered combat models fly at the same speed as a glow-powered one, although in general they turn tighter and are probably faster around the manoeuvres.

Because the Super Tigre develops maximum torque at around 13,000 rpm and its peak power at above 20,000 rpm, it is essential that models are light so they do not 'kill' the motor rpm in manoeuvres – tight manoeuvres with a glow motor invariably slow the model down considerably. Therefore, flying a glow-powered combat model against a diesel-powered machine can be tricky, as when attempting to follow one ends up with the glow model overshooting. However, the technique to be



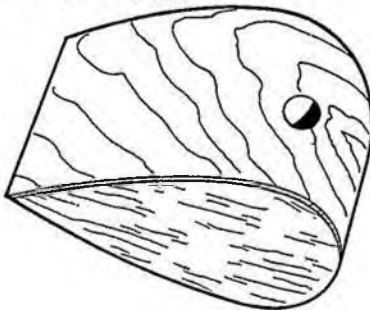
Note how the pit box carries several Bulldog clips to nip off the fuel tubing between the fully inflated fuel tank and the engine. Starting procedure is described in the text.



Various propellers used by the Cannock Outlaws – from left to right are a cut down Keil Kraft 8x4in., a 7x6in. Tornado and Frog, a cut down Frog 7x6in., full-sized Top Flite and Keil Kraft 7x6in., and finally a cut down Tornado 7x6in.

developed is to go for cuts in the cross, and also to attempt to follow at a distance and 'cut corners' where possible. It is very difficult to practice combat flying with these motors, because if the whole club flies glow motors then practice sessions do not relate to actual contest conditions!

1/32in. plywood covering



Two sides from 1/8in. hard balsa.

Figure 2. Typical pod for housing pacifier fuel tank. Pod should be approximately 3-4in. long, 2 1/2in. deep and have 1/4in. diameter hole for inserting the empty pacifier.

To fly glow motors you need a good reliable pit crew. Many top fliers pick up their pit crews at competitions, but with glow motors this would be virtually impossible as the pit crews need to be acquainted with the systems involved. For example, normally when a diesel-powered model hits the floor it is immediately restarted and thrown back into the air – this is *not* the case, however, with glow motors. The system used is that the person delegated as a streamer holder replaces the streamer from the crashed model, puts a clip on the 'dummy' to stop the fuel escaping, returns to the spare model (which is being pitted by the other two members of the team) and attaches the streamer to this spare model. This is quite a hectic procedure, especially if during the four-minute bout you have more than one or two collisions!

Close up of MVVS installation reveals the pod installed right against the leading edge and bearers, with the empty pacifier ready to be inserted.

### Conclusion

It is interesting to note the remarks of all the top combat fliers when talking about glow motors. The normal reaction when we walk on the flying field is, 'You're not playing with those toys again'. Mick Tiernan expressed the usual opinion that they were too much trouble to sort out, but 'don't stop flying them – we need some variety'. Whilst having a similar discussion with Vernon Hunt, his remarks were that he thought anybody could be good flying a combat model ten miles an hour quicker than anybody else, and that all the art was being taken out of it!

There are only one or two other clubs and individuals who fly glow motors, but we normally find that anybody who is flying a glow motor at a competition cannot go back to flying diesels.

Finally, there is one thing to remember; whilst it takes considerable time, money and effort to make a diesel run at a consistent 85 mph, *anybody* can purchase a Super Tigre G15, run it for about 15-20 minutes' 'running-in period' and obtain 90 mph in the air. Whilst this may not be as consistent as a diesel, it is certainly quicker and we are sure that if more people were prepared to try glow motors in combat models, combat flying in Great Britain would take a turn for the better. Should anyone require any further details, or information regarding glow motors for combat, just contact us at any combat competition.



Simplify construction and speed-up assembly by using a

# WING BUILDING JIG

TONY CORDES explains how

THE CONSTRUCTION of modern high performance under-cambered wings can be considerably simplified and speeded up by using a curved-form wing jig. In the initial stages of construction there is no need to pack up the leading and trailing edges in the traditional way and

styrene cores are employed then again it is simply a case of attaching the bottom sheet to the jig and building above it. No matter what the internals of the sheet covered wing, the final task is to add the top sheeting and again the undercamber support enables this task to be

of the front tangent is different to that at the rear. (N.B. Most aerofoils can be approximated to two tangents plus a joining curve.)

There is, of course, no need to build warps into wing panels on the jig, apart from warps which are automatically built in via elliptical or tapered tips. If panels are built flat and butt joining of panels is used at the dihedral breaks then it is a simple matter to offset the joints to produce the required amount of incidence change (Figure 4). Although this method is not generally employed it

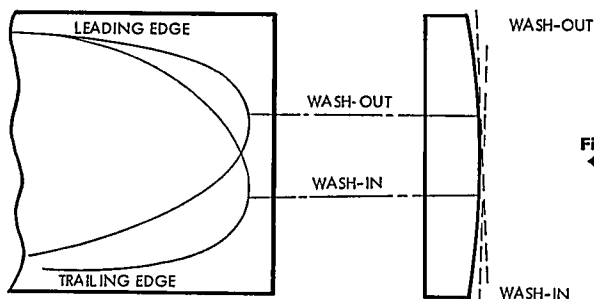


Figure 1

Figure 4

much time can thus be saved. Later, because the entire undersurface of the wing panel is supported, much more 'holding pressure' can be applied without the ribs collapsing or splitting, and the shaping of the leading and trailing edges or the insertion of top spars becomes much easier. In fact the whole process of building a wing panel appears to be so much easier because of the undercamber support that the not-so-skilful, or less experienced modeller, can attempt a construction that formerly he or she would consider too difficult.

Sheet covered wings become very much simpler to construct using a jig since the bottom sheet is merely pinned or taped to the jig, thus automatically taking up the undercamber form, while the ribs and spars, leading and trailing edges can be glued to the sheeting. If poly-

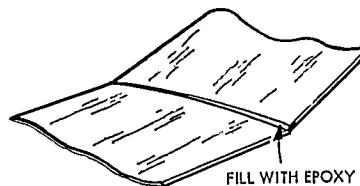
completed in a less frustrating manner.

Elliptical shaped tip panels are also very much easier and quicker to assemble, again because there is no need for packing. When elliptical tips are made over the jig wash-out is automatically built into the panels. This might be considered a disadvantage especially if a warp free or wash-in wing is desired. A limited amount of warp variation is possible however by varying the location of the apex of the ellipse (Figure 1). Since there are basically two relevant variables, namely the location of the apex and the curvature of the undercamber, it is difficult to calculate the resulting warp in the tip, and thus one must resort to a little trial and error.

Generally wing warps may be built into wing panels to a limited degree without resorting to packing, which after all would defeat one of the main advantages of the wing jig, by building the panel out of line on the jig (Figure 2). The limit to the amount of warp is governed by the length of the tangents at the front and rear of the undercamber curve (Figure 3). The warp is a result of the fact that the angle to the horizontal



"WARP"



FILL WITH EPOXY

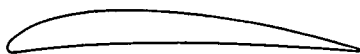
has been used successfully by several prominent modellers.

Wing jigs are also very useful when repairs or rebuilds of damaged flying surfaces are necessary and because they are not as big or heavy as the standard building board they could be taken to the flying field for on-the-spot repairs which are some-

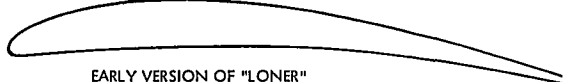
Figure 5



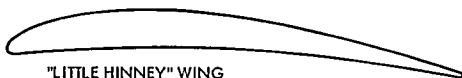
"LONER" WING



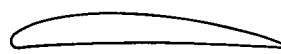
"LONER" TAILPLANE



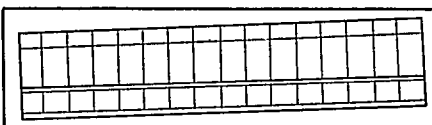
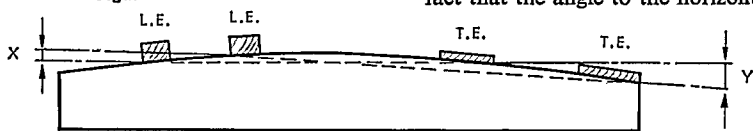
EARLY VERSION OF "LONER"



"LITTLE HINNEY" WING



"LITTLE HINNEY" TAILPLANE

Figure 2  
Figure 3

$$\text{WARP} = Y - X$$



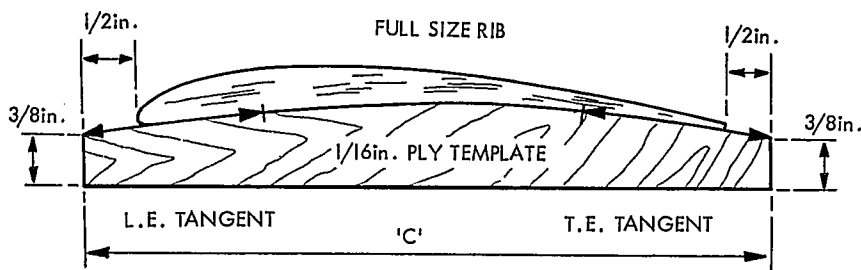


Figure 6

times necessary during a contest. In recent years with the advent of quick-drying epoxies more complicated field repairs are possible and the jig will certainly prove more beneficial than the model box lid!

It might be argued that a wing jig places too much of a restriction on the choice of aerofoil that can be employed on any particular design. To a certain extent this is true but set out in Figure 5 is a selection of aerofoils that have been used for the wings and tailplanes on a range of models, all of which can be assembled on the same wing jig. Also, many so-called different aerofoils have very similar undercambers for the same chord, and would thus be assembled on the same jig without too much difficulty. In any case, as can be seen below, a wing jig can easily be constructed in an afternoon, so if one is sufficiently diligent a range of wing jigs can soon be accumulated. Obviously the main advantage of the wing jig in this sense is gained when it is desired to construct several similar models and this was the underlying reason why I made my original jig.

#### Construction of a Wing Jig

It is assumed at this stage that the choice of aerofoil to be assembled over the wing jig has been made. Draw the aerofoil full size as accurately as possible. Using the undercamber portion only, carefully draw tangents at the leading and trailing edges so that a smooth continuous line is produced (Figure 6) and extend them  $\frac{1}{2}$ in. at the front and rear of the aerofoil so that the width 'C' of the baseboard is determined. The length of the baseboard is such to accommodate the longest length of wing panel likely to be assembled over the jig. Something around 30in. is normal.

Having determined the dimensions of the baseboard, it must now be cut to size from  $\frac{1}{2}$ in. blockboard, chipboard or similar, but make sure that whatever material is used it is perfectly flat. Using a set square, mark off the locations of the ribs allowing a uniform spacing of about 2 to  $2\frac{1}{2}$ in. between ribs (Figure 7a) and then mark the locations of any webbing (see later). Carefully make a plywood

rib template (Figure 6) and make sufficient ribs with it from  $\frac{1}{2}$ in. medium balsa sheet. When they are all cut out, pin them together *en bloc* and sand them to ensure they all have an identical profile. Epoxy the ribs to the baseboard in the marked off locations (Figure 7b).

