

Aero Modeller

FEBRUARY 1978 35p

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HOBBY
MAGAZINE



SEE page 67

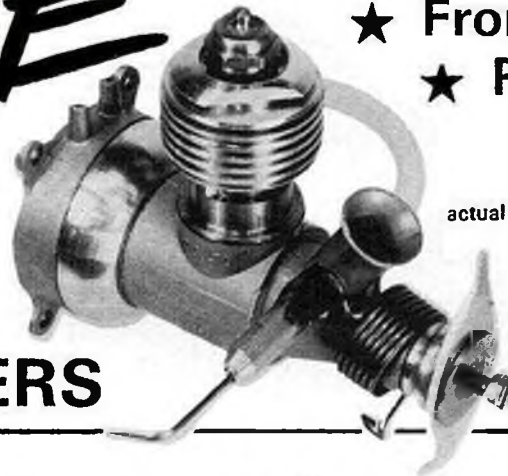
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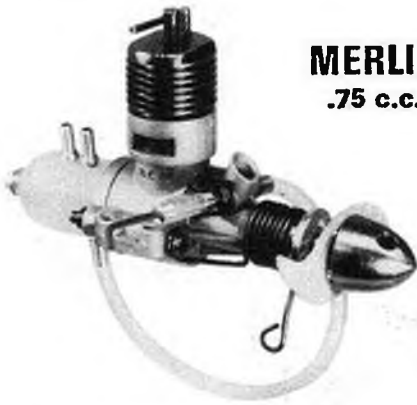


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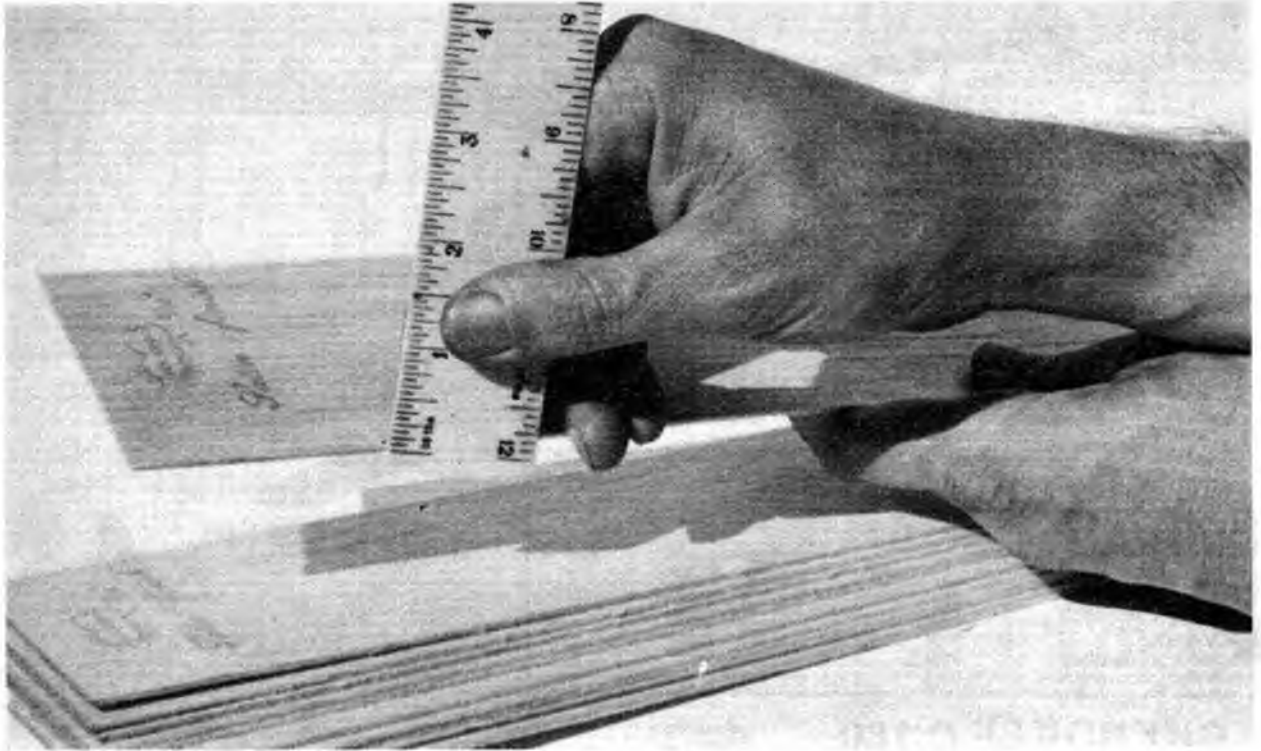
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Aero Modeller

INCORPORATING
MODEL AIRCRAFT

February 1978

Volume XLIII No. 505

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Comment

Opening the 1978 Model Engineer Exhibition at Wembley, Lord Mountbatten of Burma recalled, amidst an astounding fund of reminiscences, his first model aeroplane. It was a compressed air type - pumped up as he aptly described, for the small rotary engine to propel it across the cricket field in a straight line or set for circular flight. It worked well. More recently, he said he had assisted his grandsons in the construction of a radio controlled Gipsy Moth. This he confessed was far more complicated. It had flown well but ultimately disappeared in a flyaway "over the hill" with the family in full chase. Such a delightful personal account of Royal involvement in a subject so dear to all of us was a splendid start to the first major event of the year. We trust it will be a happy augury for many more successful exhibitions, rallies and competitions in the coming year.

on the cover

Alain Roux flew a typically 'French' style model at the AeroModeller hosted Coupe d'Hiver International (as reported on page 90). Note the use of a pod and (glass fibre) boom fuselage, and a relatively large design for the windy conditions. Photograph by Tony Dowdeswell.

next month

Details of Paul MacCready Jnr's success with *Gossamer Condor* in winning the Kremer prize for man-powered flight over a figure-eight course. Plans for Dave Hipperson's contest winning Coupe d'Hiver design, more on spraying, news from the Model Engineer Exhibition, plus all the regular features. The March issue of *AeroModeller* is on sale 17th February - don't miss it!

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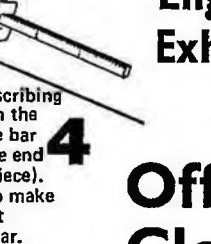
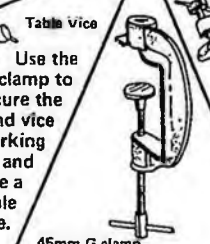
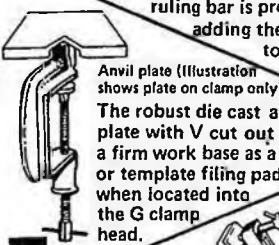
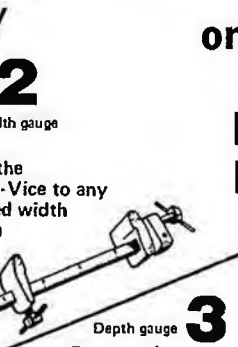
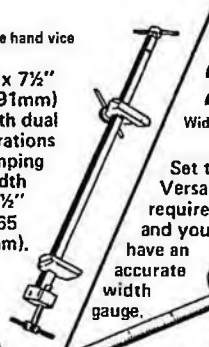
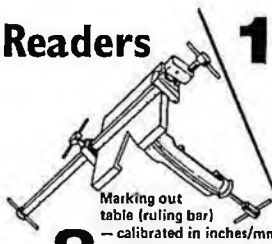
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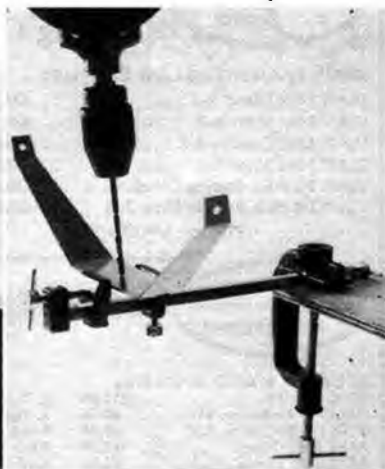
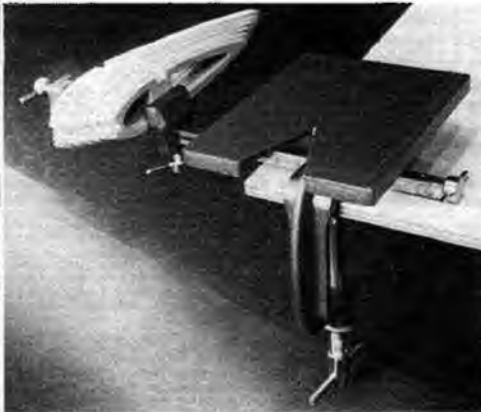
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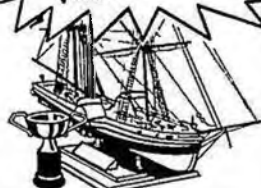


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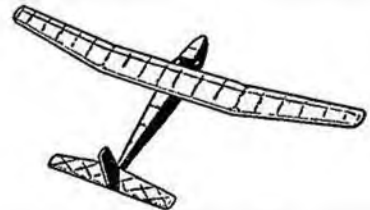
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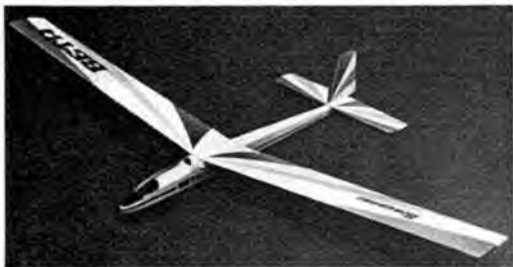
NewsFlash



PENNY

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Length 27in. (690mm)
Total area 160 sq.in.
Weight 6½ ounces
Loading 6 oz./sq.ft.

GRAUPNER'S LATEST FULLY PREFABRICATED 'TRAINER' Sailplane - ideal for Junior Club events as well as complete beginners. Designed on true high-performance lines with (23%) high-mounted tailplane and Jadelsky wing section - yet virtually no skill at all needed to build the model! Fuselage shells are INJECTION MOULDED in plastic, ready to take shaped tail boom. All wing panels and ribs are pre-shaped. Other preshaped wood parts and plastic mouldings. Everything you need to complete the model, even noseweight, rubber bands, adhesives and decals. **£5.75**



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Calibrated in dB(A) with 'fast' or 'slow' selection switch. Range 60-110 dB. Omni-directional dynamic microphone. Powered by a single PP3 battery. A really accurate instrument AT A VERY LOW PRICE. Every club and every serious power modeller - must have one!



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Duoperm 50F (50 watt) £11.30. Dia 35mm, length 66mm, wt 165g. Duoperm S100F (100 watt) £14.00. Dia 35mm, length 90mm, wt 280g. Nylon Mtg Bracket £1.70. Beam Mtg. Clamps 99p. Townsend Ring Mt. £1.70. Duoperm Prop Driver (fits 4mm shaft) £2.10



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KINDLY MENTION 'AEROMODELLER' WHEN REPLYING TO ADVERTISEMENTS

Heard at the HANGAR DOORS

KREMER PRIZE AWARD. There cannot be many in the land who remain unaware that Paul B. MacCready, Jr., and the team which prepared the GOSSAMER CONDOR have been awarded the £50,000 cheque generously donated by British industrialist, Henry Kremer. Paul and his pilot, Bryan Allen, received the trophy from HRH Prince of Wales and the cheque from the hands of Henry Kremer at a presentation in London on 30th November, and also the congratulations of practically everyone else who has been involved in the quest for the first 'figure of eight' flight.

Talking with Paul, who has been US National Champion in both model and full-size gliding fields, as well as 1956 World Champion in gliding, we came to realise how the remarkable machine he developed was the product not only of aeromodelling experience, but also came from the skills of a large team of similarly-minded enthusiasts.

Next month, we shall be telling the full story behind the creation of GOSSAMER CONDOR, and future prospects for the next great challenge of a Channel Crossing - for which Henry Kremer has generously offered no less than £100,000!

MAN POWERED A/C EVENING
The Royal Aeronautical Society is staging a series of outstanding lectures and films in a 'Man Powered' evening on 7th February. Starting at 3 pm the programme includes an

Steve Marriott's Coupe returned a year after launch at '76 Nationals.



At last! Smiles all round as Paul MacCready (right) receives the £50,000 cheque from Henry Kremer who was delighted that his 18 year old challenge had been met.

account of the unique 'Newbury Manflier' by Rear Admiral Goodhart. This is an enormous flying wing with two independent crew, each in a fuselage pod with a trailing stabiliser. Modellers have been helping the construction of this very latest contender for the Kremer Prizes. This is followed by the story of the Japanese 'Stork' aircraft (which has flown a greater distance in straight line than any other). The session concludes with a full description by Dr Peter Lissaman, co-designer of the Gossamer Condor. This splendid opportunity to learn from the experience of the two most successful design teams in Japan and the USA, plus first news of the adventurous British newcomer is free, and open to everyone. It takes place in the RAeS Lecture Theatre, 4 Hamilton Place, London W1 (opposite the 'Inn on the Park' and next to the 'Intercontinental' hotels).

WORLD'S LONGEST FLIGHT
Steve Marriott, well known in F/F circles, may be one of Britain's unluckiest modellers; this year alone he has lost three Wakefields and two A/2 gliders. Imagine his relief, therefore, when a phone call reported one of his models had landed in a lady's garden in Newbury. No, it wasn't one of this year's listed above but one launched at the 1976 Nationals to land 14 months later; some maximum!

No official record flight time will be claimed however as Steve believes the truth of the matter is that the original finder, unable to trace its true owner, continued flying the model locally until history repeated itself. The name and address label had

long since disappeared and the model was only traced through local hobby shop owner Sid King, contacting SMAE to trace the owner from Membership Numbers still visible on the wings. Naturally Steve would be fascinated to learn of the model's history during the intervening months so if you recognise it and can add to the story, why not drop us a line at Aeromodeller?

LOST TROPHIES. Southend R/C Flying Club are hoping to secure a new flying site at Leigh marshes where they intend to once again hold large competitions. However in the meantime they now discover they no longer have the trophies to award. So all you 1971 winners can stop polishing those trophies now, and contact club secretary David Verlander, 46 Dawlish Drive, Leigh on Sea, Essex SS9 1QX.

Southend Aerobatic Trophy
Essex Models and Hobbies Trophy
Estuary Cup (Biplane Pylon)
Leigh Racing Cup (FAI Pylon)
Thames Trophy (Class II Scale)

& FOUND. MODEL. Found some while ago at RAF Ouston downwind of Albemarle Barracks, a CO₂ powered kit model now in the safe hands of John O'Donnell. All prospective claimants phone him on 061-427 2711.

32nd MRA COUPE D'HIVER INTERNATIONAL. Also ½A power. 26th Feb, Corbas Airfield, Lyon.

Many British flyers will want to take this opportunity of visiting the French contest. To co-ordinate travelling plans for individuals, *AeroModeller* will act as a clearinghouse for prospective entrants. Phone for details.



Champion of Europe
 Luciano Compostella's

TANGO

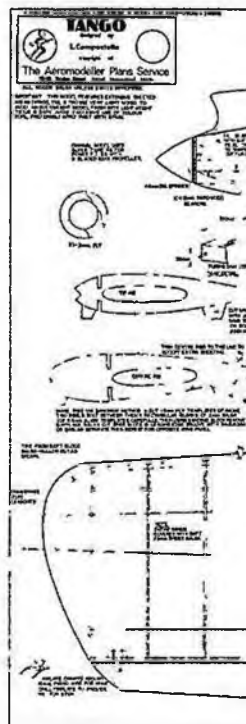
60 inch wingspan control-line
Aerobatic design for .40 - .46 engines

THE MORE one studies this design, the clearer it becomes that it was created to satisfy one particular demand – practicality. Perhaps the general outline is not especially aesthetically pleasing, but when it gets down to basics, which is better – a 'pretty' aircraft which takes months of hard work to build, or a thoroughly good performer which is capable of providing hours and hours of flying without constant maintenance.

That upright engine may be a little *passee* as regards modern styling, but it means that you can start the engine without going through the 'let's turn the model inverted' routine which always requires a second pair of hands to achieve. Tank blocked? Not to worry, unscrew the bicycle spoke nipple, pull off the cowl and there is the tank ready for inspection. Move it 1/2 in backwards and out it

Luciano pictured at the 1974 Czechoslovakian World Champs, where he placed eighth. Uses plenty of control surface area and flies relatively fast. Very functional lines are evident - note use of upright mounted engine (Super Tigre 46) and three bladed Tornado 10 x 6 propeller. Model is one piece and very rugged.

FULL SIZE COPIES OF THIS 1/8TH SCALE REPRODUCTION ARE AVAILABLE AS PLAN NO. CL 1322 PRICE £1.50 (INCLUSIVE OF POSTAGE AND VAT) FROM AEROMODELLER PLANS SERVICE, PO BOX 35, BRIDGE STREET, HEMEL HEMPSTEAD, HERTS, HPI 1EE.





comes! Replace it, modify it, raise its position or do what you will. Is life so simple with *your* current stunter?

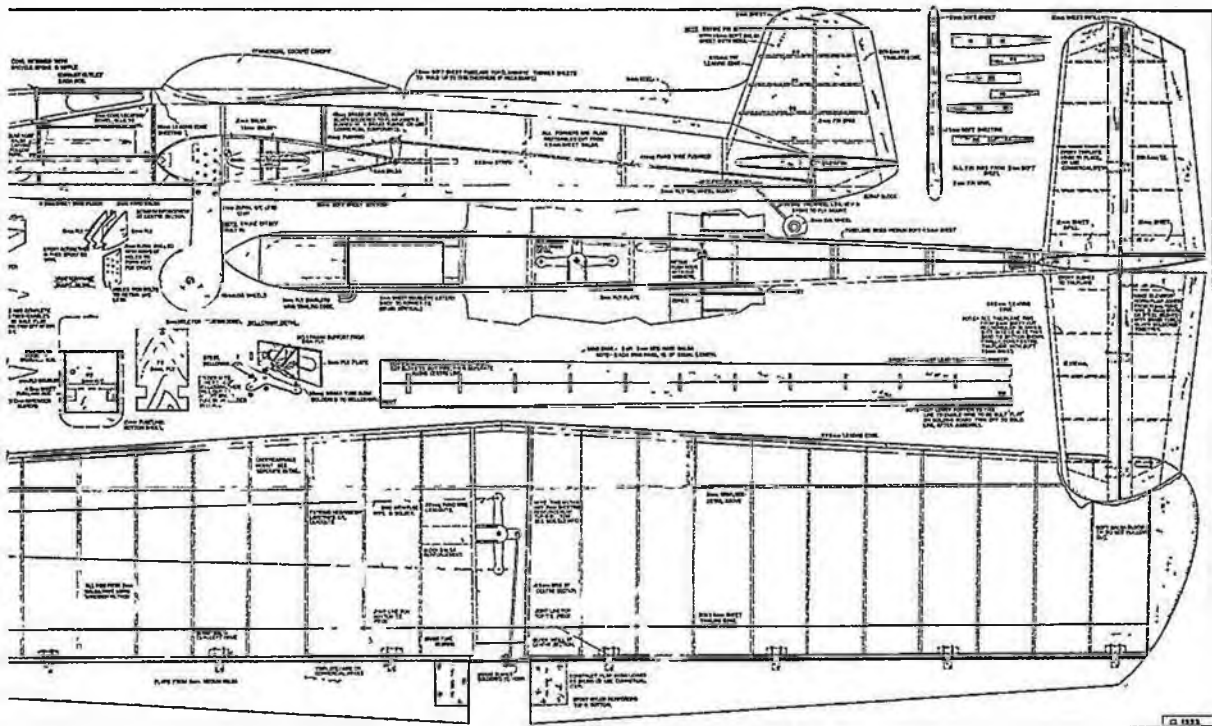
Although the wing is not detachable, transportation should not prove too difficult, and the removable undercarriage legs are quite a help. Hard landing? Never mind undo two bolts and a leg can be replaced or straightened. Tissue rips in the covering? Impossible with this design – the entire model is sheeted with 1.5mm balsa which should certainly give it a long operational life. No more minor repair work patching shock tissue-tears following a hard ‘arrival’, and the whole airframe is far less susceptible to fuel seepage. However, do be careful with your balsa selection, and be prepared to use that sanding block a lot, as it would be all too easy to exceed the original target flying weight of 1,700 grams (60oz).

The wing construction will prove extremely rigid and accurate – once built, there is no way a warp can creep in.

Building a warp-free wing is extremely easy (providing your building board is truly flat!) thanks to those aligning tabs on the underside of the wing ribs combined with the way in which the spar is left square until after assembly. It is best to cut part way through the wood where indicated so that when built, the excess material can be snapped off. When building the wing, make sure that the top wing sheeting is added while the basic structure is still pinned flat to your building surface. Use of PVA adhesive will also help to avoid building in warps.

More practical points? Take a close look at that fully bushed and well supported bellcrank – designed for long and trouble free service. Note, too how the engine is provided with a fair degree of offset, and this combined with the airfoil sectioned fin, greatly helps to maintain line tension in calm weather when you suddenly notice how much the wind normally helps to keep those control wires tight! In addition, tip weight is used. Worried about the lack of adjustable features? Forget it, if the model is designed correctly in the first place then you will not need them – and remember that this is the model that the current European Aerobatics Champion has flown for many years at both International and World Championship level. For his 1977 success his only ‘modification’ was to use an inverted engine installation. Clearly once you have a first class design, stay with it and practice your flying – that’s the way to success. With *Tango*, you are free to concentrate your leisure hours on bringing *your* flying performance up to scratch, rather than being confined to your workshop.

The original used the ever popular Super Tigre 46 powerplant although most 6-7.5cc engines would suit. If you use the smaller engine, then choose a good ‘un, and build light. Luciano flies on a three bladed prop (10 x 6in Tomado) for a very good reason: the upright engine provides a low thrustline, but by using a 10in diameter three-blader instead of an 11in diameter conventional prop, the length of the undercarriage legs are kept to reasonable proportions.



... what's happening?

World Championships in England
Premiere event in the busy year ahead will be the 1978 WORLD SCALE & CONTROL LINE CHAMPIONSHIPS to be held at WOODVALE, near LIVERPOOL between 4th-10th August. This is the first C/L Champs to be held in England since the 1966 event at Swinderby. Two years ago at the last champs, 27 countries took part, giving global recognition to the sport, and at least as many are expected again this year. For the first time ever, Combat has been recognised as a World Class and now joins the traditional Team Race, Speed and Aerobatics as an official FAI Class. Bearing in mind that at previous internationals and unofficial world contests British flyers have usually taken top honours, there must be a good chance of seeing a British World Champion emerge from the meeting.

Also being organised to coincide with the championships at the same venue, will be the Scale World Championships for both C/L and R/C models that will provide the scale and full size enthusiasts with more recognisable airframes than their functional competition compatriots. An event for stand-off scale to Class II rules on an invitation only basis will help complete the interest for all model minded spectators.

New Office for SMAE

Our national body for model aircraft, the Society of Model Aeronautical Engineers, has once more established a permanent office and full-time General Secretary. The office address is Kimberley House, Vaughan Way, Leicester, where they will join the British Gliding Association, and the British Parachute Association. Maurice Hassell has been appointed to take the position and enquiries can be made during office hours, 9-5 Monday to Friday. The GPO reserve number is Leicester 58500, operational from 16th January we hope.

