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FEBRUARY 1981 50p

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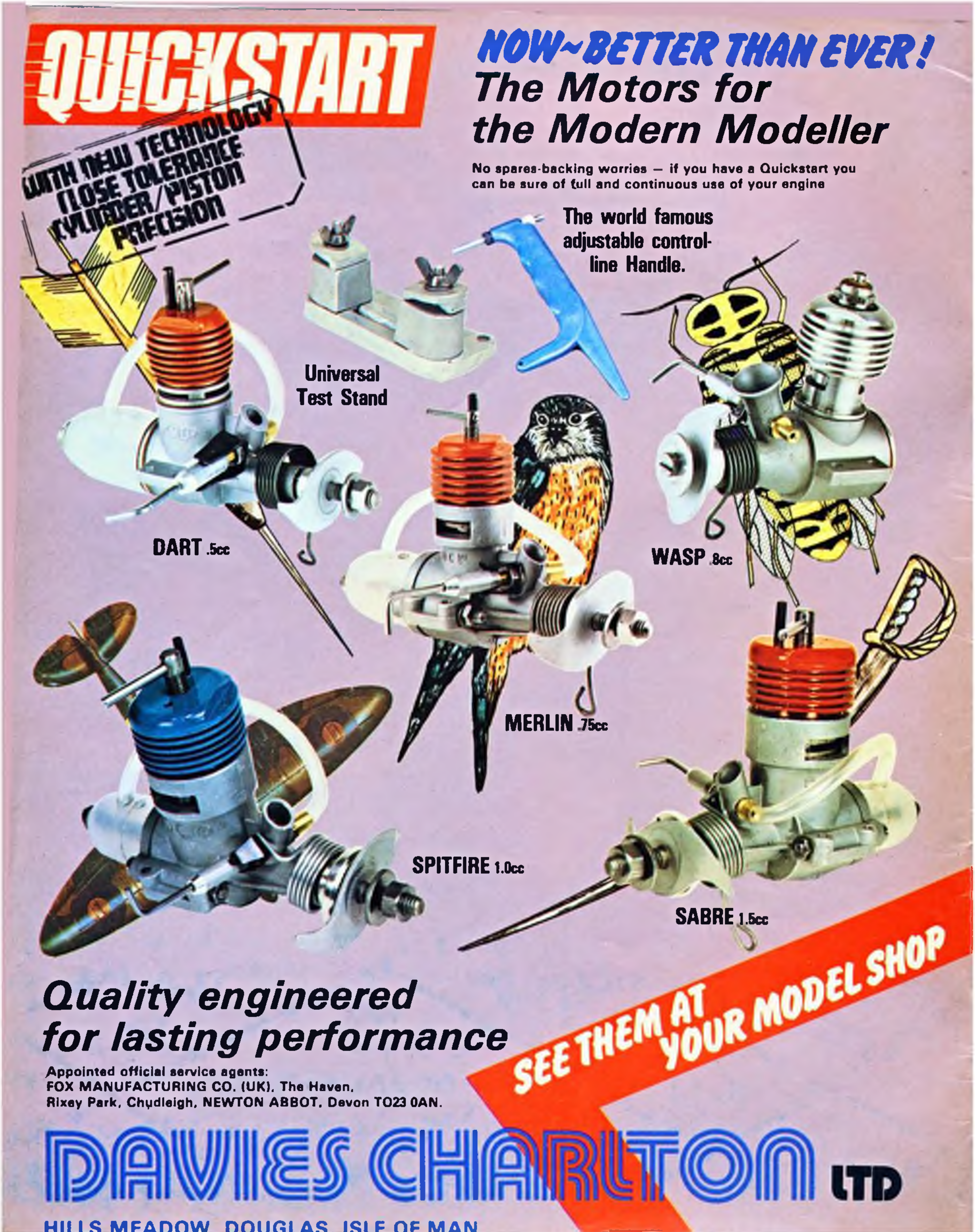
International Year of Disabled People 1981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Aero modeller

FEBRUARY 1981

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MAP MODEL DIVISION MAGAZINE

Advertisement Director M. GRAY
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Comment

PROXY-FLYING, the provision in international aeromodelling events, by which qualifiers unable, for very valid reasons, to attend, nominate available substitute operators to fly the qualifiers' models, has been part of the international aeromodelling scene for a long time.

One of the most basic rules revisions approved at the annual FAI Models Commission meeting in Paris in early December, certainly where free flight is concerned, must be the decision to delete the provision for proxy flying in FAI International Calendar and World Championships events.

The proposal came from Denmark, home of the current world champion in F1A (Glider) whose proxy win, so the argument goes, bestows an international reputation not earned in the sporting, participatory sense.

Supporters of this change of emphasis feel that it is a positive influence for the sporting image of the competitive side of our hobby — a useful lever in establishing status with amateur sporting authorities. Great stuff!

Pardon our wooden spoon, but if a more orthodox sporting image is the target, in line with the mainstream of sporting activities, how long can we maintain that great preserver of the genuine aeromodelling image — the 'Builder of the Model' rule? After all, as the standard anti-B.O.M. argument goes, cricketers don't carve their own bats, golfers don't make their clubs, tennis players don't make their own rackets . . . and so on!

It's just a thought, we're not promoting any individual view but maybe some of you have views — as we said, please excuse our wooden spoon!

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ON THE COVER

Cliff Silva of Southern California is among many disabled people who have become internationally famous for their achievements in Aeromodelling. Cliff favours vintage modelling and is a prominent member of SAM, taking part in their meetings, where we caught him preparing his Cloudster for a flight at Taft. 1981 is to be the International Year of Disabled People and we look to Aeromodelling Clubs for their involvement in this most worthy cause.

NEXT MONTH

Ian Barrett will conclude his article on building from plans, with a step by step description of how to build one of his own glider designs. There will also be a full report on the Aeromodeller Coupe d'Hiver meeting, plus another of 'Pat' Lloyd's super scale drawings of light aircraft worth modelling, this time the Rutan-Mojave 'Quickie', a real challenge for aeromodellers.

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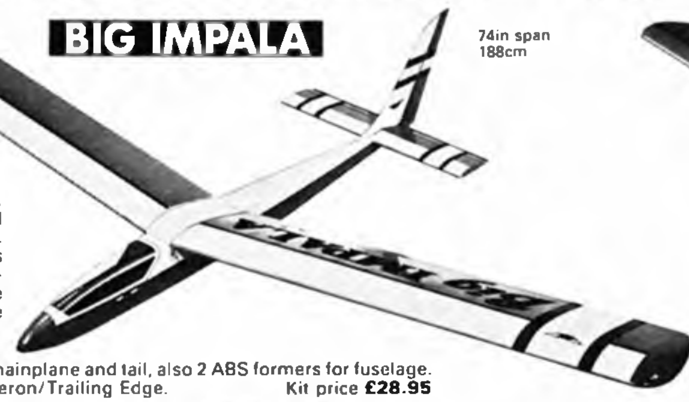

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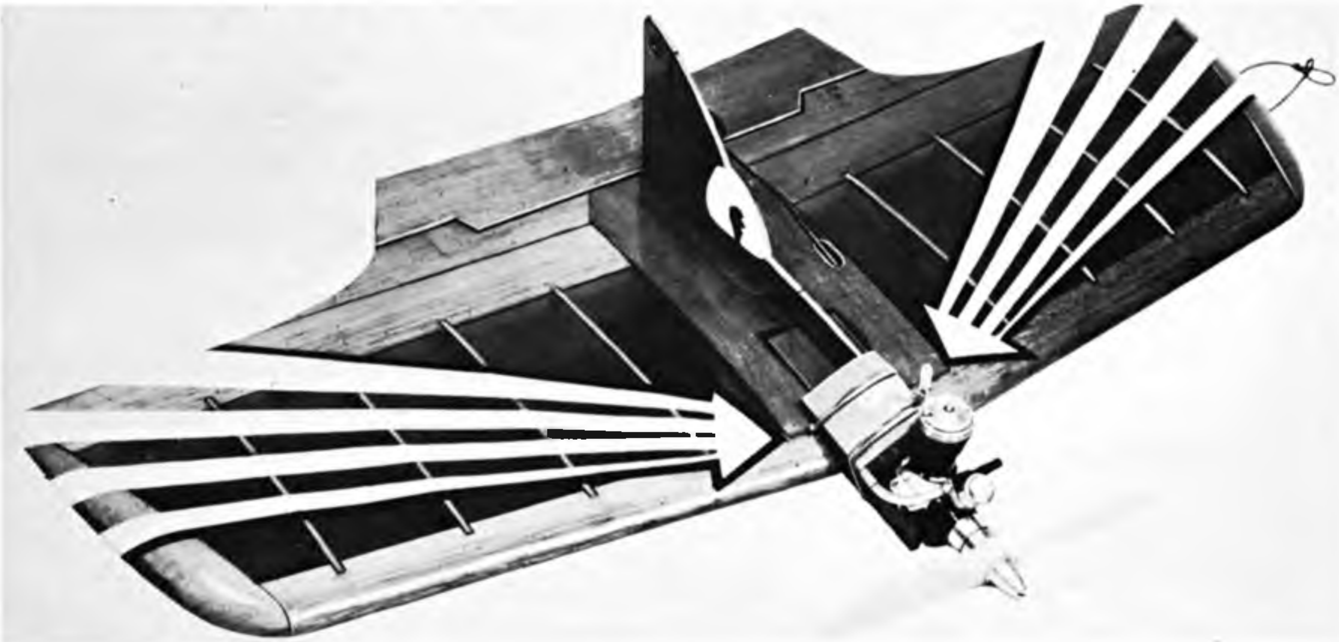

Control-line Combat is really back in favour — and not all models are foam wing 'planks'. This type of super-manoeuvrable model originated some thirty years ago when engine powers were a bit limited and total model weight had to be kept to a minimum. Another trick to make them more manoeuvrable was to move the CG back towards the bellcrank pivot point. That could — and often did — produce a model which was almost impossible to fly under control all the time!

Present-day engines have a lot more power for the same capacity and weight. (Choose a Schnuerle ported type for top performance). They also have a higher fuel consumption — so you need a bigger tank. But apart from that, design requirements haven't changed much. The high standard of performance achieved with present-day Combat models is mainly due to better engines — and better practiced and more skilled pilots!

Unless you *plan* to write off models consistently, there's a lot still going for the all-balsa airframe with a stout ply engine mount. More scope for introducing some pleasant curves into the outline shape. Combat models may be functional, but they do not necessarily have to look *ugly.* And if you come up against a better pilot, there will always be some sympathy for you for having a better looking model!

You could, in fact, once again prove that 'balsa models fly better'. And be quick and easy to build if you stick to a simple 'basic' structure. Using the best balsa, for best results, of course. You've guessed it? (Solarbo, of course).

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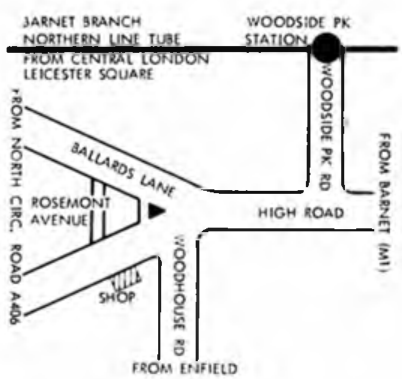

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INTERNATIONAL YEAR FOR DISABLED PEOPLE

1981 is the International Year of Disabled People, and the Sports Council, Regional Sports Councils as well as the SMAE, will be mounting various activities throughout the year directly aimed at involving disabled people of all ages in sporting pursuits.

At the SMAE Annual General Meeting last November, Bill Blake, the society's Public Relations Officer, called for whole-hearted support from individuals, clubs and area committees in giving help and encouragement to any handicapped people who would benefit by taking part in indoor and outdoor events. The doors are open to all aeromodellers to contact the local newspapers, radio and TV stations and to tell them what aeromodelling has to offer those who are handicapped. The SMAE will be contacting the national media for publicity so now it's up to modellers at local level to contact organisations concerned with the handicapped, and offer their services.

All branches of the hobby have something to offer because the most important factor in this exercise is the interest and involvement of the participants. A lot of work is already done but there is plenty of room for much more. The SMAE is determined to demonstrate its ability to care for people who are themselves interested enough to take an active role in model flying.

If you have ideas, or think you can help in any way, write to the SMAE PRO, Bill Blake, at the SMAE Office, Kimberley House, Vaughan Way, Leicester.

COUPE d'HIVER

Old Warden's fantastic record of fair weather was sustained with blue skies on December 7. Despite the confines of this reserve venue, made available at short notice by the Shuttleworth Collection when it became impossible to obtain a larger airfield, attendance and performances were excellent. For various reasons, mainly the stringencies of recession, France was represented by just one competitor this time when Robert Champion attended to place 20th in the Aeromodeller Trophy and 10th in the Bernard Boutillier Event (100gr). Full results and report with colour cover picture come next month.

It was a meeting noteworthy for success of the old-timers with that perpetual proxy flown for Frank Monts (USA) by John O'Donnell, placing first in 80gr. placed by Bruce Rowe of St. Albans. In the French rules 100gr. event, Len Ranson (who has been stretching rubber for longer than anyone else on the fields), led John Cooper and the freshly returned ace of the lightweights of the 50's, Norman Marcus.

A total of 119 models were entered and, yet of the hundreds of flights — only 16 'max's' of 120 secs were registered which was fortunate in many ways, bearing in mind the downwind woods and dense undergrowth of the Shuttleworth estate!

This vintage model is a Warnford 'IMP' produced in the late '20s as an almost nearly ready to fly kit of parts. This example was purchased by Brian Welch of the St. Albans MFC at an antique fair, was shown to us at the Aeromodeller Coupe d'Hiver event on Dec. 7th.

HANDS OFF CHOBHAM

Chobham Common in NW Surrey has been used by model fliers for approaching 50 years but is now coming under pressure by other groups, eg horse riders and conservationists, who wish to limit or in some cases prohibit, all types of model flying (free flight, control line, R/C power, R/C glider). As some of these other activities are represented on the Surrey County Council management committee for the common, a number of regular fliers have formed the 'Chobham Common Model Fliers Association' with the object of endeavouring to preserve existing flying facilities and drawing up a code of conduct to promote 'Safe and Sensible' flying practices. The Association is also negotiating with the Surrey CC to ensure that the existing rights of model fliers are not lost by default, misunderstanding and misinformation.

The Association has opened a 'register' of fliers who wish to show support for their objectives and who wish to be advised of any major developments. Anyone wishing to be placed on the register, please write to Mr. Bob Lane, 'Sandlands,' Scotts Grove Road, Chobham, Surrey, enclosing an SAE (12p). They will then eventually be informed of the outcome of negotiations with the County Concil.