The next stage is to epoxy into place all the webs (Figure 7c). These are made from  $\frac{1}{2}$ in. medium balsa sheet and are located at the leading and trailing edges and intermediates along the chord to give about 2 to  $2\frac{1}{2}$ in. gaps. Make the webs slightly oversize in the vertical direction, and when the epoxy is set plane or sand

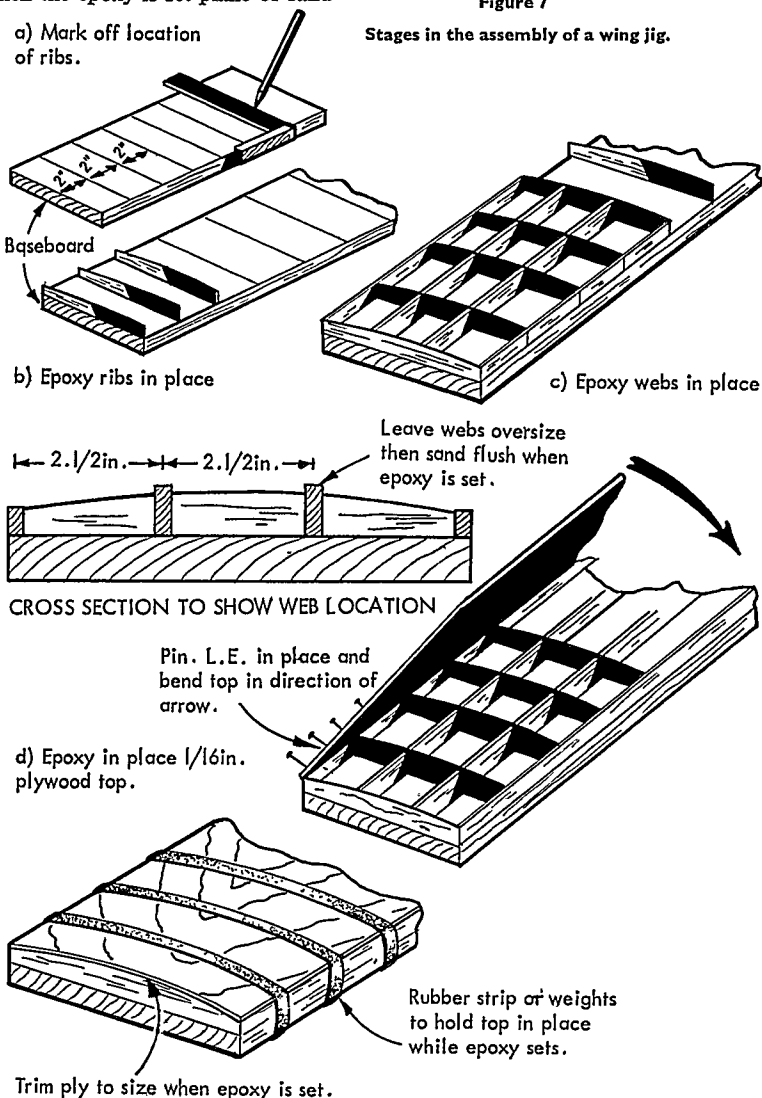
them to the correct chamfer flush with the ribs.

It is best to fit all the webs into place 'dry' so that as many as possible can be glued in position for a given mix of epoxy. (It is not possible to glue all the webs into place with a single mix of normal quick-setting epoxy).

Next cut a piece of  $\frac{1}{8}$ in.-thick plywood slightly oversize to fit over the top of the assembled structure. Mix an excess of epoxy and working quickly, cover the structure and attach the plywood top using rubber strip or weights to hold it down until the epoxy sets (Figure 7d). When all is dry remove the rubber strip or weights and trim the plywood to size. Finally give the jig four or five coats of thinned (50/50) banana oil rubbing down between each coat with 600-grade wet and dry paper, and complete with two or three coats of car or floor wax polish.

Figure 7

Stages in the assembly of a wing jig.



First of a two part feature on the subject you cannot ignore:

# MODEL FINISHING

Painting, that is, not 'pranging'!

I HAVE BEEN aeromodelling now for some 20 years, and as the proprietor of both a motor vehicle coachworks and paint manufacturing company, I must confess that my facilities for final finishing of models are far in excess of those available to the average modeller. However, in this article I shall attempt to prove even to the 'long-in-the-tooth' modellers that with just the most rudimentary facilities one need not spend aeons of time (hair-rendering, nail-biting, chain-smoking, etc.), in finishing your model to the highest possible standard. No doubt some of the 'old school' will disagree with some of my methods, but before we kick off might I say that it is 1974 my friends, not 1934, so get with it!

In view of the diversity of materials now on the market for building and covering models, I shall deal with each in turn and invite comments from readers which I hope will be published at a later date. Are we sitting comfortably? Then we shall begin:

## TISSUE, NYLON AND SILK WITH DOPE AND POLYURETHANES

Many modellers still prefer these conventional methods of covering models, especially the scale and vintage fanatics. I will not even attempt to tell you how to cover your model with these materials but may I suggest the following variations to your final finish? When covering with nylon or silk, especially for a scale fabric finish, first cover the model with white lightweight tissue, and apply two or three coats of clear dope. Pin down to dry in the usual way. Now wet cover the model with silk or nylon (trimming the edges with pinking shears gives a beautiful effect). The more water the better because the surface tension of the water will draw the nylon/silk onto the doped tissue and eliminate air bubbles. Dope is not applied to the second covering at all; merely brush a little thinners round the edge of the wing/tail/fin, or the appropriate longerons and edges of the fuselage. The thinners will penetrate the wet

nylon/silk and sufficiently dissolve the dope which has been applied to the underlying tissue to hold down the second covering (undercamber as usual, creates problems especially if ribs are uncapped – several gross of modelling pins is usually the answer). Now pin the frame down again until thoroughly dry. **DO NOT APPLY DOPE!** When dry, lightly brush the second covering, or better still lightly spray, with pure thinners just sufficient to dampen the covering all over. This will eliminate blooming round the edges where thinners was applied whilst the second nylon/silk covering was wet and also firmly bond it to the tissue without air bubbles. No further dope is needed as the nylon/silk weave is in effect filled by the underlying doped tissue, but the fabric finish is still prominent.

I now recommend that the final coat of coloured or clear fuelproof

of your required colour blend by volume of component colours in your particular blend, and mix a little at a time as you need it.

Should you wish to use tissue only to cover your model, the method I have just set out will be found perfectly satisfactory. Use either heavy or lightweight tissue for the second covering. If the brushing or spraying of your final fuelproof coat lifts some of the tissue fibres, leave them alone for the moment. When thoroughly dry, gently wipe the surface a few times – do not rub – with a dry 1200-grade waterproof silica carbide paper (generally called 'wet' and 'dry'). This paper is available from most stockists of vehicle painting materials which I shall list later. If you are lucky you may obtain 1200-grade from a car accessory shop, but not many stock such fine grades. Whilst you are buying your 1200 you may as well get some 150- and 280-grade – I will explain the uses of these later on. After wiping your model with the 1200 paper to remove any 'fuzz', brush or spray a second coat of polyurethane diluted 50-50 with the appropriate thinner, and a beautifully smooth matt or gloss finish will result.

Inside engine compartments and cowlings you can apply as many coats of two-part polyurethane as you wish. To thoroughly fuel-proof these parts I have applied up to ten heavy coats with only four hours drying time between each. I usually place the fuselage in an airing cupboard to dry it quickly at a temperature of approximately 120°F. This temperature will not warp the model, but do not allow the heat to go over 140°F or it may. The paint in the engine compartment should thoroughly dry at these temperatures within the four hours – if not, add approximately 10 per cent extra catalyst component 'B'. You should appreciate that two-part polyurethanes dry by chemical reaction, not by solvent evaporation or oxidation, so no shrinkage and opening-up of the fabric weave will occur. The method which I have just described has several advantages:

BY  
VERNON  
SMITH

finish is applied. I have tried several paints for this purpose and have found that *International* or *Little Ship* two-part polyurethane paint or varnish is the best. Most boat or yachting centres stock these and with care you should only need one coat brushed well into the fabric with a large artists wash brush, or preferably lightly sprayed. Several colours are available which can be blended to give the final colour (e.g. olive drab and buff) which you require if you are not using pre-coloured fabrics. If a matt finish is required a matting agent can be obtained for this purpose from *International Paint Co., Southampton Ltd.*, to add to your blended colour. The batch of matt colour must be used within 24 hours, or the matting agent will settle to a solid mass at the bottom of the tin and ruin the whole lot. I recommend that you make a note of the formula

1. The finished product is lighter by as much as 15 per cent because much less dope and/or paint is needed.

2. The covering is stronger by as much as 20 per cent due to the additional layer of tissue.

3. The model is made totally fuelproof in one operation—and warp resistant.

4. The final coat of colour will not chip or scratch off as it is impregnated right into the fabric.

5. Less dope means less likelihood of distorting structure by shrinkage.

6. The fabric finish really stands out (take note scale fanatics) because the weave will not be obliterated by countless coats of dope.

7. Two-part polyurethane, when dry, have similar properties to Mylar films (*Solarfilm*, *MonoKote*, etc.), i.e. if slackening of covering occurs

will most polyurethanes and cellulose. Please take my word for it, I hope my biology degree has not been completely wasted.

#### FUELPROOF DOPE

Many of you have, in the past, tried the old butyrate fuelproof dopes and found them unsuccessful, but I am sure that you will find the latest types, e.g., *Pactra Aerogloss*, *Testors* and my own brand, *Vernonite*, perfectly satisfactory. I apologise for the apparent 'plug' for my own product, but after all I am a modeller myself and I formulated *Vernonite* with your specific requirements in mind and feel sure that we have overcome the disadvantages which were characteristic of the original butyrates.

Fuelproof dopes are used in the

can be recommended for application over any other type of dope.

Under normal circumstances, dopes and cellulose-based materials cannot be applied over non-cellulose paint but there is a *Vernonite* special sealer which permits cellulose paints to be applied over polyurethane and conventional enamels without 'cockling' and bubbling. I will gladly answer any of your questions relating to these materials if you should care to contact me c/o Vernon's Model Supplies, 69 Clive Close, Potters Bar, Herts

I recommend that when brushing any dope you add a small amount of I.C.I. *Belco* retarder, available from I.C.I. Paints, Slough, or any of their *Belco Car Finish* stockists. I have found it to be compatible in small quantities with any of the available dopes to prolong drying time. Provided you are painting your retarded material onto a good surface with a soft brush (the bigger the better on large areas), the brushing will have ample time to flow out leaving a glass-like, blemish-free, finish which at most will need only a light polishing. There is, therefore, no need to spend valuable modelling capital on spraying equipment.

However, you must bear in mind that delayed drying time increases the possibility of dust inclusion, so do not try painting in the back yard please! Apply your retarded dope in a warm, enclosed, draught-free area and, if possible, damp down the floor. If you are doping in the kitchen or living room cover your furniture with dampened brown wrapping paper or wall lining paper. N.B. wet newspaper will stain your expensive three-piece suite.

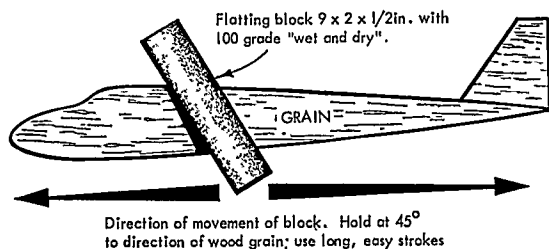


Figure 1

after a minor prang, or due to wear and tear, apply heat and it should re-tighten. Wash-out, wash-in, etc., can also be put into a wing after the panel is finished.

#### EPOXY RESINS

In my opinion epoxy resins have certain disadvantages; mainly that they are very difficult to brush, and spraying is extremely hazardous to health without proper industrial facemask and adequate extraction of fumes and atmospheric particles. Many authorities also consider epoxy resins are carcinogens, i.e. a cancer risk, and I am sure we do not wish to shorten the life span of our modellers (falling from Ivinghoe Beacon, damp grass and cold frosty winter mornings are sufficient to contend with!). To cite but one example, Walt Schroeder, the editor of the American magazine *Model Airplane News*, spent some months in hospital under intensive care after using epoxy resin paint without the aforementioned safety equipment. Both epoxy resin particles and vapours are accumulative toxins and will not be passed out of the body by the usual metabolic processes, as

same manner as conventional dopes and replace fuelproofers, epoxy-resins, polyurethanes—indeed any other type of top coat may be considered obsolete and to my mind the whole finishing process is thus simplified to the ultimate degree, if you wish to be that adventurous.