Indoor hand launch glider series

Just announced as a new concept for the coming year is the staging of a series of events aimed at promoting and raising the standards of indoor HLG in Britain. A sponsor has already come forward, namely Solarbo Ltd (the balsa wood company), with an offer of prizes. A flyer's best three results throughout the series will count towards a classification to decide the overall winner. The twofold objective will, in addition to the

competitive side, attempt to raise the British Record as a by product. To give some idea of how far we still have to go in this country, the World Record stands at 1:30 by Ron Wittman in USA using his "Super Sweep 22" (*scale plans in current 1977-78 Aeromodeller Annual. Ed*). Set in 1973 in the hangers at Santa Ana, California, the flight was the result of over a year's preparation, continuously improving designs with weight training and physical preparation as well. Still you would expect something pretty special for a world record.

It is interesting to note, however, that the same design flown by an 11 year old junior has also recorded flights of over a minute! So, top performance is in no way limited to muscle bound experts. I know, here in England, our own Pete Bayram has recorded a 1:07 at Cardington, and several others have topped the magic minute. Bearing in mind we have one of the best sites in the world at RAF Cardington, just outside Bedford, it must certainly be worth having a go.

The first meeting will be of a get-together nature with classes for under 12 in span and unlimited span. Dates to remember are 26th March, 18th June, 30th July, 26th August, 17th September. Anyone interested in visiting Cardington must appreciate that the arrangement is only for those wishing to fly a model, and prior permission must be sought from Indoor Chairman Laurie Barr, 4 Hastings Close, Bray, Berks.

1978 Wakefield Golden Jubilee

The year 1978 will represent a milestone in aeromodelling history. Long before the days of Radio Control, before engines had been developed, or control line had been invented at a time when even gliders were viewed with suspicion, there was the Wakefield. The rubber powered model flown to a set of rules named after Lord Wakefield of Castrol fame, donator and sponsor of the Trophy for the first world championships. For decades the Wakefield Cup represented the ultimate achievement in model flying, of all the events at home, international and world level this event above all others commanded real prestige. This year it will be 50 years since that first momentous event.

Although Wakefield is still a hotly contended world class the emphasis over the years has changed. The models have been modified by

various rule changes. The question is how to best celebrate this event. Perhaps a contest to the original rules, or one for $\frac{1}{2}$ scale all sheet versions, or a series of historical articles and interviews with those who once flew this class. Maybe a static display of the actual models that survive, those multi stringered streamliners, steam pressed balsa fuselages, feathering folding props, retractable undercarriages, multi skein gear driven propellers. The creativity and invention of these early models has to be seen to be believed now in the super simple seventies. Let us have your ideas now in order to plan ahead for the year.

New club

Leisure Lakes Model Club is the title of a newly formed model club catering for aircraft and boating enthusiasts. The club has obtained the sole rights to use the new Leisure Lakes Complex at Merebrow, three miles north of Stockport. The idea is to provide a club for the modeller and his family, there being numerous facilities available including a cafe, picnic and play areas, and boating lakes with pleasure crafts. Various events are currently being organised for the coming year. Additional information for interested parties can be obtained from their Club Secretary, Ted Rogers, 2 Birch Avenue, Burscough, Lancs (0704 892592) or membership details from Club Treasurer C. D. Vince, 42 St Annes Road, Formby, Merseyside (Formby 75232).

Northants Flying Sites

The Leisure and Recreation Committee of the Northamptonshire Local Authority has just completed interim report on model aircraft flying and needs within the county. Following the passing of a local By-law forbidding model flying above an arbitrary 36in wing span and the provision of temporary flying alternatives, the council is now looking at the local needs with the intention of some more permanent provision for flyers. They would welcome comments on their first draft from groups of flyers in their area and copies can be obtained from either Derek Giles, Chairman of SMAE South Midland Area, 64a Station Road, Bow Brickhill, Milton Keynes MK17 9JT (M.K. 74494) or from R. Wright, County Leisure Officer, Northampton House, Northampton (0604 34833).

AEROMODELLER ANNUAL 1977-78 edited by R. G. Moulton, drawings by A. A. P. Lloyd, published by Argus Books, 144 pages, 8½ x 5½in (215 x 135mm), soft bound, price £2.95.

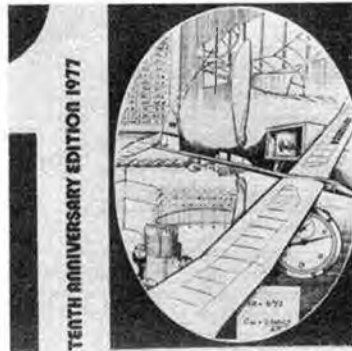
EX A/2 flyer Geoff Dallimer comments on today's R/C thermal soarers at World Champs, includes flapper wings and releasable tow-hooks, which proves that the R/C boys are catching on to F/F technology. Dave Rees gives a stateside view of changing C/L Aerobatic design trends. Full details of Japan's Kremer prize contender "Stork" which was ultimately foiled by Paul MacCready who recently collected the £50,000 prize for man powered flight in US. Also a reconstruction of the historic Lippisch model ornithopter; silencer development and evaluation; existing FAI World Records; an introduction to Carrier Deck flying and controls for flaps and throttle via third lines. A novel way of styling gliders from bird planform, together with many other interesting articles on F/F, C/L and R/C activities are included and there is even an article on stringless kites!

Numerous plans include 3 Stunters (Compostella), 3 Combat models, 2 speed, Team Race and Carrier Deck models, 3 A/1 gliders (Loffler), 3 A/2 gliders (Lars G. Oloffson and Lee Hines), 2 Chuck Gliders (World Champion Ron Wittman), also Wakefield, Coupe d'Hiver and several power models. Indoor models (Microfilm World Champion Bud Romak), simple tissue (ex World Champ Kalina), plus several R/C Thermal Soarers.

BOOKS

10th ANNIVERSARY EDITION REPORT of the NATIONAL FREE FLIGHT SOCIETY SYMPOSIUM, edited by Bob Dodds, printed by NFFS Inc, USA. 152 pages, 11 x 8½in (280 x 215mm), illustrated, soft bound. Available in GB from *Free Flight News*, 2 Alexandra Close, Netley Street, Farnborough, HANTS GU14 6AH. Price £5.00

A COLLECTION of papers on the science of free flight and model aerodynamics presented annually at the US Nats, collected together in a handy A4 format paperback edition, regularly lists the latest advances in model flight technology. Included in



report of the
annual symposium
national free flight society

this celebration issue: "Computer approach to model glider design and performance analysis" (*Wow! well they are Americans you know.* Ed). Heavy going but invaluable for those modellers with a computer terminal alongside their building board. Also, optimum prop design, an extension of the Schwartzbach approach to Rubber Power props. Wing tip variations by Hoerner. Power model props with innumerable graphs and design information. Warp and flutter resistant structures, mathematical evaluation of numerous structural configurations. Aerodynamic characteristics of high lift two element wings, futuristic airfoils with experimental data. Detailed analysis of FAI power, climb performance and rubber driven models, thermal lift and methods of detection. The definitive work from thermisters to bubble machines, cat-tails, birds, grass, clouds and body methods. Use of taper swept wings as an alternative to dihedral stable layouts. FAI

gliders and books. All in all not light reading, but thoroughly compelling for the enthusiasts, plus scale plans of the NFFS top ten models of '77.

AERO MODELLING PLANS HANDBOOK NO. 1 published by Model and Allied Publications Ltd. 144 pages, 8½ x 5½ins (210 x 145mm), illustrated, soft bound. Price 50p.

AN UP-TO-DATE reprint of this most valuable source of information. New larger format allows for better illustration of plan models, now including all the very latest additions to the range. Plans section covers all aspects of model flying including: Gliders, Rubber and engine powered, CO₂ and electric free flight models in sports, mini, open and FAI classes with sports trainers, combat, aerobatic, speed, carrier deck and all the racing classes of control line models, including a large range of scale models, biplanes, and multi-engined flying models and solid scale. Altogether literally hundreds of illustrated plans plus further hundreds of "X" listed models for the vintage fans, and scale drawings of full size aircraft.

The handbook is also packed with informative articles on building from plans, selecting the engine, handling rubber motors, balsa wood and how to use it, forming a club, plastic moulding, tissue covering, doping and finishing, fitting auto rudder and dethermaliser, how to trim free flight models and making a cheap glider winch. An invaluable guide to both expert and novice and terrific value at 50p, available at most model shops or from the Plans Sales Office at PO Box 35, Bridge Street, Hemel Hempstead, Herts HP1 1EE; add 15p post and packing.



Aero Modeller
Annual 1977-78

£2.95 net



FOR YEARS NOW the standard aeromodelling motto has been: "If you want it to fly, go easy with the paint". Sound advice too, as nothing flies worse than an overweight model. Recently miniature spray equipment has come to the aid of the model plane constructor, and is increasingly becoming a universal tool.

Even Indoor modellers are using spray techniques for controlled water shrinkage or application of minute amounts of colour. At all levels of model making, spraying offers unique advantages over traditional brush methods, allowing standards of finish and decoration previously associated with professionalism. A handy tool no doubt, but where to start?

Presented here is the first of a series by Ian Peacock covering all you ever wanted to know about spraying but never thought of asking. To whet your appetite on just what we do have in store for future editions, we list some of the topics to be covered; a survey of all the major commercially available units with their specific applications and limitations and how to choose one to suit you. Air supply equipment from spare tyres to compressors, and how to build your own from inexpensive spares. Paints, how to mix them and conditions for successful spraying. Finally, spray techniques, trouble shooting help and tricks of the trade for all types of models from plastic kits and camouflage patterns to full customising and decoration.



First installment of a detailed series on the use, choice and techniques involved in spray finishing by IAN PEACOCK

IN THE BEGINNING

Most good stories begin with "Once upon a time there was a man . . .", this story is no exception, or maybe only slightly, in that here we have three men farsighted enough to envisage nearly a century of continual development and expansion of what is now a major industry – spraying . . . with the tremendous spin-off now made available to the amateur hobbyist.

In the closing years of the 19th century, three quite brilliant and talented men saw a problem, or rather three individual problems, the surmounting of which laid the cornerstone of the spraying industry.

The first, Joe Binks, an engineer with an inventive turn of mind, was employed at Chicago's leading departmental store and one of his several tasks was to supervise the whitewashing of the store's several basements. He was convinced that there had to be a better way, and soon had produced, entirely unaided, the world's first machine for spraying cold-water paints. At the giant Columbian Exposition of 1893 in Chicago, Joe's "cold-water paint machine" was put to work with great success. An offshoot of the business was the production of spray nozzles.

Around this time an English artist, C. L. Burdick, had a somewhat different problem. Working with water colours, Mr Burdick wished to lay one colour on top of another without disturbing the lower colour, a difficult task with a paint-brush as the brush tended to "drag" the base colour. Burdick's solution was to apply the colour by air, and thus the "airbrush" was born. This was the first spray device to be controlled by the action of a "needle", and actually led to the formation of the Aerograph company. Today's airbrush owes much to Burdick's design and as will be seen later in this series, some still use the original design philosophy.

The third man of our opening sentence – an American doctor, Alan De Vilbiss – had yet a different problem. He was horrified by the crude method of treating throat infections: clearly a method of applying the medication

correctly and keeping fingers, unwanted germs, etc. out was much in need. The result was the "De Vilbiss nose and throat atomiser", looking rather like a scent spray and operated in the same way by a rubber bulb, squeezed to produce the air pressure to create the spray.

It was some time before Dr De Vilbiss expanded into the painting business and it was not until 1909 that his first "compressed-air-driven" spray gun was introduced. Much friendly interchange was to occur between Mr Burdick and Dr De Vilbiss for many years, which eventually led to a merging of interest in 1931, and by 1966 Burdick's original *Aerograph* name was finally replaced by that of Dr De Vilbiss.

Another big breakthrough came in 1923 when the American Du-Pont Company produced the world's first nitro-cellulose lacquer. This new material was revolutionary as it dried in minutes rather than hours. Motor manufacturers were quick to seize this advantage but soon discovered that the rapid drying properties made it virtually impossible to apply by brush; spraying was the obvious answer. Difficulties were encountered with this new lacquer drying in the nozzle and blocking the gun, but ever inventive minds soon designed new nozzles that did not block up.

Considerable advancements over the years have led to a state where virtually every kind of liquid can be sprayed by the products of this vast industry. Many of the companies are widely known to modellers (Badger for instance), others are not. Probably the biggest aid to the rise in popularity for the hobbyist has been the introduction of the pre-packed aerosol can, offering the user a small, portable source of pressure which, to the intermittent user, is relatively cheap. Many are specialists in certain types of spraying and it may well pay the modeller to search them out if a specific problem is to hand. He will find them ready and willing to offer all the help and assistance within their scope.



The Binks Bullows 920 unit typifies the style of the hand-held spray gun. Lower connection (at base of handle) is for air supply pipe, and screw connection in front of trigger is for paint supply.

BASIC TECHNOLOGY

To make a success of spray painting it is of vital importance that the modeller acquires the "know-how": the technique of spraying, which is as important as the selection of the correct tool for the job. It is hoped that much of this know-how will be passed on to readers, to suit their particular needs throughout the series. It is quite possible for the average modelmaker to be interested in both large flying models and small-scale plastic kits.

Mere words, however, will never make a paint sprayer, and the oft quoted "*practice makes perfect*" is possibly more true here than in any other aspect of the hobby. The object then is to explain the basic principles, describe the products that are available, determine one's needs and show the basic practice steps that **MUST** be fully understood. This understanding is an essential step towards satisfactory results that can be obtained from the equipment, whether it be professional and expensive, or the cheaper, less sophisticated end of the product range.

To start with, then, here is a glossary of some of the terms frequently associated with spray painting:

- Air Cap** The extreme front end of a spray unit.
- Air Compressor** A pump which, by mechanical means, provides the compressed air to drive the spray unit.
- Air Delivery** The actual **VOLUME** of air delivered to the spray unit (in cu ft/min) after the inevitable losses have been taken into account (in lbs/sq ft) exerted by air that has been mechanically compressed.
- Air Motor** An air pressure driven motor – sometimes used to drive 'paddles' set into the paint container to continually agitate the paint. Particularly necessary when using metallic paints (and others) that have a tendency to "settle" unless continually stirred.

- Air Receiver (or Reservoir)** The pressure vessel in which the compressed air is stored.
- Air Transformer (or Regulator)** Affords the user the ability to regulate the available pressure in the receiver to a lower level, to suit the gun in use.
- Air Volume** A measurement of air (in cu ft) at any pressure.
- Airless Spray** A method, widely used in industry, of forcing paint directly through the nozzle under extremely high pressure (usually 4,000–5,000 psi). Specially designed nozzles are required. A prime advantage of air-less sprays is the reduction in over spray and paint rebound. Airless sprayers are sometimes found in cheaper DIY situations.
- Atomise** To break up the paint (under air pressure) into very fine particles.
- Fluid Needle** A long pointed needle that, seated in the rear of the fluid cap, provides a control valve to regulate the paint flow.
- Fluid Tip** The part of the spray unit directly behind the air cap, through which the paint is drawn by the airstream flowing around its orifice.
- Oil & Moisture Trap** A device, fitted in the air line to remove unwanted impurities from the air supply, offering clean, dry air to the spray unit.
- Paint Container** The paint container is a detachable unit fitted to the spray unit and contains the bulk of the paint prior to its release into the fluid tip. Containers may be mounted above the unit (gravity feed) or below the unit (siphon, suction or pressure fed).
- Set-up** A phrase widely used to describe a "matched" set of (1) air cap, (2) fluid tip and (3) fluid needle. Many units are capable of accepting a range of 'set ups' of differing sizes enabling the user to obtain maximum flexibility.
- Viscosity** A term used to define the resistance of a fluid to flow ie high viscosity – like treacle, low viscosity – like water.



The Brown Hobby Gun, employing a truly external mix nozzle illustrates the economy end of the spraying market.

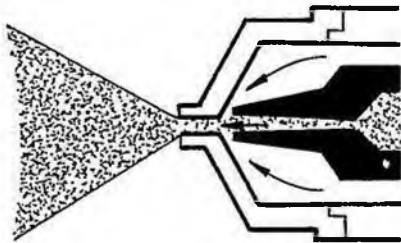
AIR CAPS

Once again, there are two basic types in common use, namely internal and external mix, thus referring to how the air and paint are mixed.

Internal Mix

Here, air and paint are mixed *inside* the nozzle of the gun. Most low pressure and low volume consumption guns fall into this category as it allows the manufacturer to use a smaller, cheaper compressor. The air cap has either a hole or a slot through which the air/paint mixture appears into the atmosphere. The 'fan' of paint depends on the size and shape of the orifice (a round hole produces conical spray, slotted holes produce a flat fan spray). It is not uncommon to have an option with both orifices supplied with the unit.

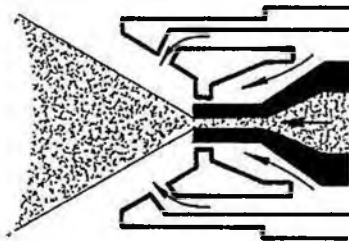
In general terms, internal mix nozzles do not produce a particularly fine atomisation, and are more usually found employed in "course" finish situations or in DIY uses for reasons of economy. They are also considered unsuitable for fast drying paint such as Matt enamels and cellulose dopes. Unfortunately most airbrushes feature an internal mix head – they were designed for the graphics industry, where ink is more the order of the day! In fact, some airbrush manufacturers expressly state that the equipment should NOT be used with dope and enamel. This matter will be more clearly covered later in the section dealing explicitly with airbrushes.



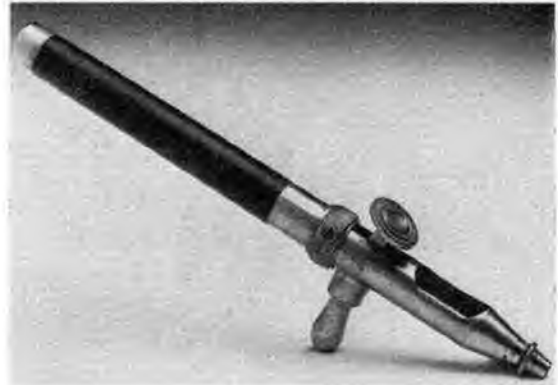
Internal mix cap, both paint and air mix inside the cap before being emitted as a spray.

External Mix Caps

These are to be found on most quality production guns. Here the air and paint are mixed *outside* the nozzle, the paint still being "drawn" out by the airflow. The air cap itself is of a much more complex design having many more holes to produce both suction and airflow to form the spray cone. Air flow through these extra holes can be controlled from a separate needle and serves to direct an auxiliary air flow onto the periphery of the spray cone, thereby flattening the shape of the spray fan. Varying the auxiliary needle setting will effectively vary the spray pattern from "round" through "oval" to a long thin ellipse. The fluid deposited, however, remains constant for any given air and fluid pressure and, therefore, results in a less dense paint cover (particularly useful as will be seen later, for spraying in corners!).



External mix cap, air supply divides to partly induce a vacuum to suck the paint out where it then mixes externally with the main paint supply.

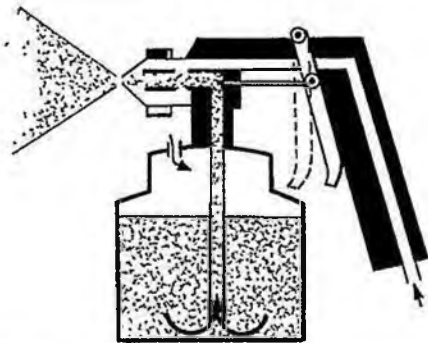


The original airbrush designed by C. L. Burdick and which has formed the basis of virtually every artist-style airbrush developed since. Held pen-fashion, spraying is controlled by the button located over the air supply inlet. Colouring agent is added to the small trough in front.

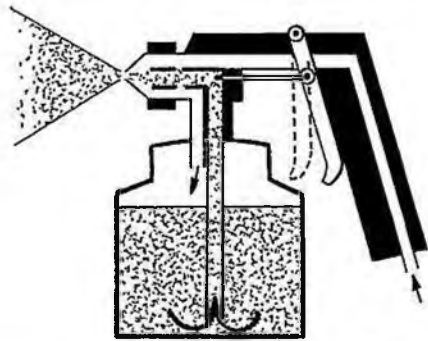
External mix nozzles themselves may be broken down into two sub-types:

Siphon feed. Produced by the air blowing directly across the opening of the paint supply tube, thereby creating a vacuum which sucks the paint upwards to form the spray. Note that the paint container must be vented to allow the replacement of paint by air.

Pressure feed. Achieved by the air supply blowing into a sealed paint container, thus forcing the paint out through its supply tube to meet the main air supply in the air cap and form the spray.



Syphon feed, note air vent that allows flow of paint to be replaced with incoming air.



Pressure feed sealed paint container where paint is displaced by incoming air.

BASIC TYPES

Spraying equipment maybe divided into two basic types, distinguished by their air supply, Bleeder and Non-Bleeder units.

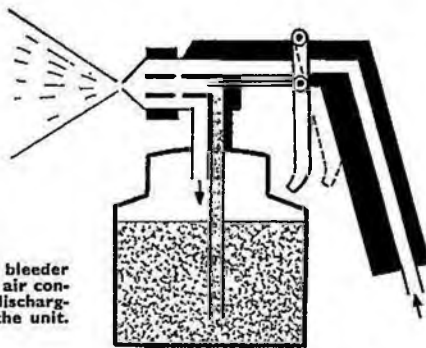
Bleeder Units

These are spray units where the air flows continuously through the nozzle, the flow of paint being controlled only when a trigger is pressed. These guns require a continuous supply of air, thereby being unsuitable for limited container-air supply. More usually employed in the heavy-duty end of the market. An air receiver is not required.

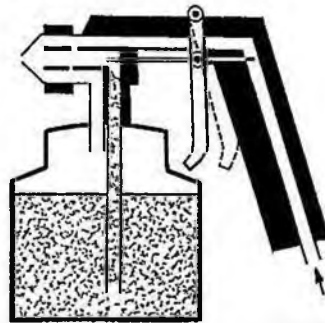
Non-Bleeder Units

With this type, both air and paint supply are controlled by the use of one or more actions of the trigger. When not spraying, then air is not discharged, making them suitable for use with containers of compressed air. Continuous operations compressors thus cannot be connected directly to a non-bleeder unit unless provision is made to bleed-off the surplus air from the airline. Smaller spraying equipment falls into this category, ie the majority of airbrushes.

Next month. A full survey of the various commercial models of spray guns and air brushes to help identify the ones best suited to your needs.



Above: A bleeder type with air continuously discharging from the unit.



Right: Non-bleeder type air and paint only released upon the action of the trigger.



**"So it's
Goodbye from me
and it's
Goodbye from
him"**

'And so it's time to say goodbye . . .' – Peter Richardson
It was way back in 1969 that I increased the MAP payroll by a factor of one, becoming an assistant to the 'legendary' Ron Moulton, January 1971 brought with it promotion of 'fearless leader' to Managing Editor, and myself to occupy the editorial chair. Now, rather neatly, seven years and 84 edited issues later, I slide (gracefully) to the helm of another MAP title, *Motorcyclist Illustrated*.

Naturally I shall miss the very many friends and acquaintances made over the years, both in this country and overseas. It has been a real pleasure to meet such a wide variety of enthusiasts and characters – and if I have ever tripped over your lines or distracted you from setting the dethermaliser, then my everlasting apologies.