In the meantime any flier proposing to use Chobham Common must ensure that they have current insurance, that power R/C models have effective silencers, and that glider bungees do not cross paths or bridleways. Models should, of course, be flown in a responsible manner and with due consideration to other users of the common.

NEW SMAE TROPHY

This new trophy for first place in the Annual Indoor Championships, FAI Class, has been presented to the SMAE by Aeromodeller. Specially commissioned from Ian Dowsett who designed and made the trophy, it symbolises indoor flight with the rotating silver framework of a propeller encased against a cobweb background, within the symbolic shape of the famous Cardington Airship shed. The trophy was first collected by Dr. Bob Bailey for his 1980 achievement.

WORLD CHAMPS T/R RESULT

Control line enthusiasts who followed our World C/L Champs report in October '80 edition will recall the Final of the class F2C Team Race event in which the Smith/Brown (UK) and Albritton/Perkins (USA) teams suffered line tangles, with resultant uproar when remaining finalists Geschwentner, Mau of Denmark were declared immediate winners in the face of an anticipated re-run.

The FAI Model Commission (CIA) meeting in Paris in December has now confirmed the result, so the Danish team are officially World Champions until the 1982 event.

FRENCH INVITATION

Long time devotees of the annual Anglo-French Coupe d'Hiver Challenge will certainly recall those winter contests in France. Unfortunately, it's all been but a memory for some years now.

This year, however, we are hoping to rectify the situation after an invitation from Bernard Boutillier in France to participate in their Coupe d'Hiver International which takes place at Issondum on February 22 with classes for 80g, 100g plus ½A power.

If there is enough interest, it may be possible to organise a group travel arrangement. This could be in the form of the use of private cars, or a group fare from Newhaven and, then picking up a hired minibus, or rail to Paris, then on to Issondum or Chateanroux.

Time is short, so to enable us to evaluate the possibilities all wishing to compete in the competition should contact the Editor for further information.

Book Review

'Usbourne Guide to MODEL AIRCRAFT' by John Stroud, published by Usbourne Publishing at £2.99. 30 pages. Hardback. 285 × 220 mm.

For anyone with a youngster interested in model aircraft, this is the book for them. Author John Stroud really has put some thought into the content and presentation of this delightful volume. The Usbourne Guide covers all aspects of model aviation, with chapters on how to choose, build and fly the enormous variety of model aircraft seen today. There are also sections on model engines, round the pole flying, indoor models, right up to radio control helicopters, all written in a very easy to read style with superb illustrations. This would make a super present for that budding flier.

THE NEW SCIENCE OF STRONG MATERIALS, Pelican 269 pages £1.50.
STRUCTURES, Pelican 395 pages £1.95, both by J. E. Gordon.

Not quite hot off the press, but still worth while reading for any model flier interested in what he's doing, are two Pelican paperbacks — *The New Science of Strong Materials* and *Structures*. The author, Professor J. E. Gordon, worked on the design of wood and plastic aircraft structures at RAE Farnborough during the war, and writes in an interesting and amusing way that takes several examples from aircraft design, as well as such diverse areas as dress design, Roman catapults and Mississippi river boats.

Any A/2 glider flyer who wonders about the distortion his wings undergo flying high-speed zoom launches could learn from the section in *Structures* dealing with the series of fatal accidents that befit the Fokker D-8 fighter in WWI. Its twin I-beam spars gave the wing a centre of flexure well aft of the centre of pressure, with the result that the wings washed-in during dive recovery, and tore off. Beefing up the rear spar in fact made the problem worse and the cure was to reduce its stiffness and so move the centre of flexure forward towards the CP.

Definitely a couple of good reads, and with the minimal maths thoughtfully tucked away in appendices, these are two books for every *Aeromodeller* reader's bookshelf.

PEANUT POWER by Bill Hannan published by Historical Aviation Album, California, USA. 80 pages illustrated with photographs and diagrams 280 × 215mm, soft bound, distributed by W. E. Hersant Ltd., 228 Archway Road, Highgate, London N6, price £4.75p.

In the modelling world, Bill Hannan is one of those total aviation people who writes with stimulating and original style. Though he wasn't the founder of the great Peanut Movement, he was certainly the one who put it on the map after the Connecticut origins were first established. Bill tells the story in absorbing style but the book is at first perhaps a little disappointing for the already committed Peanut flyer. One might have expected more than one full-sized design, and somewhere or other a full spelling out of the rules and regulations for Peanut Contests! It is only when one becomes completely immersed in the text that the Hannan style fully reveals itself as the most complete account ever to appear on this miniature class. All the processes are fully covered; prop carving, drafting, assembly, selecting one's own designs, getting the equipment together, transporting the model and flying. None of this is heavy and serious, it's all light hearted and in aeromodelling vernacular. The tone is set on the front colour cover of a Peanut model Fokker F11 on the trunk of a gigantic elephant in San Diego Zoo. If you are in any way inclined to having fun with this most relaxing class of model than you simply have got to have 'Peanut Power.'

What's Happening?

February 1, 1981
NE AREA SMAE INDOOR MEETING *EZB, IHLG, SCALE*. 10am-3pm Venue Spennymoor Recreation Centre. Contact Jeff Anderson, Tel Stokesley 711200. Venue E

February 8, 1981
SOUTH EAST AREA INDOOR MEETING *EZB, HLG, PEANUT, CO² OPEN SCALE RUBBER* Venue Crawley Leisure Centre. 12.00-6.00pm Contact J Dolding, 22 Loxwood Walk, Ifield, Crawley, Sussex RH11 0HY Venue F

February 15, 1981
GRANTHAM & DIST MAS *SCALE RTP CONTEST*. Venue Smeley's Canteen, Spalding Contact Gerry Gibbons, 11 Apeldorn Gardens, Spalding SAE. Venue G

March 1, 1981
NA INDOOR MEETING *EZB, IHLG, SCALE* 1.00-7.00pm. Venue Colne Valley Leisure Centre, Slaithwaite, Nr. Huddersfield. Contact Bernard Hunt, Tel Huddersfield 862353. Venue H

May 18
EAST ANGLIAN AREA *OPEN ½A COMBAT CONTEST* Start 10am Venue Changtry Park, Hadleigh Road, Ipswich, Suffolk Limited pre-entry £1 (SAE for map and rules) Contact A Malcolm Tel Ipswich 40896 Venue H

May 4
RAFMAA SUNRISE CONTEST *F1A, F1B* About 5-9am weather permitting Venue Barkston Heath Go/No go decision, based on weather forecast, will be made at Barkston Heath on May 3 Contact F/Sgt Brian Baines, MSF, RAF LEUCHARS, FIFE. Tel 033 483 471 Ext 420 Venue G

May 3
RAFMAA FREE FLIGHT AND 100s MEETING *O/G, O/R, O/P, F1A, F1B (Thurston Trophy), F1C, HLG and 100s R/C GLIDERS* All SMAE members welcome Venue Barkston Heath, Lincs Contact F/Sgt Brian Baines, MSF, RAF LEUCHARS, FIFE Tel 033 483 471 Ext 420

On MoD property, model aircraft may *ONLY* be flown by *FULL* SAME members or contest entrants. All SMAE members (Associates and Juniors) and their families are welcome as spectators, and non members *may* be admitted by prior arrangement with contest director. For SMAE membership details Tel 0533-58500

Supermarine Sparrow

A simple to build 1/12th scale model of a pre war ultra-light for .5-.75cc engines, which includes pendulum control to the rudder and ailerons to aid stability.

by G. F. Elsegood

WHILE LOOKING for a scale model suitable for flying in a small field, I discovered the range of delightful light aircraft designed for the Air Ministry Trials held at Lympne between 1924 and 1926 and decided to build the MkII version of the Supermarine Sparrow.

This was the first design by R. J. Mitchell who later became famous for a range of aircraft he designed for Supermarine culminating in the Spitfire.

For model work, the Sparrow offered a considerable challenge in trimming, due to the lack of dihedral, so it was necessary to fit a pendulum control system. Pendulum control was developed to a fine art by the late P. E. Norman during the '50s. He was able to make pendulum controlled free flight models perform considerable aerobatic feats, but in our case, we are using the pendulum just as a stabilizing device.

The Sparrow flies well, but is essentially a calm weather model — just the thing for a warm summer evening — aeromodelling at its most enjoyable in fact.

CONSTRUCTION

Fuselage

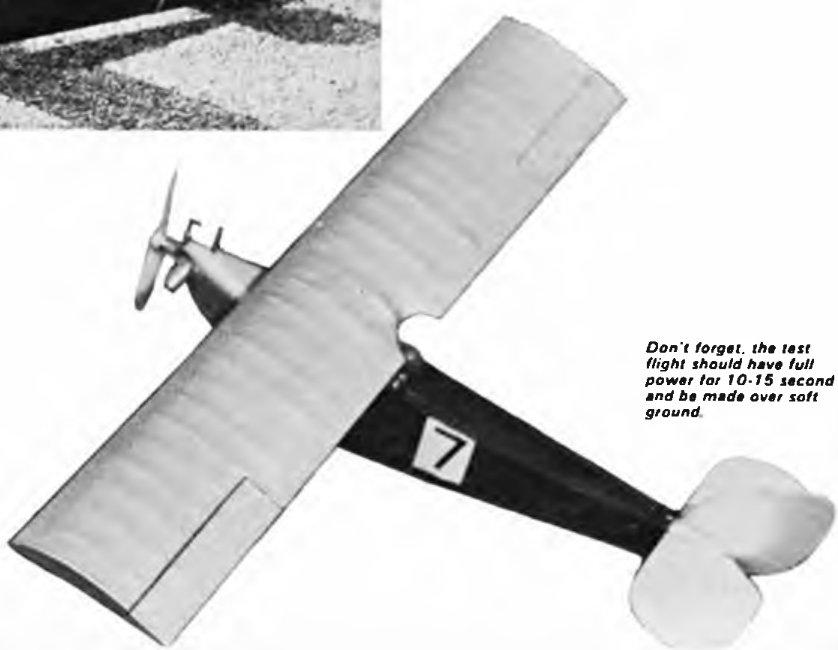
Cut the fuselage sides from 1/16" sheet medium soft balsa and also formers 4 to 9. Former 1 is from 1/8" ply and F2 and F3 from 1/8" medium balsa. Start by marking the positions of the formers on the inside surface of the fuselage sides. A fibre tip pen is ideal for this job. The next step is to glue F3 and F5 to one side of the fuselage, making sure these formers are square. An old set square with the corner cut away to clear the cement joint is the best tool for the job.

Next, glue former F4 to the other side of the fuselage, allow a good half hour for the formers to set and then join both sides together. Lay the centre top edge of the fuselage onto a flat surface to ensure that both sides are parallel. Fix all the other formers in place making sure that the engine bearers have 3° side thrust and 3° down thrust.

Bind the undercarriage to a piece of scrap 1/4" sheet and cement well to the fuselage. Glue the wing struts to formers 2, 3 and 4a and use balsa cement or a small amount of epoxy. Now sheet in the bottom of the fuselage with the grain going across the width of the fuselage. The tail skid can now be glued in place.

Fitting the pendulum torque rod is a bit tricky. First, cut the 1/8 in. square torque rod to the correct length and bind the rear fitting with its tube bearing in place. This rear bearing can now be fitted through the rear end of the fuselage but *not* epoxied at this stage. Now bend the front fitting of the

Left: note the position and relative sizes of the racing numbers. Our wheels were turned from aluminium with Mecanno tyres but suitable tyres can be made from rubber tube joined with a cyanoacrylate glue.



Don't forget, the test flight should have full power for 10-15 second and be made over soft ground.

torque rod, and cut length of brass tube for the bearing and fit through the front of former F5. The front fitting can now be bound to the torque rod and both front and rear bearings epoxied in place, making sure *no* epoxy gets into the brass tubes. Now epoxy the pendulum bearing in place and make sure everything works freely. Although it is not shown on the plan, an adjustable pendulum weight is a good idea. The end of the earth pin from a mains plug could be used.

Cut off the end that takes the wire and slide it onto the pendulum rod using the screw to retain it in position. You will probably require a weight of about a 1/4 oz or more which can be soldered on to brass fitting as required.

Wings

These are quite uncomplicated and are made in one piece using hard 3/32" sheet for the spars and undersurface of the ribs. For the upper surface of the ribs, cut a ply template and cut all the ribs required from 3/32" sheet medium balsa.

When the wing is complete, fit the pendulums, making sure that the control rods do not bind at any point. The ailerons should have about 1/8" of up at the full extent of the pendulum swing.

Tailplane

Cut from 1/16" sheet medium balsa and cement on strips of note paper to represent the ribs before covering with lightweight tissue.