The double-covering process which I have previously explained, can be followed through in exactly the same manner, but where I have used two-part polyurethane paint, use *Vernonite* fuelproof dope. However, please bear in mind that more than one top coat may be needed, whereas you may get away with only one top coat of polyurethane. Also, note that of all the fuelproof dopes which I have tested so far, only *Vernonite*

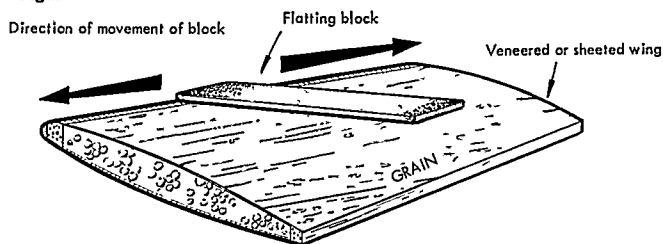
#### PAINTING SHEET WOOD STRUCTURES

e.g. Fuselages, Foam Veneered Wings, Sheet Fins, etc.

##### 1. Preparation

Fill in all cracks, pin-holes, seams, etc. after construction is completed. I recommend *Instant Polyfilla* in tubes for deep imperfections, and

Figure 2



for shallow dents, etc., use *Fine Surface Polyfilla*, available in small tubs from most D.I.Y. shops. Both bond well to balsa and other aero-modelling woods, dry quickly and are easily rubbed down. Plastic wood or equivalent is not recommended as it is very hard and when rubbing down a balsa structure you may find that the wood is abraded more readily than the filler, therefore a pronounced bump or ridge will result which is extremely difficult to remove. You may even rub right through the balsa and hardly make any impression on the plastic wood filler. For rubbing down balsa (flattening) I always use 150-grade Wet and Dry paper in its dry condition. Always use a flattening block, i.e., a piece of  $\frac{1}{4}$  in. sheet hard balsa size approximately 9 in. x 2 in. This ensures that the surface being prepared will be free of ripples, dents and high spots which can be caused by finger pressure through the paper. Cut a piece of 150-grade to the exact size of your block and stick to the block with Sellotape Twin-Stick. Always rub down with the grain of the wood and where a curved structure, e.g., nose cowl or turtle deck is being prepared, carefully finish off by hand to remove any flats created by the block. Always hold the block at 45° to the direction of block movement (this prevents clogging) and rub with long easy strokes - *Figures 1 and 2*. Short swift strokes will cause ripples. I have found 150-grade perfect for this purpose as it is sufficiently coarse to prepare the surface with a minimum of effort but fine enough not to tear up soft balsa grain. For those readers who live within easy reach of Camden Town or Southgate, Morelli & Co. Ltd. (address in 'phone book), stock 3M dry flattening paper in the grades required which is admirable for this purpose; otherwise I suggest you keep to the conventional wet and dry. I do not use sanding sealer.

After you are satisfied with the surface you may cover with lightweight tissue for strength and apply two coats of clear dope. If you are covering a solid sheet fin or tailplane I do not recommend the use of dope

Figure 3



Patches of guide coat which remain after flattening with 280-grade sandpaper denotes areas to be filled with stopper.

### Cellulose Car Finishes

1. Best sprayed but retarder available from *Belco* stockists to make brushing easier.
2. High gloss but matting agent available from *Valentine* stockists, for drab (vintage scale) finishes.
3. Not fuelproof. Recommended for gliders and diesel power only unless separately fuelproofed.
4. Good colour density.
5. Over 1,000 stock colours available.
6. Fairly heavy.
7. Quick drying (15 mins).
8. Fairly hard-wearing.
9. Non-shrink.
10. Brittle, will crack if applied to any fabric or wing panels in thick coats.
11. Not to be applied straight on to wood, nylon, tissue, etc.
12. Cannot be used exclusively for finishing fabric or tissue.
- 13.
14. Litre tins only, approximately £1.75.

### Polyurethanes

- Easily brushed or sprayed. Messy to spray without proper spray booth.
- High gloss but matting agent available from *International* for drab (vintage scale) finishes.
- Fully fuelproof.
- Good colour density.
- Approximately 12 stock colours available but can be mixed.
- Very heavy.
- Slow drying (6 hrs).
- Very hard-wearing.
- Non-shrink.
- Fairly flexible, difficult to crack even if flexed.
- Not to be applied straight to wood, nylon, tissue, etc.
- Cannot be used exclusively for finishing fabric or tissue without much difficulty.
- Litre tins only, approximately £1.75.

### Fuelproof Dope

- Spray or brush. With *Vernonite* retarder, brush marks flow out well.
- High gloss, drab (vintage scale) colours available from *Vernonite* and *Pactra*.
- Fully fuelproof (only *Pactra*, *Testors* and *Vernonite* have been tried).
- Colour density varies with manufacturer.
- Many *Pactra* and *Testor* colours available. *Vernonite* only 12, but can be mixed.
- Approximately same weight as conventional dope colours.
- Quick drying (15 mins).
- Hard-wearing.
- Pactra* and *Vernonite*, good shrink.
- Same properties as normal dope.
- Can be applied straight on to wood, nylon, tissue, etc.
- Can be used exclusively to finish a model.
- Pactra* say their product cannot be applied over any dope, *Vernonite* can.
- Full range of sizes available up to 1 imperial pint, 40p - £1.25.

### Advantages and disadvantages of various finishes

as the shrinkage can easily warp a lightweight thin sheet structure. I strongly recommend either *Belco* or *Valentine* clear base cellulose lacquer for this purpose which are available from Brown Bros. Ltd., Morelli & Co. Ltd., most car paint

stockists and good car accessory shops. Neither of these products shrink on drying and therefore avoid warps. If you feel that your construction is sufficiently strong you may dispense with the tissue covering altogether and proceed straight to phase 2 after the first preparation.

**NO DOPE IS REQUIRED AFTER THIS POINT** other than *Vernonite* for fuelproofing if required.

**2. Priming and Further Preparation**

Many modellers may find that the finish thus far achieved with the tissue is adequate, but for a concours finish proceed as follows:

*continued on page 683*



# RUBBER TECHNIQUES

## PART V

Ron Coleman writes on how to cope with the 'Coupe' motor tube

It is most important that the fuselage being wound must not adhere to its former. As a safety precaution candle wax is rubbed over the surface whilst being melted by the heat of a domestic cooker, in addition to using strips of polythene.

SQUARE or rectangular sectioned fuselages, consisting of longerons and struts, or flat sheet, balsa construction are the easiest to make, but they also offer a good deal of extra drag due to turbulent airflow, which of course absorbs power during the model's climb.

The Coupe d'Hiver model with its

The best formers are purpose-turned on a woodworker's lathe (Figure 1) but alternatives are cardboard tubes, round table legs, round wood rulers, or metal and plastic plumbing pipes. The former needs to be truly straight so that it can slide out from inside the balsa wood tube when the joint glue line has set.

Procedure for making a rolled balsa motor tube

1. Prepare the wood or cardboard tube former by rubbing heavily with candle wax, and melt into the surface by heating over a cooker ring. When the wax has set, wrap three separate pieces of thin polythene sheet around the former - these pieces should each only just reach around the circumference with a slight overlap. The combination of the wax and polythene layers allow the former to be slipped out from inside the balsa tube when the glue has set, and prevents any possible adhesion. Use small pieces of tape to hold the edges of the polythene if it is difficult to control in the wrapping, but allow nothing to stick to the former.

2. Cut the piece of  $\frac{1}{16}$  in. or  $\frac{3}{16}$  in. sheet balsa to the same length as the former (average about 14 in.) and equal in width to the former circumference ( $1\frac{1}{2}$  in.  $\times$  3.14 usually). With a glasspaper block, glasspaper a chamfer on the inner joint edge. See Figure 2.

3. Soak the balsa wood in very hot water for twenty minutes and wrap around the former, holding it down with long narrow strip elastic

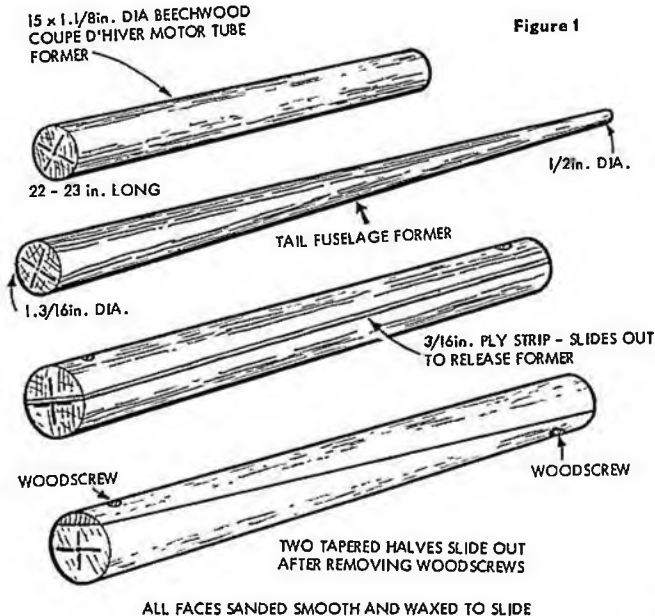
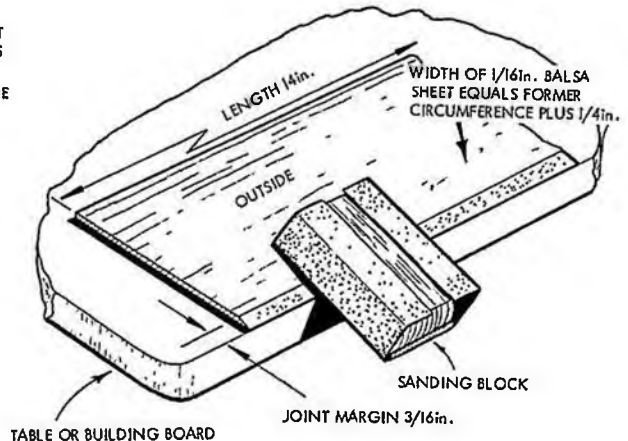


Figure 1

10 grammes of rubber has no power to waste, and so the circular sectioned fuselage is much to be preferred. A round fuselage is compact, and much stronger and longer lasting than the longeron-strut variety while the rolling of round sheet balsa fuselages should present no great difficulties, providing that accurate formers are made available.

Figure 2



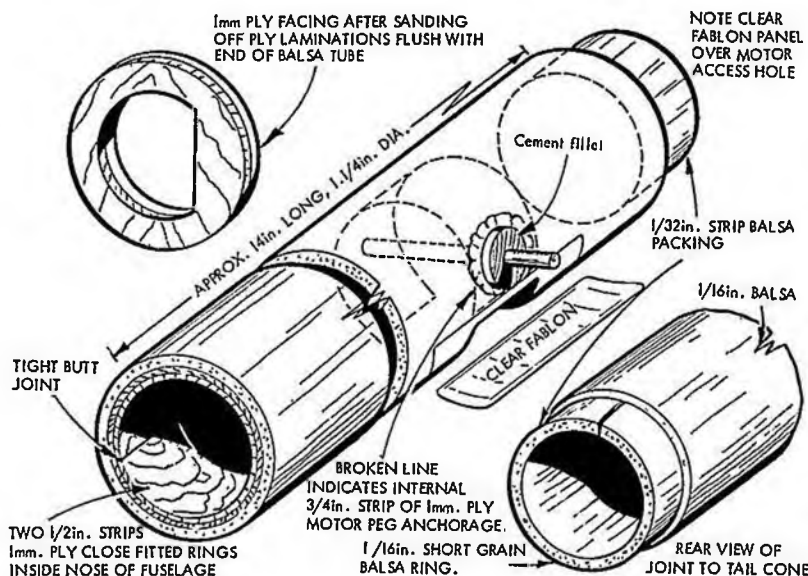


Figure 3

medical bandage. Leave to dry out for two or three days.