My thanks too for the faithful band of contributors – both past and present – for not only providing such interesting material, but also for responding so magnificently to the 'panic' telephone calls for help.

Editing a specialist interest magazine means that one becomes completely immersed in all aspects of magazine production, from the blank paper stage to the final product. Due to this very personal involvement, one naturally becomes deeply attached to the magazine – may I say then that breaking the bond has been made much easier by the knowledge that the 'baby' will be in such good hands in the future. Good luck Martyn – you are bound to enjoy your vocation!

What do you think of it so far . . .? – Martyn Cowley
Although I am new on the staff at *AeroModeller* many of the readers will know that I am not new to model flying. Indeed that face has been somewhat over-exposed in these very pages of late. I have been an avid reader myself for some 15 years and have seen its contents and style develop over that time. Speaking now on behalf of the readership I would add my thanks to Peter Richardson for the high standard of *AeroModellers* he has produced during his seven years as editor, and wish him all success with his new role editing *Motorcyclist Illustrated*.

I doubt whether any change will be detectable for the first few months while I find my feet. However all editors must inevitably create change by doing things their own way. Personally, I would like to see a swing towards more generative information to help modellers overcome the difficulties of designing, fabricating and flying their models. Whatever the category, from scale or sports to performance and competition, the fundamentals of model flying involve the same satisfaction of creation; through the science of model aeronautics. This then could be your opportunity to drop me a note on your suggestions. I can at least offer you the editor's ear for the future.

One consolation at least with this change in editorship is that now I am safely behind the other end of the lens, at least there will be more room for photos of some of our other 30,000 readers!

topical twists

by 'Pylonius'
Illustrated by Sherry

Pinning It Down

Technically model building has come a long way from bending that sliver of cane, or even pinning down the ceremonial strip of $\frac{1}{16}$ in square balsa, for we now read of somebody with his own vacuum forming machine. Some people, of course, cynical of model flying, might think the vacuum formed to be above the ears, but certainly the use of such advanced machinery is a far cry from the time when the average modeller carried the model version of a Field Marshall's baton in his modest tool kit. You can no longer get to the top with the talented use of a metal backed razor blade; you now need to be a master mind at the centre of a whole lot of specialised systems.

Personally, I am not all that struck on machinery and gadgetry, preferring the simple, uncluttered life style. You might be all acquisitively excited when you get the new gleaming piece of machinery, but once you have it you have to allot part of your nervous system to its functional health. Even when it is operating well you have a certain anxiety about it continuing to do so, and when it goes wrong you are in a state of nervous collapse. When someone comes into the office looking haggard and distraught, you naturally think he is suffering from what is now man's major worry affliction: a sick motor car. Yet he may well be in the tortuous grip of radio failure, retract undercart troubles, glow burnouts, and even too much air in his vacuum forming machine.

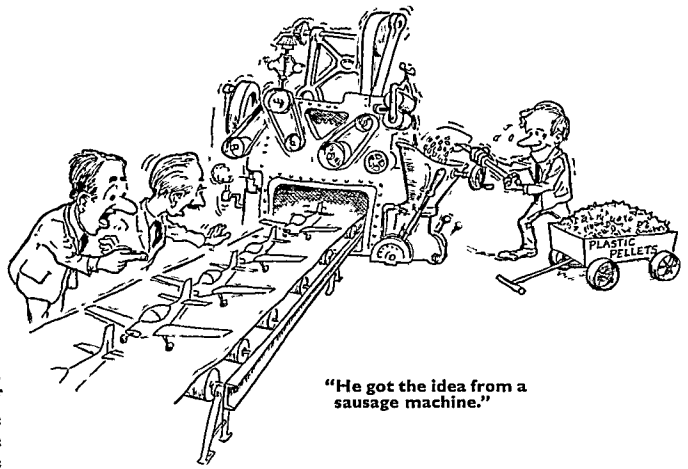
In all fairness, though, we should distinguish between the honest home-made gadget, be it beneficial or nay, and the shop bought component which, so often these days, seem to have only one part that is more or less guaranteed to function and that is the built in failure mechanism. This manufacturing of things within a hairline of part or total collapse, is one of the triumphs of modern consumer goods engineering. It is even more of a triumph that the thing should be irreparable; something to do with embedding everything in plastic to ensure total replacement when the inevitable failure occurs.

I know it is old fashioned, and out of touch with modern trends of instant modelling, but I am just about to pin down a piece of $\frac{1}{16}$ in square balsa . . .

Sizing It Up

In a way scale models are like children, in that they should be seen and not heard. By which I mean they look so enticing and realistic decked out in decals, roundels and liveries various, with all the cleverly wrought detail for us to marvel at, but once the engine starts up the super scale model becomes just another noisy little model aeroplane. This impression was never more marked than when I was admiring a *Fokker Triplane* which looked so realistic you could almost see a miniature Baron Von Richthofen climbing into the minutely detailed cockpit. Suddenly the engine was started up, and the model roared off with such a very un-WWI sound, and at an even more un-WWI scale speed, that all sense of realism quickly vanished.

Now, there is a point, depending on visibility, at which a model plane, however beautifully built, handsomely finished or tricked out in full size masquerade, just becomes a smallish flying object. Any scale model operating beyond this point of admiration is just wasting its fuel. Unfortunately, when the scale model does come within effective viewing distance, it displays those non-scale characteristics which destroy the general impression. Take-off's are usually bumpy and hairy, and landings, for protective pur-



poses, are made into long grass where the clumps of herbage act like crude arrester wires.

One way to a more realistic flying performance is by beefing up the size of the models. The slogan '*Large is Beautiful*' is implicit in all those page filling shots of monster models we see in the mags. Obviously a half size reproduction is not only going to give a highly realistic, non-wobbly flying display, it will also put most of the minnow sized scale models, however elaborately detailed, in the shade. Usually, size can only be achieved by a multi engine set up, which adds to the general dramatics, but tends to make what should be just another flight into an event involving a full airfield alert, with crash tenders at the ready, and, if the model is a bit on the heavy side, an Aircraft Ministry permit.

All this poses problems for the future. We are fast getting to a position when we will have to distinguish between 'toy realism' and 'real realism'. A scale model might look like the real thing, but that superb cowling is actually the bottom of a saucepan, and that ritzy looking radial engine a set of worked-up cotton reels. All very ingenious and clever but also very phoney. What the with-it boyos will be looking for in the future will be out and out realism, and that means nothing less than the full size replica, complete in every factual detail.

The model, if such it could be called, of all plastic and glass fibre construction, would come in a compact box. This could fit in the boot of a car, and the full size replica assembled on the flying field. Inflatable components are not to be ruled out. Extras would be by way of plastic grass landing strips and activated dummy pilots. It would open up a whole new era of model flying, or perhaps kill it altogether.

Hairy Modellers

Forget all about Leonardo De Vinci, Sir George Cayley and all the other pioneer model builders, for it now seems that the origins of the model aeroplane go much further back. We are now told that an object found in an archaeological dig is a model of an aeroplane belonging to a former advanced society. The reason for its fine state of preservation is that it is made of gold rather than balsa. Whilst it seems the ancients used balsa for their Kon Tiki type rafts it is doubtful that they used it on model planes, though even now someone may be preparing a paperback on this very subject.

Being of solid metal it is doubtful whether the model was ever intended to fly, although pioneers have always been known for their optimism. And since there is now strong evidence that we are descended from spacemen rather than the good old monkey (models of which, in brass rather than gold, were believed to be a primitive form of weather station) anything is possible. This spacemen theory goes far to explain why the old homo sap goes into orbit at the least upset, and it could well be that Adam and Eve were a couple of space people who lost their space suits whilst going through a black hole - which could account for the origins of *Oh Calcutta!*



DIDN'T HE DO WELL!

Could only be someone from Feltham couldn't it – third and fastest qualifiers at the 1977 US Nats, Riverside, California and grinning out of the photo is Stewart Willoughby with team mates Al Kelly and Bob Oge and his GMA Rossi 15 Fl glow, plus megaphone plus Lil' Quicke Goodyear. Stewart writes:

"The Willoughby/Oge/Kelly team put in fastest heat of 2:43 (80 laps, one stop) in the only 3-up heat and followed with a 6:21.8 in the finals (160 laps, 3 stops) for 3rd place. Actually first place was well within our capability for I had to fly an extra three laps penalty in the finals – I had some trouble getting past Big John Ballard and chalked up some warnings. Les Pardue won the event with 6:18.7. Pity!

My Lil' Quicke was powered by a GMA Rossi with megaphone and a 6 1/2-5 1/2 in. GF prop of my design. I used one of the GloBee '2' racing plugs – a new version. They are super plugs – didn't blow one. 50% nitro/20% Union Carbide Snowmobil Oil/30% Methanol fuel was used. Two-wheel landing gear with nose skid was used in the races, however the model was processed and passed the night before with British style mono-wheel! We noticed a loophole in the rules, for nowhere do they say that two wheels are required. We were 'forced' to use two wheels in the races after rumours that someone might 'tread' on the plane were heard . . .

Pity – we were doing 14.8-14.9 sec/8 laps (shade over 120 mph) with mono-wheel, but the second wheel knocked us down to 15.1 to 15.2 in traffic – still the fastest there.

Tense moments were experienced during the checking of the motor after the finals. We were 0.00005cu.in. under the limit – definitely too close. Also note Al Kelly's heavily bandaged hand – 28 stitches due to a gash just before the contest. So Bob Oge stepped in to pit and did an excellent job at very short notice and no practice!"

Stewart closes out by pleading for printing this report and the photo – seemingly 'Feltham needs the publicity'. Oh! really – but deserved Stewart congratulations.



Latest product available from DES (Model Components) of 7 Pendle Close, Basildon, Essex are these glass fibre props. At top is the item for Class B enthusiasts – a copy of the Frenchmen Surugue/Uzan's product. In the centre is a replica of the Tribe brothers' tooth-pick best suited for Bugs, while at bottom is the tiny Smith/Fry airscrew – perfect for high performance Goodyear.

SPEED

by Allan Lee

PREPARING ABC LINERS AND PISTONS FOR SPEED

During the past few years the majority of engines offered to speed flyers have employed ABC liners and pistons, that is: a plain aluminium piston running in a hard chrome-plated, brass cylinder liner.

The advantages of this system (first put into production by Super Tigre around a decade ago) were (1) Reduced reciprocating weight using a plain unringed piston, (2) Better heat transfer, as the liner expanded at a similar rate to the crankcase, and so stayed in intimate contact at the running temperature, and (3) Better wearing qualities; as it used a soft piston running in an extremely hard bore, the engine should stay at its peak output (once run in) for a much longer period.

These were the advantages; are there any disadvantages? Well, there are a few problems such as:

- (a) It is not really possible to run-in the piston/liner as in the case of the usual ferrous piston and liner sets.
- (b) Very little can be done to correct an out of round or wrongly tapered liner.
- (c) Cost of replacement units, due to all the processes involved in producing the liner, becomes greater.

Under the right conditions, however, with an ABC engine it is always able to go that little bit faster than the same engine using a ferrous piston and liner unit; so, we have to be able to overcome the few disadvantages to take advantage of the extra power available.

The piston material is a silicon aluminium; the silicon present in the alloy can be up to 20% apart from a small percentage of iron and manganese (around 0.5% of each), the action of silicon is to reduce the coefficient of expansion of the aluminium to a value as near as possible to the expansion of the brass used in the liner, just to illustrate the point here is a list of the Linear Expansion Coefficients for Brass and Aluminium (per °C):

Brass	– 80% Cu 20% Zn	= 0.000018
Cartridge Brass	– 70% Cu 30% Zn	= 0.000019
Muntz Metal	– 60% Cu 40% Zn	= 0.000020
Duralumin	– Al/Cu/Fe Alloy	= 0.000023
Rolls Royce Alloy	– Al/Cu/Fe/Ni	= 0.000022
Silicon Alloy	– 15% Silicon	= 0.000020

For Comparison:

Iron (Cast)	– 0.0000106–0.0000110
Steel	– 0.0000110–0.0000132
Silver	– 0.0000192

It can be seen from this list that by choosing a suitable alloy of brass for ease of machining and plating, we should, by altering the silicon content, arrive at a suitable piston alloy with the same expansion ratio. Easy isn't it? Well it would be, if we could always be sure of keeping the percentages of constituents in the alloys exact, and I am sure, in the production of the alloys in question, if held to very close limits of composition they would become far too expensive to use so we have to compromise as best we can.

As I mentioned in my list of disadvantages, the ABC engine cannot be run in, in the usual way, particularly in the case of engines used for speed.

It is better if the engine is modified with the correct piston fit, and run-in on the type of fuel which is going to be used in competitions.

If the engine is going to use FAI fuel it must be set up to run on it; if you are going to use dopes, the engine must be modified to use them from the out-set, to gain the maximum benefit from its use.

It has been found in this country at least when using FAI fuels, that the engines do not work very well on cold damp days, particularly the piped engines. Once temperatures go above the 15°C mark however, the problem lessens. This is caused by better cooling afforded by the much improved transference of heat from the cylinder region. The only way to overcome this problem, should it arise, is to use minimal cooling in the model to raise the operating temperature.

Because of the greater temperatures reached using high nitro-methane content in Open Speed, the problem is not as apparent and can usually be overcome by increasing the nitro content to compensate for the lower ambient temperature.

How then is the piston/cylinder unit set up for running? Some engines, like the K & B 29 and 40, are set up initially with an ex-

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tremely tight piston fit, this is because the cylinder material used expands at a greater rate than the piston material, and only at running temperatures is the fit correct. Other engines (DPS and Super Tigre) use alloys which have closer expansion rates and fit can be relatively loose at normal room temperature.

So, before you start hacking the piston away or honing the liner try and find out by experiment which type of engine you have. I have been known to stick the whole engine in the oven, at 200°C (well, it is one way to find out!)

The starting point for beginning running in ABC engines, is to get the piston a tight fit in the top of the liner, at TDC. For a 2.5cc engine this means the last 2mm, and up to 4mm in a 10cc engine.

After dismantling the engine and doing any other modifications you have in mind, by honing or lapping out the crankcase make sure the cylinder is a nice push-pull fit in the case; if the cylinder is loose in the case, it can be copper, silver or brass plated to get the fit correct.

Check the taper in the cylinder — it should be around 0.002in in a .15" and up to 0.004in in a .60", larger at the bottom of the bore. Because the layer of chrome is so thin on the bore, very little material may be removed to correct any faults in the liner; this means of course, that unless you can re-chrome the liner, any faults can only be rectified by buying a new liner and piston.

All the work must therefore be done on the piston. The pistons are usually ground to fit the bore; some manufacturers hold the sizes to very close limits, others are more lax but before starting any work the piston should be a fairly tight fit in the bore; any loose units should be rejected. When I say loose, if the piston will pass right through the cylinder with only moderate finger pressure, the unit will be far too loose unless you envisage using 10% nitromethane all the time!

I use soft laps to remove any metal from the piston; these are made from lead or pure aluminium. I have also used laps made from Araldite impregnated with lapping paste; I use 320 grit silicon carbide for metal removal and 500 grit, silicon carbide or aluminium oxide for finishing; use plenty of lubricant (thin oil) when lapping to prevent the piston seizing in the lap.

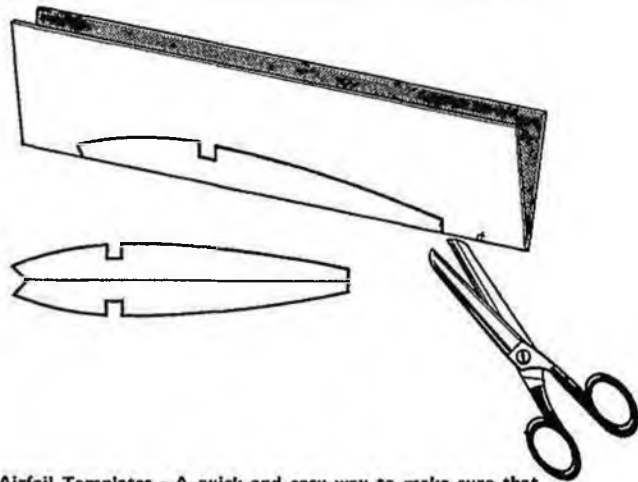
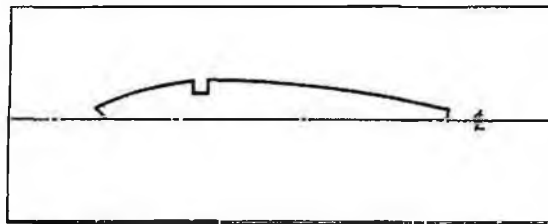
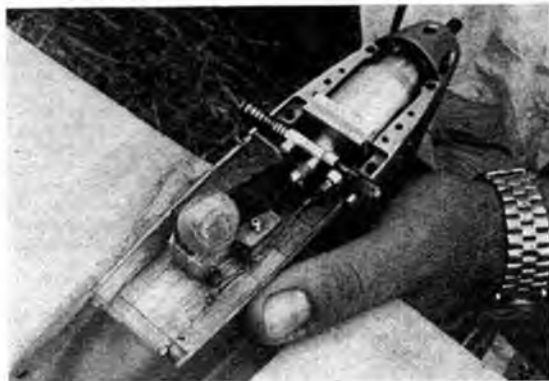
I am lucky in having the use of an ultrasonic cleaner to remove the abrasive off the piston; this is most important, and do not use a lap any harder than the piston as the abrasive will be embedded into the piston, which will then very effectively lap out the cylinder when running; a very effective way to run an engine in and out quickly!

On the larger size engines (80s), I have been turning the top 2.5mm of the piston down by 0.001in, because these engines will be using from 30%-50% nitro the crown can get very hot and grow; this process has a similar effect to tapering the piston top, and after an hour's running the step is barely noticed. (This is done before the final fitting).

When the piston has been fitted to your satisfaction you can commence running in. Because the engine is set up to run on a particular fuel, the engine must also be run at a speed approaching that which it will reach in use.

By using a low pitch prop, thinned and trimmed to give us the required revs, start running the engine for periods of 1 or 2 minutes, letting it cool down in between runs. Keep to a rich setting for the

Recognise that crankcase? Probably not - it belongs to a Cipolla team race diesel made by the Italian brothers of that name and flown at the '77 European Champs. Cipolla do make model engines commercially, but this one is not planned for production. One day perhaps . . .



Airfoil Templates - A quick and easy way to make sure that whatever shape your wing section at least it will be symmetrical. First mark a centre fold line across a piece of paper and mark only one half of the section as shown. Make sure that ends are either perpendicular or at 45 degs to ensure correct fit for trailing edge or diamond leading edge. Carefully fold along centre line and cut out to produce an accurate symmetrical paper airfoil that can then be stuck onto card or thin ply and trim round to give a long lasting template.

first half dozen runs, you can see if the piston is bedding in correctly: if the piston starts to grow at the crown, the engine will have to be stripped down and the offending metal removed using a 400-500 grit rubber matrix stone.

An hour's running should complete this process but this, of course, depends on the growth of the piston, which may not be constant from one engine to the next, or even those of the same make.

The very nature of silicon aluminium alloys makes predicting the amount of growth quite difficult and also the heat distribution in the modern model aeroplane engine, especially where piped engines are concerned is difficult to predict, but once the engine is run in as described it should hold its peak power output for a long period. Although the ABC set-up will tolerate a slightly lean run better than a farous set up, they are not to be recommended. Even at 200-250°C, the temperature our motors run at, the strength of the piston alloy has reduced considerably, and will become distorted very easily, and during a lean run the engine temperature rises, so the piston may grow again.

If this happens during a competition the piston will have to be refitted to the liner, using a very soft abrasive (Brasso or Autosolvul metal cleaners) and a rubber oil stone as before (available from Norton Abrasives in various grades).

In various experiments of my own, using different materials for pistons and liners: Aluminium pistons in chrome plated aluminium bores, Phosphor Bronze Dykes rings in chrome plated brass bores, even silver plating alloy (under size ABC units) piston in plated brass bores, the advantages of the systems far outweigh the disadvantages. What the next step will be? Well, once we have found the ideal alloys to use, the improvements for consistent power outputs look very good indeed.

If your engine is to produce maximum power, the rest of the engine must be set up correctly; for any budding engine tuner, George Aldrich's article in the Aeromodeller Annual 1963 will give many hints on the best procedures to follow. If correctly done, your engine will be more powerful and — more important — far more consistent on the flying field.



Goodyear finalists at the Ulster Nats. Standing left to right are Mitchell Shaw, David Thomason and Bertie Wright all pilots, and kneeling, left to right, Maurice Doyle, Robin Kane and Mark Thomason the pitmen.

IT may not be generally known in England but thanks to the hard work of the NIAA in Ireland, model flying has received recognition by their Sports Council. The advantages of such support became apparent at their annual C/L Nationals when they received continuous publicity on local and National Radio followed by a brief TV report on the activities. All of which naturally led to a fine turnout from the general public who were certainly not disappointed by the excellent flying in very fine conditions.

Goodyear. The entries for this event came up to expectations with the regular 'circus' turning out along with a few old faces anxious to have a go and a number of novices, stimulated, no doubt, by the numerous novice awards new to this event. The machinery used fell into the two usual categories of fast (sometimes) glows and consistent, slower (sometimes) diesels. Hot favourites were the Thomason brothers, fresh from their win at the Leinster Championships, but entrants Doyle, Hamilton, Kane and Wright were expected to be challenging hard on their heels, ready to take advantage of the slightest slip-up; in the event the Thomason's RV Rossi 15 took top honours.

Stunt-Precision Aerobatics. For once the competition was graded with virtually perfect flying conditions and the large, appreciative audience was helped by the publication of the schedule in the programme. As one would expect the .35 models predominated but it was pleasant to see some competitors, undaunted, flying smaller models, down to 1.5cc power in one case! Maurice Doyle flew early and although he didn't feel very happy about some of his manoeuvres he returned a good score. Towards the end of the round John Hamilton produced a very tidy schedule and was thought to be the likely winner until Graham Dickson, out of retirement for the day, flew a real 'blinder' with the last flight of the day to come out on top. Lou Keating, flying over concrete for the first time, did well to gain the top novice award. The remaining entrants, whilst not returning the highest of scores, were certainly noted for their enthusiasm.

FAI Team Race. Although the entry was low it was decided to proceed with the event to give the racing fraternity an opportunity to test their machinery under full racing conditions. Super Tigre power predominated with the exception of a lone ETA15 from Dublin. The only new model on view was the high aspect ratio, all GF machine produced by the Thomasons. The heats indicated a real lack of performance, preparation and practice! Nevertheless the three fastest appeared for the final, anxious for improvement. The final got underway and showed a real improvement in performance all round but, regrettably, this situation was not to last for long because, just short of the thirdway stage, the Hamilton/Wright engine cut on take-off and the resulting unscheduled landing demolished the rear end of the Thomasons' model, which was being pitted at the next segment. After careful deliberation the Controller was left with no alternative but to disqualify the offending team and award the result as shown. Despite the low entry there was a lot of interest in the event which perhaps augurs well for a possible Irish challenge at next year's World Championships.