Finishing

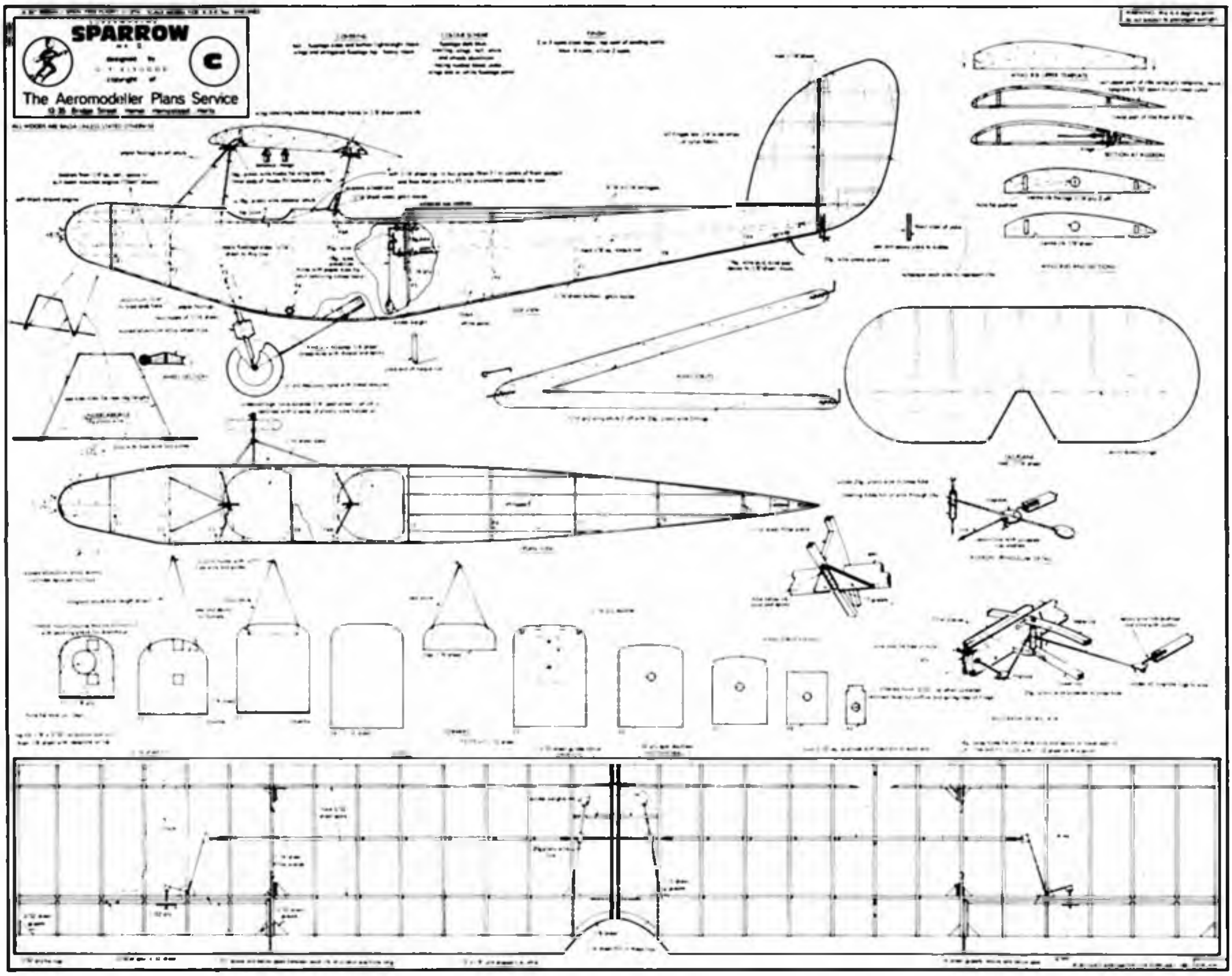
Cover the entire model in lightweight Modelspan tissue and give two coats of clear dope. The original plane was coloured dark blue for fuselage and struts while wings and tail surfaces were aluminium doped.

The MkII aircraft carried competition No. 7, painted black under both wing tips with the top of the figure at the wing leading edge and again black on a rectangular white panel on the fuselage sides behind the rear cockpit.

Flying

The original was powered with a .5cc D.C. Dart and had a dummy cylinder turned from aluminium to preserve the scale appearance of the original horizontally opposed engines. The dummy cylinder weight helps to get the C.G. in the right place, which should be 30 — 40% of the chord from the leading edge. Test glide over long grass and trim by adding weight to the nose or tail, not by altering the incidence of the tail. There should be no suggestion of a stall on the glide as this could lead to a side slip on a powered flight.

Make the first powered flight with full power, but for short engine runs only (10-15 secs.) over long grass. To control any violent turns, adjust the engine's side and down thrust. Remember it is essential to fly this model on a calm day, at least until the trim is set up.



GET IT RIGHT WITH RIPMAX FUTABA

WORLD LEADERS IN DIGITAL PROPORTIONAL RADIO CONTROL

Radio control is the ULTIMATE in aeromodelling! And it need not cost the earth – if you go about it the right way. Here is your guide to BEST BUYS✱ to give you maximum satisfaction, maximum enjoyment – and best value for money.

Radio is the ONLY answer for CONSISTENT long flights with slope soarers – or for thermal soaring. And, of course, the ONLY answer for aerobatic gliders, course and distance 'racing' etc – even aero tow and release. Everything that full size sailplanes can do (and more) – because YOU are the pilot!
CHECK BOX A if your model is to be flown on rudder and elevator control.
CHECK BOX B if it also has ailerons, or you need an extra control (e.g. for triggering a camera for aerial photography).

ARTF models are the quick-and-easy way to get a radio model completed and ready to fly. Most are engine-powered, but number of controls available may vary.
CHECK BOX A for rudder and elevator only.
CHECK BOX B for rudder/elevator/ailerons or rudder/elevator/throttle.
CHECK BOX C for rudder/elevator/ailerons/throttle.

R/C TRAINERS are deliberately designed with a degree of 'automatic' stability to help a pilot learn to fly. If you make a mistake, return controls to neutral and let the model recover itself to a normal flying attitude. Models of this type normally operate with rudder, elevator and throttle control. For the radio required, **CHECK BOX B**.

AILERON TRAINERS are less stable, need piloting all the time – but are still not 'tricky'. They are also fully aerobatic – e.g. can readily perform **smooth** rolls, which are beyond the capability of most 'basic' trainers. You need 'full house' controls for these models – so **CHECK BOX C.**

RADIO is the SAFE way to fly scale models, because you are in control all the time. It also means you can successfully fly prototypes which would be 'hopeless' in free flight. Ideally, nothing less than 'full house' controls – so **CHECK BOX C.** If you want retract gear or other realistic functions – **CHECK BOX D.**

FULLY AEROBATIC MODELS with 'contest standard' performance demand 'full house' – so **CHECK BOX C.** If you also want to operate retracts and/or flaps independently, **CHECK BOX D.**

✱ Based on RIPMAX-FUTABA radio chosen for its quality and reliability and the fact that you can be assured of getting HIGH PERFORMANCE AT LOW COST. Your local model shop should have most (if not all) the equipment shown in stock.

RIPMAX FUTABA

Please note that the 'L' Series is now also available in FM version. Check with your model shop for prices.

BOX A — YOU NEED 2-ch RADIO

And preferably a TWINSTICK Transmitter, so you can control rudder with one hand and elevator with the other. Complete reliability of your radio is essential – the safety of your model depends on it. With cost also in mind, we recommend:

BEST BUYS
RIPMAX-FUTABA 'L' Series 2-ch DRYCELL COMBO (£22.00) with two FD32M or FD33M servos – **Total price only £44.00.**
Or if you want to do a lot of flying: ABOVE with NICAD CONVERSION is £24 extra.

BOX B — YOU NEED 3-ch RADIO

Choose a TWINSTICK Transmitter with the option of 'throttle-left' or 'throttle-right'. Choose the mode which seems most natural to you.

BEST BUYS
'L' Series 3-ch DRYCELL COMBO (£30.00) with three FD32M or FD33M servos – **Total price £63.00.**
Or if you want to do a lot of flying: Above with NICAD conversion is £24 extra.

BOX C — YOU NEED 4-ch RADIO

For long term use we would definitely recommend an All-Nicad outfit – but for initial economy you can get started with a Drycell Combo.

BEST BUYS
'M' Series 4-ch Combo (£95.50) plus four FD32M or FD33M servos.
Total price £139.50
or for INITIAL ECONOMY 'L' Series 4-ch Drycell Combo (£44.50) plus four FD32M or FD33M servos-**Total £88.50**

BOX D — YOU NEED 5- or 6-ch RADIO

For reasonable operating times you definitely need Nicad batteries – the extra expense is more than justified.

BEST BUYS
'L' Series 5-ch Combo with Nicad conversion. **Price £79.50‡**
'M' Series 6-ch Combo **£105.50‡**
'M' Series 6-ch FM **£145.50‡**
‡With 5 FD32M or FD33M servos, add £55 for total cost. With 6 servos, add £66.

GET IT RIGHT WITH RIPMAX KITS

AVAILABLE AT ALL RIPMAX STOCKISTS

Had a good look at the opposite page? Now let's deal with recommendations for KITS which fit into the various categories. VALUE-FOR-MONEY kits which again will ensure you SATISFACTION. We reckon each one is a 'BEST BUY' — otherwise it would not appear in the RIPMAX range!

GLIDERS

For a MINIMUM COST R/C MODEL start with a glider! You won't have to buy an engine (or fuel) and a glider is the EASY type of model on which to learn to become an R/C pilot. More easily — and cheaply — repaired if you crash it, too. Pick from these superb Graupner models — all DESIGNED for radio control via rudder and elevator. 63" Dandy* **£22.25**, 77½" Beta **(£38.85)** for example, which is a low-wing model with exceptionally docile handling characteristics.

*These models also convert to PYLON POWER, which means you can fly them from flat sites without the need for tow launching.

Or how about a high performance all-purpose R/C sailplane for slope soaring, thermal soaring, or contest flying in FAI Multi-Task, SMAE '100' rules, Cross-Country. Then the model for you is Sean Bannister's 98" span **ALGEBRA 100** (kit **£28.75**).

At the top end there are R/C sailplanes with a performance directly comparable to full-size machines. For example Graupner's 138" span MINI-NIMBUS with its 20:1 aspect ratio wing **(£149.50)**; or the ⅙-scale 118" CIRRUS **(£55.95)** and the new 111" CIRRUS 75 **(£103.00)**. All SUPER Deluxe kits — and we really mean 'super'. Fully moulded plastic or GRP fuselages — and VERY complete kits!

HAVING COMPLAINTS ABOUT NOISE?

Not if you fly R/C gliders, of course. But if you prefer 'power', then how about *electric-powered* aircraft. Switch-on-and-go models — *easier* to fly than engine-powered models. And many authorities reckon they make the best R/C trainers! We recommend the **GRAUPNER** electric flight models. After all, they were first in the field and these kits have years of flight testing and development behind them. Try the 57" span ELEKTRO-MAX **£37.60** (shown bottom left) or the 70" span ELEKTRO-FLY **£36.85**. Jumbo 755 for Elektro-Max **£9.95** and Jumbo 550 for Elektro-Fly **£6.70**.

ARTF (ALMOST-READY-TO-FLY)

A number of manufacturers have produced ARTF models more properly classified as toys. Too small or with far too limited a performance to satisfy genuine modellers. So look for the *genuine* models here. One range stands out from all the rest. **RIPMAX-KYOSHO.** They are even complete with Cox 049 (or Enya 09) engine already fitted. You can fit them out with radio of your choice in only an hour or so — and they really *do* perform! Quick and simple to repair, too, if you have a crash! Check out these models at your local model shop. 36½" span SPORT-AVIA motor powered sailplane (above) **£48.95**. 36" span CESSNA CENTURION **£48.95**, 41" span D.H. CHIPMUNK **£74.50**, 45" span CESSNA CARDINAL **£74.50**, 42½" MESSERSCHMITT Me109 **£82.00** and 28" span MIRAGE IIIC **£52.75**.

ENGINE-POWERED R/C TRAINERS

We are particularly proud of the RIPMAX TRAINER which we developed ourselves to give learner-pilots EXACTLY what they need. A good looking model with 'forgiving' flight characteristics — and a VERY COMPLETE PREFABRICATED KIT with no extras to buy at all (except radio, engine and covering material of your choice). The standard **RIPMAX TRAINER** kit (with built-up wings) costs **£35.50**. **There is also an AILERON VERSION** (with foam wings) for advanced training (price **£36.30**).

Speaking of advanced trainers, there are many other kits in the Ripmax range well worth considering. The 56" MONARCH GRADUATOR **(38.85)** for example, which is a low-wing model with exceptionally docile handling characteristics.

Biplanes make good 'trainers', too, and are usually FULLY aerobatic. So you need some basic flight training first before you fly them! Two bipes we can particularly recommend are the 48" span MOONSHINER (BIG on performance, but small enough to fit into your car), kit **£33.55**; or the 36" span MINI-MOONSHINER **£25.75**. A super model for dog-fighting!

RADIO CONTROLLED SCALE AIRCRAFT

Wide open for choice of subject! Stand-off scale or fully authentic, even down to 'scale' airframe construction. For super-realistic models the EASY way (extensively prefabricated kits including plastic mouldings, etc.) check on the following Graupner kits. 62" MONSUN **£73.75**, 47" PIPER PA18 SUPER CUB (shown above and below) **£35.75**, 63" PIPER CHEROKEE **£92.50**, and 66" JODEL ROBIN **£155.50** which can also be used as a tug for launching the Mini Nimbus sailplane.

For models that BUILD QUICKLY and really fly well (with none of the vices often present in scale aircraft), there are none better than Mick Reeves 68" span FOCKE WULF FW 190D **(£59.80)**; 63" span SPITFIRE **(£46.45)** or giant size (80" span) HURRICANE **(£79.95)**. Or if you want to duplicate Mick's 1978 WORLD CHAMPIONSHIP model, try the 110" span FOURNIER RF4 **(£69.95)**. Or for a really wide choice of prototypes in kit form, look at the STERLING range. Many 'classics' here.

If you fancy your skills as an aerobatic pilot you can get a lot of fun for a start with Graupner's 39½" span CHICO **(£28.75)**. It only needs an 09 engine and 2-ch. radio. Otherwise, if you are a 'qualified' pilot, go straight for Mick Reeve's GANGSTER 52 **(£25.75)**, GANGSTER 63 **(£34.75)** or his RACKETEER **(£34.75)**. The latter you can sleek up with retracts.

Ron Moulton reviews the new craze in ultra-light aviation as seen at the annual EAA Fly-in, Oshkosk, U.S.A.

MICROLITES

Each Microlite was restricted to four circuits at a time to permit almost 100 to fly at Oshkosh. This is just five of a typical 15 to 17 airborne in the Ultralight area.

Most popular is the Eipper Quicksilver, this one with French roundels. Engine is a pusher, mounted above wing with prop at trailing edge.

LIKE darting dragonflies over the bull-rushes in a forest pool, a count of 17 microlites in the still summer evening air at Oshkosh was as exciting a sight as one could wish. The buzz of two-strokes from the slow moving circus drew a huge crowd away from the mass of homebuilts, war-birds and vintage planes for which EAA and Oshkosh are so famous. So great was the variety, and inspiring the performance, we thought we'd pass on some impressions.

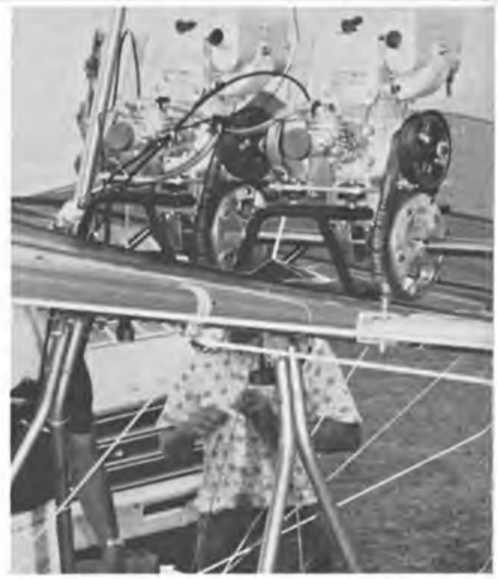
Wings from sailcloth, cut foam or built up with thinnest alloy, wire braced, with CG shift for pitch control, and engines that look marginally bigger than we use for large scale models go to make the Microlite a natural attraction for aeromodellers. While this new generation of minimum aero-planes started with conversion of the biplane 'Icarus,' all kinds of configuration have been proven possible, mostly without the benefit of research other than practical experience and inspiration from hang gliders.