4. Unwrap the bandage, check that the balsa is free on the former, and run a thin line of PVA glue along the joint bevel, and smooth it out into a neat glue strip with the forefinger. Roll the balsa firmly into place on the former, bringing the glue joint together. Sponge off any slight excess glue, then working quickly, remove the balsa tube and sponge away any glue which might have found its way onto the polythene sheet. Replace the balsa tube on the former, bring the joint together and bind firmly, but not too tightly, with the elastic bandage. Allow to set for three hours. Carefully slide out the former and remove the polythene sheets. Push the balsa tube back on to the former and trim the ends square with a balsa knife, and pare off the excess balsa from the joint. With a glasspaper block sand the joint edge into the cylindrical contour, and face off the tube ends - a powered sanding disc and table are very handy for this end facing.

5. Inside the nose end, a 1/2in. wide strip of 1mm plywood cut on the

short grain, is applied in two layers with PVA glue. This should first be soaked in hot water and allowed to dry whilst bound to the former tightly, or it can be rolled into a ring upon itself and held with a strong rubber band. When dry, it should be close butt-jointed in two layers, keeping the ends on the long side always to ensure a tight all-round fit to the inside of the balsa tube. When the glue has set the end of the tube should again be glasspapered to face off accurately (incorporating any built-in side and/or down thrust angles desired) before glueing on the 1mm plywood facing former - Figure 3.

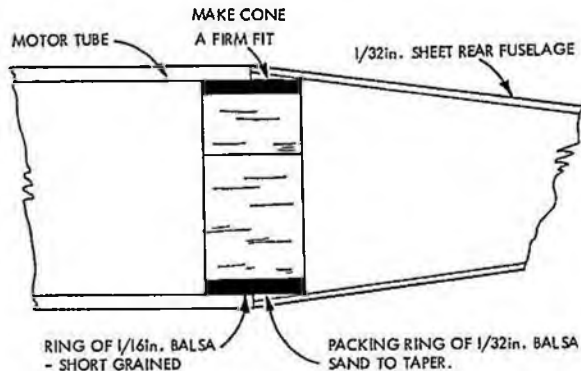
6. The joint at the rear end of the motor tube to the tapered rear fuselage cone is made with a 1/2in. strip of balsa cut on the short grain, and forms a joint similar to an Easter egg cardboard carton joint. As the cone is usually made from 1/2in. balsa, a packing piece of 1/2in. balsa is required at the joint, and the balsa ring needs to be carefully sanded by hand to the slant of the cone to secure a firm fit, and accurate alignment of the two fuselage

halves - Figures 3 and 4.

7. The rear fuselage cone of 1/2in. balsa sheet is made in a similar way and is cut from a 4in. wide sheet. Mark off the circumferences plus joint overlap at the front and tail ends, and using a straight edge, cut out the tapered piece (the tapered former is much easier to slide out as it can be tapped lightly at the rear end). Incidentally, if you have great difficulty in removing formers, despite the wax and polythene sheet 'shims', suspect the accuracy of the former it must be straight. If straight, but slightly tapered, it can only be slid out in one direction! If it is in any way bulged, convex or concave, your former is permanently locked in... and, it can only be removed by cutting the balsa wood. You may wish to make, or get a skilled wood-turner to make for you, formers like those in Figure 1, which can always be removed easily after sliding out the packing piece, or the two halves of the former.

8. A far stronger motor tube - well worth the extra work - can be made by cross-graining two layers of 1/2in. sheet balsa wound spirally onto the former, bonded together with PVA glue. It is necessary to work with parallel strips, say 1 1/2in. wide (cut two from a 3in. sheet). Soak the wood in very hot water and wind on to the former at an approximate angle of 60°. The former needs to be a good deal longer to accommodate the considerable overlap waste ends due to the spiral. Bind down the first layer - you may need assistance to hold the ends, etc. - or you could use tightly bound rubber strip to hold the ends. Make sure that the ends come neatly together. The first layer of wood can be dried out, followed by the second layer, or you can put both layers down together, if pressed for time, but this is a little more awkward to manage. Allow the wood to dry out thoroughly whilst bound down, with

Figure 4



Left: Front end of the wound balsa fuselage shows ply facing to accept noseblock together with internal plywood reinforcing rings - see Figure 3.



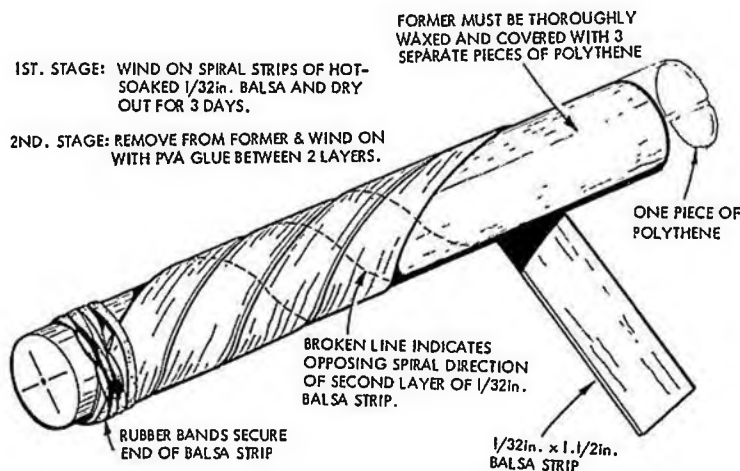
Access hole to the motor peg is covered by transparent Fablon (note its backing sheet in foreground). Reinforcing for motor peg may be either ply discs as shown - or internal ply rings.

rubber strip or elastic bandage. However, if the ends are secured the spiral wound strips may keep themselves in place adequately - Figure 5.

9. After drying for 2-3 days, cover the former with polythene sheets as before and bind on the first spiral wood layer (which, removed from the former will be like a floppy coiled spring). Make sure that the edges are properly aligned and coat the whole layer with PVA glue as you proceed to wind on the second wood layer, cross graining the first. When set, trimmed and sanded off, your tube will be very strong; a light 'plywood' cylinder



Figure 5



which can be easily patched and repaired as, with care, it goes on giving flying service for many years, or at least, months!

10. Motor anchorage reinforcement plates of 1mm plywood (Figure 3) should be cemented in place and well filleted at the edges. The motor access hole can be covered with clear self-adhesive plastic sheet such as Fablon which can easily be removed and replaced as needed, and it has the advantage of being a 'dust magnet' (like a magnetic oil drain plug for metal particles in a car engine) which immobilises dust and dirt which otherwise collects on the rubber motor.

In Part VI of this series I shall discuss a cheap, simple and efficient method of treating the internal surface of the motor tube as an 'everlasting' protection against sogginess from rubber lubricant.

## MODEL FINISHING

Continued from page 680

Brush or spray as many thick coats as you see fit of *Valentine* or *Belco*, grey or brown, primer surfacer (if brushing remember your retarder) and when dry quickly spray or brush one very thin coat of a contrasting colour. In the motor trade we call this a 'guide coat', it is designed to cover the primer but its use will become apparent as we proceed. Primer-filler has very high build properties, i.e., the dried film is very thick but low mass and is much more easily flattened than top coat or dope. It also takes the place of sanding sealer if your model has not been tissue covered. You can afford to be heavy-handed with the primer as your aim is to provide a good surface for your top-coat. Do not

worry about adding weight as most of the primer will be removed by your next flattening.

When thoroughly dry, flat your model as before, now using 280-grade wet and dry paper in its dry condition, or better still your 3M 280-grade dry flattening paper. The first few strokes will cut through the guide coat and you should ultimately remove it all, leaving a smooth grey or brown surface, of flattened primer. If any spots of guide coat remain after a thorough flattening you know that you have a dent or crack which has hitherto been overlooked - Figure 3. Now you know why we call it a guide coat! Fill any such imperfections with *Valentine* or *Belco* stopper (cellulose putty) avail-

able from same stockists as primer surfacer. Special stopper rubbers are available from these stockists for the application of stopper - do not use a filling knife, carving knife, or old spoon or you may easily mess up the whole job. However, a polythene spreader will do, provided it is flexible and you exercise great care. Do not use any other filler as it will not adhere properly. The model must now be set aside for 24 hours to allow the stopper to dry thoroughly before flattening the 'stopped up' areas with 280-grade and your block. No further primer need be applied over the stopper.

To be completed next month



# BOCHUM '74 INTERNATIONAL

September 14-15th

**Dave Clarkson visits the popular German control-line meet, in company with several British competitors**

**Eventual team race winners Gürtler/Baumgartner wait for the start of a heat with their all-Bugl model. This team is consistently recording times around four minutes at present.**

THIS ANNUAL EVENT on the F.A.I. Contest Calendar was held on the car park of the Ruhrpark Shopping Centre, near Bochum, a very pleasant and mostly new town in the Ruhr between Essen and Dortmund in West Germany. As in 1973 a large contingent of British fliers competed, and for the first time achieved some considerable success! Most of the British arrived late on the Friday after travelling by car on the overnight ferry from Dover, half of us camping at the shopping centre; the rest staying in Bochum either with friends or in a local guest house. The first job performed by the campers was to assist the organisers, the Bochum club – which includes such well known people as Josef Fröhlich, Jürgen Lenzen and Emil Rumpel – to erect the safety fence around the Speed/Team racing circle.

Steve Blake supplied the Stunt and Speed reports, myself the Team Race report, with photographs from Dave Fry and Steve Blake.

## F.A.I. Team Race

Twenty-one entries were received from six countries including five teams from the U.K., namely Tribe/Fry and Harknett/Smith from the Feltham club, Heaton/Ross, Sutherland/Woodside and Clarkson/Daly from the Norwest club. We also had an interest in the Anglo-German entries of Jackson/Summerfield and Lenzen/Broad. In the virtually ideal weather fast times were to be expected now that the 'unspeakable' line groupers are with us, and fast times certainly resulted. The International Jury was consistent and fair but again illustrated the differences between British and Continental rule interpretations. It soon became apparent that safety and procedural rules were being strictly enforced and that obstructing or 'holding up' one's opponents was frowned upon, whereas a steady lean on the model and 'fast' overtaking went unpenalised. Possibly because of the sloping contest site the Jury enforced warnings for low flying as well as the more usual high flying; quite an obscure rule interpretation.

Heat 1 saw the first British team of Tribe/Fry suffering bad settings and a missed catch on their Bugl to record only 5:10. Things improved for us with Heaton/Ross recording a 3-stop 4:15 time from their newest model and for Clarkson/Daly, using a brand new K & B first run a few hours before, a problem free 4:18. Sutherland/Woodside recorded a moderate 4:44 with another very new K & B in a 'bitsa' model, assembled from their Woodford Rally wreckage but Harknett/Smith retired from their heat when Tony Harknett caught-off the outboard tip from their best model, the rest of the model crashing into locals Brendel/Glodek's model which did not please anyone, including the Jury. Besides these good-to-bad British results, the Austrians had achieved 4:01 and 4:02 heats showing just how fast they are. Almost as impressive were the converted Rossi's of Kühnis/Saccavino and Brendel/Glodek with 4:10 and 4:23 respectively.