Combat. The organisers decided to run two circles and although this did stretch the organisation to the limit it allowed the event to be completed before darkness fell. In keeping with current trends the foamies were out in force but in general they suffered badly at the hands of older technology, especially when chief protagonists O'Gorman and Fogarty were eliminated in Round 1. Another notable extraction from this round was the lone lady entrant, Andrea Kane. The semis saw the lone surviving glow of Mark Thomason in with three diesels and the resulting mêlées brought him and Graham Dickson together in the final. Literally! for the final was a short-lived affair terminated by an early collision which eliminated Graham, giving Mark his second victory of the day. The novice class was won by Tom Leonard with Clifford Wylie runner-up.

Dusk heralded a massive clean-up operation followed by the prize-giving. Prizes were awarded down to 10th place which meant that most competitors went home with something to show for their day's work. It was pleasing to see that the Dublin boys managed to go home with a major award each. Finally, a word of thanks must go to the many officials (and not forgetting the competitors) who helped to make the event such a success, and in particular to Terry Purnell and the Craigavon Club who took on and smoothly accomplished the task of running the racing events. For those wishing to contact the Northern Ireland Association of Aeromodellers write to PRO W. R. Kane, 17 Clondeboyne Way, Bangor, Co. Down.

RESULTS

Goodyear

Place	Entrant/Team	Heat 1	Heat 2	Final
1	Thomason/Thomason	4:52	4:52	10:24
2	Hamilton, Wright	6:26	5:41	11:33
3	Kane/Shaw	5:24	6:02	12:13

FAI Team Race

Place	Entrant/Team	Heat	Final
1	Doyle/Dickson	9:22	Still flying
2	Thomason/Thomason	10:14	Collision
3	Hamilton/Wright	6:58	Disqualified

Combat

Place	Entrant	Place	Entrant	Score
1	Thomason	1	Dickson	270
2	Dickson	2	Hamilton	255
3	Carroll	3	Doyle	240

NORTHERN AREA FAI RALLY - Elvington, 6th November 1977

The weather was not too unkind for the N.A. FAI Rally which contributed to the relaxed, friendly atmosphere that prevailed. Four rounds of heats were held, without any fuss or bother, with much assistance from the Wharfedale Juniors on the time keeping side. The chief rivalry was between Davis/Broadhead 4:11.8 and Clarkson/Woodside 4:13, with Langworth/Lorrimer 4:18 and Wilson/Gardner 4:19 closely disputing 3rd place.

For the final a three man jury was appointed who ensured that the rules were strictly adhered to, and with the added interest of three different engines, Bugl, Rossi and Nelson, an eventful final it was. Clarkson/Woodside's Rossi was a little cold for the first couple of tank fulls, while Langworth/Lorrimer's Nelson failed to get its usual 31 laps, leaving David/Broadhead's Bugl a worthy winner despite a slight cock-up near the finish.

Despite exchanging his traditional helmet for a more 'racy' continental style, 1977 was not the best year for Malcolm Ross and his pilot Derek Heaton. Competition is tough at the top - more now than perhaps ever before. They will have to work hard to retain their No. 1 status for the new season.



Whatever happened to the Likely Champs? Asks Dave Hipperson

THE PAST few years have produced no overall National Senior Champion in Free Flight. Not through lack of interest, but lack of organisation in deciding which are the official events. This year's proposal to count any seven results from 15 nominated events also failed to produce a result. Here Dave Hipperson has collated the results of all the SMAE events to illustrate how events might have turned out. By the way, congratulations Dave!

This is an analysis of how people placed in the 1977 SMAE Free Flight events. All the SMAE results for the year are included plus the three Mini events that the Northern Area added to the Northern Gala's programme without telling anyone! They subsequently turned out to be official events. Also included of course are the eventual results of the Trials – which incidentally make little difference.

It had been planned to detail the number of events entered by each individual. However this proved very inaccurate as it was impossible to be sure just who had flown in what at the more casually arranged Area events. Too often flight cards are torn up in frustration and never returned to control.

The results are laid out in two sections. The first is a more detailed examination of exactly what the top TEN won and where, followed by all those with one win and some other placing in order of number of wins.

One or two very interesting trends emerge and the more one studies it the more things appear. It is interesting to see that the most consistent results seem to have been achieved by fliers who fly little or no FAI, despite the large amount of FAI in the calendar last year and the emphasis – by way of more numerous flights – on consistency in the FAI Classes. What is also interesting to note is that practically every one of the top ten fly at *least* one, and more often two, Mini classes.

Dave Hipperson (Croydon). 6 – 1sts, 3 – 2nds, 3 – 3rds Gained most of his victories in the rubber categories. Won Open rubber at both Southern and Northern Galas and the first Area event, plus wins in Coupe d'Hiver at the fourth Area and Nationals, where he also won F1B Wakefield on consecutive days. All his 2nd places were in Coupe d'Hiver at both the Mini events and S. Gala, with a mixture of 3rd placings; $\frac{1}{2}$ A power at the first Mini, Open rubber second Area, and Wakefield at fifth Area.

Julian Hopper (Stansted). 4 – 1sts, 2 – 3rds Concentrated on the Power events. Had another good year repeating his remarkable S. Gala double by taking Open power and $\frac{1}{2}$ A on the same day. Other wins were Open power first Area and $\frac{1}{2}$ A at N. Gala. His 3rd places coming from Open power at N. Gala and HLG at the second Mini contest.

Tony Cordes (Whitefield). 3 – 1sts, 2 – 2nds Finished up overall top glider enthusiast with another S. Gala double, this time in Open glider and A/1 after also winning A/1 at the Nationals where he placed 2nd in Open glider, his other 2nd place in F1A coming from the second 2-day FAI meeting.

John O'Donnell (Whitefield). 2 – 1sts, 2 – 2nds, 4 – 3rds Showing better form than last year, took F1B Wakefield at the second 2-day FAI event and won Vintage at N. Gala.



Winner of the most SMAE contests in 1977 - Dave Hipperson, who was also responsible for compiling the statistics below.

2nd places in Wakefield at third Area and Vintage again at the Nationals. A double 3rd at the first Mini event in A/1 and Coupe d'Hiver with 3rds also in Open rubber first Area, and Wakefield at first 2-day FAI event.

John Cooper (Biggles). 2 – 1sts, 2 – 2nds, 3 – 3rds British team member in F1A at his third consecutive World Champs (including Ron Pollard F1B, the first time this has been achieved). John won top individual place in the Open glider team event together with top Open rubber at the windy Club Champs where he also gained 2nd in Open glider. 2nd also in Coupe d'Hiver at the fourth Area. 3rd places coming at fifth Area in A/1 glider and sixth Area in Open rubber, not forgetting his 3rd place F1A at the Team Trials.

Stafford Screen (Birmingham). 2 – 1sts, 2 – 2nds, 1 – 3rd Achieved Britain's top place at the F/F World Champs in the power team, Stafford won the British Nats in Open power also winning fifth Area event, 2nd in both Open power fifth Area and the Team Trials with a 3rd also in F1C at the Nats.

Pete Bayram (Richmond). 2 – 1sts, 2 – 2nds Renowned as our top chuck glider expert and more recently showing consistent form in $\frac{1}{2}$ A, his top placings were in Glider! Winning Open glider at the Nationals and HLG at the first Mini with another Open glider success 2nd at S. Gala and 2nd HLG at the second Mini event.

Martyn Cowley (Biggles). 2 – 1sts, 1 – 2nd, 1 – 3rd A surprise newcomer to F1C power as a member of this year's World Champs Team going on to win FAI power at the Nationals. A/1 glider producing his other 1st place fifth Area with a 2nd place at the second Mini, having been 3rd at the Team Trials.

Gary Madelin (Crookham). 2 – 1sts, 1 – 2nd, 1 – 3rd Consistently one of our leading FAI Glider Flyers. Gary won F1A at both the Nationals and the second 2-day FAI meeting, 2nd in A/1 at S. Gala and 3rd again in F1A at the first 2-day FAI meeting.

Bob Wells (Anglia). 2 – 1sts, 2 – 3rds Placed well in the year's $\frac{1}{2}$ A events, winning the first Mini event and the sixth Area. Individual 3rd in Team Open glider at fourth Area event and lastly 3rd in Coupe d'Hiver at the second Mini Centralised.

Those are the 'Top Ten', here are the next 29 –

11th: 2 – 1sts, 1 – 3rd, L. Burrows. 12th: 1 – 1st, 5 – 2nds, P. Harris. 13th: 1 – 1st, 3 – 2nds, 1 – 3rd, T. Payne. 14th: 1 – 1st, 2 – 2nds, F. Chiltern. 15th: 1 – 1st, 1 – 2nd, 2 – 3rds, A. Jack. 16th Equal: 1 – 1st, 1 – 2nd, 1 – 3rd, C. Parry (Junior) and J. Fletcher. 18th Equal: 1 – 1st, 1 – 2nd B. Baines, A. Crisp, M. Harper, S. Philpot, B. Rowe. 23rd: 1 – 1st, 2 – 3rds, E. Jones. 24th Equal: 1 – 1st, 1 – 3rd, T. Gray, G. Ferrer, S. Marriott. 27th Equal: 1 – 1st, G. Anderson, R. Collins, M. Dilly, M. Duce, C. Edge, R. Elliott, M. Gilmore, J. Godden, R. Johnson, J. Kay, J. Moseley, J. Pool, J. Tipper.

1977 SMAE ANNUAL PRIZEGIVING

Centre Hotel, Leicester – November 26th

Trophy	Event	Winner
KMAA	FIA 1st Area	M. Harper (Anglia)
Frog Senior	Open Power 1st Area	J. Hopper (Stansted)
Halifax	FIC 2nd Area	R. Collins (Anglia)
Gamage	Open Rubber 2nd Area	J. Anderson (Tynemouth)
Weston	FIB 3rd Area	B. Rowe (St. Albans)
White Cup	Open Power 3rd Area	P. Harris (Birmingham)
Astral	FIC 4th Area	F. Chilton (Crockham)
Model Engineer	Team Open Glider 4th Area	Anglia
Gutteridge	FIB 5th Area	Tim Gray (St. Albans)
Keil	Team Open Power 5th Area	Birmingham
SMAE Glider Cup	FIA 6th Area	S. Marriott (Biggles)
Farrow Shield	Team Open Rubber 6th Area	Croydon
Plugge	Club Champs – all 6 Area Comps	Anglia
Thurston	Open Glider Nats	P. Bayram (Richmond)
Model Aircraft	Open Rubber Nats	G. Fører (Leicester)
Sir John Shelly	Open Power Nats	S. Screen (Birmingham)
Women's Cup	Combined R/G/P Nats	J. Nash (Anglia)
Frog Junior	Combined R/G/P Nats	J. Smith (BAC)
Fred Boxall	FIB Nationals	D. Hipperson (Croydon)
Lady Shelly	Tailless Nats	J. Pool (York)
Mini Speed	C/L Speed Class 1 Nats	M. Gagg (Wolves)
Model Aircraft No. 1	C/L Speed Class 2 Nats	A. Lee (Sherston)
Model Aircraft No. 2	C/L Speed Class 3 Nats	P. Eisner (Feltham)
Model Aircraft No. 3	C/L Speed Class 4 Nats	G. Isles (Sharston)
Model Aircraft No. 4	C/L Speed Class 5 Nats	K. Morrissey (Sharston)
Model Aircraft No. 5	C/L Speed Class 6 Nats	M. Billington (Elliot)
Model Aircraft No. 6	C/L Speed Class 7 Nats	R. McGladdery (Feltham)
Gold Trophy	C/L Aerobatics Nats	P. Tindall (Dagenham)
Whitney Straight	C/L Combat Nats	V. Hunt (Alfreton)
RAFMAA Trophy	½A T/R Nats	Bengstar/Bohlin (Sweden)
Davies A	FAI T/R Nats	Heaton/Ross (Norwest)
Davies B	Class B T/R Nats	Bengstar/Bohlin (Sweden)
Elliott Novice	Novice Goodyear T/R Nats	Fitzsimmons/Dalglish (Stockport)
Goodyear		N. Mattingley (N. Berks)
R/M Thermal Soaring	FAI Thermal Nats	C. Foss (Sussex)
P.A.A.	SMAE Thermal Duration Nats	W. Dennis
Superscale	F/F Scale Nats	M. Staples (Shuttleworth)
Knokke No. 2	C/L Scale Nats	E. Coates (Lee Bees)
Ripmax	R/C Class 1 Scale	C. Edwards (Darlington)
Junion Kit Rubber	Any Rubber Kit Nats	J. Walker (Birmingham)
Junior Kit Glider	50in Glider Kit Nats	A. Cordes (Whitfield)
Pilcher Cup	Open Glider S. Gala	D. Hipperson (Croydon)
Flight Cup	Open Rubber S. Gala	J. Hopper (Stansted)
Short Cup	Open Power S. Gala	J. Hopper (Stansted)
Quickstart	½A Power S. Gala	J. Kay
C.M.A.	Open Glider N. Gala	D. Hipperson (Croydon)
Caton	Open Rubber N. Gala	J. Moseley
Hamley	Open Power N. Gala	Wilson/Gardiner
Budapest	½A T/R N. Gala	Hill/Oris (W'dale)
Wharfedale	FAI T/R N. Gala	Nixon/Campbell (Hinckley)
ETA	B. T/R N. Gala	A. Crisp (Biggles)
A.M. A2	FIA WCH Trials	C. P. Williams (Richmond)
Premier	FIB WCH Trials	R. Johnson (St. Albans)
A.M. Power Bowl	FIC WCH Trials	Biggles
F/F Club Champs	Centralised Club Champs	D. Smith (Southend)
Knokke No. 1	C/L National Champion	C. Parry (Biggles)
Heather	Junior FIF Champion	G. Lynn
Arthur Mullet	Outstanding Service to SMAE	



Top: Guest speaker Roy Scott of Micro Mold presents the Ripmax Trophy to Eric Coates. Below: National Champion combat flyer Vernon Hunt receives the Whitney Straight Trophy with SMAE records officer Dave Stapleton looking on. Youngest trophy holder Chris Farry 14 years old collects his reward for being overall Junior champion for 1977. At bottom long suffering George Lynn the popular recipient of the Arthur Mullet Trophy for his outstanding service to the SMAE.



AEROMODELLER

Coupe d'Hiver International Challenge

RAF HALTON

December 4th 1977

THE BRITISH COUPE D'HIVER international is fast establishing itself as a major social and flying event for free fliers. The 1977 third International received a further increase in support, including a party of 20 from France, a lone Italian expert and several proxy entries from the USA and Canada. A large British contingent swelled the entry, which included many new to Coupe flying, and who had built models especially for the contest.

The Annual event started some 24 hours earlier for the French contingent over for the weekend. They spent a leisurely (?) Saturday visiting the RAF Museum at Hendon, also the location of this year's International Plastic Modellers Society's

Championships, where they bumped into another party of visiting fellow countrymen. Others went to the Science Museum, Beaumont Aviation Bookshop and, of course, the '308' Model Shop. Saturday ended with an aeromodelling takeover of the Pizza House with ranks swelled by British friends. The exception was poor George Matherat, still back in room 301 of the hotel feverishly building a model to replace his eight, stolen in Lyons when on his way to London.

The all important weather smiled favourably on the gathering next day with bright sunshine, and despite a chilly and turbulent wind blowing down from the Chiltern Hills, the contest proved both challenging and

Top picture shows Pierre Rouselot, Editor of 'Model Reduit d'Avion', handing his magnificent MRA Challenge Trophy to fellow Frenchman Bernard Boutillier for winning the 100 gram class. Below is John Billam launching his glass fibre boomed model which he flew in both the 80 and 100 gram classes. At left is sixteen year old Ian Davitt also travelled down from Leeds. Placed third best Junior Commemorative rosette shown in leading picture was presented to every entrant.

100gr (MRA Challenge)

1. B. Boutillier (F)	..	..	120	120	120	360
2. J. Cooper	..	..	117	114	111	342
3. B. Boutillier (F)	..	..	91	120	90	301
4. A. Roux (F)	..	..	66	120	100	286
5. F. Rapin (F)	..	..	120	120	44	284
6. =Mrs C. Rapin (F)	..	..	61	100	120	281
6. =I. Kaynes	..	..	107	65	109	281
8. C. Sotich (USA) (Proxy D. Goodwin)	..	..	78	120	64	262
9. =R. Champion	..	..	26	120	101	247
9. =S. Savage (CAN) (Proxy G. Dowsett Jnr)	..	..	74	66	107	247
11. S. Marriott	..	..	92	62	90	244
12. R. Moore	..	..	37	70	112	219
13. F. Rapin (F)	..	..	41	99	77	217
14. J. Godden	..	..	31	119	59	209
15. I. Dowsett	..	..	53	77	76	206
16. A. Meritte (F)	..	..	42	69	90	201
17. J. Cooper	..	..	27	60	113	200
18. =I. Kaynes	..	..	68	79	49	196
18. =A. Wells ..	..	..	36	120	40	196
18. =J. Billam	..	..	68	79	49	196
21. D. Roche, 192; 22. A. Roux (F), 188; 23. S. Billam (Jnr) 183; 24. H. Tubbs, 178; 25. R. Champion, 176; 26. J. Godden, 166; 27. D. Greaves, 163; 28. M. Harper, 159; 29. A. Crisp, 156; 30. M. Cowley, 151; 31. S. Marriott, 150; 32. C. Menget (F), 147; 33. Dr R. Carlyle, 141; 34. A. Crisp, 140; 35. D. Davitt, 130; 36. I. Dowsett, 123; 37. =P. Ball, 120; 37. =R. Kenward, 120; 39. G. Buisson (F), 110; 40. J. Brooks, 86; 41. D. Goodwin, 82; 42. I. Davitt (Jnr) 80; 43. L. Ranson, 62; 44. G. Buisson (F), 45; 45. P. Bixby, 45; 46. M. Dilly, 43; 47. R. Miller, 0.						

Overall Top Juniors

- 1st G. Dowsett (9th - 100gr)
2nd S. Billam (22nd - 80gr)
3rd I. Davitt (42nd - 100gr)

OFF
RES



enjoyable. Thermal activity was extremely strong for those lucky enough to contact lift in the otherwise tricky conditions. At one stage a Mylar streamer was whisked from its pole to gyrate upwards in a strong lift, disappearing after an easy maximum "flight".

With probably the finest selection of prizes for any British contest, receiving as it does considerable trade sponsorship in the Christmas spirit, the pressure to strive for the top places was left to the true enthusiasts. Most entrants were content to merely enjoy flying their models in the game of chance and changing fortunes that the turbulence or thermals provided, knowing that all participants would at least

receive a memento of the contest with the top 70 or so receiving some tangible prize.

For those seriously contending the top places the contest was a hard fought and very difficult one. The 'monster size' models that had dominated the two previous calm-weather Internationals were left in boxes in favour of more compact layouts that could ride the turbulence; the early morning witnessing many broken wings with a few brave flyers attempting to use these giants.

Tactically, the problem of achieving a full score was tackled in many ways; waiting for calm patches, watching the opposition or using electronic bubble or streamer detection. No approach seemed universal,

80gr (AcroModeller Trophy)

1. C. Shepherd	120	120	120	120	120	600
2. D. Hipperson	120	120	120	105	120	585
3. B. Rowe	48	120	120	75	120	483
4. C. Menget (F)	105	120	105	110	33	473
5. R. Best	59	120	44	120	120	463
6. A. Meritte (F)	120	73	62	76	115	446
7. D. Greaves	106	63	120	34	120	443
8. R. Giolitto (I)	73	62	58	120	120	433
9. T. Gray	120	94	45	114	54	427
10. I. Dowsett	115	68	37	65	120	405
11. H. Tubbs	35	89	120	65	86	393
12. L. Ranson	37	112	118	60	56	383
12. =D. Linstrom (USA)	107	94	55	45	82	383
(Proxy A. Cameron)						
14. R. Pavely	74	120	79	62	42	377
15. D. Roche	36	37	120	77	104	374
16. P. Ball	65	88	75	42	96	366
17. D. Taylor	44	67	120	80	48	359
18. P. Meritte (F)	70	120	35	97	31	353
19. A. Crisp	35	54	93	120	48	350
20. P. Cameron,	41	87	73	96	51	348
21. F. Rapin (F), 344; 22. S. Billam (Jnr), 341; 23. A. Roux (F), 340;						
24 = J. Billam, 338; 24 = F. Nikitenko (F), 338; 26. G. Ferer, 334; 27. B.						
Boutillier (F), 332; 28. R. White (USA) (Proxy P. Chaussenbourg), 326;						
29. I. Kaynes, 325; 30. J. Bailey, 319; 31. = M. Dilly, 311; 31. = Jessica						
Nash, 311; 33. = M. Harper, 305; 33. = R. Uden, 305; 33. = J. Cooper,						
305; 36. J. Goddon, 302; 37. R. Johnson, 301; 38. = F. Chilton, 300; 38.						
= M. Cowley, 300; 40. R. Moore, 297; 41. R. Champion (F), 293; 42. G.						
Madelin, 286; 43. S. Marriott, 280; 44. M. Stones, 275; 45. D. Davitt,						
268; 46. A. Moorhouse, 262; 47. L. Sargent, 247; 48. A. Wells, 243; 49.						
= M. Dixon, 231; 49. = R. Monts, 231; 51. F. Takagi (USA) (Proxy R.						
Johnson), 222; 52. I. Davitt (Jnr), 220; 53. R. Miller, 217; 54. R. Gibbs,						
215; 55. K. Taylor, 210; 56. J. Brookes, 196; 57. P. Carter, 194; 58. J.						
Chabot (F), 190; 59. F. Michelin (F), 187; 60. P. Chaussenbourg (F), 184;						
61. J. Bailey, 177; 61. = G. Guisson (F), 177; 63. S. Johnson (Jnr), 120;						
64. M. Scott, 110; 65. R. Scales, 72; 66. R. Taylor, 53.						

Heading picture shows Colin Shepherd - winner of the AeroModeller Trophy for the 80 gram (FAI) event was the only flyer with a perfect 10 minute total. Top picture shows Alain Roux's model leaping away from a rise of ground launch in the 'Franch' contest. Below is Pierre Chaussebourg who also proxy flew Bob White's 'Bear Coupe' - helped here by Ian Dowsett. At right: rise of ground and away for top Junior - 15 year old Gary Dowsett seen here proxy flying for Canada's Dr Stuart Savage.

ICIAL
ULTS



Above left: Still smiling at 3 am as he races against time trying to replace his stolen models - George Matherat. Above right is Bernard Boutillier displaying the French 100 gram class winner. Left: Rodney Kenward made a rare appearance to proxy fly for Dick Monts of USA. Right: anxious moment for Italian Roberto Giolitto (left) watched by Alain Roux. Model did in fact make a max.



but incorporating a novel Xenakistype torque operated VIT that worked in reverse, ie more incidence during climb, reducing for the glide.

This clinched the British domination of 'our' 80gm class with France's Christian Menget, champion of a decade ago, placing fourth. To be fair, we have the advantage of being able to ballast up our models for the 100gm class, whereas the continentals, who build to 100gms, cannot remove 20gms of structure. They therefore fly overweight designs or need to build special 'British' lightweight models.

However it was in the 100gm class that the French again proved supreme champions. The dynamic duo of Boutillier and Matherat, the leading force, had suffered a sad fate when George's model box was stolen from his car.

Having lost his models he had not lost his courage, and on arrival in England purchased fresh supplies of balsa and set to in his hotel room on a replacement. Not a simple sheet 'quickie', but a full blown geodetic structure in true craftsman-like fashion. The previous week George had sent Christmas wishes to his friends written on the back of his scaled down plans, and it was just such a greeting card that provided the necessary information to hand! The top section from one of the team's glass fibre fishing rod mylar poles provided the fuselage boom.