There were almost 100 examples at Oshkosh ranging from the traditional open frames to streamlined bathtubs for 'cock-pits' and unsupported sailwings to all-rigid canards. While engineering standards were equally varied, it was significant that the only incident in an intense week of flying was the carnage caused by a 60mph storm. This plucked the lightweights from tie-downs and blew them into the corn-fields. One even went missing for a few hours!

Emerging from all this activity in the USA is a world-wide enthusiasm in 15 nations including the UK. The British Microlight Aircraft Association (BMAA) has 400 members. An SAE to the secretary, D. Thomas, 80 St. George's Road, Aldershot, Hants will bring details. Annual fee is £12 and while flying is all-year round, the first major rally of '81 is at Shanklin, Isle of Wight, May 2-9. By that time there should be even more British designs airborne in-cluding one by BMAA Chairman Steve Hunt which promises to be a poor man's Piper Cub with full 3-Axis controls plus flaps yet it packs away on a roof-rack! Steve introduced the 'Trike' conversion of the Hiway hang-glider (July 80 issue) and is a keen exponent of the geared prop drive for efficiency.

Average cost of a Microlite is £3,000 ready to fly away — and being under 100kg empty, any reasonably powered machine will hop off after a 40 yard run.

Engines range from 100 to 440cc, con-verted out of saws, snowmobiles, and motorcycles. One at least is specially made, looking very much like a 10X version of the vintage Brown Jr model engine, even



Left: typical power system, a 250-350cc two stroke with belt drive to a layshaft and a pull-start on the crankcase, as used by Eipper.

Above: 'Doublequick' twin engine arrangement by Eipper and right: the Lazair with the 100cc engines on leading edge, pendant control column - even brakes on the wheels.

Left: the P-Fledge is one powered variant of the famous hang glider. Only seven wing ribs hold the aerofoil! Above: Quicksilver 2-wheeler prepares for foot assisted landing at all of 15mph ground speed. Note extended tailwheel.

Trike Eipper fly-by, pilot pulling forward to descend.

sounding (and vibrating) just like the original inspiration! Cleverest of the Oshkosh power units was the co-axial twin engined unit in 'Puffin' by Dan Steward. Several coupled twins in tandem and a Konig 3 cylinder radial (complete with electric starter) were among the great variety of Yamaha, McCullough, Fuji and Honda engines.

A common denominator is the popular use of Ritz propellers. These come from none other than Gerry Ritz, one-time king of the model propeller business and world A/2 glider champion. Gerry supplies machined laminated props at prices that have staggered even the thrifty hang-glider types and they're obviously good.

Outstanding for its engineering is the Ultra-flight 'Lazair' an all aluminium structure from Ontario, Canada with two 100cc engines on sleeves which snugly fit the leading edge of a rigid wing. Its inverted vee tail carries ruddervators and inset ailerons complete a simply yet very effective control system. Come to think of it — one could almost turn the wheel full circle and make it a subject for a flying scale model!

Craig Catto's Goldwing rigid canard is among the newest developments.

American Aeroflight's 'Eagle' is a membrane wing canard with tip rudders, also available with floats.

Left: the Hummer combines ruddervators on Vee tail, with generous dihedral. Engine is mid-mounted as a pusher with pilot unusually forward. Below: manoeuvrability of the P-Fledge on approach, using pilot seat shift and tip rudders makes microflying look deceptively easy.

PRACTICAL AERODYNAMICS

Martin Simons gives some useful tips on how to improve the performance of your model.

THE GENERAL IDEA of this series of short articles is to give the practical aeromodeller some further insight into the basic theory of model flight so that he will be able to apply the ideas directly to whatever kind of model interests him. There will be no complicated mathematics beyond the occasional number or fraction.

Theories

A theory is an attempt to explain something that happens and to predict what will happen in future. A theory is never, and cannot ever be, proved absolutely right. It is only proved workable or unworkable in the same sense as a vehicle or some other machine may be proved at a *proving ground*. Treat all theories as waiting for a new test and accept them only as long as they do work in practice. This includes not only the theories presented here but also those of your own or of other modellers. Any of them may prove unworkable next time you go to the proving ground with a model for test. Modellers do sometimes go on believing in theories which, in the distant past, have been proved useless time and time again, and the proving ground is very hard when models trying to operate under these false theories arrive there. The advantage of the theories discussed here is that they have, *so far*, proved workable in practice, but who knows what the next well-designed trial might show? Get out and try it. Don't be content always with the existing model design or standard modellers' habits. There is no model so good that it cannot be improved and a little theoretical study can bring considerable rewards, not merely in better flights, but in a clearer understanding.

Climbing under power

As every modeller knows, all flying machines other than balloons, airships and rockets, get support from the air by means of a wing or wings moving through the fluid medium. Helicopter and autogyro rotor blades and propellers on orthodox models, provide support or thrust too, but these are really slender wings driven in a rotary sense instead of more-or-less straight along and the blades behave in exactly the same way as wings. The lift from a wing depends mainly on its speed of movement and its aerodynamic angle of attack relative to the airflow. An increase of speed will increase the lift, a decrease of speed will reduce the lift, if the angle of attack is the same.

To maintain level flight in a fluid like the air, the wings act so that they generate an upward force to balance the downward force or weight due to the model's mass. Tailplanes, if they take on some share of the work, may be regarded as small wings. It is also possible, though hardly ever a good idea except for some special purpose, to make a fuselage, wheel, or some other part of a model, produce some upward supporting force. Indeed, aircraft with no wings at all but with so-called 'lifting bodies' have been flown but they are not very efficient for general purposes. For the moment regard the mainplanes as the chief source of upward supporting forces in level flight. In such flight, the total of all upward forces must equal, no more, no less, the total weight of the aircraft. The wings usually take on the job with very little help from any other part of the aircraft.

The balanced arrangement of upward and downward forces is the same for any other object that is maintained at constant distance from the centre of the earth. You, as you sit or stand, create a force acting down which would pull you towards the centre of the globe but this force, fortunately for you and all of us, is exactly balanced by equal and opposite reaction forces from your chair or the floor or whatever you happen to be resting on. If you pause to think about it for a moment you can feel the upward reaction on your body, keeping you at constant height. If the chair or floor gave way beneath you, you would accelerate downwards until you hit something that would bring about a sharp deceleration. Afterwards, if capable of feeling anything at all, you would once again be able to sense the upward forces keeping you in equilibrium. This, then, is a general theory or law which works for everything on earth. If the supporting forces are less than the weight, the body *accelerates* downward. Conversely, if the weight is exceeded by an upward force, the body accelerates upward. This is how rockets, for instance, are accelerated upwards; the thrusts from their very powerful motors exceed the total weight and they accelerate up and go on accelerating till the motor cuts. Then, either they fall, accelerating downwards, or if in orbit, they cease to have any weight and so again, upward and downward forces are equal; both zero. In level flight, then, a model's weight is equalised by the reaction forces of the air, mainly on the wings. It has a certain speed and is trimmed to achieve this.

The same equality of up and downward forces is true in climbing and gliding, and even in steady descents or dives under power. Some people find this puzzling at first, thinking that when the model climbs it must be because the upward forces are a little more than the weight. This is not so. Models do of course accelerate up and down at various stages of a flight and in aerobatics they are doing this nearly all the time. A change from level flight to a climb, is an acceleration and a change from climb to dive or glide, is a deceleration or a downward acceleration. If you ascend in a fast lift, you will be aware at the beginning, of acceleration. You will feel, momentarily, heavier than usual and the upward forces through your feet will be correspondingly more. In a really rapid acceleration you might even be forced to your knees because your body might not be strong enough to take the extra load. Exactly the same applies to model aircraft when accelerating rapidly upwards. However, once the machinery of the lift has, so to speak, got into its stride, the rate of ascent remains constant and your weight returns to normal. You can stand again, and the reaction of the floor is again just the same as your weight. If a model climbs at a steady rate, the weight and total upward forces are exactly equal. At the top of the climb the lift decelerates and you feel lighter, the floor's reaction is correspondingly reduced and in an extreme case your weight might come to zero and your feet would leave the floor altogether. Again, a model changing rapidly from rapid climb to level or descending flight goes through a similar phase, but during a steady glide or descent or dive, weight and supporting forces are equal.

Consider the diagram, **Figure 1.** The model is shown in a steep climb. The propeller is pulling hard and obviously, since the thrust line is inclined upwards, a lot of the total supporting force is coming from the propeller. At the angle of climb shown, in fact, nearly half the weight of the model is supported by thrust alone.

So what is the wing doing? Clearly, since the total upward force equals the weight, *the wings support less weight than when the model is in level flight*, because the propeller is supporting its share. In horizontal flight the propeller simply pulls the model along horizontally so all the weight has to be supported by the wings. In a truly vertical climb, all the upward force comes from the propeller and the wings do nothing which is why helicopters don't need them. In general, then, the steeper the climb, the less lift is needed from the wings. That means, either the wing must move slower through the air or it must have less angle of attack.

Suppose a modeller, misunderstanding this, decided to try to get a faster climb by increasing the lift of the wings. He might attempt this in several ways but on the flying field the most obvious would be to pack up the wing leading edge a little, increasing the angle of attack. The effect will be to upset the balance of forces achieved with the previous trim. He launches the model, and it takes up a climbing attitude. When it reaches the same angle of climb as before, the wing is giving more lift than it did. The propeller is still working just as hard but the wing will be lifting more than its share. However, the lift force generated by a wing does not act

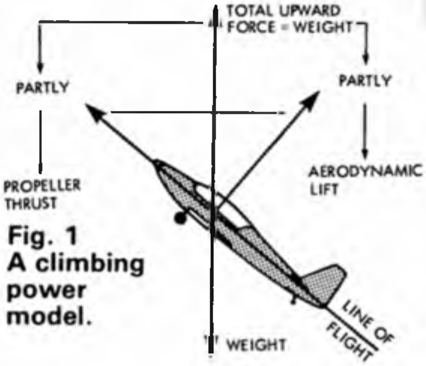


Fig. 1 A climbing power model.

upwards when the wing itself is at this sort of angle. The lift force is roughly square to the wing surface, i.e., partly upwards, partly horizontally. There will be acceleration of the model, but this will be in the direction of the excess lift force. The effect is to *steepen* the climb. Well, isn't this what the operator wanted? Not necessarily. He wanted a faster *rate* of climb, not a steeper one. As we have seen, as a climb gets steeper, the propeller's share of the work gets more and the wing's reduces. The wing has now worked itself up into a steeper climb where the propeller will take even more of the supporting force, leaving less for the wing to do even though the modeller's idea was to make it work harder. Yet, because of the packing under the leading edge, it still will try to work harder. The imbalance of forces tends to get worse, still lifting too much, the wing steepens the climb more, the propeller finds it is taking more load, and there is still less for the wing to carry, so it steepens the climb more, and so on. The acceleration is always in the direction of the force producing the imbalance.

One of two things will happen. If the motor is not very powerful, a point will be reached where it simply cannot do any more. The propeller can only support so much load, and it cannot continue to move the model up its steep climb path so fast. The model actually slows down. This has the effect of reducing the wing lift, restoring the balance. So the effort to make the wing work harder has slowed the model down. The flight path is steeper but whether the model climbs faster depends on the power available. Very likely, the model will come to a position where it is 'hanging on the propeller' almost like a helicopter hovering, gaining hardly any height. The exact angle to give the best rate of climb, has to be found by experiment with a particular model, if the motor is not over powerful. The best trim is the same as that for the lowest sinking speed on the glide.

With a very powerful motor, and most duration power models or even rubber driven models do have more than enough power for this, the effect of trimming the wing for more lift will be to steepen the climb more and more until it is vertical and with the model still moving upwards the wing lift direction will now be close to the horizontal. The imbalance of forces will pull

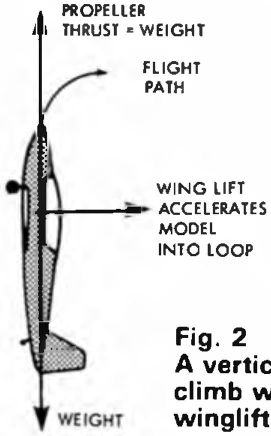


Fig. 2 A vertical climb with winglift.

the model over onto its back and the model will beging to loop the loop (**Figure 2**).

Note that this chain of events has nothing to do with the angle of the motor thrust line to the fuselage. To add excessive amounts of 'downthrust' will not prevent the wings from producing more lift. Indeed it might have the opposite effect. Nor will the position of the wing, whether mounted low or high on a pylon, make much difference. The tendency of high-powered climbing models to loop is caused simply by the wing lifting too much. At least one notable aeromodeller, some time ago, tried to overcome this problem by mounting the engine and propeller on a tall pylon up above the wing, the idea being to use the high thrust line to pull the model's nose down. It did not work because the wing lift remained too great for the climbing attitude.

There are two ways of controlling such a high-powered climb. One is to let the wing develop more lift than is required, and then waste this force by turning it sideways. This is done by trimming the model to climb in a spiral.

A turn is a sideways acceleration, so to make a model turn in level flight, an excess force has to be generated in the horizontal direction. This is done by banking the wing over so that while some lift remains acting upwards to balance the weight, some is also acting to the side and the acceleration takes the model in that direction. The weight is still there to be supported so in a turn the wing has to carry the total weight and provide the accelerating sideways force (**Figure 3**). This places more load on the wing, in a 60 degree banked turn, the wings actually carry twice the load they do in normal level flight. At 80 degrees bank, the load on the wing is eight times normal and the sideways acceleration then is 7 'g', i.e., the pilot would feel seven times heavier than usual, if there was a pilot. Not surprisingly, wings sometimes find such loads too much for them and may respond in various undesirable ways, even breaking.

Returning to the problem of the climbing power model, the modeller who rigs the wings to give too much lift, has to get rid of this unwanted force during the climb by making the model turn as it climbs, banking the wings over at whatever angle is

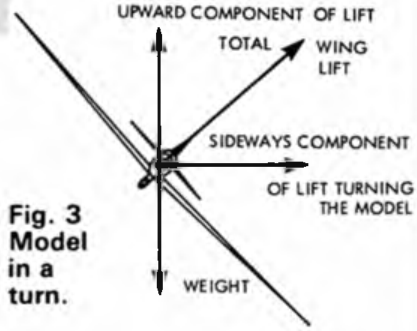


Fig. 3 Model in a turn.

needed to use up the surplus force. Many successful models have flown in this manner. It is not, however, aerodynamically the best solution. Firstly, lift is not a cheap commodity. To make a wing produce a large lifting force creates a lot of resistance or drag, the steeper the angle of bank, the heavier the price. Drag will slow the climb down, engine power that could be used to pull the model up faster, will be wasted overcoming the extra drag. Also, because of the extra 'g' loading caused by the turning acceleration, the wings will have to be made stronger and so, heavier. Excess weight also slows the climb down (granted, with some contest models there may be weight to spare, but that is another matter).