The second round started next day under a cloudless sky and hot sun. Again Tribe/Fry opened for the British, and again setting problems slowed them to a 4:36; good by U.K. standards but not

**Best British performers in each class were (left to right) Derek Heaton and Malcolm Ross with their Bugl powered racer. Steve Blake and his trusty Fox 35/Starmaker aerobatic combination and Gordon Isles with Rossi 15 powered ex-Rumpel speed model.**

enough for Bochum. John and I marched in for the second heat and found ourselves with Austrians, Fischer/Nitsche and a Bugl-powered Dutch team. Whilst the Dutch were getting themselves disqualified for low flying, Fischer and I had a nice contest for the middle, with his Bugl slowly deteriorating and my K & B coming on. At lap 94, the K & B finally ousted the Bugl, and John started cheering so loudly that I thought we had finished. Anyway I relaxed, and cut the motor on lap 98, and then realised from John's changed noises that we had not finished, so glided the last laps. Starting rather slowly, another 4:18 resulted, with Fischer/Nitsche in at 4:12 because of three pit stops. Heaton/Ross with an older model and motor, two-stopped to 4:16 and Harknett/Smith improved to 4:49. After increasing the venturi size, Sutherland/Woodside found a 5% speed increase whilst retaining 2 stop range on their K & B, and recorded a nice 4:29. Unfortunately, the Metkemeyer brother's time-keepers had failed to start their watch and the whole thing had to be re-run. Surprise, surprise! Sutherland/Woodside repeated their 4:29, and flew themselves into the semi-finals to join their Norwest clubmates. Whilst all of this was going on, the Austrians (very experienced competitors indeed) Gürtler/Baumgartner slipped in a 3:56 heat time, the fastest ever recorded in an F.A.I. Open International contest, and 1974 British Nats. winners Helmich/Kroon gained a new Dutch record of 4:08 with their Bugl powered Nats. winning model – nice one Henry! Finally, Manfred Bader and Konrad Kaul produced a new Rossi RV diesel, and three-stopped a 4:16 to push John and I down into seventh place.

The semi-finals were generally slower, as so often proves to be the case, leaving Gürtler/Baumgartner, Fischer/Nitsche and Heaton/Ross as the finalists. Sutherland/Woodside were going better than ever until their second pit stop, when due to the slope of the ground their model did not 'come out' fully, so Jim Woodside





slipped the catch and had to do a very quick retrieve job, which must have cost them at least five, possibly ten seconds. Our K & B unaccountably lost range and a little speed, a third pit stop on lap 97 resulted in a personally disappointing time.

With two Austrians in the final against our own Heaton/Ross, Derek expected some 'pressure' in the middle, and certainly received this, notably on his left arm and shoulder! The rapidly changing temperature and humidity in the early evening caused all three pitmen to set their Bug's too lean, with Heaton/Ross suffering the most (a bit of dirt possibly made things even worse for them) so all three adjusted needles at early first pit stops. Malcolm had to do this again in short order, finally getting a good setting – a full  $\frac{1}{2}$ -turn further open than in practice a matter of minutes before the final. This second pit stop penalty was too much for them to make up, despite real effort from both partners, so they ran out third in the fastest final ever seen outside the Iron Curtain.

### Aerobatics

The British participation in the stunt event was the result of a commendable initiative by Glen Alison and Ted Fowler, who organised the trip to gain some experience of International competition standards. Your scribe joining the party to fill the third seat in the much-loaded Marina. The stunt site at Bochum is one of the worst conceivable for an international competition, as it has a slope of 8 to 10ft. across the circle. Ironically a perfectly flat site was available only 100yd. away in the same complex, but for some reason this could not be used. As the site is part of the car parking area at a huge out-of-town shopping centre, practice was only possible for a few minutes before flying commenced properly on the Saturday afternoon.

Twenty-one competitors from six nations made up the field while judging was in the hands of the experienced Liska from Czechoslovakia, Van Ommeren, Snr., from Holland, and a member of the local Bochum club. As the first round proceeded it was difficult to follow the competition as we had to wait until the following morning for the scores to be published. However, it was obvious that the honours were being contested between Van de Hout (Holland), Cappi (Italy), and Compostella (Italy). Louis Van de Hout in particular was keen to recover from his disappointing placing at the World Championships. Cappi and Compostella were, as ever, very consistent – so much so that they scored exactly the same amount of marks. These were the only pilots to top 900 marks in this round, but another five had scores between 850 and 900, so the competition was definitely still open. British fortunes were mixed; Glen Alison suffered an attack of competition nerves half-way through his flight and forgot the order of manoeuvres (we should have had better teamwork and been ready to prompt), Ted Fowler did his best which for just one year's flying is good, and much to his surprise (though not mine) was not placed bottom!

My own flight had a good engine run but unfortunately I either suffered from the very strong sun, or caught some exhaust fumes in my eyes as the model was turned over when starting, the result was that half the flight was flown virtually 'blind' and the score not surprisingly reflected this.

The second round caused a mild sensation, this time it was Louis Van de Hout's turn to suffer from competition nerves, and he missed out his hourglass completely. Meanwhile, back in the Italian camp, Cappi and Compostella made no mistakes and the gap between them widened to a whole six points. Paul Tupker who had received high marks in the first round, did not manage to maintain the standard and dropped almost 100 points. Glen and Ted both had trouble-free flights, whilst yours truly managed a slight improvement despite doing my loops 180° out of position (well, the wind had changed since the day before!).

Round 3 saw Van de Hout clinch the competition with a good flight, whilst the Italians slipped slightly again. I managed the second best score in this round to keep fourth, chased by the fast improving Raeymakers. Rossi was out of luck in sixth place, and Paul Tupker finally settled in seventh. Claus Maikis suffered an abrupt engine stop whilst inverted with his beautifully finished *Coronado*, but the damage was nothing that a few more coats of paint wouldn't cure. Youngsters, Edel and Guerrini were noteworthy; let's hope they keep at it. Glen Alison and Ted Fowler, whilst not achieving high placings, did nevertheless gain the experience they wanted, and perhaps next year?

### Speed

The speed event was perhaps disappointing, attracting as it did only eleven entries from the five participating nations. Furthermore, only twenty-one official times were recorded out of the possible thirty-three.



Above, Claus Maikis does it again! Always one with an eye for an attractive stunter, his new machine once more has different most attractive lines – and an appropriate superb finish.



Karl Ilg, better known for his team race antics, also flew in stunt with this 12-year-old *Crusader*. Solarfilm covered areas are those that have been repaired, while rear end of fuselage is uncovered!

Heaton/Ross tried out this flying wing racer in practice – features an old fuselage and aluminium skinned balsa wing for better rigidity.





Above, a neat way to carry a brace of racers – in this case Fischer/Nitsche's version of the Bugl 'Moskito'; Bugl powered of course. This model is fast becoming a 'standard' design – we have seen examples from at least five different countries now! At left: Jürgen Lenzen's Rossi 15 powered racer, pitted on this occasion by Jim Broad, currently working in Germany. Rumble pan/tank assembly used in this fast machine.

Most competitors were using Lenzen/Rumpel inspired models, with the latest 'mod' being a detachable aluminium tip section to ease the fitting of the lines. These models are not without problems however, handling seems to be the biggest and was the reason for several superb shaft runs, including Gordon Isles' new record (7) of staying airborne on a  $1\frac{1}{2} \times 8$  in. prop! Brechet wasn't worried by these problems with his very conventional model, and proceeded to confirm that the Swiss are now a real force to be reckoned with in Speed (it must be something to do with the distance from Brescia). Our own Gordon Isles made a personal best to place second, using his German origin plane, after experiencing severe handling problems with his identical copy. Lenzen bettered his World Champs performance by 1km/hr. to make third place – a fortune not shared by team-mate Fröhlich who had lost 31km/hr. since Czechoslovakia.

\* \* \*

At the subsequent prize-giving, presided over by the Mayor of Bochum and the manager of the Ruhrpark Shopping Centre, Heaton/Ross received their bronze medals and the three top U.K. team race teams received individual pots for the Team Prize.

Gordon Isles received the biggest cheer of all for his second place silver medal in Speed, and we were left with the knowledge that if one other British speed flier had entered and achieved more than 175km/hr., we would have come home with the ultimate bacon, the overall National Team Prize – a magnificent trophy donated by the

The Swiss team consisted of Kuhn/Saccavino with their Rossi 15 powered F.A.I. Racer (7th placed) Brechet who won the speed event with his usual metal winged Rossi 15 model and in the foreground Salathe who placed 13th in aerobatics,



Ruhrpark organisation. Nevertheless we returned home delighted and with two new U.K. records. Heaton/ Ross's F.A.I. Final time of 8:44 and Gordon Isles' F.A.I. Speed flights of 246km/hr.

#### RESULTS

F.A.I. Team Race		Final	
1.	Gürtler/Baumgartner (Austria)	8:27	Bugl
2.	Fischer/Nitsche (Austria)	8:36	Bugl
3.	Heaton/Ross (G.B.)	8:44	Bugl
		Best Heat	
7.	Clarkson/Daly (G.B.)	4:18	K & B
9.	Sutherland/Woodside (G.B.)	4:29	K & B
11.	Tribe/Fry (G.B.)	4:36	K & B
16.	Harknett/Smith (G.B.)	4:49	K & B

#### Aerobatics

1.	L. Van den Hout (Netherlands)	1,944 points
2.	C. Cappi (Italy)	1,909 points
3.	R. Liber (Belgium)	1,903 points
4.	S. Blake (G.B.)	1,801 points
15.	G. Alison (G.B.)	1,488 points
17.	E. Fowler (G.B.)	1,242 points

#### Speed

1.	A. Brechet (Switzerland)	251km/hr.	Rossi
2.	G. Isles (G.B.)	246km/hr.	Rossi
3.	J. Lenzen (W. Germany)	238km/hr.	Rossi

Guerrini used typical Italian stunt design with upright motor to place 11th – could well be a name to reckon with in the future if he continues his current promise.



# topical twists

by 'Pylonius'

illustrated by 'Sherry'



## Contest run down

WE ARE OFTEN told that we live in a contracting world. And I can well believe it, for we are besieged by contractors on all sides; bulldozing away the airfields, pushing motorways across the commons, and altogether flushing out our traditional flying sites with seas of concrete. All of which contracting has brought about a contraction in thought on how we should run our competitions. The general international idea, as far as free flight goes, is a sort of rapid commuting across some bit of undigested meadow or unused corner of an airfield; rather like a relay race, using loaded up models as batons.

Now this has caused a certain amount of anxiety among our own British breed of ageing free fliers who, unlike their track-suited, spiked shoe-shod continental counterparts, are not given to Olympian feats of athleticism. Some of the more agile British types tuck their baggy trousers into their woollen socks to give a more rakish appearance, but the compulsory tweed jacket and its multi-cardigan underlay tend to cut down on the rate of progress through the thistle and gorse of the average British flying field. Even with the aid of the ancient bikes (legacies of their distant youths?) with which they wobble down the crumbling runways, they are just not up to winking the model out of the tree, or culling it from the ubiquitous corn, in the few minutes between rounds.

Personally, I think this overseas agitation towards multiplicity of contest flights is all a dark conspiracy by these scheming foreigners to lower British morale, and prospects, even further. Quite apart from a twenty-five-year per man advantage in elasticity of sinew, they have all that state aid retrieving equipment like tracked vehicles, helicopters and the local militia. All we can do is to stick out for a return to the old three minute flight schedule.

## Sparrows sometimes . . .

Cows are not the only creatures with a taste for model fodder, according to a story told by veteran modeller, Mr. Harold Townner. Those ornithopting members of the Natural Flight Race, known as sparrows, have been digesting the yellow bits on the starboard wing of an old Tiger Moth stored in Mr. Townner's garage, mistaking it, no doubt, for a late crocus.

Now, whereas the urban sparrow may have a predilection for yellow paper there is another well known type of bird which goes for the green stuff in a big way, devouring it with huge bills. This cuts down on the amount of money available to spend on the really worthwhile things of life, like model aircraft.

But all this birdly ingestion is not to be confused with the pecking order which now prevails in the model world; that of social status. On the lower level there is the

hapless owner of the flapping wing model which operates thus through lack of spar rigidity; and, at the higher level, there is the radio genius who is preparing to flap his way across the channel – no doubt a £200 kit for the project is already in preparation.

## Weight and see

Someone, browsing through old model mags, came across a 1960 recommendation by the Italians to ballast up free flight models – 24oz. gliders, for instance – so that they could fly to two minute, airfield-saving maxs. The idea was considered a bit *avant garde* at the time, but now gravity anchors and flight restrictors are all the rage it is possible that, had the browser browsed far enough back, he would have got right up to date with modern thinking: contests of 40oz. machines doing a bare thirty seconds. It will be nice to see the old birch and oiled silk models back on the airfield.