Unfortunately there was no happy ending for George; the model was

or reliable.

The most successful style came from the Croydon team who successfully read the problems of swirling turbulence coming from a line of trees on one side and the hangars to the other, of which most other flyers seemed to a large extent unaware. They chose to wait for more stable conditions, launching in between these hazards to give good results for both Dave Hipperson and Ian Kaynes.

Dave had all but won the 80gm event, having dropped only 15 seconds during the day, when another British challenge from Colin Shepherd topped the results with the only perfect score. Colin used a basic APS *Nikolina* plan (D/873), now considered small by today's standards,

completed, but faced with the breezy prospects on the Sunday, he decided not to burn himself out with a final super-human effort covering, doping and trimming the model. We offer our commiserations for a brave effort.

Meanwhile his compatriot Bernard Boutillier flew with twice the determination, choosing to fly from well into the middle of the 'drome, away from the upwind obstacles, where the air had settled down again. This flying style produced the only perfectly maximum score in 100gm to secure the *MRA Challenge Cup*, and using another model for his second entry, allowed by the rules, he nearly achieved the distinction of beating himself by also placing third! Only

continued on page 106



SCALE MATTERS

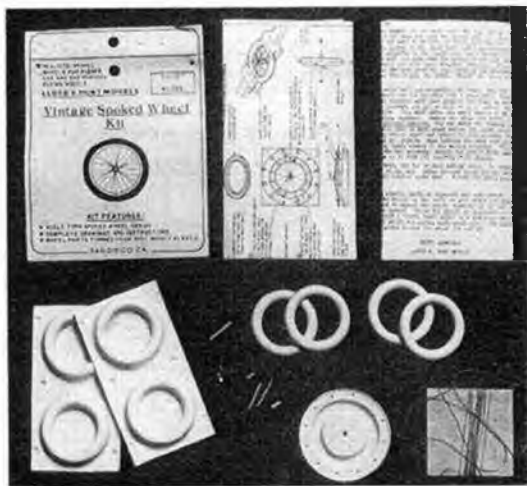
by Alan Callaghan

RECENTLY received for review this month is an import from the United States in the form of a kit of parts to make a set of scale spoked wheels. These are manufactured by *Lloyd V. Hunt Models* of San Diego and are available by post from the *Modeller's Den of Bath*. They come in seven sizes from $\frac{3}{16}$ in diameter to 2in diameter, but at the time of writing I have no details as to prices. Each kit consists of four vacuum-formed high impact plastic tyre halves, four wheel rim halves, a specially designed 'spoking' jig, aluminium tube hubs and bearings, silk thread for the spokes, and instruction and diagrammatic sheets explaining how to put it all together. I think the illustrated sheet could have been graphically laid

out to show the sequence of assembly more clearly, but by following the written instructions carefully no real problems should present themselves during assembly. The only other criticism I can think of is that the tyres, being of fairly hard plastic, will not stand up to a lot of continued hard flying over floors such as Cardington's which is very rough relative to the size of even the largest wheels from this range. On a model that will only be flown outdoors over grass or even a polished gymnasium floor, the problem will not arise. The kits provide a very interesting and different exercise in construction, and having to some degree learnt the 'secrets' of spoked wheel building from them, I am sure any builder will

be less inclined to shy away from the many interesting types to be found amidst the ranks of early pioneer aircraft that would involve making a set entirely from scratch.

Scale enthusiasts who are avid readers of all the ads in American magazines will be familiar with the name of Gene Thomas, who during the last three or four years has been producing some very interesting kits and planpacks for a small handful of light aircraft. The Thomas range is now expanding into greater things (1:4 scale model kits due out in 1978!), and presently consists, subject-wise, of the Heath Baby Bullet, Church Midwing, Heath Super Parasol, Alexander Bullet, and the 1911 Cessna. These are available in Peanut



Heading picture: Full size Bucker Jungmeister? No, it is our columnist's Peanut scale version finished in cream/red livery. Careful photography helps realism!

Left: The Lloyd V Hunt spoked wheel kit. Tyres are vacuum-formed - several sizes available. Right: Documentation booklet by Gene Thomas - one of a range of three.



Scale and 1:8 scale at the moment. The unrivalled feature of the Thomas kits is the quality of the scale documentation that goes with them. This includes very accurate plans, photos, and colour schemes presented in a very attractive manner. Illustrated is the eleven page documentation booklet for the Super Parasol containing information and photographs from "Modern Mechanics Flying and Gliding Manual" and the "Aero Digest" from the late 1920s amongst other sources. A main feature of the booklet is the centrespread tone drawing by Gene Thomas showing colour schemes and some construction details of the real aircraft. The kits include many vacuum-formed parts such as engine and cowlings, together with a full set of very authentic transfers. I have not yet had the opportunity of examining an actual kit but from the information I have they appear to be quite excellent.

The larger versions of these models are stated as being suitable for conversion to R/C using sub-miniature systems such as the Ace and Cannon sets produced in the USA. Radio flying not being my cup of tea, I am not sure if these systems are generally available over here but I suspect not. Averaging 39in span, they are eminently suitable as engine powered conversions (I believe they were originally designed for rubber). I do not know of a British supplier of the kits but once known I would be happy to pass the information on. In the meantime those interested can write direct to *Gene Thomas/Classic Models PO Box 681, Melville, New York 11746, USA.*

As suggested two months ago in a paragraph on how to approach building, I try as much as possible not to have to finish a model to a given dead-

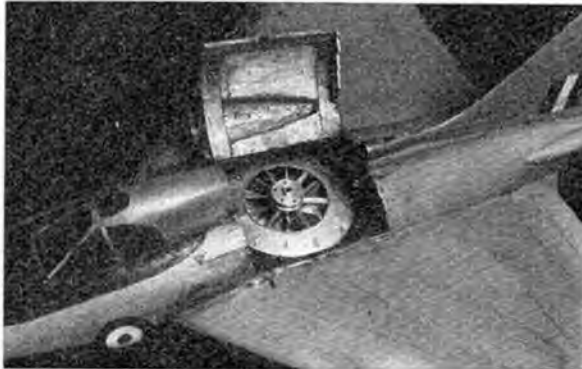
line but prefer to let it grow gradually so that all the inevitable unforeseen snags can be ironed out at leisure. Using this technique over the last ten months or so I have slowly been putting together a 1:12 scale Hawker Tomtit designed for rubber power. This subject was chosen for its very attractive lines, an abundance of information available from many sources, and the radial engine, which is usually more easy to adapt to incorporate a detachable noseblock than is an inline engine, and gives in the process a generously proportioned hole through which to feed the motor. The model is 28in span and scale tailplane areas are dihedral are used. Dihedral on the Tomtit is not great, and I am counting on the sweepback of the wings to make up for this in terms of stability. The model has been test flown a number of times and does not appear to have any really serious vices.

I tried very hard to prevent the model from stalling by building in about three degrees of downthrust but no sidethrust. As set up it now flies in right-hand circuits but as the power dies away the nose rises and it gently drops a wing. I put this down to insufficient noseweight - there is still a fair amount of detail such as the exhaust system to add - and the slight excess of downthrust is holding things steady during the initial power burst of the motor. The glide is quite smooth and flat. After adding the extra detail (and not worrying unduly about its weight!) I will put in a little sidethrust in the hope that this will make the model turn, leaving the rudder available to coax the model into a powered gliding approach hopefully in the opposite direction to the climbing turn. During the first part of the flight the slight opposite rudder should be holding the nose up in the turn.

Wishing to keep the weight as low as possible on this model I omitted on the wings and tail every alternate rib. The ribs used are of 1/16in sheet, but after covering and clear dopping the surfaces I then added 3/32in wide strips of heavyweight Modelspan as rib tapes in all the correct rib locations. From certain angles it looks as if all the ribs are actually there, but of course from other angles it doesn't! Nevertheless, I was quite pleased with the overall effect which is similar in kind to the airbrush shaded lower ailerons, i.e. not built exactly to scale but giving the impression of this at anything over an arm's length distance away.

The upper wings of the Tomtit are built in one piece and strapped to the centre section runners with rubber bands - not the most satisfactory method, but fairly crashproof and it allows the model to be flown while trying to devise a better way of doing it! The lower wings are permanently attached to the upper ones by the interplane 'N' struts which are made of one piece of 20g wire faired with balsa. Wire hooks are fitted to the wing roots to take a single rubber band in a paper tube through the fuselage which also has two 1/4in dia dowel locating pegs at each side at the lower roots to hold everything true. This system is very resilient in crashes but is very easy to keep properly aligned. A few more details are due to be added - instrument panels, pilots, small markings, and rigging. I would also like to try a finer pitch prop to keep the airspeed down. This to me is the main attraction of the large FF rubber scale model in that they can be made to fly much more slowly than a powered model, and a much smoother transition from power to glide is possible. Large rubber motors are not exactly cheap to make up, but in a scale model they are

A 26in. wingspan ducted-fan Boulton-Paul P111 built by John Coatsworth of Epsom. Powered by an Elfin 1.8cc diesel equipped with a centrifugal fan - access to which is gained via a hatch (below right). Additional air is drawn in through the cockpit windscreen which is unglazed. Engine was pulley started but a modern electric starter should simplify this task. Model has been stored in a loft for the last 14 years, but is now being renovated to fly once again.





Paul Leith scaled up Doug McHard's original rubber powered design to arrive at this superb 50in. wingspan Heinkel 46. He chose a civilian colour scheme and kept the weight right down; in fact a Davies-Charlton 0.5cc Dart diesel is used for power. Quite an achievement!

rarely if ever wound up to the limits of performance as they would be in a duration model, and so will last quite some time if properly stored. Lastly, but perhaps some would argue most importantly these days, there's no noise. Who would argue that a Mills 1.3 or similar sounds like a Rolls Royce Eagle or similar anyway?

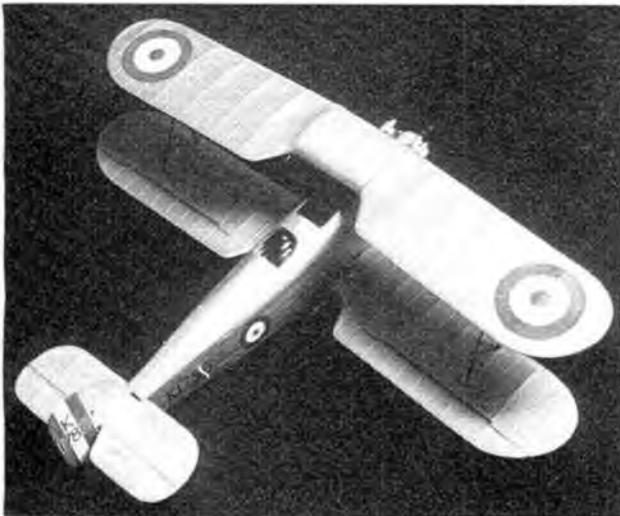
Those whose scale interests stretch back to the middle and late 1950s will be familiar with the name of P. E. Norman, whose pioneering work in the field of ducted fan propulsion was known the world over. "P.E." was also one of the most prolific builders of "normal" scale models of all types ranging from the Fokker Triplane to the Hawker Typhoon, and a number of his designs are still available through APS. Their hallmark was usually very strong constructional methods coupled with pendulum control. It is a great tribute to his very original building techniques that now, many years after his passing away when flying his models at Epsom Downs, a large number of his models still exist. Two members of the 2FSA association, Alan Jupp and Derry Eggs, have offered to try to restore some of the models with the primary intention of getting them flying again, possibly at the 1978 Old Warden Scale Rally.

From an assembly of over sixty

models of various kinds temporarily housed in Derry's garage I was given charge of a neat little yellow Boulton Paul P.111 fitted with a ducted fan system and an Elfin 1.8 diesel. Described in 'Model Aircraft' and Ron Moulton's 'Flying Scale Models'. A larger P.111 with glass-fibre fuselage and knock-off wings was there for comparison, but the smaller one was more interesting in that the fan is of the centrifugal type rather than radial. The fan itself is made of aluminium and draws air into an aperture on top and then pushes it out sideways into a horizontal duct leading to the tailpipe. The motor is mounted directly below the fan with the crankshaft lined up vertically. The model itself is in quite good condition with only the port wingtip and fin requiring attention. Once most of the grime and dust has been cleaned off and the repairs made a new coat of yellow would be in order. Although it is not the intention to overdo the restoration work and give these models the kind of super concours finish that they did not have in the first place. "P.E." was better known as a very active flyer rather than a super detail builder, and whilst the models are simply and neatly finished it is obvious that this stage in the building of them was not painstakingly laboured. Having swotted up a number of features on ducted fan

propulsion I feel a little dubious about trying to start a fairly powerful motor like the Elfin with an aluminium impeller attached since the blades on such things are known to have a habit of coming off due to fatigue under stress. Thankfully, that problem can wait until the airframe is restored. Should anyone living within reach of South London wishing to help in the restoration of some of these models, write to me, care of this column, and I will be happy to put them in touch with either Derry or Alan. I should point out that the models are *not* for sale, and that the main intention is to make them *fly* again.

The FF scale modeller who wants a substantial kit of an interesting prototype is not badly served these days, he is not served at all. The problem is not one of simply designing and engineering a kit itself, this is relatively straightforward if you know what you are doing, but more one of choosing a prototype with enough appeal to sell in large enough numbers to make it all worthwhile. Consequently, the successful FF kits that you see on the model shop shelves are very much a compromise between something that looks only at first glance like a real scale model, and a basic sports model usually with non-scale dihedral, tail areas, and undercarriage. With the growth in



The author's 1:12 scale Hawker Tomtit for rubber power. This 28in. wingspan model has scale tailplane areas and dihedral. Cockpit detail and pilots have yet to be added. Note too the rib effect employed on the wings - see text for details. Picture above illustrates strut attachment and flexibility of this arrangement. Details of this system are provided below.

recent years of Peanut scale and interest in small scale models, this type of thing has become more and more acceptable generally, but certainly not at for example serious contest level on the indoor scene where the top standards are very high indeed. It is very doubtful that we shall ever see the really pukka super-scale FF model kit in the shops. The nearest I have ever seen to it are two or three obsolete kit plans from the American Cleveland Company, but even these would require the odd modification to achieve the degree of resilience obtained in a model built from the best of modern specialist designed plans most of which, luckily for us, are in the APS.

Two new releases definitely aimed at the sports flyer come courtesy of **The Modellers Den**, Bath, and consist of a *Corben Baby Ace* from Peck-Polymers, and a small *Taylorcraft* - one of a range now being marketed under the Hi-Flier trademark which also includes the familiar kits previously sold under the Tern name. The *Baby Ace* is 17½in. wingspan, intended for CO₂ or rubber power, and unquestionably is an excellent kit that should get anyone successfully started in small scale models. Contained are two large sheets of full-size parts showing all the information for either rubber or CO₂ versions, beautifully printed sheet, stripwood, vacuum-formed spats, rubber, all the necessary accessories, and a set of three-views as scale documentation. The price is approximately £3.70, and anyone finding difficulty in making this one fly should confine their talents to C/L or R/C.

The *Taylorcraft* is 16in span and is a re-visit of a very early design; in fact the plan is dated 1939(!) but has

been modified to accommodate some very clean-vac-formings for the cowling and spats. A good feature is the inclusion of the very efficient 'Tern' propeller which will be an excellent aid to flying performance. Showing its age, the plan illustrates an all-balsa landing gear which is

unlikely to survive very many 'arrivals', and despite the illustration on the box and the low price of £1.25 I would say that it is not very suitable for young modellers since by its very nature this type of kit requires care and accuracy in building in order to properly fulfil its promise.

† NEIL WILLIAMS and DOUG BIANCHI

WHEN NEIL WILLIAMS was reported missing on the delivery flight out of Madrid in a Spanish-built equivalent of the Heinkel He 111, air enthusiasts all over the country were shocked to realise that this so-skilful and intrepid pilot would no longer be entertaining a vast public with his spectacular displays at the Air Shows.

Neil's colourful career in aviation had an aeromodelling background. We shall miss his annual family visit to the Model Engineer Exhibition and his reunion with Peter Bullivant of the Electric Model Flying Team at the RTP circle. Peter sent Neil off on his first-ever solo as an Air Cadet glider pilot. But that was many years ago, long before Neil was to list hundreds of different types in his logbook and many an adventure in the process. He could, and would, fly *anything* and was among the most highly respected pilots in the British scene. He could leap from the seat of a Box Kite into the cockpit of a Spitfire at any of his Shuttleworth Shows, or he would deliver a decomposing Lancaster or Mosquito for renovation to a Museum, thrill crowds with his flying of a Pitts Special or

test-fly a renovated Yak-11 or Lysander.

By strange quirk of circumstances, one of his closest friends and the one person who perhaps gave him more opportunity than any other to fly the unusual - Doug Bianchi - died on the very same day. Doug also had an aeromodelling background, being a contemporary of the late and great P. E. Norman, and like Neil, he always had time to talk about modelling connections with full-size aviation. Doug's hangar's at Booker are unique in the UK, if not the whole world, for the incredible variety of 'planes they contain. Spitfire, Lysander, Yak, Morane and the replica S.E.5, Fokkers and pioneer Vickers type, all made Doug the most enthusiastic "full-size" scale modeller we ever knew.

We shall miss both of these great enthusiasts who have inspired the love of flying among so many. Our sympathies are extended to their families and especially to Tony Bianchi and his mother and sister who will carry on the good work at Personal Plane Services.

Latest Engine News

by Peter Chinn

News from Fox

JUST AS A start was about to be made on this article, a letter arrived from Duke Fox giving a brief account of recent developments at the Fox Manufacturing Company plant in Arkansas, USA, so what better way to begin than to pass on some of this news?

Those of us who have followed Fox fortunes over the years would probably agree that the Fox motors that spring most readily to mind, so far as contest successes are concerned, are the famous Stunt 35 widely used by C/L aerobatics enthusiasts for more than a quarter of a century and, almost as well known, the Combat Special in its various guises. Development work on the current Schnuerle-scavenged Mk.III Combat Special, introduced eighteen months ago, has continued and the latest models have improved crankshafts and conrods which, apparently, are successfully resisting the best efforts of, to quote Fox, "the destruct artists". A minor weakness on another engine, namely in the throttle barrel of carburetors fitted to the 19 and 25, has also been eliminated by a redesign.

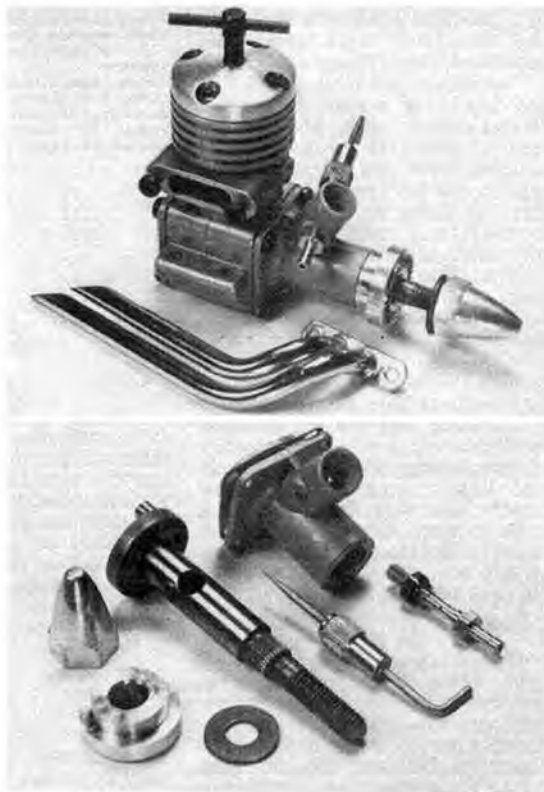
In last August's issue of *Aero-Modeller*, we featured a full test

Something new to arouse old memories a new British 1.5cc diesel the Kingcat 1.49. An attractive looking motor moderately priced that should find plenty of willing buyers.

report on the then-new Fox 15BB Schnuerle engine. Some people may have expected this motor, with its somewhat more advanced specification, to be up in the World Championship class, whereas our findings on a stock sample gave the engine a gross output of 0.33bhp at 20,000 rpm on 5% nitro and 0.37bhp at 21,000 on Fox Missile Mist (25% nitro) fuel - useful figures but not exactly destined to cause consternation in the Rossi camp. Actually, we

suspected that our test motor may have been a little below par, performance-wise, and were concerned in case the test figures gave a slightly pessimistic view of its capabilities, so it is reassuring to have Duke's own comments. He writes: "Regarding our 15 Schnuerle motor, with the focus of interest on contest work and quarter-midget racing, the temptation was very strong to concentrate on a full racing motor. I elected, however, to make the motor that I felt the average sport R/C flyer and sport control-line flyer would want: easy starting, insensitive on mixture adjustments and as trouble-free as possible. Now, with a year behind us, this has proved to be the right direction."

Not many manufacturers with a strong home market demand, like Fox, bother to consider the special requirements of export markets, but Duke Fox has done exactly this by introducing a new version of the Eagle 60 engine, to be known as the Export Eagle. Most Fox engines are designed to run best on the medium nitromethane content fuels more widely used in the US, such as 'Missile Mist'. The Export Eagle, however, is set up to operate satisfactorily on straight methanol and castor-oil. Outwardly, it is identified



Parts of the Kingcat 1.49. Design and construction is somewhat different from traditional small diesel practice.

by a modified head with the glow-plug moved over to the exhaust side and placed upright instead of in-clined.

This engine and most of the Fox line now have a matt grey bead-blasted casting finish. Most people seem to prefer this to the previous tumbled finish and all future Fox engines will have bead-blasted castings — excepting the Stunt 35 which, for the sake of tradition, Duke says, will remain shiny.

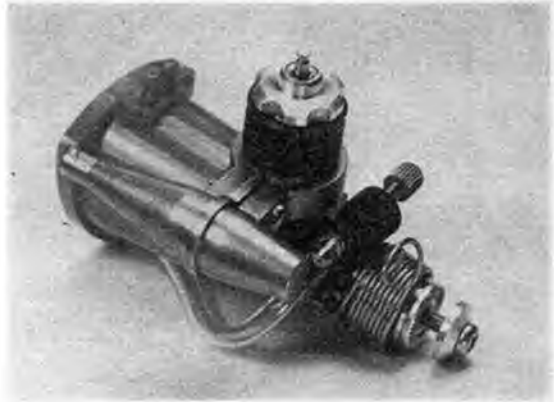
In addition to engines, Fox produces a wide range of accessories: tanks, spinners, silencers, shaft extensions, engine mounts, etc. and, now, wheels. Unlike most other manufacturers' wheels, these new Fox products have aluminium hubs — something that will be welcomed by all those of us who have gloomily contemplated plastic hubbed wheels that lean drunkenly after a few months' use. Fox wheels are being made in three styles. Two of these have cast six-spoke hubs: a lightplane style in diameters from 1in to 4in in $\frac{1}{4}$ in steps and a high-pressure military type in similar steps up to 3in dia. The third style is a 'Cub' balloon type with machined and polished hubs, again in $\frac{1}{4}$ in increments in diameters up to 4in, but also including four extra large sizes: 4 $\frac{1}{2}$, 5, 5 $\frac{1}{2}$ and 6in for really big models. The accurately balanced air-core tyres for all these wheels are moulded in the Fox factory using special Fox-designed machines.