A better answer, aerodynamically, is to avoid the wings generating the excess lift in the first place. Unfortunately, with free-flight models designed for good gliding performance as well as high-powered climbs, the trim needed for the climbing mode is incompatible with that for gliding. In the glide, the wing supports all the weight, so it must produce plenty of lift. In the climb, it needs a different trim entirely. The aerodynamic solution is to arrange some sort of automatic re-trimming device to eliminate some of the lift during the climb. Models have flown with such devices but they are not easy to adjust nor always reliable. Still, this is the most promising approach.

In closing, it may be mentioned that hand-launched 'hurl' or 'chuck' gliders encounter a similar problem with the climbing phase, because they have surplus energy to use up, the energy coming from the modeller's strong arm or, perhaps, catapult. The model is given more speed than its normal flying speed and the whole climbing phase represents the using up of this excess energy to gain height. If, during this phase, the wings lift too much, the model will have to be trimmed for a spiral climb or it will simply loop the loop. It would be better if there were no wings at first, because then the launch would carry the model higher against only the minimum resistance, much like a dart. Then if the wings could be extended, the ordinary glide could begin. In practice, since such complications are very difficult to incorporate into such small models, the modeller has to compromise. Usually, a 'low lift' trim is used to ensure a good climb, then a trim less than the best for the glide results.

S.M.A.E. Prizegiving 1980

AWARDS night can be a dull procession but certainly NOT so for the SMAE! The galaxy of precious silverware is so varied, ranging from a scale Hawker Hart to traditional cups dating back over 60 years; and the people involved are so energetic, that the event can't fail to be a rousing success! These are just a few of the many winners. Apologies to those with equal honours who don't appear and congrats to all on a tremendous year of achievement.

Those who elect to give this annual SMAE social get-together really do miss out on a most enjoyable evening. We recommend it to all SMAE members.

Top: Air Vice Marshal B. Brownlow OBE, AFC, Commandant of the RAF College Cranwell gave a lively speech before prize presentations. Top right: Dave Hipperson collected 'Flight' Trophy for the fifth time! - Plus the 'Mercury.' Right: Fastest man on wires - Mike Billinton with 'Model Aircraft' speed trophy for 200+mph. Below left: Justly proud of the Gold Trophy for C/L aerobatics, Barry Robinson is a new name to add to the engraving. Centre: Chris Parry, no longer a Junior and now challenging the Seniors, took the Pilcher and 'Heather' Trophies for free flight. Right: Newly elected Fellow of SMAE, Tom Chambers took the Caton (remember their rubber?) Barometer after countless years of trying. Bottom left: Kay Brownlow congratulates 'Mr. Thermal Soaring,' Sean Bannister and bottom right: Kay, with Records Officer, Dave Stapleton, hands over the new Aeromodeller F1D Trophy to Dr. Bob Bailey who has done so much for Indoor over recent years.

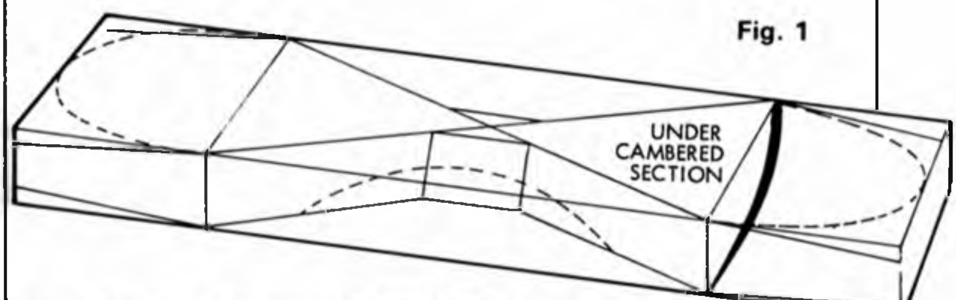
CARVING PROPELLERS

Len Ranson discusses requirements for efficient propellers for rubber powered models

WE MODEL FLYERS call it the propeller, although it is more accurately termed an airscrew, because that is what it does: screw its way through the air. I suspect, though, that our reason for calling it by the somewhat archaic term, propeller, is that it is a more pleasant looking and sounding word, even if it does suggest pushing rather than pulling.

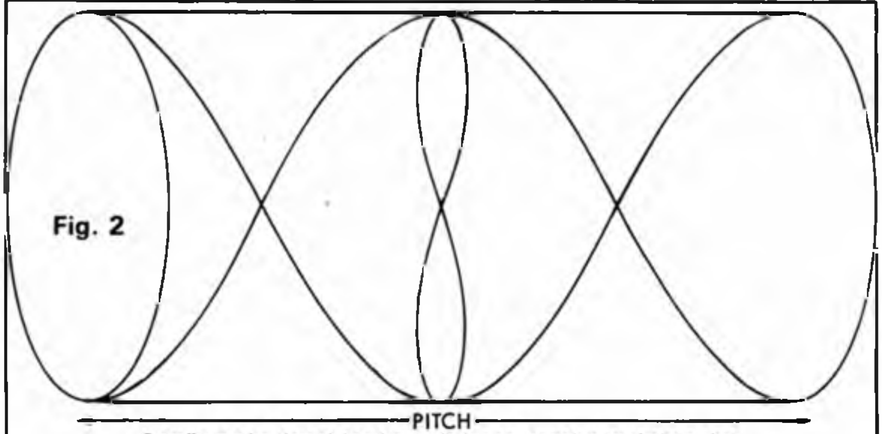
The propeller is not anyone's particular invention; its origins can be traced back to antiquity, and it was waiting in the wings, to use an appropriate simile, for a suitable aircraft engine to employ it, long before powered flight became a possibility. When you come to think of it the concept of the screw must rank very close to the wheel itself in advancing the technology of civilised man, considering the multitudinous applications that it has, there being hardly a mechanical device that does not employ a threaded bolt or screw somewhere in its structure or working parts. Used as a propeller the screw revolutionised the maritime means of propulsion, and it was to be equally effective when its helical blades became the only practical means of sustaining a heavier than air machine in active flight.

As far as the model plane is concerned we see what is undoubtedly a recognisable modern type propeller on the rubber powered model of the Frenchman, Penaud, as far back as 1871. In design this helical airscrew seemed to be much in advance of the crude paddles which so often spelled failure for the early aeronauts. From the time of Penaud, model propellers, relatively small and narrow bladed, did not alter very much over the years, and it was not until the 1930s that an alternative power to rubber became available: the internal combustion engine. In a way the generous margins of power and endurance of the various kinds of i/c engines, petrol, diesel and glow, killed design interest in propellers, at least for the average model flyer who came to rely on the commercial products which were machine turned and cheap. Only in rubber power was there a continuing design involvement in this fascinating component, and it was also in the 1930s that propeller design really took off, coinciding with the introduction of the light balsa airframe.

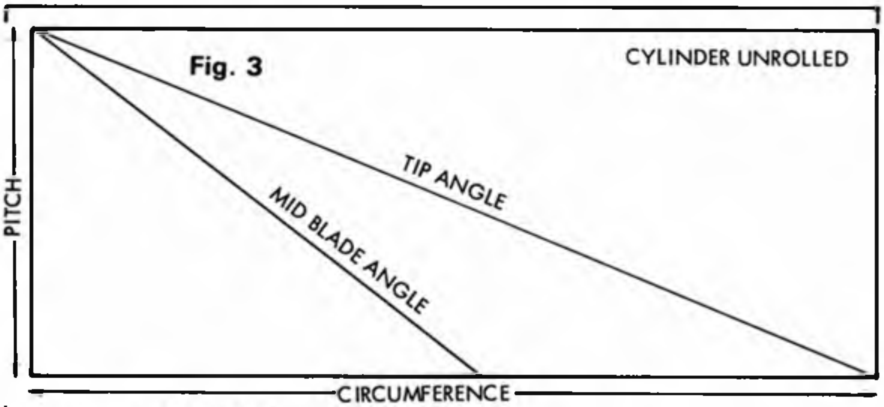


'Vintage' prop blank. Fully dimensioned and carved edge to edge not accurate helical particularly so when cut away at hub.

The rubber motor, though perhaps not high on technology, is cheap, light and reliable — and, you could say, a good starter! Its particular failing is the way it releases its energy, with a big rush at the beginning and a dawdle towards the end. The old model flyers tried to get over this disability by the use of frontal gears, but more adventurous thinking produced the shovel bladed propeller. Higher in diameter and pitch than the conventional airscrew, it also had a much increased blade area. The new style propeller utilized the energy in the rubber motor more economically, not least of the reasons being the governing or braking effect it had on the exuberance of the bigger section motors which were being used. The pitch, incidentally, is the distance the propeller 'screws' its way forward in one complete revolution, and the high pitch offset to some extent the increased drag of the large blades when the propeller was in the freewheeling stage, as it offered a narrower frontal area.



Propeller moving through imaginary cylinders one complete revolution = pitch.



Apply formula: $\frac{\text{Radius} \times \text{pitch}}{\text{circumference}}$
to give pitch length when circumference is scaled down to length of one propeller blade.

Propellers were now becoming quite a bit technical, and even more so when model flyers saw the advantages of folding the blades at the end of the motor run. This was a big advance, adding considerably to the performance of the models, as on the glide they became well, gliders! The now less vulnerable blades were thinner and often produced from lighter material in the interests of keeping the centre of gravity shift on folding to a minimum. There tended to be also an increase in diameter, with a relative decrease in pitch. Even when the rubber weight of the Wakefield (F1B) was reduced to a mere 40 grammes the propeller remained large in diameter and blade area, no less than 22in in diameter and say 26in in pitch. Attempts to use smaller propellers with long running, low power motors were demonstrably unsuccessful, not generating sufficient torque for high climb performance.

The production of blades rather than an integral propeller led to greater variation in shape. Generally, though, the new style blades had more area near to the hub than the old shovel bladers or, indeed, than the conventional 'waisted' airscrew. It is true, of course, that the blades are rigged out on wire hinges, and therefore, the hub is, in effect, non-existent, but even so modern blades do not taper in quite as much. It is arguable that the slowly revolving portions of blade area near to the hub do not contribute much towards the total torque output and could be considered an unnecessary drag factor. However, widely outrigged blades are usually to be seen on Coupé D'Hiver where the 'governor' effect is not so necessary because of the low powered motors used.

Coming back to the basic propeller, there are four main design factors involved: diameter (the tip to tip measurement) pitch (the distance travelled in one complete revolution), the blade shape and the blade area. To some extent pitch and diameter are interchangeable, for an increase in either will absorb more power, although, of course, pitch should be matched to the cruising speed of the model, if, that is, a rubber powered model could be said to have a true cruising speed, for not only is the torque (energy) output on a downward curve but the model is expected to hold a climbing angle throughout the power run. Blade shape is something else upon which no hard and fast rules can be applied, but it is noticeable how blade shape has changed since the old integral propellers gave way to the separate folding blades. Partly, this is due to practical reasons, as the production of separate blades is a quite different procedure to carving out an integral propeller. This will be appreciated when, later, we come to the setting out of propeller blanks.

It is fair to say that the free flight modeller is more scientific in his approach to model design than was the case in the days of the free wheeling propeller, and this very much applies to the way he devises his propeller blades. Looking back at some of the old free-wheeler propellers it can be seen that mostly they did not follow a true helical twist. Often the blanks set out for edge to edge carving were only approximately correct, invariably losing out on the necessity of cutting in at the hub, whereas modern blades are more carefully set out, with the use of wire hub arms eliminating the hub bulk that had to be so drastically cut away. Figure 1 shows a typical free wheeler blank which involved a large, expensive block of balsa, of necessity hard, and of good corresponding density. On such a blank only two points of the helical can be said to be correct: at the widest blade cross section, and at the tip.

We can see this better if we now proceed to lay out a blank on the classic principle of 'unrolling the cylinder'. It will be appreciated that a propeller is rather like a pair of wings (blades), each with an infinite number of variously angled chords. The twist of the blade is such that the angle of any chord taken along its length will 'screw' its way through the air the same distance forward as any other, even though the actual distance travelled is greater or lesser. Thus the chord angle near the hub is high because it rotates slowly and must cover its short travel distance in the same time as the shallow angled, fast rotating blade tip. This can be readily seen in the diagram, in which a cylinder represents the swept volume of air in one revolution of the propeller. The two dimensions of the cylinder are made up of the diameter of the propeller and its pitch: the term used to indicate the distance travelled forward in one revolution.

'Unrolling' this cylinder gives us all the information and necessary measurements for laying out our blade blanks. Looking at the rectangle revealed we have the long side equivalent to the circumference of the propeller and the smaller side the pitch length. And here we have a bit of luck, for we can scale down that rather oversize diagram so that the longer side is equal to that of one blade of the propeller, and this comes in very useful indeed. To find the equivalent of that scaling down for the pitch length on the smaller side you merely have to apply the simple formula:

$$\frac{\text{Radius} \times \text{Pitch}}{\text{Circumference}}$$

We now have a diagram where the

Fig. 4 Typical set out for ½in. sheet blank for 22in. diameter 24in. pitch blade.