## Noises off

We are told that the Noise Advisory Council is seeking powers to dampen down those minor noise nuisances, such as the cornet vendors and model aircraft – the ice cream and the high scream. Having failed to make any impression on the big acoustic fish, the jets and the juggernauts, they are going to see what can be done against the murmuring minnows.

Since noise is a symptom of life the noise objectors represent a very small section of the population, and might be disregarded if they didn't make so much noise about the silence they crave. And it is no use telling them that all they need is a bit of patience in order to enjoy an eternity of unlimited hush; they want their heaven on earth today.

Most people, particularly the young, are too busy kicking up their own kinds of row to worry overmuch about other people's noises. It is true that people living around airports might get a bit furious when a low flying jet drowns out the cornflake jingle, but generally the *homo sap* equates a good time with plenty of rum-bustious noise, and old Mother Nature herself is not backward in making an ear drubbing contribution to the scheme of things with cracking thunderstorms, roaring winds and the dawn chorus of birds.

It is a well known fact that the 'one foot in the last hole' brigade hate all that is young and clamorous, which is why they pick on ice cream vans – the joy of the kiddies – and on the model aircraft which, *they think*, is the toy of the kiddies.



R.A.F. SCULTHORPE, near Kings Lynn, provided the venue for the Trials held over the weekends of September 21st/22nd and October 6th/7th. The weather generally was cold and wind strengths varied over most of the contest period from 10 to 20 knots. At the scheduled start of the contest (10 a.m., September 21st) it was raining, and although unpleasant the wind was, in the view of many present, by no means so strong as to warrant cancellation. However, the Competition Secretary, no doubt influenced by the F/F Sub-Committee members, cancelled the first round – which meant no flying until noon. Immediately, controversy ensued between those who agreed with the decision and believe that teams can only be selected in ideal conditions (presumably hot and calm), and those who believe an advertised and scheduled contest should run regardless of conditions. Obviously, several opinions fall between these two extremes.

By noon there was no improvement in the weather, so the next round was cancelled, with little or no reference to competitors' views, and since this round included a lunch break this meant a three-hour wait for the third round. Opinions at this point became heated, especially when it was muted that the entire day's flying should be cancelled; so the officials called a meeting of competitors, where it was announced (again, with no apparent consultation with competitors) that irrespective of weather conditions, flying would commence at 3 p.m. At this time, the weather was no better than earlier, but in fairness the weather forecast was for improvement. As it happened, by 3 p.m. the rain had practically stopped and the wind dropped to almost zero; flying commenced and continued for the remainder of the Trials.

## TEAM TRIALS for 1975 Free Flight World Championships

**Tony Cordes comments on the meetings to choose our representatives in Bulgaria, Trevor Grey provides the pictures**

The organisation of the Trials was, on the whole, very poor. But for the commendable efforts by members of the F/F Sub-Committee telephoning as many competitors as possible, no prior information would have been available, as the *Model Flying* which was to contain details did not materialise. Consequently, several competitors arrived at the Trials not knowing the round times, or the sequence of flying. True, there were difficulties with regard to the venue being available or not; but these details are independent of the planning. It had also been decided to allow those who wished to fly purely for the Senior Championship to compete in the Trials (although they were not eligible for a team place), and also those who wished just to fly for fun. As it happened, few competitors fell into these latter categories, but one cannot see the sense in 'cluttering up' the already overburdened Trials for the Championships in Bulgaria with these extra bodies.

The contest ran itself, rather than was run; especially during the first weekend. Competitors were not able to assess their relative positions on a round-by-round basis until late in the contest, since no scoreboards were on display. Having cancelled the first two rounds, no attempt was made to make up the lost flights, and the 'organisers' remained absolutely inflexible as regards scheduled times of rounds – apparently it is more important to have meal breaks than to fly. It is a great pity that what is considered by most F/F fliers to be the most important and prestigious contest in the calendar should be run in so offhand a manner. What a shame the S.M.A.E. could not learn from the organisation and running of the *Free Flight News International* held just a year ago.

The above comments are not meant to be levied at individuals,

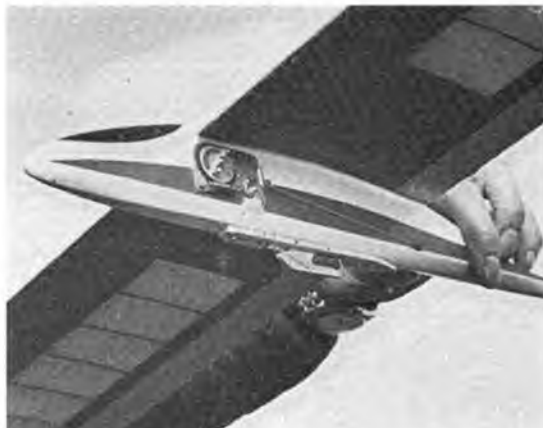
Heading picture shows the top three finalists in Power – namely (left to right) R. Collins of Anglia, R. Bailey and K. Faux both of the St. Albans club. Below is seen the Wakefield trio of (left to right) M. Woodhouse from the Norwich club, A. Wells of Anglia and R. Pollard of Tynemouth M.A.C. At left is Roy Green (St. Albans) with his continental style Wakefield – note the short nose moment and forward mounted fin.







Above, nose detail of Roy Green's Wakefield reveals Seelig timer mounted on pylon, sheeted leading edge and turbulated airfoil. At right is Ian Dowsett's A/2 - note the painted 'cockpit' outline and circular tow mechanism. Below right is Gerry Pink of Bristol and West who was placed third in Glider at the end of the first Trials.



but rather at the movement as a whole. It is wrong that only two or three keen individuals should be given, or have to take, responsibility for the *in situ* running of the Trials. Unbiased, non-flying help should be made available (subsidised, if necessary) to the competition secretary in a manner corresponding to the judges used in control-line or radio-control aerobatics. A means should also be found for reducing the number of fliers competing in the Trials, which would alleviate some of the organisational difficulties.

There were, however, some improvements over previous Trials: spot checks of flight times and engine runs were made, which led to some illegal flights being cancelled. Spot processing of models was also done, though no disqualifications were necessary, and while early morning starts were tried the weather did not co-operate and little or nothing was gained from them. Rule abuse by competitors and timekeepers was reduced, but was still evident, and this could possibly be lessened further with extra spot checking.

In spite of the organisation and the weather, strong teams consisting of good fliers emerged. Ron Pollard proved to be in a class of his own in Wakefield. Power flying was very consistent and to drop a single flight by more than a few seconds meant elimination from a team chance. Designs of Wakefield and A/2 have changed little from the last Trials, but Power is showing an increasing tendency to go 'Continental' by using triple fins, high aspect ratio, etc.

Below, best three in A/2 glider proved to be (left to right) John Cooper of Southampton, John Boon of Falcons and Mike Fantham of Richmond. Bedraggled appearance and wet runway in foreground underline the unpleasant conditions experienced. Will conditions in Bulgaria be like that? At right is Ian Dowsett seen with his superb A/2 at the first Trials. Saw-tooth turbulators used over full span, while colour tissue trim adds to its attractive appearance.



#### RESULTS

**F.I.A. (A/2)** - 1. M. Fantham 31:51; 2. J. Boon 31:12; 3. J. Cooper 30:49; 4. G. Madelin 30:37; 5. J. Punter 29:29.

**F.I.B. (Wakefield)** - 1. R. C. Pollard 33:18; 2. M. Woodhouse 31:36; 3. A. Wells 30:48; 4. R. Hymers 30:12; 5. M. Duce 30:07.

**F.I.C. (Power)** - 1. R. Collins 36:00; 1. K. Faux 36:00; 3. R. Bailey 35:56; 4. R. Monks 35:11; 5. R. Johnson 35:04.



## READERS' LETTERS . . .

Dear Sir,

As a retired FAI speedman, I do like to hear about really high speeds, so the October *Aeromodeller* report on this year's World Champs was a joy to read.

One question, though — why did it take so long to get to this level? Back in my days ('66) Bill Wisniewski went over 160 mph, Chuck Schuette showed us the potential of the asymmetrical model and, soon after, the incredible Rossi model was revealed. Also by '66, all knowledge necessary to make grouper systems as advanced as apparently used at this year's Champs was available.

Groupers are nothing new. I was playing with a simple version back in 1960; I seem to remember an American called Bob Lutker was at it even earlier. Our early versions were just single-hole PTFE tubes, the hole being slightly over twice the line diameter. We tried to help the mutual line positioning by holding the handle horizontally (can't do this in an FAI-type pylon, though). All this produced a rather inconsistent speed rise, maximising at about 4 per cent. It took a while before we decided to become sensible — to give up intuition and go and chat to some aerodynamicists. They put us straight; they told us that if the lines are slightly vertically displaced, or if the lateral separation exceeds about three diameters, the airflow round the lines is very unstable and can randomly reverse in direction (presumably the vibration Pete Halman found this year when he tried groupers with 'unstraight' wire). We also learned that the total drag of

two ungrouped lines was likely to exceed  $2 \times$  the drag of one line because of the resulting interference drag, and that in optimum position, grouped lines could have a total drag of only about  $0.8 \times$  the drag of one line. So we're talking about a possible drag reduction of two-thirds.

Knowing all that, I was silly enough to use monoline (Uniline) from 1964 to 1966 — laziness really — flying speed toys on Uniline was so comfy! But at the end of a very hectic 1966 (developing pipes, etc.) I decided to retire from running round pylons, and was then able to put things into better perspective. It was easier then to see how silly we'd been in our approaches: the ideal grouper was then completely obvious. I passed on all my information, thoughts, and a Duoline handle I made (lines emerge from the handle correctly grouper-positioned, which makes life a little easier for the groupers) to my friends. By the principle of parallel discovery (many inventions are dreamed up by different people about the same time as each other — i.e. atom bombs, carbon fibres — British and Japanese patent applications were separated by just one day) lots of people should have been at the same stage by then — eight years ago!

To go back to another Kevin-silliness, at the 1964 Champs in Budapest I got talking to a German speed lad. I nodded politely when he showed me his model, but inwardly wondered if he was joking — his toy looked so different. I stopped inwardly laughing when it went 8 mph faster than

my British record-holding toy! Maybe now the low-interference drag of Schuette's asymmetric has made the *Stuppi* obsolete; but we're missing the point — the *Stuppi* was a very fast symmetrical model and resulted from wind-tunnel testing — aha — point made, at last! Begone, then, intuitive development — let's start using brains. The enthusiastic intuitive amateur approach is not going to beat Rossi, it's too slow. Just think, I was one of the first modellers to use tuned-length exhaust pipes (in late 1965) — 18 years after they were invented.

The world is full of bright people. All we not-so-bright people have to do is pick their brains and, if possible, to get access to their equipment, etc. Potentially, there's lots of things to be done to get speed toys faster, even if the brilliant Snr Rossi doesn't extract any more static gee-gees from his mills. Aerodynamics can not only reduce model drag but also increase engine dynamic BHP — engine/model interaction is fascinatingly complex.

There's no point in my listing any of these possibilities because they would probably end up getting banned along with groupers!

I wonder if it is necessary to limit speeds, though — I would have thought if one can ban the nasty pivoting-FAI pylon/handle system and go back to the old-fashioned wrist-in-eyon techniques, one could go round a pylon a bit faster. The fact that *in theory* one could then 'whip' hardly applies to 180 mph stuff.

Kevin Lindsey.