Kingcat Diesel

By courtesy of Keilkraft, who have recently taken on the distribution of Kingshire Products, we have just been having a look at the newly introduced Kingcat 1.49 diesel. In a way, this was like going back in time a couple of decades or so, simply because the advent of a new British-made small diesel, rare today, was a common occurrence in the fifties. Not that the Kingcat is old-fashioned

Novel Japanese G-Mark engines the .03 with tank and silencer

Below, two views of the .061R/C with throttle, silencer, radial or beam mount. See text.



(in many ways it is refreshingly different) but the mere sight — and smell! — of a 1.5cc diesel takes one back to thoughts of all those diesels of similar size that introduced tens of thousands of modellers to power flying before radio-control became popular; names like Allbon, Elfin, Allen-Mercury, Frog, Mills, or to other makes now half-forgotten such as J.B., Kemp and Reeves. Happily, a few are still with us, including two of the best, so far as performance is concerned (Oliver and P.A.W.) but, as we have said, new diesels, especially inexpensive ones for the ordinary fly-for-fun modeller, are pretty scarce today.

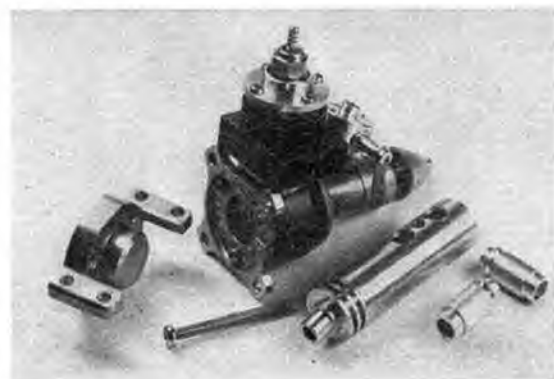
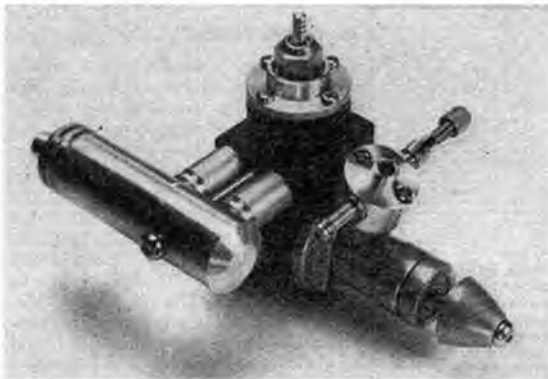
The Kingcat starts easily and runs well and, in due course, it is hoped to publish a test report on one of these engines but, in the meantime, a few words about its design and construction may be of interest.

In appearance, the Kingcat is rather neat and this is aided in the *de-luxe* version, by the addition of a pair of curved chromium plated exhaust pipes and a spinner-nut. Unlike most other small diesels, it does not use annular cylinder porting. Instead, the engine is of a cross-flow

scavenged type, using single diametrically-opposed transfer and exhaust ports and a flat crown deflectorless piston. Induction is via the usual crankshaft rotary-valve.

Structurally, the Kingcat layout is, in many ways, more in keeping with glow engine practice than with customary small diesel design. The main casting, for example, comprises the crankcase barrel, open at both ends, with a full length cylinder jacket incorporating an exhaust duct on the right side. The cylinder sleeve, in the usual glow engine fashion, is a slip fit in the casting, located by a flange at the top and held in position by the head which is tied down with four Phillips screws. The front housing and backplate castings have square flanges and each is secured with four Phillips screws to the crankcase — again typically "glow".

The nickel-chrome crankshaft has a 0.312in o.d. journal, a 0.150in dia crankpin and a 0.180in i.d. gas passage and runs directly in the front housing material. The piston is of cast-iron and is coupled to a machined alloy conrod by a fully floating silver-steel gudgeon-pin. The contra-piston is also of cast-iron. The





The Davis diesel conversion head assembly here fitted to a Cox TD 049 in place of the standard glow head. A set is also available to suit the Pee Wee .020 model.



Parts of the DDD Cox 049/051 size diesel conversion kit showing (clockwise from head) three fluorocarbon seals aluminum contra-piston compression screw and spring.

cylinder liner is of nickel-chrome steel and the cylinder head is machined from aluminium alloy bar.

The Kingcat has a bore and stroke of 0.501 x 0.460in, which gives a swept volume of .0907cu.in or 1.486cc. Checked weight of the example examined was 107 grammes (3.77oz) or 123 grammes (4.34oz) with exhaust pipes.

G-Mark 061

In the May 1977 *Latest Engine News* column, an early example of a new baby glow engine of Japanese manufacture was described, namely the G-Mark .03. This motor, of 0.4915cc or .0300cu.in displacement, has since appeared in a new version, called the "Humming-Bird", complete with a neat plastic radial tank-mount and a silencer. (See photo).

It has been joined also by a second, larger, engine from the same manufacturer called the G-Mark .061 or "Seagull". This has a bore and stroke of 11.2 x 10.15mm, giving a swept volume of 1.000cc or .0610cu.in. This motor too, is sold complete with a silencer. It does not include a tank but has, as the photo shows, an unusual mounting arrangement featuring two interchangeable pressure diecast backplates, one providing for four-point radial mounting, while the other, having a pair of forward facing lugs, allows normal beam mounting.

The two examples of the Seagull submitted for examination were .061RC models - i.e. they were both fitted with throttle type carburetors for radio-control use, but presumably the engine will also be obtainable in a standard version, since the intake has provision for fitting a spray-bar assembly.

Negotiations have been going on for the distribution of G-Mark engines in Britain by one of the major UK wholesalers. If and when G-Mark engines become obtainable here, we will give more detailed descriptions of them and, perhaps, a test report.

Dieselize your Cox

Nowadays the conversion of lapped-piston glowplug engines to diesel operation is a more practical proposition than it used to be. Powerful modern glow engines are more robustly constructed and are less likely to suffer bent conrods and broken shafts when subjected to the rigours of "detonation - ignition". Piston/cylinder fits are much better than they were thirty years ago and are often quite capable of providing the degree of piston seal necessary to achieve the compression required to generate enough heat to detonate the fuel charge for starting.

In the United States, Robert Davis, of Davis Diesel Developments Inc., has proved these points with his DDD conversion system for the small Cox engines. The DDD conversion kit was first marketed at the end of 1976 for the Cox Tee-Dee 049 and 051 and a smaller conversion is now manufactured for the Cox Tee-Dee 020 and Pee-Wee 020 models.

Diesel conversions are not completely new, of course, but the DDD system has one important difference. It retains the traditional arrangement of a variable compression cylinder head but instead of depending on a closely and accurately fitted contra piston (usually of cast-iron and requiring the addition of a sleeve

extension to the cylinder), the DDD has a shallow, loosely-fitted aluminium contra-piston within a deeper cylinder head that screws directly into the Cox cylinder in place of the standard Cox glow head. Gas seal no longer depends on the contra piston. Instead, a plastic disc of fluorocarbon material is inserted into the cylinder before the new head assembly is installed. This, clamped between the head gasket seat and the head, seals the combustion chamber but remains flexible enough to follow the small vertical movements of the contra piston pressing down on it from above as compression is adjusted.

Fluorocarbon seals of 5, 10, 15 and 20 thou thickness are available for the 049 size conversion, the thicker discs being recommended for the high performance Cox TD series engines and the thinner ones for the less powerful Medallion, Black-Widow and Bee models.

An advantage of the DDD system, compared with conventional tight-fitting contra pistons, is that the compression control moves much more freely. For this reason, no tommy-bar is fitted to the screw: there is simply a round knob and, if the user wishes, this, in the case of an R/C model, can be linked to a servo to enable compression to be adjusted in flight for optimum performance or use as a speed control.

The DDD conversion system is manufactured by Davis Diesel Developments Inc, Box 141, Milford, Connecticut 06460, USA (to which address trade enquiries should be directed) and is retailed in the UK by Racing, Sport and Vintage Engines of Finchley.



Are you between 10 and 16 years of age? Then don't delay, join today

WHAT WOULD YOU LIKE FOR CHRISTMAS, SON?

ONE OF THOSE CONTROL LINE PLANES, LIKE WE SAW AT THE DISPLAY, PLEASE DAD.

LAST week a young beginner came to me with a problem concerning his newly-bought 1½cc diesel engine. The starting instructions told him to unscrew the needle valve 2½ turns – sadly they did not tell him how to differentiate between the needle valve and the compression screw. About a quarter of a century ago I firmly believed that the tube emerging from the back of my ED Bee Mk 1 was the exhaust pipe. (My starting ritual, incidentally, included screwing the comp. screw fully home and then unscrewing it a set number of turns – great exercise for the con rod!) During the summer I saw an apparently well-built 'Mirabilis' disintegrate in a heavy landing at the end of its maiden flight. Its young builder had interpreted the wing centre-line drawn on the plan as an instruction to cut and butt-join the leading edge, the trailing edge, the spars – even the ply braces!

The above extract from the 'Nitro' Newsletter amply illustrates the problem facing most newcomers to the hobby, which is deciphering those confusing instructions or battling their way through the bewildering choice of options that confronts them.

Everyone has their own ideas of which type of model they would like to fly – be it a realistic scale replica, a simple glider, or the excitement of control line. But how do you go about it? What makes models fly? It all looks so easy when someone else is doing it. How do you avoid a crash, or just as importantly, repair the damage? How do you find these things out, where do you get the information, who do you ask, what models to start with, a kit, or a plan?

Obviously there is no easy answer, but in the many letters we receive from Golden Wings members, these questions are the most common, and the ones that in the coming months we shall be attempting to answer.

If there are any generalisations to be made it is surely these: That much of the fun and enjoyment in model flying, as a hobby and sport, is in fact in "finding out for yourself". But to be fair, you have to give yourself a fighting chance, it is no good trying to find out the principles of flight by trial and error with your latest fragile scale bi-plane. The model just will not last long enough for you to learn. Similarly, it is no good practicing elaborate paint finishes on a simple chuck glider, it will end up performing like a well decorated brick! An aerobatic stunt model is probably the worst model with which to learn to fly manoeuvres. It sounds ridiculous to the newcomer, but it is true. They were designed to fly manoeuvres and not to continually hit the ground. Far better a really tough model that can hit the deck countless times until the rudiments are mastered.

The most important thing to realise is that in order to learn you have to make mistakes. And with model flying that means hitting the ground; robustness is the name of the game when choosing your first models. If you want to fly super lightweights, or true scale models, do not try and get there all in one step – you will never do it. So many beginners choose the wrong model to start

with, meet with failure, get disillusioned, and never achieve their intended goal of flying model aircraft.

That is not to say that the toughest trainers are boring to fly, just the opposite in fact – it is the learning that's the fun; the ability the reward. But how can you tell which models are the best trainers? The choice is still yours, but make it simple. For a C/L trainer choose one ideally of all sheet balsa, at least you will learn not to get giddy with it. For stunts, probably a nylon covered combat model to start with, a flying wing with no fuselage, therefore less to break. Free flight? A simple sheet chuck glider can teach you almost all you need to know about stalls, dives, spins and the battle against gravity, striving for duration. Tow-line gliders, rubber and power – start with easy models; functional square outlines and few parts. Perhaps they are not beautiful, call them ugly if you like, but their purpose is to teach you to fly, to enable you to progress to better things.

In model flying, no one knows all the answers; there were no kits or plans or experts to ask when people started building models 50 years or more ago. The secret lies in experimentation, do not be afraid to try out changes on your models, to learn from the laws of flight. That is where the simple trainers come in; it does not matter if you make a few mistakes as they are quick to repair, or hopefully they will bounce anyway undamaged.

Of course, it is still difficult to do all this on your own unless you have aeromodeling friends or a school club. Alternatively, why not seek out your local town club or simply ask those you see successfully flying in your area. If you never seek help, or ask for it, you cannot expect much help in return. So contact your local flyers and get a head start.

If you think I have side stepped some of your questions, and you need some real suggestions, how about choosing one of these plans for a start? I cannot guarantee it will be dead easy, but at least you will be giving yourself a fair chance of success, and I can guarantee you will enjoy building and learning to fly any one of them. Below are listed some suitable models, with wingspan engine size, the plan number you must quote when ordering and the price code.

Chuck Gliders

- Slarmi 18in G/953 - B
- Monster 18in G/1173 - B
- Sailaway 15in & 6in G/730X - B

Towline Gliders

- May Morning 36in G/1253 - C
- Phoebus 30in G/1052 - B
- Downbeat 44in G/867 - D

Rubber

- Little Mavis 29in D/890 - D
- Delinquent 36in D/923 - D

Power

- Chatterbox 30in .5-.8cc PET/715 - C
- Tomboy 44in .8-1cc PET/398 - D

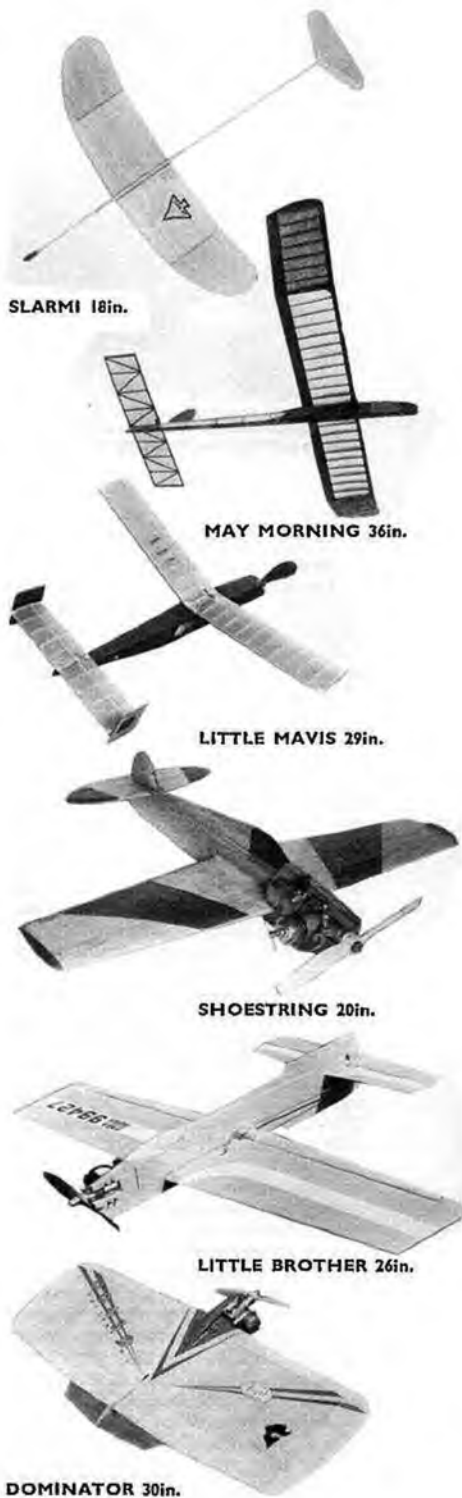
Control Line Trainers

- Deerfly and Shoestring 24in .8-1.5cc CL/1232 - C
- Little Brother 28in .8-1.5cc CL/1309 - B

Combat and Stunt

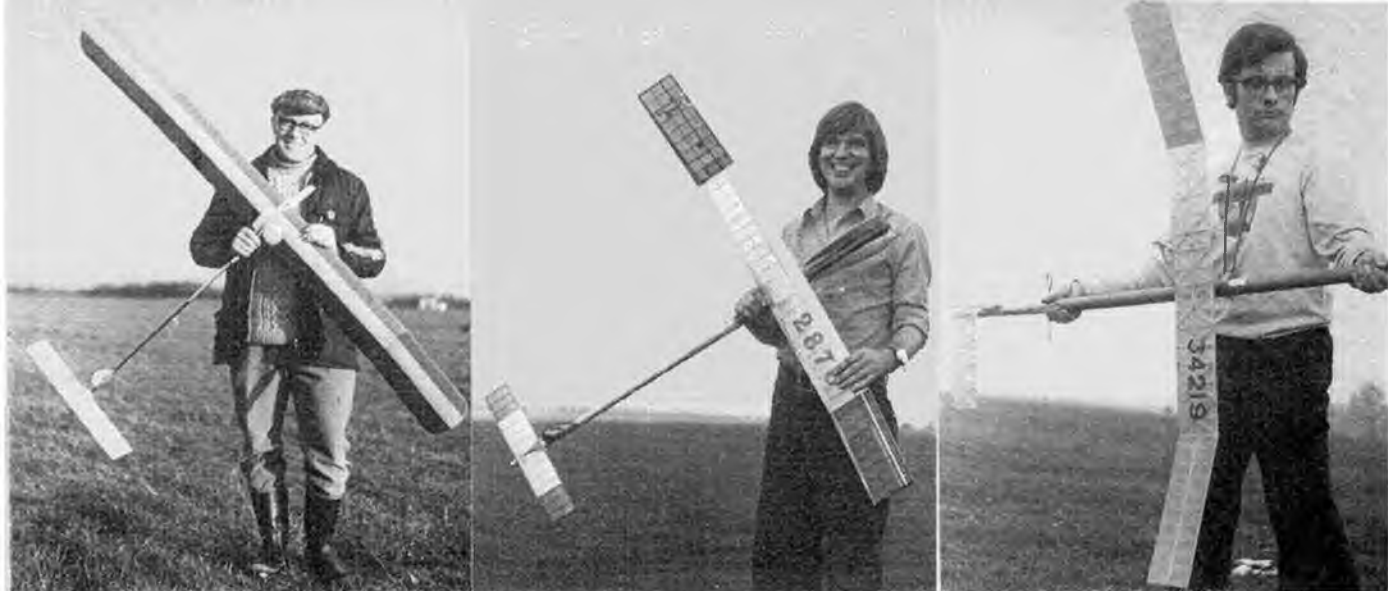
- Dominator 28in 2.5cc CL/893 - B
- Liquidator 32in 2.5cc CL/998 - D
- Spiroira 30in 1-1.5cc CL/1162 - B

B 60p, C 80p, D £1.10 plus 20p p&p.



DOMINATOR 30in.

2/78 15p in the £1 Rebate plan purchase coupon for Golden Wing Members G.W. No.



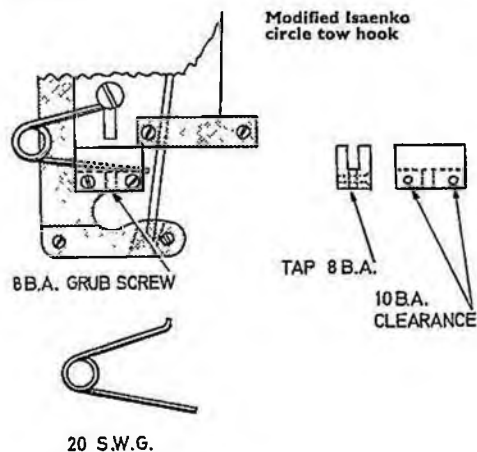
THE FREE FLIGHT SCENE

This month: Martin Dilly

(to whom we offer our congratulations on having been awarded a Fellowship of the SMAE)

FIRSTLY, a plea for a little free-flight evangelism. Have you ever wondered why there seems to be some antagonism towards free-flight from the 'Sundays-in-the-local-park' radio flyers, and towards competition flying in general? Ignorance. The majority of these people have little or no idea what the aims of free-flight are; one non-contest R/C flyer (and who incidentally is currently working on the SMAE Council) literally did not know that the general idea of free-flight is to stay in the air for as long as possible, until I happened to mention it in conversation. Maybe we in F/F need to do a lot more of a 'hard sell' on our branch of model flying; at present it looks as if the powered R/C-flying majority think free-flight is a kind of poor relation, and that we would really all rather be steering our aircraft in pretty patterns round the sky like they do.

How about making a friendly approach to your local R/C club, with an offer of a talk, and maybe a demonstration of what contest F/F is all about? Most of these clubs have fairly regular non-flying evening meetings and ask guest speakers along to talk to their members; perhaps you could book the SMAE's print of the film *180 is Max* to show them at the same time? An awareness of what other model fliers are trying to achieve, and how they do it, can only help the various branches of the sport to be less blinkered in their outlook.



Above left, Fred Baldwin of Keighley used this Brian Baines 'Sunshot' to win Northern Area FAI contest, features a 22 swg steel shim 'feather' sprung against hook to prevent tow ring drop off during straight tow. At centre is Tim Gray, winner of the Gutteridge Trophy. The 22 x 28in. laminated props trigger the auto rudder via a Montreal stop as they fold. Columnist Bob Bailey (right) holds club mate John Fletcher's APS Predator during the fly-off for Farrow Shield.

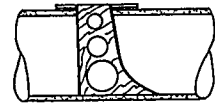
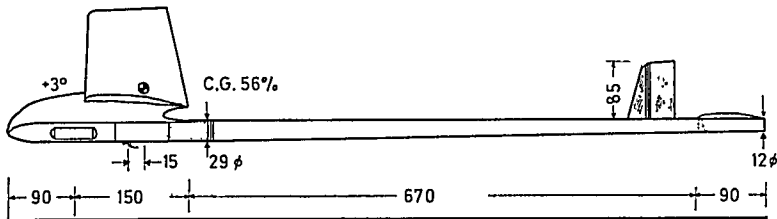
READERS' REQUESTS

Your response to our query a few months ago, about what you would like to see in *Free-Flight Scene*, has been most helpful; an overwhelming majority want details of systems and techniques – variable incidence tailplanes, circle hooks, prop hub mechanisms, suitable wood sizes for various structures, model retrieval methods, how to enter a contest, care and feeding of rubber motors, thermal detection, and heaps more. Several letters ask questions that we have covered in the past couple of years, which suggests that, rather than repeating the same material every year or so, like schools television, a free-flight bibliography would be helpful. This way at least readers will know *where* to find the information they need; MAP Ltd normally carry back numbers of *AeroModeller* for the previous six months, but also offer a photocopying service at a cost of 50 pence minimum for up to five pages, and then 10 pence per additional page, including postage, so you can easily obtain any of the *AeroModeller* references we mention. Naturally, there is a great deal of extra material available in the specialist newsletters like *Free Flight News*, and some foreign magazines like the excellent Czech *Modelář*, but you will also gain a great deal by joining a good club that specialises in free-flight. Write to the SMAE's Membership Secretary at 21 Burghley Road, St Andrews, Bristol 6 for details. As Dr Johnson said in the mid-eighteenth century, "Knowledge is of two kinds, we know a subject ourselves or we know where we can get information upon it."

ISAENKO HOOK MODIFICATION

In the December 1976 *F/F Scene* we gave working drawings of Viktor Isaenko's towhook, which is one of the simplest and certainly most successful of the many circle hooks. Viktor's hook uses a pair of coil springs, one each side of the hook body, to give a fixed unlatch pre-load; the rather similar hook that 1977 World Champion Kostadin Abadjiev used at Roskilde employs four springs for the same purpose. If you want to alter the tension at which these hooks unlatch you either substitute different springs, or else snip off coils from the existing ones.

I have used a copy of the Isaenko hook and, on a Mark II version, have shamelessly added the neat pre-load adjuster that Bob Hartschek employs on his circle hooks. The adjuster consists of a 'safety pin'-type spring, with its upper arm bearing against a stud on the sliding part of the towhook; the other arm is held in a slot cut in a small retaining block of dural, fixed to the main body of the hook. An 8BA hole is tapped vertically into the bottom of this block, and a socket grub screw used to compress the spring to the required pre-load. As well as providing adjustment, this modification also enables the width of the hook to be reduced. The sketch shows what is involved; I used 20swg for the spring on my version.