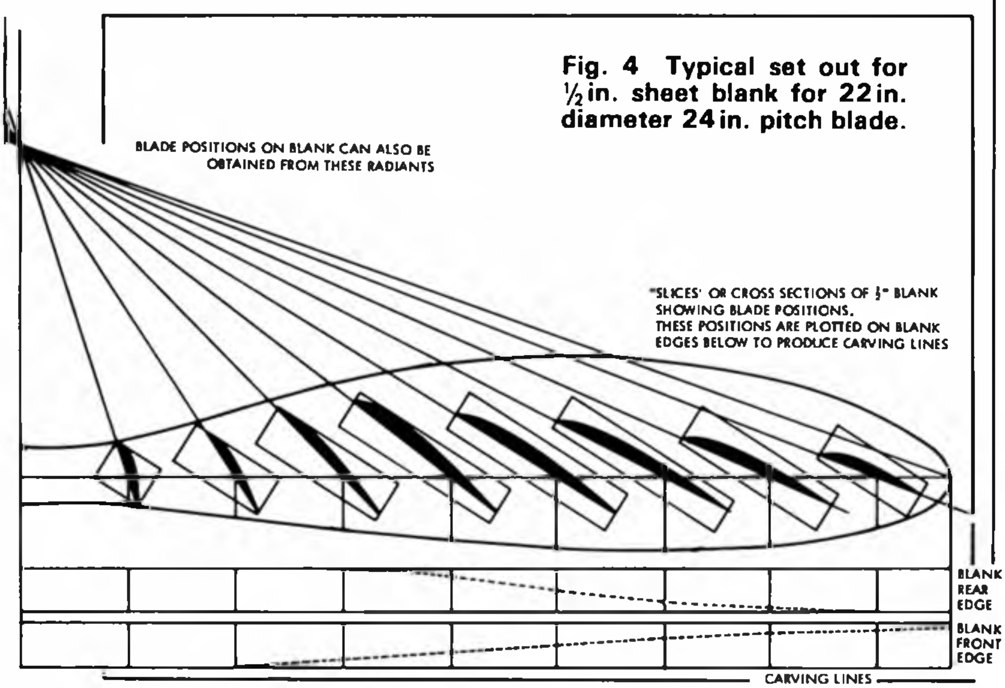
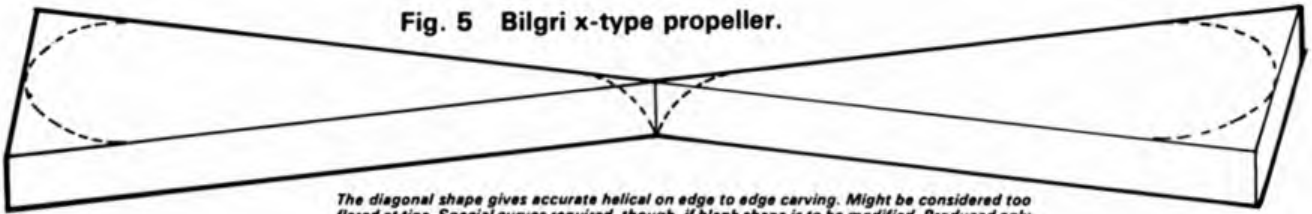


Fig. 5 Bilgri x-type propeller.



The diagonal shape gives accurate helical on edge to edge carving. Might be considered too flared at tips. Special curves required, though, if blank shape is to be modified. Produced only from fully dimensioned blocks.

various pitch angles can be directly related at as many points as you wish to choose. This now gives you an idea what the blade angles will look like on the propeller that may be prescribed for your model, say, 22in in diameter and of 24in pitch.

The trick now is to use this information to produce a helically shaped blade. We should here point out that the only way to obtain a true helical blade from a balsa block carved diagonally edge to edge is by using the Bilgri X method, unless you wish to be involved in some rather complex geometric exercises. Modellers who turn out a considerable number of blades generally find that, for cheapness and accuracy, 'carving lines' give better results than 'edge to edge' shaping.

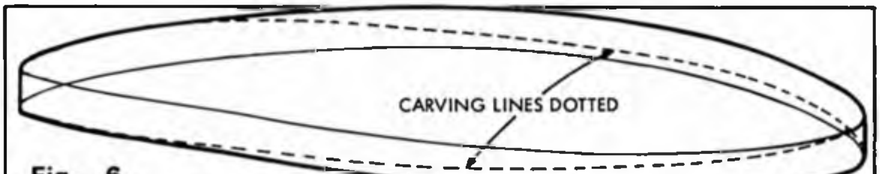


Fig. 6 Typical sheet blank showing carving lines.

If you look down a blade from tip to hub you will notice that the helical twist evolves through a fairly narrow compass, and that in terms of actual material needed a quite large blade can be 'taken out' of a piece of ½in sheet balsa. Now, as any good carpenter will tell you, this is more a matter of judgement than exact method. But if you look at the cross sections drawn in at the various blade stations it is rather like having a propeller blank sliced up to show the blade running through it. You will see that the blade lies flush along the centre of the cross section at approximately half way along the blade, and this is usually a fair guide. From the blade positions on these cross sections we can plot the carving lines on the front and rear edges of the blank. What will emerge are the characteristic curves of the helical twist. Once you have produced these carving lines they can be used, together with the template, for any future blades you may require. And, on the subject of templates, we have used a Schwartzbach type blade for the purposes of demonstration, although this type of propeller is not a true helical.

When the term non-helical is used it does not infer a flat blade but one that is generally of a helical appearance but modified to suit a particular aerodynamic theory or experiment. For instance, the Schwartzbach blade has a slight over twist, giving the effect of wash-out at the tip. Obviously tip design is extremely important, as a blade can stall from the tip inwards just like a wing, and washout could well have a stabilising effect in this regard. Also, vortices at the tip can give rise to unwanted drag, which, of course, is why the blade is tapered fairly sharply at the tip. These, and other considerations, suggest that there is still scope for experimentation in propeller design, and one area of experiment that readily suggests itself is the variable pitch propeller to equalise the uneven torque output of the rubber motor. The principle is directly opposite to that emplyed on full size aircraft where the pitch is fined for take off accelration, and coarsened for cruising flight. The model propeller is coarse pitched at take off to absorb the high initial burst and fines down as the torque decreases. Any system based upon this principle is necessarily complicated, involving precisely machined parts and accurately loaded springs, although there is the primitive method of using a flexible blade that widens the pitch under pressure.

Possibly a better system, if one could be devised, would be a two position blade; the second position coming into effect at a selected phase of the motor run. And what about rotors instead of propeller blades?

Such rotors would not be expected to fold, for it would hardly be practical with the high diameters envisaged, but could feather out in a horizontal position. A model of this type would climb wholly on its rotor, with the wing acting as a counter stabiliser. The model would, it is hoped, glide normally. It may not be practicable, but bold ideas such as this will be needed to evolve the model plane a notch further.

Before leaving the propeller we should pay some respect to its general efficiency, for it is a most effective propulsive device, even though it has been superceded in so many spheres of aviation by the jet — although it could be said that the turbine itself is a form of propeller. Anyway, tests have indicated that propellers can operate very near to a theoretical 100 per cent efficiency. And this very much applies to model propellers. If we take a typical Wakefield, using a propeller of 24in pitch, ideally the model should move forward the pitch distance of two feet in one revolution of the propeller. Now if we assume that the 40 gramme motor will accept 400 turns, this gives an optimum distance of just 800 feet of travel. Relating this to the short distance covered in the first fast unwinding, air clawing burst of power, the height achieved and the footage tracked in the spiral climb, we can not but be impressed at the way the propeller performs its function.

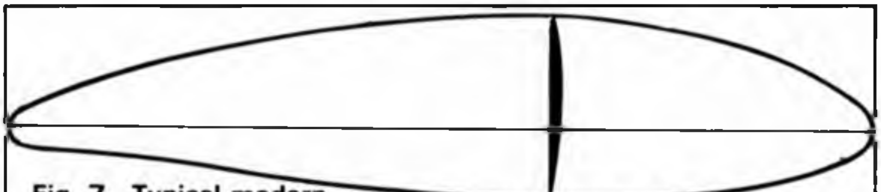


Fig. 7 Typical modern 'forward area' blade — usually carved from thick sheet.

It could well be that, at times, the blades are working at above their theoretical limit. At least we know that the propeller is extremely versatile, working effectively over a wide range of speeds and under varying loads. Even without a variable pitch device it has its own built in 'gear' system; you might call it a fluid flywheel. After all, it was not until aircraft reached speeds in excess of 300mph that the variable pitch propeller became necessary.

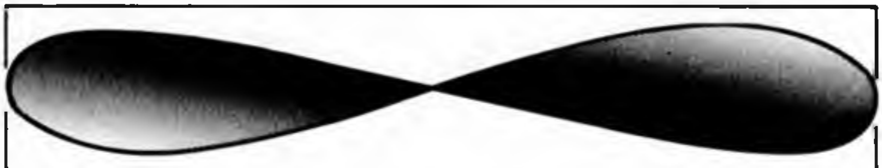


Fig. 8 Twisted wood propeller — accurate helical if properly formed, used on early models.

THIS MONTH: CONSTRUCTION IN EXPANDED POLYSTYRENE FOAM AND CARDBOARD

R/C Sport Flyer

by
Chris Pinchbeck

SO FAR IN this series we have concentrated on the conventional building methods of built up, open frame, construction. Having said this, the use of polystyrene foam and glass reinforced plastic (GRP or fibreglass) is fast becoming, or has become, a convention. This month therefore, we will consider the use of polystyrene foam and the rather more unusual building material, cardboard.

Foam has been used for some time to produce wing halves and has the advantage, if properly cut, of providing a quick and easy warp free component which is both light and strong. This expanded polystyrene foam has little or no strength in itself but needs a covering which acts as a stressed skin. The normal coverings are balsa wood, hardwood veneer, and paper or card. Of these, hardwood veneer is the most common in the UK, balsa wood being used mainly in the USA. Of the available veneers, obechi is the most popular followed by sapele. A cheaper substitute, but one which is not so effective is paper. Whilst suitable for small light models, white 'art card' is better for the larger model.

The heart of a good component is of course the foam itself. A close grained material is needed of about 16oz per square foot density, although a density of down to 11oz per square foot can be used. However, the lower the density, the coarser the foam 'beads' or 'granules' and this gives rise to problems of cutting, a smooth clean surface being difficult to attain. Styro-foam, as it is more generally called, is available in block form from many model shops, or failing this, a look through the classified advertisements at the back of the modelling magazines will often provide a source.

Being a petroleum based thermoplastic, the foam is of course attacked by petroleum based solvents and adhesives such as balsa cement, dope, polyester resin, normal contact glues (Evostick etc.). PVA white glues are suitable but take a very long time to dry since they rely upon evaporation of the water content. The best glue to use is a latex based contact adhesive such as Copydex. If you have any doubt about whether the glue is compatible with the foam, test it on a small piece of scrap first.

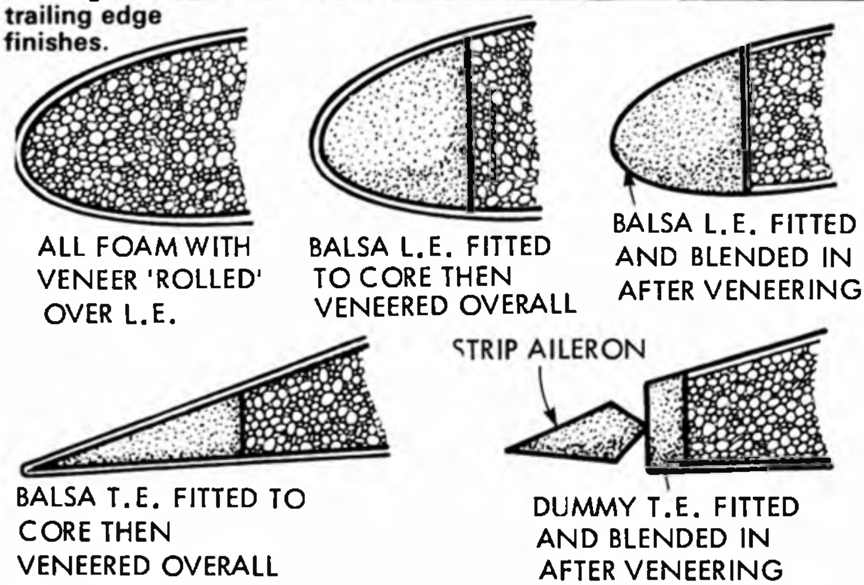
Having considered the basic components of foam construction, let us now look at the tools required to do the work. Conventional modelling tools are used but the exception, which does the basic work, is a 'hot wire' foam cutter. This is rather like a bow saw but instead of teeth, it has a Nichrome resistance wire, as used in electric fires. This wire is coupled to a 12 volt source, either transformer or car battery, never direct to the mains, and the electrical current causes it to heat up. 'Black' heat is quite sufficient to cut styro-foam by melting it. If the heat is too high, the area of melt will be greater and the 'trueness' of the wing or item being cut is adversely affected. In addition to this, strings of molten polystyrene will result which will drag across the surface giving imperfections. Commercially made cutters are available but it is a simple matter to construct your own.

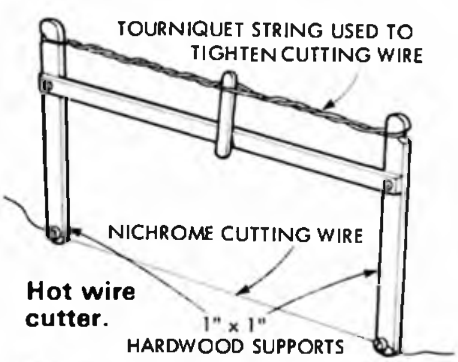
Cutting the foam

On the actual work of cutting the foam, to do this accurately, a minimum of two templates are required. Some people opt for metal templates but I feel that these can often act as a heat sink to the hot wire

Tilting the tip template at an angle to the centre line to give washout

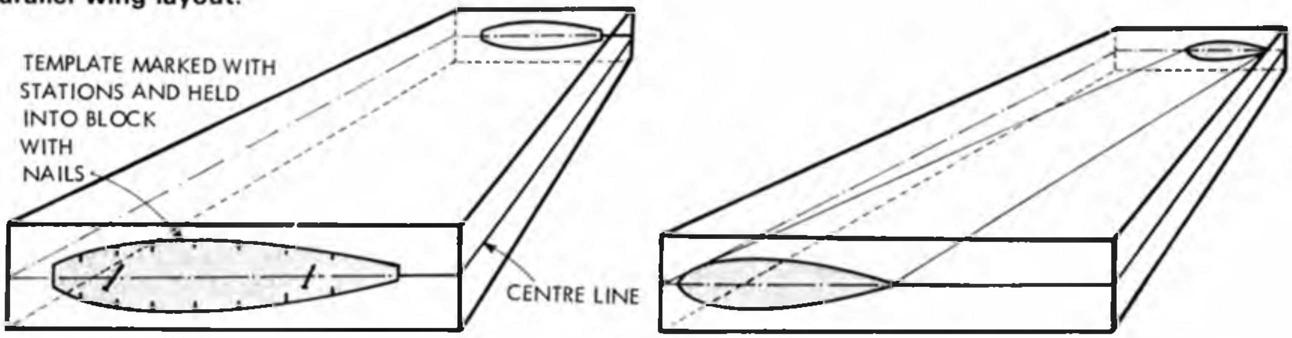
Leading and trailing edge finishes.





Hot wire cutter.

Parallel wing layout.