## FREE FLIGHT COMMENT

continued from page 665

(Leeds) 13:36. **Combined Mini** (5x2 min., K factor — 3 trebles) — 1. R. Monks (Birmingham) M+2:32; 2. J. Moseley (Leeds) M+2:27; 3. J. O'Donnell (Whitefield) M+2:24. **Chuck Glider** (5 from 9, 1 min. max.) — 1. E. B. Jones (Sunderland) 4:58; 2. D. R. Yates (Whitefield) 3:56; 3. M. McAskie (C/M) 3:46. **Vintage** (3x3 min.) — 1. E. B. Jones (Sunderland) 9:00; 2. M. Sanderson (Grimsby) 8:55; 3. D. Scott (Morley) 7:46. **Open Precision** — 1. E. Smales (Blackburn) 9:77; 2. R. Moore (C/M) 20%; 3. T. Grey (Sittingbourne) 112.5%. **Jetex** (3x3 min.) — 1. I. Dowsett (Northwood) 6:55; 2. J. O'Donnell (Whitefield) 3:47; 3. W. Newton (Urmston) 1:50. **Tailless** (3x3 min.) — 1. M. McAskie (C/M) 3:00; 2. J. B. Poole (York) 2:28. **Junior Kit** (5x2 min.) — 1. D. Baldwin 7:39; 2. M. Miller 4:43; 3. G. Moore 4:36.

**Sixth S.M.A.E. Area Centralised Meeting — September 8th, 1974**

**Keil Trophy — Team Power** (9 teams of 4 members) — 1. Southampton 24:01; 2. Norwich 'A' 23:10; 3. Leeds 16:14; 4. Brighton 9:54.

**Keil Trophy — Individual Places** (3x3 min.) — 1. J. Hook (Southampton) 8:50; 2. N. Willis (Norwich) 7:13; 3. T. Hargreaves (Leeds) 7:11; 4. D. Smalley (Norwich) 6:55. **A/1 Glider** (5x2 min.) — 1. J. Hanson (Liverpool) 9:42; 2. J. Hopper (Stanstead) 8:27; 3. P. Scrivens (Cheltenham) 7:14; 4. T. Dilks (Falcons) 7:10. **Wakefield** (7x3 min.) — 1. J. O'Donnell (Whitefield) 13:50; 2. J. Cooper (Southampton) 13:03; 3. H. Tubbs (Leeds) 8:23; 4. A. Grantham (East Grinstead) 4:37. **Plugge Cup** (after 5 events) — 1. Southampton 1,266 points; 2. Norwich 1,222 points; 3. Crookham 905 points; 4. St. Albans 791 points.

**South Midland Area Rally — Cranfield, September 22nd, 1974**  
**Open Rubber** — 1. J. O'Donnell (Whitefield) 3:48; 2. T. Gray (St. Albans) 3:45; 3. P. Ball (Grantham) 3:00. **Open Glider** — 1. J. O'Donnell (Whitefield) 8:54; 2. P. Scrivens (Cheltenham) 5:00; 3. J. Watkins (Wolves) 4:29. **Open Power** — 1. J. Hopper

(Stanstead 8:30; 2. J. Godden (Leeds) 6:42; 3. A. Abram (Five Wells) 4:59. **Hand Launch Glider** — 1. P. Woolvin (Grantham) 3:44; 2. A. Sopp (Market Harborough) 3:35; 3. P. Bayram (Richmond) 3:28.

**Northern Gala — Rufforth, Saturday, September 28th, 1974**

**Open Rubber (Caton Trophy)** — 1. J. Hopper (Stanstead) M+4:45; 2. J. Anderson (Tynemouth) M+4:27; 3. Mrs. L. Hopper (Stanstead) M+4:04. **Open Glider (C.M.A. Cup)** — 1. J. O'Donnell (Whitefield) M+2:44; 2. C. Hickmott (York) M+2:27; 3. T. Dilks (Falcons) M+2:02. **Open Power (Hamley Trophy)** — 1. R. Peers (Falcons) M+5:20; 2. H. Wright (Liverpool) M+4:45; 3. D. Scott (Morley) M+3:51. **Junior Kit** — 1. L. D. Baldwin 6:32; 2. M. Gibson 5:17; 3. A. Godden 4:43. **Combined Mini** (K factor) — 1. J. O'Donnell (Whitefield) 10:00; 2. J. Godden (Leeds) 9:49.

Colin Hickmott of the York Club, second in glider at Northern Gala with conventional A/2.





## LYONS ICE CREAM Paper glider champs

Left: Allen Pollack launches 'Flight Master' from standard height of 6ft. 6in. Right: Paul Masterman releases his A/4 - each won a Sir George Cayley trophy, plus £100.

Radio and TV commentator Raymond Baxter conducted the proceedings, John Blake of the Royal Aero Club saw to fair play, and, one by one, each of the lucky seven took their turn through six rounds with the better three flights to count for placing.

The *Flight Master* is a 14sq.in. 6in. span fold-together design by John Morfe, who would be the first to agree that its diminutive size makes it sensitive to the slightest tweek of a trailing edge. So, after three rounds in which the top distance was no less than 38ft. 4in. (from 6ft. 6in. launch), while some other flights mysteriously spiralled out of character and luck, the hot TV lights were switched off and three last rounds took place without the thermal aid. Amazingly, the lights were proved to be the culprits for the better performances followed immediately, leading up to a magnificent 42ft. 11in. by Alan Burden and 42ft. 3in. by Allan Pollack. The averages set up by the leading three competitors were 40ft. 2in., 37ft. 10in., and 35ft. 7in. respectively, and if you think that's easy from 6ft. 6in. - just try it! Alan Burden collected the *Sir George Cayley Trophy*, cheques were distributed, and the hall was then made over to the Open Contest for freelance designs.

Three finalists had qualified on a performance basis, each a well-

practiced aeromodeller, and using experience to make the most of the specification that the design had to be cut from a single sheet of A4 size paper. Paul Masterman elected to go for largest possible wing area, creasing the section so that aerodynamic load made the wing rigid. Martin Dilly employed a Jedelsky airfoil with the lower surface folded back for a hollow box section wing on a mini A/2, and Richard Cedar made his a smaller but compact fold-together type. Except for Paul Masterman's consistent over-44ft. with a best of 48ft. 1in., the 'Specials' showed no real advantage over the mass-produced *Flight Masters*. This must prove something, if only that these paper gliders depended more on a good launch than any sophistication in shape. The subject still provides a challenge which is wide open for the next time - and we sincerely hope there will be another of these well-organised championships soon.

### 'Flight Master' Class

#### Best three flights:

1. Allen Pollack (Upper Tooting)  
42ft. 3in., 39ft. 11in., 38ft. 4in.
2. Alan Burden (Chichester)  
42ft. 11in., 36ft. 1in., 34ft. 6in.
3. Paul Dolling (Swindon)  
36ft. 4in., 35ft. 8in., 34ft. 10in.

#### Other personal bests:

Jeffrey Lyons 33ft. 5in., Timothy Clairmont 32ft. 5in., Clive Freeman 29ft. 1in., Raymond Ellis 27ft. 7in.

### Open Class

#### Best three flights:

- P. Masterman  
48ft. 1in., 45ft. 5in., 44ft. 2in.
- M. Dilly  
40ft. 1in., 39ft. 6in., 38ft. 6in.
- R. Cedar  
31ft. 7in., 30ft. 6in., 28ft. 3in.

A GLIDER CONTEST held below ground level in the heart of London Theatreland is news in itself. Make it the first challenge event for two *Sir George Cayley* Trophies plus a generous listing of large cash prizes and the location becomes even more surprising. But this was no ordinary model championships. Held in the Ballroom of the Strand Palace Hotel, it was for paper gliders - and distance, not duration, was the criteria.

For months, the ice-cream vendors of *Lyons Maid* and *Mister Softee* distributed two million leaflets giving details of their *Flight Master*, a high-tailed delta. Area finals were held, and on October 2nd the seven challengers met for a last chuck-off. To qualify, each entrant had to be under sixteen years old and to equalise the broad disparity of heights a tier of platforms was positioned in the large hall.



# CLUB NEWS

The South Bristol M.A.C. is a large club with many varied interests - here just the control line contingent display their wares. Some keen contest types as well as sport fliers in this active group.

"WHY?", somebody said, "*The summer seems to have flown by.*" Well, I'm not so sure about the 'flown' part, judging by the few occasions I've been tempted to take the lid off the model box, nor am I too certain that we have had any summer, come to that. I did look forward to a more temperate autumn, but came to the depressing conclusion that 'wash out' is not something confined to wing tips.

But, somehow, club life struggles on even through the deluge, and our first report comes from Mr. G. H. Bryant of the Three Shires M.F.C. The name has nothing to do with large size horse-power, but was adopted because of close proximity of the renowned 'Three Shires Oak' to the club H.Q. The tree marks the point where the counties of Warwickshire, Worcestershire and Staffordshire meet, and is obviously not far from the Quinborne Community Centre, Ridgacre Road, Quinton, Birmingham 32, where the club meets at 8 p.m. each Thursday. Mr. Bryant tells us that the membership is around the fifty mark, with something like thirty turning up on club nights, which is pretty encouraging since the club covers such a wide area. Somewhere to meet, and also somewhere to fly: the club is lucky - or perhaps enterprising - in having the use of a private field. Not spacious enough for free flight, unfortunately, but alright for control line and radio. Even so, all the branches of model flying come within the spectrum of activity, with the youngsters reared, appropriately enough, on Mouse Racing, and then progressing to such rarified pursuits as F/F Scale and Slope Soaring. A cutting from a local paper shows a group of club members around a very fetching BE 2c biplane, one of the display attractions at a village fête.

From 'down there' to 'up 'ere' for a few choice words from those team racing tearaways of the North, the Wharfedale boys. According to the report from P.R.O., John McAlroy, the waterlogged tarmacs have not dampened their spirits - in fact they are aglow with the success they have had over the year. The financial side of things is blooming under treasurer Barrie Pickles, and the membership has shot up to around the eighty mark. Radio has made its inevitable impact on club life, but the two species, R/C and C/L co-exist happily on the field. The fact that some members are equally at home with aerial and handle is an aid to the general togetherness. Things are going well at the Harden Moor R/C

and Sports C/L site and a tarmac strip could be in the offing elsewhere. A number of teams have done well during the year, particularly Haworth/Horton and Barker/Hill, and the new combo of Langworth/Williamson looks a good bet for the future. Yet another bit of team potential comes with Ev Davies forsaking streamer slicing to join up with John Broadhead. Fêtes? Well, a restful year for the display team, with the weather giving little occasion for summer festivity. And further erosion of C/L dominance in evidence in the clubroom: alien intruders such as slope soarers and scale models taking up station with mini-Goodyears and H.P. 61 powered *Spitfires*. An example of the latter was built by Pete Redman, a one-man production factory. Talk in the clubroom of engines. Always the aspirations are towards more speed and more laps, but considered of no advantage if the model will not take a heavy landing.

Malcolm Wood, the P.R.O. of the Croydon & District M.A.C., takes me up on a statement I made in the September issue about seldom hearing from wholly free flight clubs in the U.K. I was, of course, talking off the top of my head at the time, and overlooked the club that has carried the free-flight flag steadfastly throughout all the vast changes and upheavals in the movement over the past decades. Let me say at once that my admiration of the Croydon Club and all that it has stood for - a deep, non-commercial involvement in the arts of model flying - is second to none, but the point I was making *vis-a-vis* certain overseas clubs is that we have perhaps a number of free flight groups but very few free flight clubs in the full-blown sense of the term - F/F is all too often a subsidiary activity in a mainly radio dominated club. Let us trust all is forgiven, Mr. Wood, so that I can say something to the credit of our F/F flyers which he brings out in his report: a massive invasion of the continental contest scene. Croydon, for instance, sending no less than eight people to the *Pierre Trebod* in France. A really fine performance came from Ian Kaynes. He finished fourth in Wakefield, losing only twenty-six seconds. Another good effort came from John Woodhouse with a sixth in Glider, just five seconds adrift. Successes on the home front were Tony Young's fourth in Glider in the first S.M.A.E. Area event, and a third place for Don Thompson in Glider at the second event. Even better results at the third event, with Dave Hipperson and Tony



Young took first in Rubber and Glider. Best effort at the Nationals was Norm Elliott's fourth place in Wakefield.