Tail mount 1mm Ply

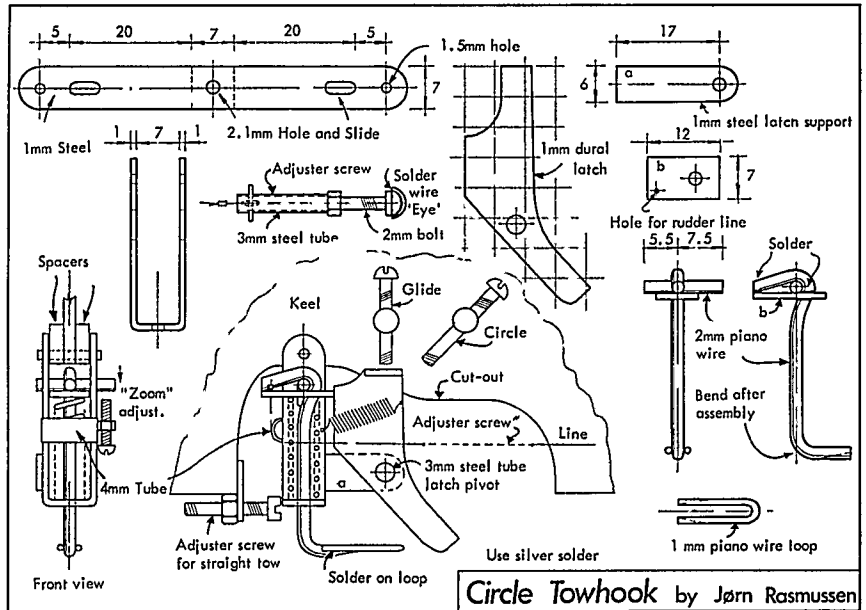
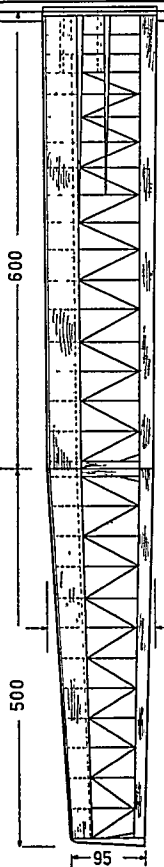
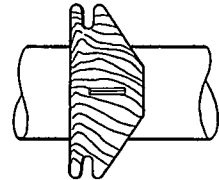
JOINERS 3MM. WIRE

LADY MORFIN

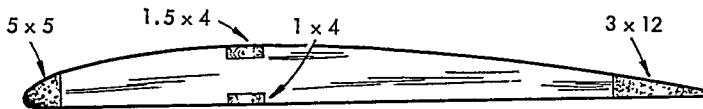
FIA Glider by Jørn Rasmussen

SCALE 1:10

all dimensions in millimetres



Circle Towhook by Jørn Rasmussen

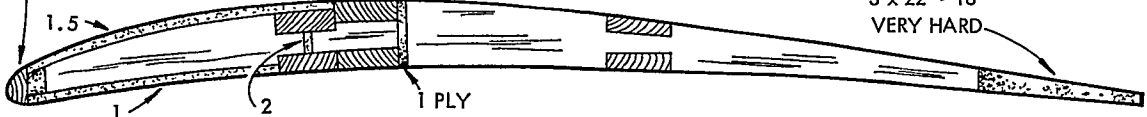


FULL SIZE RIBS

TAILPLANE RIBS 1.5 QTR. GRAIN

3 x 5 SPRUCE

Section B 63556 b	3 x 8	2 x 4 SPRUCE	TOP SPAR
Wing ribs 2mm	2 x 8	1 x 4 SPRUCE	BOTTOM
Diagonals 1.5mm	2 x 4	1 x 2 SPRUCE	TOP TIP
Tips 1mm	1 x 4	1 x 2 SPRUCE	BOTTOM



FLEXI WING JOINERS

One of the interesting features of some recent French gliders has been a deliberately flexible wing joining system: French glider flyers seem to favour offset hooks to obtain circular tow, and their high speed, high tension circling technique has wings bending to 45° or more – and leads to some concern from adjacent competitors as gliders scythe about all over the sky.

Instead of employing either a continuous tongue or else a wire dowel running between the two wing halves, the flexibility is obtained as shown in *Figure 1*. Each wing is supported on a pair of right-angled stub wire dowels, pivoting together on a longitudinal axis either side of the fuselage. Their lower ends are tensioned together with rubber bands, holding the vertical legs against the fuselage sides, so the wings assume the correct dihedral angle under normal flight loads. An advantage of the method is that effective wing area, and therefore lift, decreases with increasing line tension, which could be handy in gusty British conditions. Against this, the pivoting wing joiners are a possible source of inconsistency in trim, and the inconvenience of packing a fuselage with projecting dowels waiting to poke holes in components must also be considered.

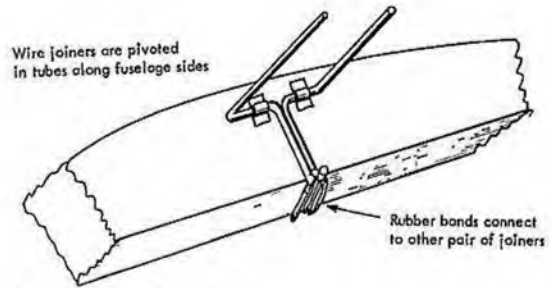


Figure 1: Flexi-wing joiners

LADY MORFIN

Our 3-view this month is of Jørn Rasmussen's A/2 glider, which I spotted at the 1977 Pierre Trebod; as well as being typical of the 'Køster school' of glider design, it has several features that you may want to use on your own aircraft. The circle towhook is basically sheet metal and wire version of Ekhtenkov's, a dural flexi-joint is used for the fuselage, which features a 2mm dural spine, and the details of the rudder hinges and tailplane mount are interesting.

Jørn sent some details of the hook. The spring consists of 11-12 turns of 0.8mm piano wire wound onto a 2mm mandrel, so that it is 3-4mm longer in its free state than when installed. Adjustment of the spring pre-load is by means of steel washers (presumably C-shaped so they can be slid into position), which are placed under the spring to compress it; 0.5mm compression increases the load by about 0.5kg.

The boom is rolled from 1mm straight grained balsa, covered inside with lightweight Japanese tissue. (No, you do not use little men with miniature dope brushes to crawl down there – you cover the sheet first before rolling it round a tapered mandrel). Three coats of Zapon lacquer are used inside, and one outside, before applying ultra-light glass cloth and a final covering of Japanese tissue on the outside of the tube. Jørn mentions that the flexi-joint spring is rolled from 1mm piano wire on a 3mm mandrel, and should be as strong as possible; the rear one of the two machined light alloy joint faces carries a hook for the spring, whose front end is hooked through a hole in the 2mm dural fuselage spine, the spring being extended to hold the two halves of the fuselage together.

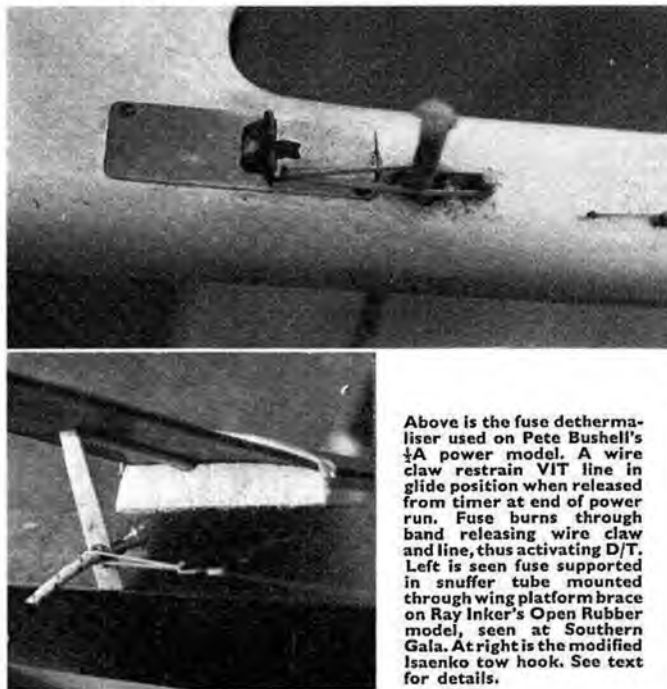
The rudder hinge consists of a strip of double-sided adhesive-coated mylar tape, sandwiched between strips of 4 x 1.5mm spruce; the final assembly forming a pair of vertical spars for the fin and rudder.

As is the case with the Soviet A/2s, great attention has been paid to reducing wood sizes towards the extremities of the wing, where loads are less and where excess weight can harm the glide a great deal. To explain this, consider what happens when a glider is upset by a gust lifting one tip. The only way equilibrium can be restored is by losing height (since there is no power onboard to maintain airspeed) thus a heavy-tipped wing needs a greater effort to level-up after disturbance than a lighter one, and will cause a greater height loss. The spar depth is greater on the top than the bottom of the wing, to resist the compression loads during tow, and the tapered spruce doublers extend 300mm out from the centre-line and are webbed full depth with 1mm ply. Weight of each tip panel is only 20 grams complete.

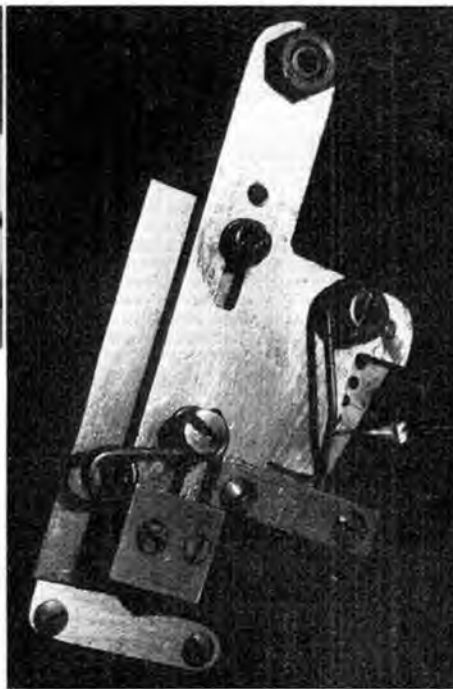
The nose section of the fuselage is carved from obeche, and a light alloy cover allows access to the timer and towhook on the left-hand side. Jørn uses 3-strand C/L wire to link the hook to the rudder; with nylon, terylene or linen variations in humidity or temperature can considerably affect line length and, as a result, rudder settings. I have started to use a small graticule under the rudder itself, and mark the correct settings on it for tow, circle and glide – once these have been established during trimming. I check the rudder position in the various hook modes before every flight in case the line length alters during the day.

Below: Gil Hart from RAF Brize Norton maxed out to win the A/1 contest at Bassingbourn. Used a turbulator $\frac{1}{4}$ in. back from the leading edge on his APS Spanish Flea. At right Peter Carter launches his Coupe entry. He too flew at the second SMAE Mini Centralised meeting at Bassingbourn. Note single blade prop with balance weight.





Above is the fuse dethermaliser used on Pete Bushell's 1/4A power model. A wire claw restrain VIT line in glide position when released from timer at end of power run. Fuse burns through band releasing wire claw and line, thus activating D/T. Left is seen fuse supported in snuffer tube mounted through wing platform brace on Ray Inker's Open Rubber model, seen at Southern Gala. At right is the modified Isaenko tow hook. See text for details.



CONTEST UP-DATE

My apologies for omitting the blow-by-blow accounts of several recent contests, but since there is so much other material of interest at present, we will confine ourselves mainly to results this month. However, a rather strange local rule was tried out at the Falcons Gala at Chetwynd, where the wind was gusty and around 15 knots at times. The idea was that glider competitors should be upwind of the launch line marked on the ground when the model was released from the towline for timing. It certainly produced a few broken models as people struggled to haul models upwind into the 'legal zone', while the wind did its best to blow them back out of it again. Apparently the aim was to reduce the number of aircraft landing outside the airfield, and to prevent tactical flying and circle towing downwind of models waiting to launch. Most people I spoke to felt it was somewhat less than successful!

FALCONS GALA - Chetwynd, 9th October 1977

Open Power (9 entries): 1. S. Screen (Birmingham) M+3:41; 2. R. Peers (Falcons) M+3:17; 3. R. Baggott (Birmingham) 7:34. **Open Rubber** (13 entries): 1. I. Keynes (Croydon) M+6:05; 2. G. Ferrer (Leicester) M+4:48; 3. R. Peers (Falcons) M+4:04. **Open Glider** (32 entries): 1. A. Cordes (Whitefield) 9:00; 2. M. Brown (Wolves) 8:05; 3. R. Sheene (Nantwich) 7:54. **Hand Launched Glider** (15 entries): 1. P. Ball (Grantham) 7:14; 2. J. Boon (Falcons) 4:38; 3. I. Allen (Falcons) 4:33. **Combined Mini** (16 entries): 1. D. Scott (Morley) 9:51; 2. R. Sheene (Nantwich) 9:24; 3. M. Scott (Leicester) 8:53. **Combined Wakefield & A/2** (27 entries): 1. D. Barnes (Liverpool) 13:06; 2. A. Evans (Liverpool) 13:02; 3. D. Allman (Nantwich) 12:54.

NORTH EASTERN AREA RALLY

The North-East Area provided £30 worth of prize money for their rally held on 30th October at Ouston, but strong winds kept entries disappointingly low. Tynemouth's Jeff Anderson's Open Rubber model, for instance, covered two miles in 3½ minutes, and A/2 winner Alan Jack's three mediocre flights ensured that the model was easier to retrieve than were those that maxed; a downwind herd of bullocks took their toll of models landing outside the airfield. **Open Rubber**: 1. R. Peers 5:20; 2. J. Anderson 3:00; 3. B. Martin 2:33. **Open Glider**: 1. P. Moate 2:29; 2. A. Jack 1:38; 3. R. Sabey 1:36. **Open Power**: 1. R. Peers 2:25. **FAI Glider**: 1. A. Jack 7:09; 2. B. Baines 5:21; 3. J. O'Donnell 5:12. **Combined Mini**: 1. P. Moate 3:54; 2. C. Edwards 0. **HLG**: 1. D. Knibbs 3:35; 2. R. C. Pollard 2:01; 3. R. Peers 0:44.

ROCHDALE & WHITEFIELD INDOOR - 20th November

The surprise of the event was Dennis Davitt of Leeds, who has never revealed this sort of standard in competition before. Dennis explained that his secret was some rubber given him by John Blount which rather indicates the area in which one should concentrate to succeed in this event. Dave Pymm in second place was using his 20 minute model which John O'Donnell commented was both lighter at under 1 gram and stiffer than his own. **EZB**: 1. D. Davitt 18:12; 2. D. Pymm 18:09; 3. J. O'Donnell 16:59; 4. I. Davitt (Junior) 14:40. **Chuck Glider**: 1. R. Roberts 49.8 secs; 2. S. Philpott 48.2 secs; 3. S. Carr (Junior) 48.0 secs.

NORTHERN AREA FAI - Elvington, 6th November

F1A (22 entries): 1. F. Baldwin (Keighley) 12:20; 2. D. Bartle (York) 12:08; 3. J. Billam (Grantham) 12:04. **F1B** (11 entries): 1. R. Pollard (Tynemouth) 12:28; 2. J. Barnes (Liverpool) 12:20; 3. K. Proctor (York) 12:14. **F1C** (5 entries): 1. S. Screen (Birmingham) 13:30; 2. K. Faux (St. Albans) 12:18; 3. P. Harris (Birmingham) 12:10.

SM&E CENTRALISED MEETING - Bassingbourn, 27th November

Coupe D'Hivor (29 entries, 27 flew): 1. R. Pavely (Anglia) 9:32; 2. D. Hipperson (Croydon) 9:10; 3. A. Wells (Anglia) 8:57. **A/1 Glider** (22 entries, 19 flew): 1. S. Hart (RAF MAA) 10:00; 2. M. Cowley (Biggles) 9:58; 3. J. Abbey (Leicester) 9:45. **Power** (18 entries, 17 flew): 1. P. R. Harris (Birmingham) 10:00+3:49; 2. D. Pymm (Walsall) 10:00+2:53; 3. P. Buskell (Crookham) 10:00+2:29; 4. P. Bayram (Richmond) 10:00+2:23. **Hand Launched Glider** (12 entries, 10 flew): 1. P. Ball (Grantham) 5:00; 2. P. Bayram (Richmond) 4:59; 3. J. Hopper (Stansted) 4:40.

AN INDIAN NEWSLETTER

Prasanta Banerjee has been one of the moving forces in Indian free-flight for a number of years and is one of the few people with the knack of presenting aerodynamic concepts in a readable way for model flyers. After a two year break, while Prasanta worked for his PhD, he has again started producing *The Calcuttan*, at a subscription rate of 15 rupees per annum. His address is 16 Surjya Sen Street, Calcutta 12, India. The issue at hand, has an article on induced drag and wing tip configuration, using a paddle-bladed miniature prop on the tips of test wings to determine the strength of the vortex core, and is very fully annotated with references on the subject. Prasanta appeals for material for publication in his newsletter, and certainly sets a standard for others to aim at.



1977 CIAM MEETING

reported by Martin Dilly

FLICKERING emergency gas lighting lit the portraits of aviation heroes and record-breakers hanging on the oak-panelled walls of the *Fédération Aéronautique Internationale* headquarters in Paris, as an electricity workers' strike on 1st December met delegates arriving for the first day of the 1977 plenary meeting of the *Commission Internationale d'Aeromodellisme*. The CIAM is one of the FAI's specialist committees responsible for the various branches of worldwide aviation; others co-ordinate parachuting, hang-gliding, space, aerobatics, gliding, ballooning and so on. Quite apart from working on international rules, records and contest activities, the CIAM draws on the experience of 30-40 nations in such vital matters as safety, noise and radio frequency use.

For many years, the SMAE has been active in CIAM and its members work for international model flying as recognised in 1973 when the Society was awarded the Honorary Group Diploma of the FAI, which is an honour made to "design offices, institutes, aero clubs etc. who have greatly contributed to the progress of aviation or astronautics during the previous year or years", as the citation says. This year the UK delegate Ian Kaynes and myself, representing the New Zealand Model Aeronautic Association, joined 27 other delegates and a dozen specialist technical observers for a meeting made specially hard by a postal problem, which resulted in the very late despatch of agendas from CIAM to the National aero clubs. Since the agenda ran to about 40 pages, and was received only a few days before the meeting, there was a lot of long-distance phoning to obtain a consensus of opinions of the technical sub-committees and get an accurate view of the needs of British model flyers.

Of paramount interest to all users of R/C equipment is a United Kingdom proposal that the CIAM should endeavour to co-ordinate the representation of aeromodelling interest at the 1979 World Administrative Radio Conference. Finnish delegate Axel Tigerstedt will be preparing the world frequency list, the aim being to

standardise as far as possible on a frequency that will provide an increased level of safety. It looks as if 70-72 MHz will be the preferred band, although another possibility is 35-40 MHz, which has difficulties in some areas due to ship-to-shore use; higher frequencies are not favoured due largely to lack of reliable information at present. Another consideration is that aircraft are not the sole radio-control users, so collaboration is vital; the SMAE will naturally be looking after British interests, as the Society is responsible for *all* model flying in Britain, not merely that of its members.

In free-flight a proposal from the German Democratic Republic that would have had Wakefield and Power flown from a 100 by 50 metre rectangle, with competitors free to dash about in it with engines running so as to launch into good air, was defeated. Instead, the starting line rule was modified to write into it the 'move along the line after each round' principle; to reduce the spread of competitors which can prevent a flyer at one end being able to reach good air at the other, the spacing of the launch poles is reduced to 4-5 metres for F1B and F1C, while glider remains at 7 to 10 metres.

After their showing at Roskilde, the Australians proposed that the F/F technical committee of CIAM should consider limiting the use of thermal detection equipment, but it was felt that since temperature-sensitive knees and swarms of thermalling insects are at least as effective as chart-recording thermistors and Korean-speaking weather advisers, the limit would be pointless. In indoor, a flight recommenced after a collision must be flown *before* the next official flight. A French proposal to put the Coupe d'Hiver airframe weight up to 90 grammes from 70 was narrowly defeated, while A/I is added to the list of provisional rules, with 18 dm² maximum area, 220 grams minimum weight, 50 metre line and five two minute maximums. Another provisional class is for beginners' indoor. Briefly, maximum span is 460 mm, monoplanes only, maximum rubber weight 1.5 gm, minimum airframe

weight 3 gm, with microfilm covering prohibited. No steering is permissible and a flight of less than 60 seconds will be a delayed flight.

Indoor World Championships venue is in doubt at present, since the firm Rumanian offer for 1978 was accompanied by a request for an assurance from CIAM "... that no team from South Africa will be competing." Another venue is being investigated, not far from Bedford, England. European F/F Champs will be all together at Ansbach, Bavaria, from September 22nd to 24th, while there is a firm Yugoslav offer to hold the World F/F Champs near Zagreb in late May or early June, 1979.

In control-line, there are no major changes, but the 80/20 fuel is now the only permitted one for speed, and the line configuration now states that they shall be separated by at least 5 mm at the point of exit from the model and at least 25 mm at the handle. A Soviet proposal to reduce the team race tank size to 5 cc was rejected, but flyers may have to check their shoes since the jury guide will specify conduct "... and stature ..." which, it was suggested, will outlaw elevated shoes to ease overtaking! In combat, there will be a penalty point for each second a model is on the ground, and in the case of a model-fly-away, the penalty time will start at the moment of fly-away, which will also result in the cancellation of that flight. A report on the use of mufflers for C/L aircraft is being prepared by the CIAM technical committee, and will be ready in the spring. Belgium has made a firm offer to host the 1980 C/L World Championships, probably in May-June.

Other World Champs tentative dates and venues are: F3A - South Africa, 1979; F3B - USA or Belgium, 1979; F4B and C - Canada, 1980.

AMA President John Clemens chaired the Information and Education committee, whose main aim is the establishment of a programme of model designs suitable for basic instruction leading on to more advanced types of model flying; a listing of useful publications worldwide will also be compiled, and a study made of means of introducing model flying to the public.

A presentation was made to Sandra Prodrom, retiring from many years work with the FAI, running its day-to-day administration at 6 Rue Galilée. Replying to CIAM president Sandy Pimenoff, she reminded the delegates that the committee is among the most active within the FAI, and that its decisions have sometimes had effect reaching beyond purely model flying interests.

LETTERS

C/L SURVIVES BROMLEY INQUIRY

Following a lengthy and costly legal inquiry into a proposed ban on model flying in the Bromley area conducted by Mr. James McDonald, Barrister at law, the following outcome has resulted:

"The main issue was whether the danger and nuisance now caused by model aircraft flying would be prevented by byelaws which permitted flying only at certain times and subject to other restrictions, or whether a complete prohibition was required. Mr McDonald concluded, after considering the arguments on either side, 'that the restrictions proposed would not cure to a sufficient degree the present ill effects of flying radio-controlled power-driven model aircraft in Norman Park'. Mr McDonald found no reason, however, to think that control-line flying would produce undue hazard or noise nuisance and concluded that a total ban on control-line flying would be unreasonable.