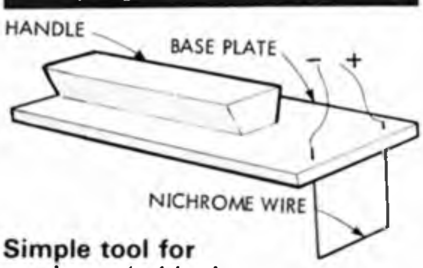
which leads to an imperfect cut close to the template. The preferred material is ⅛in. birch ply although hard grade balsa is just about suitable. Obviously the templates must be very accurate and the circumference absolutely smooth so that the wire cannot snag. Having prepared the templates, the next stage is to ensure that the foam block is absolutely square. A set square, felt tip pen, and straight edge are required for this stage of the work.

For the purposes of this article, it is presumed that a pair of wing halves are being made. As a first attempt, it is easiest to make a set which have a low aspect ratio and thick parallel chord, with a leading edge and trailing edge which is glued on after veneering. This obviates the need to 'roll' the veneer over the leading edge.

Marking out

The centre line of the wing is marked around the block, then the templates fitted to correspond with this line by pressing nails into the foam block. The templates should be marked with 'stations' to ensure that the cut is parallel to the leading edge. The wire is now heated and with a helper holding onto one end it is introduced into the block and slowly passed along the templates. Both operators should call out when the wire passes over a station marked on their own template. You must not force the wire through the block but should let it travel at its own speed. The danger is that if forced, the wire will tend to drag in the centre, leaving a depression in the cut surface. This is particularly noticeable at the leading edge where any tendency to drag will produce a bow in the edge itself. Once the cut is complete, carefully take the wing core from the block and remove the templates.


Rolling the foam core onto the veneer, ensure that the veneer is moistened at the leading edge to avoid wood splitting



Simple tool for cutting u/c block inserts.

Tapered wings

Tapered wings can be cut simply by using different sized templates at root and tip but ensuring that the same number of stations are marked on each one (the tip marks being closer). If washout is required, the tip template can be fitted at a slight angle to the centre line. For swept wings, the templates are angled. Polyhedral or gull wings are simply made in two pieces per wing half and joined accordingly.

It is normal to cut positions for undercarriage clamping blocks, servos etc. before veneering. This job can be done by using a miniature version of the main cutter, but since the shorter length of wire used needs less current to heat it, some type of variable resistor is an advantage. The final job is to cut the roots to the required dihedral angle, either using a razor saw or coarse sandpaper on a block.

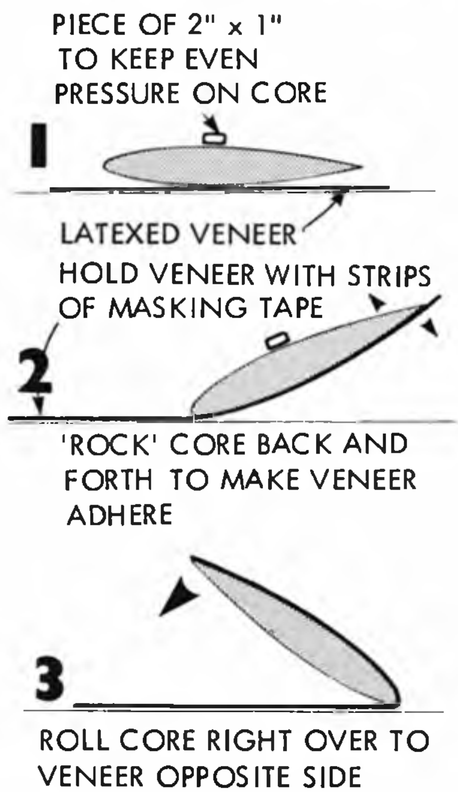
Developing the basic theme, rear turtle decks can be cut using the same principle; the width, length and general shape being controlled by the end templates used.

Since hardwood veneer is probably the most popular covering material, the following suggestions will deal with this material. The only variation is for balsa which should be butt joined before the veneering operation starts.

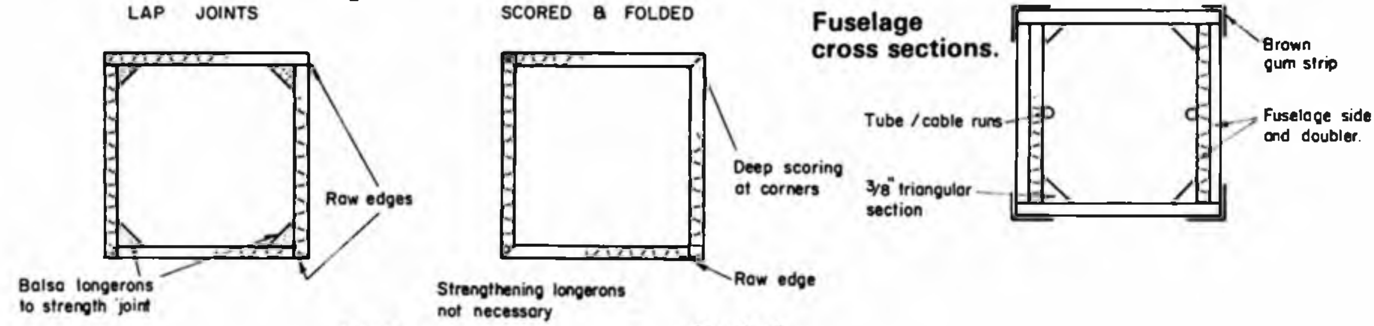
The first essential is a large, firm, flat working surface. The veneer must be cut slightly oversize, one inch all round as a

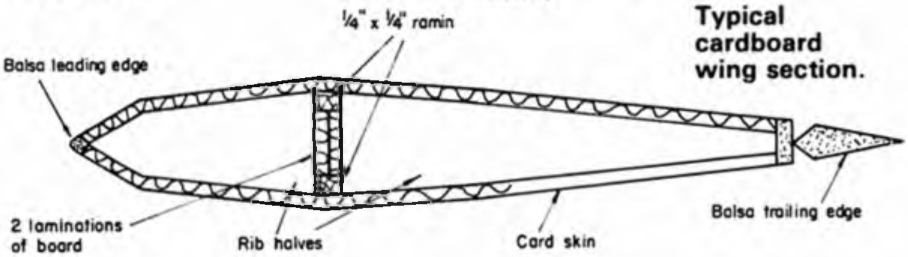

Using the tool for cutting u/c block inserts

Method of fixing veneer.



Construction methods using cardboard.





Typical cardboard wing section.

minimum, and arranged in such a way that the grain runs from root to tip following the line of the leading edge. The veneer and the core must be thoroughly cleaned to remove all dust and bits.

Adhesives

Although special styro foam adhesives are available, Copydex can be used, but straight from the tin it is a little too thick for easy application. Let it down with water in the ratio two adhesive to one of water and add a touch of coloured emulsion paint. This will help in checking that you spread an even coat over the foam. Since latex adhesives are of the contact variety, they must be left until touch dry, lined up carefully (you will not get a second chance), then press the two surfaces firmly together. See diagram on page 75. To cover a wing half with included leading edge; If you are going to glue the leading edge on afterwards, then of course you simply repeat steps one and two for the top and undersurfaces. To get a good fit around the leading edge the veneer should be dampened on the outside at that point. This will make the fibres expand and the veneer will 'form' better.

Once this stage is complete, the excess veneer may be trimmed off, balsa leading edge and tip blocks added, using PVA glue and sanded to blend in.

The final job is to join the wings with epoxy resin and when this has hardened, the join should be reinforced with a polyester resin and glass fibre 'cuff' or bandage extending about 1½in. each side of the join. A word of warning, if for any reason the join has a gap, seal this with PVA white adhesive, or more epoxy resin, since if the polyester resin touches the styro foam, it will simply dissolve it. Result, a pair of hollow wings!

After sanding smooth and filling any dents or gaps, the covering of your choice can be applied.

Before leaving the subject of foam, I must mention Rohacell; this is an acrylic foam and can be cut, sanded, and planed in exactly the same way as balsa. It is strong but not very flexible so tends to have a brittle break. I have used it for tail assemblies with great success where its lightness is an advantage. It is advisable to 'frame' the material with balsa. It will accept iron on film, and dope for more conventional finishing.

Although wings have been made successfully from Rohacell, it is necessary to incorporate some form of main spar system.

Cardboard construction

Cardboard has been used for building model aeroplanes over the years; in fact Bob Miller in America has built, and flown, a 75in. wingspan twin-engined model. His largest model to date is powered by a .60 engine with a 1300sq.in. wing area and weighing in at 9½lbs. My own experience started with a copy of the St. Leonards Model Supplies Gemini trainer, and then progressed to an aerobatic model powered by a .25 engine, the plan for which is sold by MAP (R/C 1318 BOXER).

Choice of cardboard is of course important. In the UK, corrugated board is categorised by the weight and type of its kraft paper facings, the number of flutes per foot, and its overall thickness. The following table clarifies this categorisation.

	Thickness	Flutes per foot
A Flute	5.0mm	35
B Flute	3.0mm	50
C Flute	4.0mm	44
E Flute	1.5mm	95

The more flutes per foot the greater the strength but the greater the weight penalty. After some fairly subjective testing (bending and tearing), the optimum grade was found to be 200 grammes per sq. metre Kraft facings with 8 Flute. The comparative weight against medium balsa is shown below:

	200grm 8 Flute	1/8in Balsa	3/16in. Balsa
Weight of 108 sq.in.	36grm	28grm	43grm

Tools

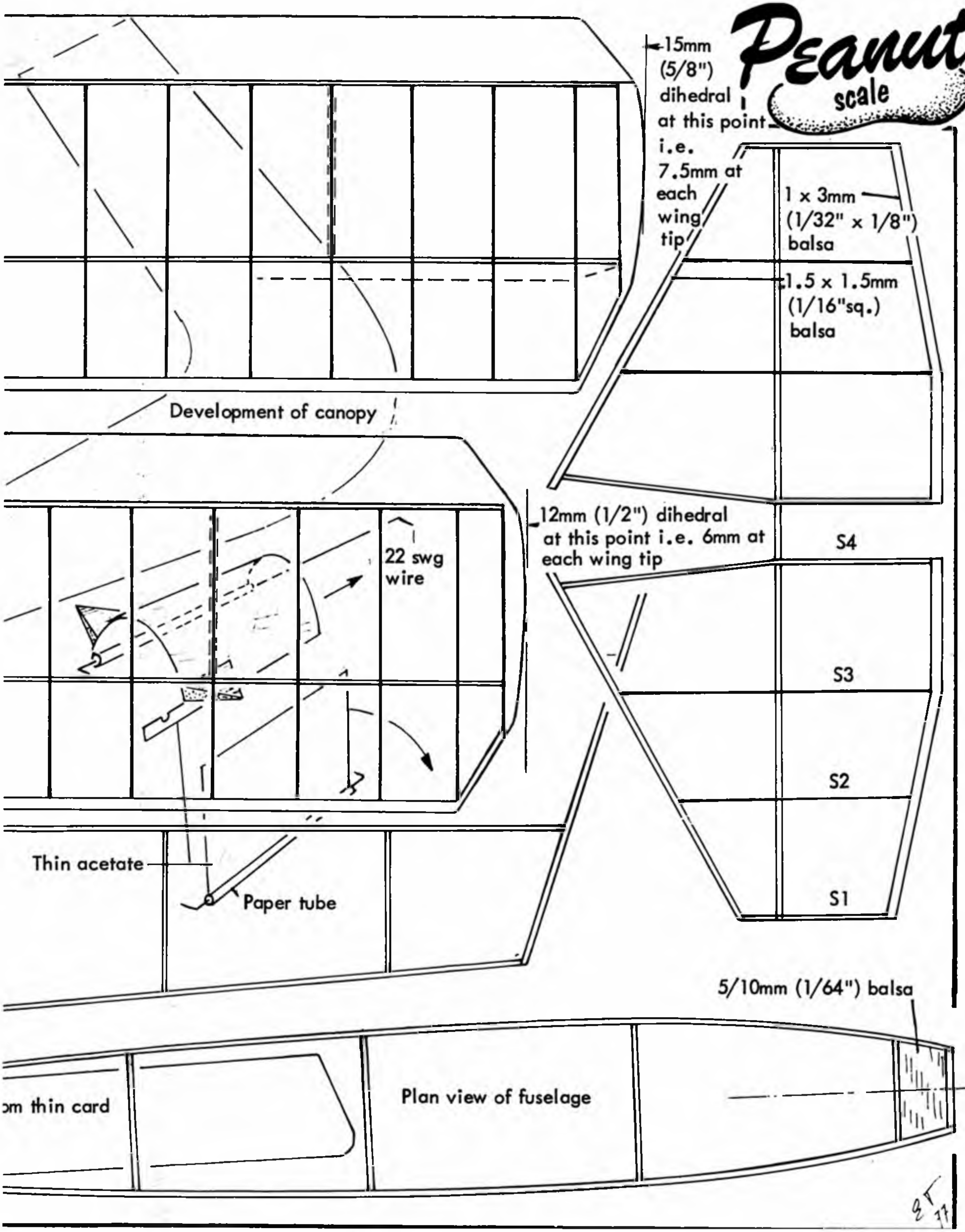
The only tools required to build a cardboard model are a sharp modelling knife, metal straight edge and clothes pegs. PVA white glue penetrates into the board and will give a very good strong bond. One obvious problem is moisture, and to overcome this, the board should be given a single coat of polyurethane varnish diluted with white spirit (four thinners: one varnish) and left for 48 hours to dry thoroughly. If this is done before construction starts, you will find that quite apart from proofing the board, it also makes it as crisp as wood so that cuts are sharp and clean.

Three basic methods of construction are used. Lap joints which leave an open unfinished edge. Simple folding where the inside is deeply scored and folded to give a box section with one raw edge. Slitting can be used to produce the leading edge of a one piece wing, the outside facing and flutes are cut through leaving only the inside facing which acts as a hinge.

Any raw edges can be covered with brown paper gum strip. Final finishing can be either iron on heat shrink film or conventional dope and tissue. If this latter method is to be used, then the original proofing of the board should be done with a dope and thinners mixture.