Give 'em plenty of elbow room seems to be the moral of an incident reported in the Leicester M.A.C. bulletin. Dave Bradshaw, flying a Spitfire in the club R/C Scale event, got crowded in on the runway by cars parked unnecessarily on both sides, and did not have the space to make a stall recovery. His model was badly damaged. Now Scale models consume any number of precious man-hours, not to mention the expense involved, and to have one needlessly destroyed is a bit traumatic to say the least. Seems you are safer flying from a mid-field grass patch than a car attracting runway. That Scale Comp., incidentally, is but one of a constant stream of contests of all types run by the club, and among other events there were a Scale and a Rat Race for the C/L fans, and an event for the Ladies (indoor flying?). A report from the Woodford Rally gives news of some successful flying by John and Charles Abbey. Their gliders were in good form that day. Charles came second in the Mini event with his A/1 *Synopator*, and John came fourth in the A/2 Comp. with a time of 6.35. This was enough to give him the Junior Open Glider Trophy, with a Veron *Deacon* kit thrown in for good measure. They thought the airfield a bit small for a major rally - 2½ minute maxs were the order of the day. A note in the bulletin reminds us that the Leicester club is the third largest of the affiliated clubs in the country, but that was on a membership count of ninety made earlier this year. It has since shot up to 130, and the club could be well on the way to a Muhammad Ali claim of being 'the greatest'.

Some interesting views by Norwich's Mike Woodhouse on proposed changes to F.A.I. free flight rules are given in the September issue of the S.M.A.E.'s *Model Flying*. Apparently the *reductio ad absurdum* Russian

ideas - 10x2 mins flown on 25 grammes of Rubber, 30 metre lines and 5 second engine runs - have claimed quite a bit of attention. Mr. Woodhouse puts forward some very strong counter-arguments against such flurries of mini flights. For one thing, low powered models do not hold their own too well in any sort of wind, and for another, models fly safer if able to clear the ground turbulence. Then he points to all the extra organisation required for a ten flight schedule, not to mention the plight of the galloping model flyer. Problems in the C/L world, too. Time was when a couple of bunts and an inverted lap of honour would decide the Stunter to wear the laurels, but now it's more a question of precision of manoeuvre than sheer virtuosity that decides the issue. This puts quite a strain on the poor old Stunt judge who can only see the action from one vantage point, and it all happens quicker than he can write down the score. No doubt the answer is a tele film with the judges sitting round a slowed down action replay.

The issue of Radio Models versus Walkie-Talkies is raised in the latest issue of the East Anglian Area newsletter. Apparently, there is a suspicion of two-way chattering getting mixed up with the North Norfolk Aeromodellers' radio signals. According to the Home Office, the walkie-talkies, operating on or about the model frequencies are strictly taboo, but just how do you pin down or apprehend the culprits? On the free-flight side of things it has been tough going these last couple of months over the wind-blasted airfields. It was too much to hope that the 6th Area Meeting at Watton, in September, would be given any sort of reprieve by the weathermen, and, like my old rubber motor, it was a 30 knot force hurtling across the field. The only flyable form of machinery was Power, and it says much for the team spirit of the Norwich boys that they were determined to fly just to pull in the essential *Plugge* points. It was dicey going, but the six flyers, one from the Anglia Club, put up some quite respectable times.

Clubman

## CONTEST CALENDAR

- December 1st **FALCONS F/F GALA.** Open R/G/P (3 x 3 mins.) Chuck glider (best 5 from 9, 1½ min. max.). Venue Chetwynd airfield, Nr. Newport, Salop. 8.30 a.m.-3 p.m. S.M.A.E. members only.
- December 8th **S.M.A.E. INDOOR SCALE.** Venue R.A.F. Cardington, Beds.
- December 15th **S.M.A.E. MINI CENTRALISED MEET.** C.d'Hiver, ¼A Power, A/1 and H.L.G. Venue RAF Syerston.

## CLUB SECRETARIES

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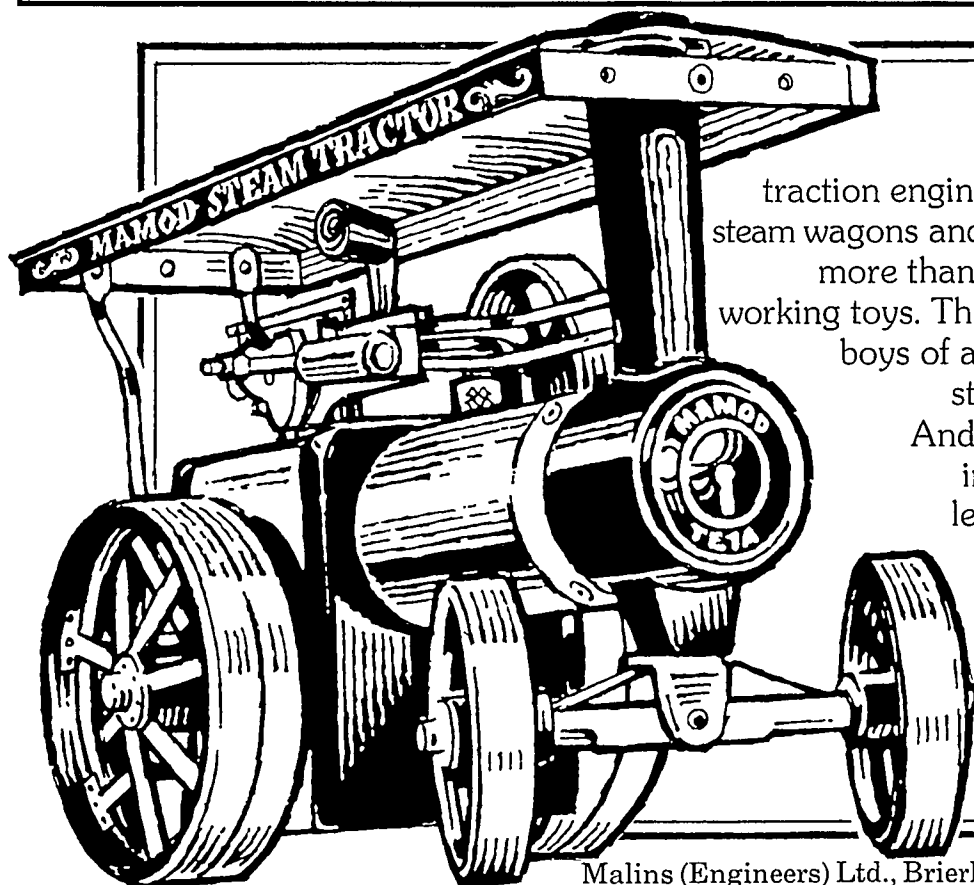
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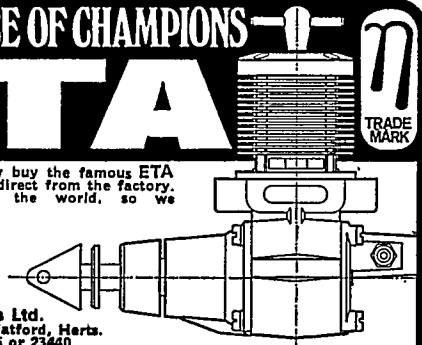
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That's why months were spent in close consultation with the Hawker Siddeley design team. And in particular with their Chief Designer, Mr. J.W. Fozard. In fact Airfix followed the original plans used for the real plane.

After all, the world's first fixed-wing vertical take-off strike aircraft was obviously going to be packed with fascinating and revolutionary design detail. So to do it justice Airfix make it into a 1/24th scale superkit. A fantastic

model with an amazing degree of realism.

Take its Rolls Royce Pegasus engine, which gives the Harrier a top speed of over 737 m.p.h. Here Airfix not only reproduced the engine with extraordinary detail, but also made it fully accessible. The directional thrust can even be altered by moving its two pairs of rotatable nozzles.

Then there's the cockpit. Here the canopy slides back to reveal a pilot surrounded by a complete set of controls.

Under the wings there's an impressive and exciting array of armament. This includes bombs, rocket pods, gunpods and a choice of either missiles or drop

tanks. It even has a retractable undercarriage and moveable control surfaces.

When assembled this finely finished model measures a full 22¾" long. A wingspan of 12¾". And a height of 7".

The Hawker Harrier. A really terrific new superkit made with care, experience and the exceptional Airfix eye for detail.



**The Hawker Siddeley Harrier GR1.  
24th Scale.**

**New to the world's biggest range  
of construction kits.**

# Graupner

# for top quality!

## POWER KITS

### TOPSY 32" span £5.05

Handy size . . . easy to build from this 'Quickie' kit. Suitable for powering by small glow or diesel engines up to 0.5cc. For radio try rudder only or 2-channel propo.



### TERRY

£12.50

Modern high-wing cabin design. 41½" span for .09 engines. A 'Quickie' kit with fully prefabricated parts - assemble in a single evening! Kit includes balsa-veneered foam plastic wings, die-cut balsa parts, all hardware, decals, etc. Ideal R/C trainer.



### CARDINAL £41.60

A truly SUPERB prefabricated kit with injection moulded plastic fuselage, foam wings and tail. Span 61" for 5-6cc. motors. This kit is an outstanding example of modern design and use of mixed materials - plastic, foam-plastic and wood with all parts fully shaped.



### MONSUN BO-209 £4.35

All sheet 21½" span scale model for rubber power. Complete kit. One of the latest additions to the Graupner range featuring the latest ideas in prefabrication. ALSO

**MONSUN 62" span £36.£0**  
De luxe R/C model



## CONTROL LINE

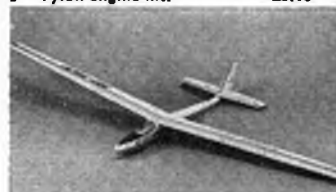
39" FW 190 — — £11.70  
30" MUSTANG — — £7.80

35½" ULTRA STUNTER £7.10  
31½" DORNIER DO 27 £9.70



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Put the HI-FLY on your Christmas shopping list! 90½" span twin ELECTRIC MOTOR power . . . or fly as a sailplane or pylon power! HI-FLY de luxe kit £19.80  
Pylon engine mt. £3.10



## GRAUPNER'S SOARING SAILPLANES!



### AS-K14 POWER/SAIPLANE £52.50

A 90½" span powered sailplane with nose-mounted engine. S-M-O-O-T-H flying - under power or soaring. And fully aerobatic. The de luxe kit includes seamless fibreglass fuselage moulding, balsa planked foam wings and tail panels - plus hardware, etc. A very comprehensive kit!

**FILOU 50" span £7.15.** Simple hi-performance glider.

**JOLLY 45" span £5.30.** A1 contest class sailplane.

**AMIGO II 78" span £12.25.** Super high performance model.

**NANCY glider, 49" span £6.00.** Quick assembly kit.

### CIRRUS 118" span

A real pilot's model - with a performance like a full-size sailplane! De luxe kit £27.50  
Pylon eng. mt. £1.90



A multi-purpose high-performance design for tow launch, slope soaring or powered glider conversion (with pylon mount and .09 or 1.5cc. engine). Specially designed for R/C but also suited for free flight.

### JUNIOR SAILPLANE £6.80

Span 53½". Model has sheet wing construction with high-performance aerofoil section - plus turbulator (all parts fully shaped). Stick-type fuselage (again shaped). Auto-rudder and dothermaliser! Also for beginners: SONNY 27" span towline glider £2.15  
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UHU Mk. 3 43½" span easily built. £3.60. KATY A1 contest model £11.45



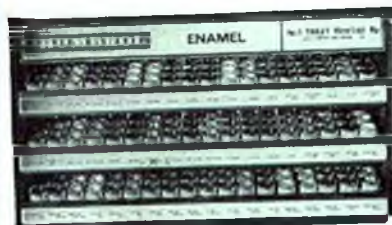
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# HUMBROL



The control-line

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