The Secretary of State is prepared to consider a byelaw prohibiting the flying

of radio-controlled model aircraft in Norman Park and in all other open spaces to which the byelaws apply. The Secretary of State is also prepared to consider in the light of the report any proposals that the Council may put forward, after consultation with interested parties, for permitting control-line flying in some of the Borough's open spaces, subject to reasonable controls, and prohibiting it in the others."

Home Office

Mrs M. E. Mixon

DECIBEL DEADLINE

News of a substantive proposed change in the DoE draft Code of Practice on noise for model aircraft, proposing an overall reduction by the given date three years hence.

Model Aircraft: Draft Code of Practice on Noise

1. I am writing to inform you, in advance of the final circulation of the draft code of practice, of one substantive change we propose to make. It concerns paragraph 5.2a, which we propose to rewrite as follows:

"Except for competitive flying as described

in b.ii and iii below, no model should be operated on or after 1 September 1980 which gives a noise measurement at 7 metres of more than 82 dB(A), or any lower level agreed and published, subsequent to the issue of this Code of Practice, by the Society of Model Aeronautical Engineers and the Scottish Aeromodellers Association in conjunction with other bodies representing model-flying, and the Model Hobby Trade Federation. Before 1 September 1980, it may be reasonable in view of difficulties which may arise in adapting models to comply with the 82 dB(A) level, for some models to be operated which give a higher level of noise, provided that such models are operated in all other respects in conformity with the terms of this Code of Practice."

2. We realize that it may not be possible for all flyers to achieve immediate compliance with the 82 dB(A) figure (which, on the measurement procedure defined in the appendix to the latest draft code, corresponds with the 80 dB(A) lower limit embodied in earlier drafts). We consider that the lead time provided by the redraft of paragraph 5.2(a) will enable flyers to take all steps necessary to ensure full compliance.

Department of the Environment

J. N. Thompson
Noise Policy Division

Coupe d'Hiver International

Continued from page 92

Britain's John Cooper could separate Bernard from himself by placing second with three good but non-max flights.

The majority of the next places all fell to other Frenchmen and indeed Frenchwomen with Mrs Christiane Rapin in 6th place, narrowly losing to her husband F. Rapin in 5th place. To sum up, the results still show a very clear demarcation between British domination of the 80gm class and French domination of the 100gm class.

One of the most refreshing aspects of both classes, especially with the inclusion of foreign participants, was the variety of designs: big ones, small ones, V-dihedral or polyhedral. People are still prepared to develop and design fresh models to improve performance rather than merely relying on thermal seeking. Perhaps the answer lies with the fact that the two minute maximum is attainable by design alone, as our French friends have repeatedly proven to us. Refreshing too that so many juniors participated in this the smallest of the rubber classes.

And now a word from our sponsors. Our thanks go once again to Chief Technician Atkinson who made us all so welcome again this

year at RAF Halton. Their own problems of accommodating a 'Green Goddess' division limited the availability of facilities we have previously used, and so a lecture room became the new venue for the prizegiving after flying had ceased. Ron Moulton rounded off the proceedings, and prizes donated by The Modellers Den, Irvine Engines, Ripmax, H. J. Nicholls, Veron, Micro-Mold, Keil Kraft, Solarbo and MAP were accepted with the traditional Gallic exuberance, until no more remained.

For those still interested in giving their Coupes a further airing this winter, or for those who wish to join our ranks, the return match, so to speak, to be held on French soil in mid-February, will no doubt attract a similar party from our shores; further details will be published as and when available, for the 32nd MRA Coupe D'Hiver International on Sunday, 26th February at Corbas Airfield, Lyon for 100gm models.

A last word of thanks on behalf of all those competitors who benefited from the continuous supply of hot

dogs and hamburgers throughout the day from Evelyn Barrett and Kathy Dowsett who manned the barbeque. And last but not least to the legion services of the "Manchester United Supporters Club Timekeepers", sorry we mean all those *Aylesbury Club* members bedecked in their red and white Jubilee C.D'H rosettes.



Georges Buisson at moment of launch: he flew his large models despite the wind but more than one pair of wings succumbed before release.

CLUB NEWS

'HOBBY' AND 'PASTIME' may be words with something of a fusty, Victorian flavour about them, but they are useful in distinguishing between two quite different attitudes to the building and flying of model aeroplanes. Whereas 'hobby' implies a fair commitment of enthusiasm, 'pastime' suggests merely a pleasant way of filling in an otherwise boring couple of hours. Most of us, I feel, like to think of ourselves as people with something more than a passing interest in aeromodelling, and for want of a better word, hobbyists to a man.

A right approach to modelling is difficult to achieve or define in the wide range of choice available to the newcomer, and Mr A. Edwards, the Secretary of the Mitchell MAC, writes to tell us of the problems the club has in putting junior newcomers to the hobby on the right lines. The club, it appears, caters mainly for the younger model flyer, who often finds difficulty in gaining the sort of practical information which will allow his efforts to develop successfully. Without the right sort of instruction they can finish up disillusioned and looking around for some other interest. Fortunately, the club has excellent instructors in every branch of the hobby, be this free flight, control line or electric round the pole. Generally, radio flying is out as the sophisticated models are beyond the means and ability of the average junior. The trick is to encourage the junior to build within his abilities, not all that easy in these days of instant modelling temptations, but a number of displays given to various organisations and clubs have resulted in a large number of enquiries

from parents who have watched their boys give up in disgust for lack of tuition. Many of these youngsters have now been encouraged back into the fold. We are warned, though. Once the youngster does start to get the knowhow, the oldies should look to their laurels.

For a number of years now Rupert Harris has been trying to revive the once thriving Debdenairs MFC, and, according to the report we have received from him, his persistence has at last been rewarded. Membership has now built up to a round dozen, and the club has the good fortune of a farm site deep in the heart of rural Essex; so deep in fact that the decibels are lost among the Daisybells! Even so, power radio is not encouraged; preservation of the site thought to be better effected with the accent on R/C, thermal soaring and free flight. The other club site could not be more different, situated as it is alongside the M11 Motorway. Now that the club is reaching a full-some state, insurance is being put in hand, affiliation to the SMAE coming into effect, and full integration into the Debden Community Association in 1978. Some successes on the contest field, too. In his first competition in this country, Australian thermal soaring member, Allen James won the '100' class and came in the top ten overall. Another notable success was Rupert Harris's performance at Bassingbourn when competing with his *Caprice* against the A/2's in the Team Glider Championships. Whilst the A/2's were being battered into submission his *Caprice* notched up two maxes and was thwarted only by the looming rifle butts for a third (no bull). This took the 1977 Glider Championship for his other club, Anglia.

Daventry in Northants was once well known as a radio station, but now it has a model club to keep the name alive, the Daventry MAC - mostly Radio, of course. The club has been in existence for three years, according to a report sent to us by Mr R. Willoughby, the Secretary. Membership is around the 17 mark - all seniors, but not for any reasons of exclusion; juniors are just not forthcoming in spite of a very minimal sub fee. The club meets fortnightly

1978 FAI CALENDAR

for Control Line, Free Flight and R/C Soaring

FAI Key to Events

F1A	A2 Glider	F2B	Aerobatics
F1B	Wakefield	F2C	Team Race
F1C	Power	F2D	Combat
F1D	Indoor	F3B	R/C Soaring
F1G	Coupe D'Hiver	F4A	F/F Scale
F1H	A1 Glider	F4B	C/L Scale
F2A	Speed	F4C	R/C Scale

WORLD CHAMPIONSHIPS

4-10 Aug. **United Kingdom** *Scale and Control Line:* F4B, Woodvale, Liverpool F4C, F2A, F2B, F2C, F2D

CONTINENTAL CHAMPIONSHIPS

22-24 Sept. **F.R. Germany** *European Free Flight Championships:* F1A, F1B, F1C
Ansbach/Bavaria

"OPEN" INTERNATIONAL EVENTS

24 Feb. **Finland** *V.L.K. Winter Contest:* F1A, Helsinki F1B, F1C

25-26 Mar. **Czechoslovakia** *International Competition:* Hradec Kralove F2A, F2B, F2C, F2D, F4B

24-27 Mar. **South Africa** *South African Championships:* F3A Vereeniging

4-7 May **Austria** *7 Hans Kratky Cup:* F1A, F1B, F1C
Wiener Neustadt

5-7 May **Austria** *Int. "Fesselflug Kriterium":* Kraiwiesen-Salzburg F2A, F2B, F2C

3-4 June **Italy** *Caproni Cup:* F3B
Vizzola Ticino

10-11 June **France** *Challenge Eole:* F3B
St. Andre-de-L'Eure

10-11 June **Netherlands** *"10 Criterium Van Midden Nederland:* F2A, F2C, F2B
Utrecht

17-18 June **Czechoslovakia** *"Rana" International Competition:* F3B
Louny

17-18 June **France** *International Criterium, Control Line:* F2A, F2C
Aeroport Paris-Le Bourget

1-2 July **Belgium** *Second Summer Soaring Criterium:* F3B
Amay

7-9 July **Czechoslovakia** *"Poprad" Competition:* F3B Thermal
Poprad

28-30 July **Hungary** *"Mecsek-Cup:* F2A, F2C
Pecs

July **Czechoslovakia** *"Brno" Intern. Competition:* F1D
Brno

4-5 Aug **United Kingdom** *"Woodvale 78" Standoff*
limited event Scale Class 2
Woodvale, Liverpool

13-15 Aug. **France** *International Free Flight Days in Poitou:* F1A, F1B, F1C, F1G, F1H
Assais-Airvault (79)

26-27 Aug. **Belgium** *International Control Line Competition:* F2A, F2B, F2C
Verviers-Wegnez

26-27 Aug. **Czechoslovakia** *"Brno" Intern. Competition:* F2D
Praha

26-27 Aug. **F.R. Germany** *10th Eiffel Cup:* F1A, F1B, F1C
Zulpich

26-27 Aug. **F.R. Germany** *7th Ludwig-Kraemer Cup:* Dortmund F3B

2-3 Sept. **Belgium** *International Combat:* F2D
Rixensart

3 or 10 Sept. **Italy** *Gold Cup:* F2A, F2C
Lugo di Romagna

14-17 Sept. **Bulgaria** *International Sofia Cup:* F2A, F2B, F2C, F2D, F4B
Sofia

15-17 Sept. **F.R. Germany** *3rd "Oktoberfest" Cup:* F3B
Munich

16-17 Sept. **San Marino** *12th International Raid:* F3B
Germany *"Fesselflug" Competition*
Bochum C/L F2A, F2B, F2C

23-24 Sept. **Italy** *Supertiger Trophy:* F2A 5cc, 10cc, Jet
Treviso

6-8 Oct. **Hungary** *"Nyirseg-Cup":* F2A, F2C
Nyiregyhaza

at the Nene Hall Community Centre of which it is a member. Meetings are 'active', in that they include film shows, building demonstrations, a chuck glider from a piece of 6in x 3in x 1/16in balsa, electric rtp, etc. Future highlights will include EZB flying and a technical talk on R/C equipment. An outdoor club winter project is for 64in span stand-off scale *Horsa* gliders for slope soaring. Of all foam/veneer construction, including the fuselage, ten are already on the stocks. Club amenities include the use of a rent free field, thanks to a local farmer, and a regular newsletter. The club, though mainly radio, has a small C/L and F/F following. In fact, the committee encourages a wide ranging participation, not wishing the club to become a narrow, R/C only group. Most radio flyers, they feel, would benefit from an occasional dabble in some of the other classes, and to this end one of the club trophies is for the best 'all-rounder'. I note from the newsletters accompanying the report, that flying field rules are very strict – which in the interests of safe and pleasurable flying is as they should be. New members welcome. Mr Willoughby's address is 47 The Willows, Daventry, Northants.

Perhaps the most inauspicious aspect of the past flying season was the way the wind blew with such unrelenting energy, and though it was hoped that by September it would be running out of puff, it gave the Three Kings Aeromodellers Open Day quite a bashing, according to the latest issue of *Court Circular*. Some consolation, though, in that on the following day the wind blew even harder and the rain came down in bucketfuls; so it could have been worse. Still the organisation was well up to scratch with safety ropes, bunting etc, not to mention the organisation and refreshments supplied by the Treasurer's wife. Main event of the day was stunted, and apart from the battering wind, it would seem the gremlins were out in force, making for some harder than necessary deck contacts. But the entrants were game, to say the least. Brian Dyke, for instance, failed to pull his *Cutlass* out of a loop and wrote off everything but the engine. Another casualty was Pete Tindal's fancied *Chipmunk* which came unstuck in the inside squares. Could be that Pete's reflexes were a bit on the slow side due to a bout of epoxy poisoning from which he had not quite recovered. I wonder if you can claim Industrial Injuries Benefit for model making? Anyway, it was a strong field of twelve top flyers against the wind, with J. Lynch of Dagenham who came out top. In the scale event the wind was even more of a problem. Strict scale was not adhered to because of the conditions, and the comp was in fact won by a semi-scale *Stunt Stuka*, flown by designer Brian Dyke of St Albans. Welcome visitor Ron Truelove bravely flew his immaculate *Handley Page Hampden*, and although the impressive model suffered retract trouble, it put in a good flight before damaging an undercart leg on landing. A good day out in spite of the crashes.

By way of continuity we have a few well known Three Kings names cropping up in *The Wolf Call*, the newsletter of the Wolves MAC. Wal Cordwell for winning the *Jack Carter Memorial Trophy* with his *Waco Biplane* and Vic Willson for taking second place with his large *Hurricane*. Seems the trophy is finding a permanent home at Three Kings. Altogether the Wolves have staged quite a number of contests throughout 1977, a whole number of Control Line events and also the very successful Free Flight Galas at Chetwynd. This is a reflection of how the club has been prospering throughout the year, with a membership soaring above the 50 mark and an arduous but rewarding C/L display programme. Two points brought up in the newsletter. First, that of contest prizes. Whilst the Wolves gave both cash and plaques at the Chetwynd F/F Gala, opinion generally seems to be split amongst regular contesters over the kind and extent of the hand outs. Some look for bounteous cash prizes and others for a decent memento.

Some even just go along for the fun of it! Cash is perhaps okay if in fair quantity, but resources are usually meagre, and a plaque is better than a couple of quid which wouldn't even go part way to the petrol costs of the day out. It would be encouraging, though, to have just a few events throughout the season with really substantial prizes – just to add a prestigious note to the routine yearly proceedings. The other point is that of club records. These, like the shellac variety, have holes in them – where the challenge has not been taken up. In most clubs the once prized record list has long gone into desuetude, but the Wolves are encouraging members to activate the interest and to at least fill up the gaps in the club record list.

Much of the November issue of *Northern Area News* is taken up with reports of the Northern Area Rally. Contest wise over the past few years Radio, C/L and F/F have tended to hold their jamborees separately. Such splitting off may or may not be indicative of a fragmenting of our movement but we must accept that each branch has grown much within itself and that airfield requirements are markedly different in each case. Even so, something of the old spirit of togetherness was in evidence at the Rufforth field where the three types of flying: free, freely controlled and tethered co-habited under the same patch of sky. Not that there was much in the way of sky to be seen at the outset when a rainstorm drove away those who had come merely to spectate, and delayed proceedings for the afficiendos. Those who stayed in the radio area were entertained with an initiating flight by Ron Greenwood's nice looking *Gladiator* in the Class 1 scale event. Also doing their stuff were a *Spitfire Mark 9* and a *Focke-Wolfe 190*. The free flight side of the rally rather unhappily, or perhaps by design, coincided with the 5th Area Centralised event. This made the job of the organisers somewhat hectic and created some confusion in the ranks. Could be there were too many events on the agenda; perhaps an all too common fault these days. Free fliers are pretty versatile, many flying the whole F/F range of models, and it could be argued that extra events do not necessarily attract a greater number of entries overall but often leave some events woefully undersubscribed. It can also spread the available prize resources rather too thinly, with some prizes going to people who have only had to enter. Surely a few events, each with a sizeable entry, is a better proposition all round – even if you do not win it makes the participating worth the while. Is the two day meeting the answer? Nevertheless, a good day's flying and a most enjoyable meeting.

A reminder that, although we do not hear much of Scottish aeromodelling, there is plenty a-doing over the border comes in a letter from Gordon Short of the Kirkcaldy MAC (Fife). The club boasts a long history of continual model flying, going back to 1938. It is, in fact, one of the oldest Scottish clubs. Membership is high: around the 50 mark, and, in keeping with modern trends, a mainly radio club. The other club interest, control line, is kept alive mainly by the handful of juniors still remaining. It is a regrettable fact that now model flying is becoming synonymous with radio control, it is an activity that you take up in affluent maturity. Flying fields are often only reachable by car, and usually such juniors that are active are the scions of aeromodelling sires. Kirkcaldy, however, have a number of good flying sites, catering for all types of models, so the possibility is there for a free flight revival. A particular achievement of the club during the past year was winning the best stand prize at the November Leisure and Recreation Exhibition. The large radio models, like Ron Fraser's *Avro Vulcan* and Norrie Stuart's *Harvard*, were especially impressive among the wide range of models displayed. The club meets at 8pm every Friday evening at the club's own rooms at 23 Junction Road, Kirkcaldy, and the Secretary is Bill Elder, of 13 Glenbervie

Road, Kirkcaldy, telephone Kirkcaldy 69328.

Still on the Scottish scene the November issue of the Scottish AA newsletter is very much in anticipation of the forthcoming AGM where, it is hoped, attendance and enthusiasm will be on a par to that shown this season on the flying field. It would appear to have been an encouraging year for Scottish aeromodelling, with a marked increase in competition entries and an improved standard of flying in most events, especially soaring and control line. From a patriotic point of view, it was pleasing to note that the English visitors did not have things all their own way as they may have done before, and by way of friendly retaliation the Scottish flyers have made their presence felt at some of the English events.

Not the usual ample newsletter from the Leicester MAC. The thin content is due to a change of editors; John Birch now taking over the job. The club AGM was attended by some 40 members to vote in the officers of the newly composed committee - 16 strong, no less. Up went club fees this year, but wait for it - only to £3 for Seniors and £1.50 for Juniors. The club is noted for the number of competitions it holds throughout the year. These again were well supported in 1977, and if there was one regret, it was just the insufficiency of Sundays. Big success as usual was the Winter Building Competition, sustaining interest throughout the winter months and supplying a general club project.

From America we have the *Star Skippers* newsletter. This covers the activities of the *Academy of Aeronautics Junior Programme*. Here the approach is both admirable and realistic, for the type of model and flying it prescribes for the young flyer comes well within his pocket and ability. The *Aeromodeller* comes in for a number of mentions. For instance, details are given of the Manhattan Indoor Cabin Model British type rules set out in our magazine.

Also a good read for the free flyer is the well known *Free Flight News*. Includes a rakish FIC design by our new Editor.

Keep those reports and newsletters rolling.

Clubman

Contest Calendar

January 22nd	SMAE 1st CENTRALISED MINI. A1, C,d'H, ½A HLG. Provisionally Wroughton. Contact Mike Fantham 01-736 7163.
January 29th	NORTHERN AREA WINTER RALLY. Open R & G, Mini, Electric, Vintage, single surface R/C. Contact: N. Walton, York 708794.
February 5th	S.E. AREA (SMAE) INDOOR MEET. Fly-in for EZB, Peanut, HLG, CO ₂ (no contest). Venue: Crawley Sportscentre 12-6pm. Contact Tel: Hailsham 844 242.
February 12th	N.E. AREA (SMAE) INDOOR MEETING. Easy 'B', HLG (N.E. Area Class II rules), Novice duration. Hall size 226 x 122 x 35ft. Sporting Club of Washington 1300-1600 hrs. Contact: J. Anderson, 16 Cheveley Walk, Belmont, Durham DH1 2AU (S.A.E.). Tel: Durham 68493.
February 12th	SMAE CLUB CHAMPIONSHIPS. Open R/G/P. Top club flyer in each class scores. Provisionally Barkston Heath. Contact: Mike Fantham, 01-736 7163.
February 26th	CROOKHAM CONTEST GALA. Open R/G/P. All in FAI (5 flights, no rounds). 10am start. Bassingbourne Old Airfield on A14 north of Royston. SMAE members only. Contact: F. Chiltern 0494-443614.
February 26th	NORWIND INDOOR MEETING. EZB, HLG, Keyhole Scale, Wigan Technical College. Contact: P. Farrimond, 272 Gidlow Lane, Wigan (S.A.E.). Tel: Wigan 34068.
March 12th	N.E. AREA (SMAE) INDOOR MEETING. All details as February 12th.
March 12th	SMAE 1st AREA DECENTRALISED. F1A (KMAA & PLUGGE), O/R, O/P (FROG SENIOR). Contact: Mike Fantham 01-736 7163.

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PLYMOUTH MODEL CENTRE
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9am-5.30pm Mon-Sat

PLYMOUTH Tel. (0752) 53330
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16 DEVENPORT ROAD
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Mon-Sat 9am-6pm. (Late night Friday 8pm)

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Sat 9.30am-5pm

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Fri 9.30am-7.30pm

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HERTFORD Tel. 50101
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Open: 10am-5.30pm
Late Night Friday 7pm
Closed Thursday

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10am-6pm. Thurs open till 7.30pm. Closed all
day Wed

ST ALBANS Tel. 53954
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12 HATFIELD ROAD
Mon-Fri 9am-6pm Sat 9am-5.30pm

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KOWLOON Tel. 3-800155
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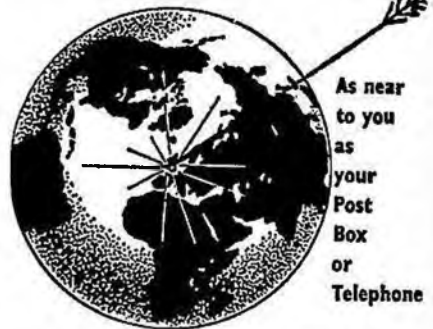
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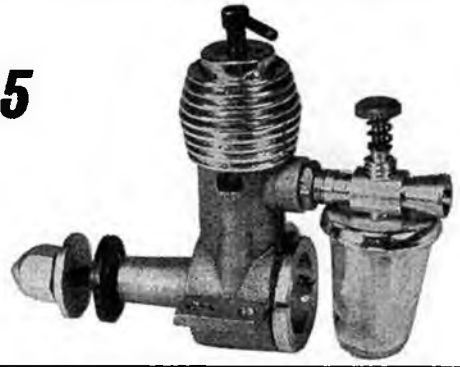
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8

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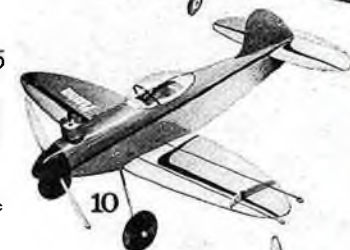
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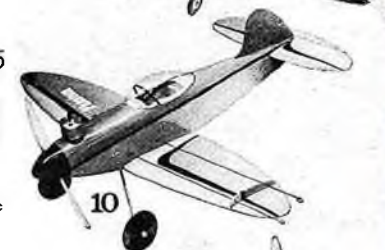
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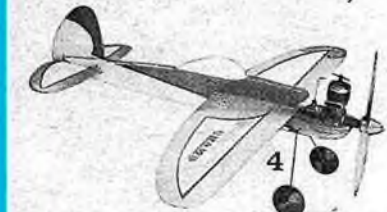
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