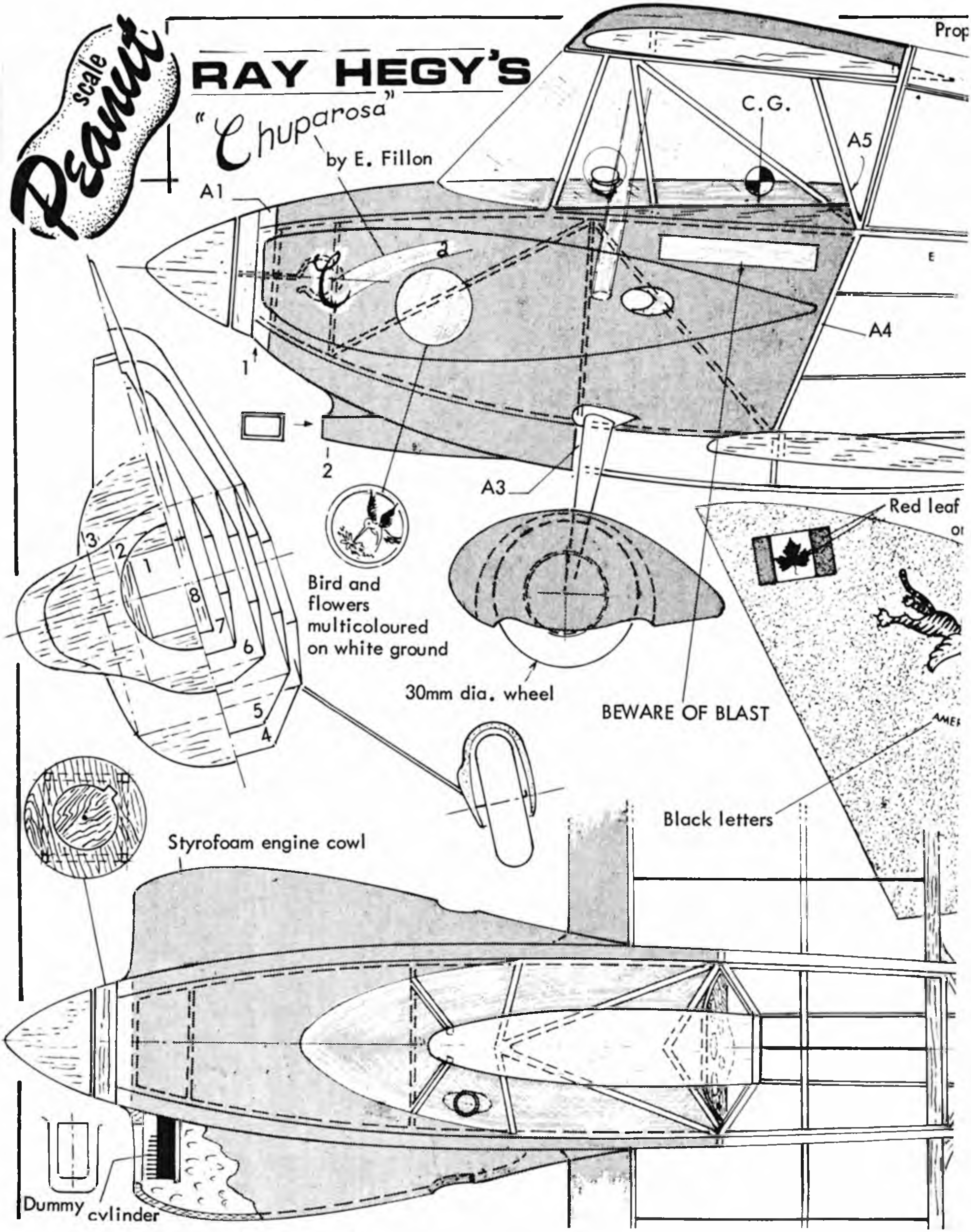
As mentioned earlier, the first exercise carried out was to build two identical models (including radio gear and engine), one from conventional materials and the other from corrugated board. This allowed meaningful comparisons to be made and whilst the cardboard model was some 34 per cent heavier, the flight characteristics were very similar. Obviously the heavier model had greater penetration but with no adverse effects. The advantages are speed of building, reduced by about 75 per cent, and cost saving. Resilience in a crash or heavy landing appears to be better due possibly to the absorption properties of the corrugated board.

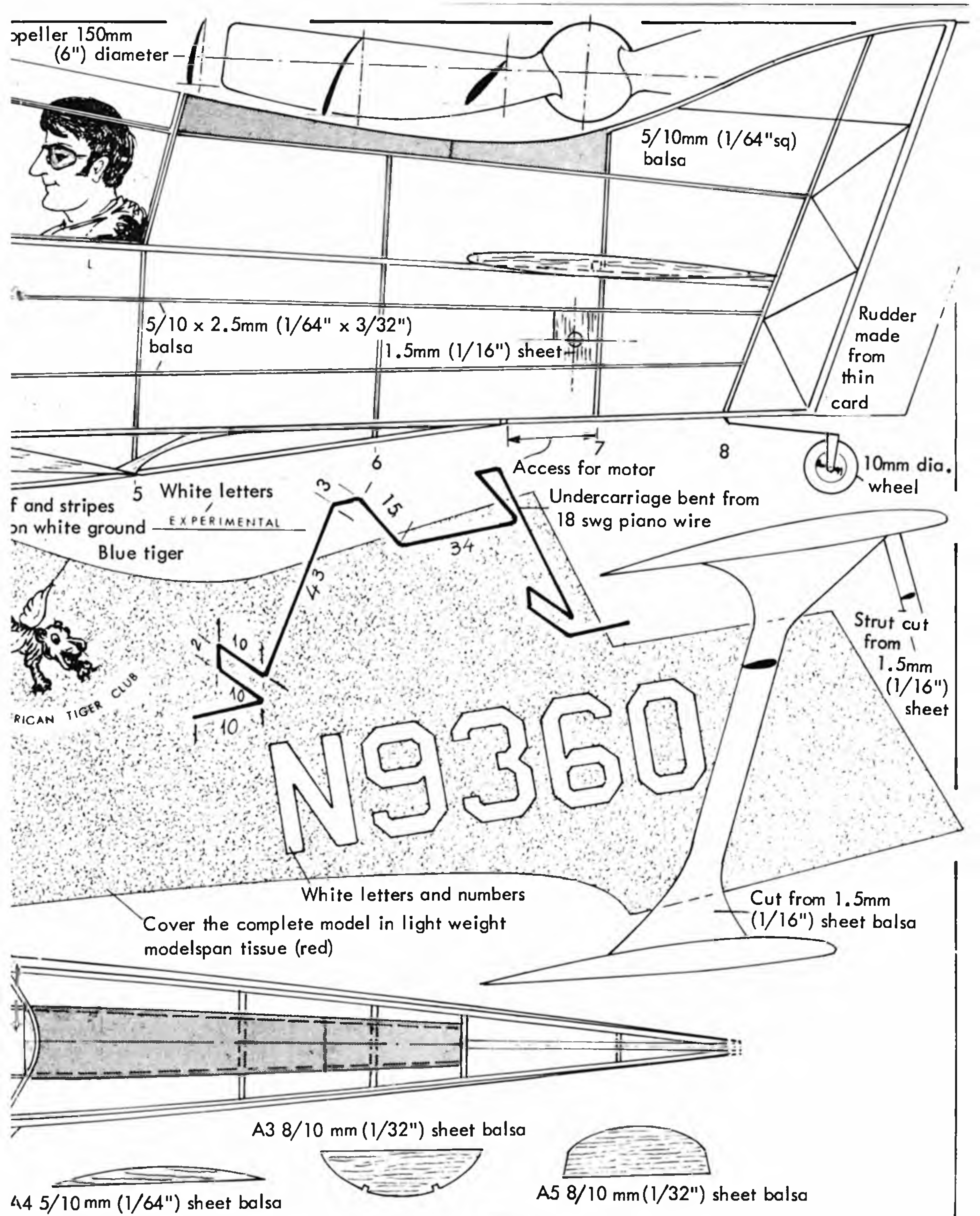
That's all for this month. Let's hear from you with some of your own experiences.


Peanut
scale
15mm (5/8") dihedral at this point i.e. 7.5mm at each wing tip
1 x 3mm (1/32" x 1/8") balsa
1.5 x 1.5mm (1/16"sq.) balsa
Development of canopy
12mm (1/2") dihedral at this point i.e. 6mm at each wing tip
22 swg wire
S4
S3
S2
S1
Thin acetate
Paper tube
5/10mm (1/64") balsa
om thin card
Plan view of fuselage

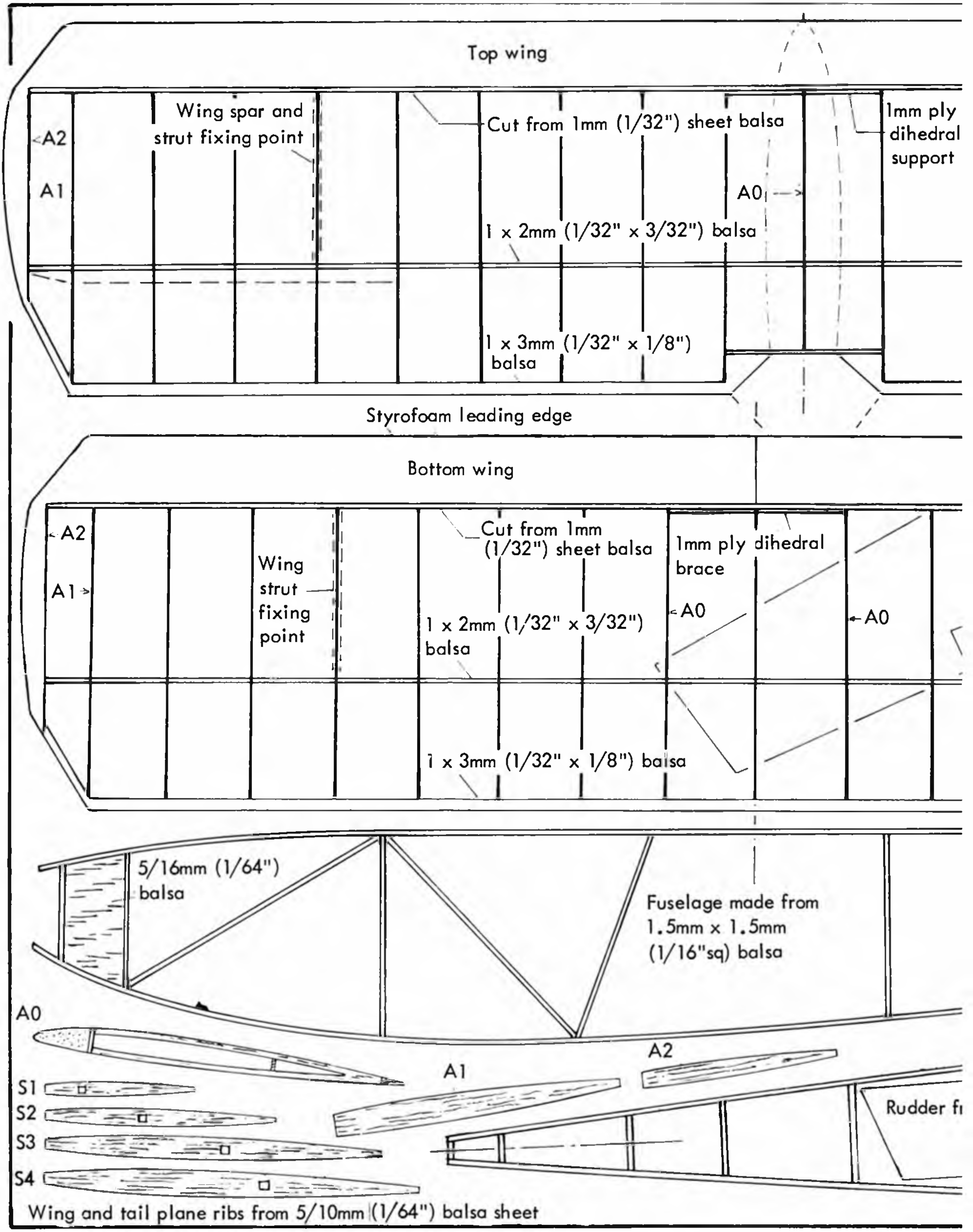
RAY HEGY'S "Chuparosa"

by E. Fillon





opeller 150mm
(6") diameter
5/10mm (1/64"sq)
balsa
5/10 x 2.5mm (1/64" x 3/32")
balsa
1.5mm (1/16") sheet
Rudder
made
from
thin
card
Access for motor
5
6
7
8
10mm dia.
wheel
White letters
EXPERIMENTAL
f and stripes
on white ground
Blue tiger
Undercarriage bent from
18 swg piano wire
3
15
34
43
2
10
10
10
RICAN TIGER CLUB
N9360
Strut cut
from
1.5mm
(1/16")
sheet
White letters and numbers
Cover the complete model in light weight
modelspan tissue (red)
Cut from 1.5mm
(1/16") sheet balsa
A3 8/10 mm (1/32") sheet balsa
A4 5/10 mm (1/64") sheet balsa
A5 8/10 mm (1/32") sheet balsa


Top wing
Wing spar and strut fixing point
Cut from 1mm (1/32") sheet balsa
1mm ply dihedral support
A2
A1
A0
1 x 2mm (1/32" x 3/32") balsa
1 x 3mm (1/32" x 1/8") balsa
Styrofoam leading edge
Bottom wing
A2
A1
Wing strut fixing point
Cut from 1mm (1/32") sheet balsa
1mm ply dihedral brace
A0
A0
1 x 2mm (1/32" x 3/32") balsa
1 x 3mm (1/32" x 1/8") balsa
5/16mm (1/64") balsa
Fuselage made from 1.5mm x 1.5mm (1/16"sq) balsa
A0
A1
A2
S1
S2
S3
S4
Rudder fr
Wing and tail plane ribs from 5/10mm (1/64") balsa sheet

TOPICAL TWISTS

by Pylonius *illustrated by Sherry*

Block to progress

The comparison that has been made of late between our modelling way of life and that of the Eastern bloc model flyers is all a bit harrowing. What it seems to suggest is that we are a set of commercialised zombies whereas they are all whizzing little aeronauts, and that whilst we are sending off that 50 quid die-cut the communist modeller is mugging up on aerodynamics and structural techniques. If it's a question of a new engine or a retract system he is learning how to do it himself instead of buying his way into flying field glory.

It seems to me that we lose out in our pre-digested form of model building in that we hand over all the fun of design, research and development to the backroom boys of the commercial world and pay them handsomely for taking over our hobby. We may coo at all the wonderful goodies on offer to us, but we should be more than a little ashamed to be using the products of other people's genius as if they were of our own devising. How much better to look the little boy straight in the eye when he asks, "Did you build it yourself, mister?"

"He likes to capture the atmosphere of the old style flying."

Basically it is all a question of state tutelage as opposed to our own Dad and Sonny system. Whereas state tutelage offers the services of experts and the availability of sophisticated workroom equipment, the Dad and Sonny system has only the kit instructions to go by; Dad being just as clueless in model matters as Sonny. And, as for workshop facilities, they are usually in some corner of the household where Mum thinks they will make the least mess.

Now, whatever sort of hero Dad may have been in Sonny's eye, the heroic father figure image takes a decided plummet after Dad has put the ribs in the wrong way round. Even further humiliation for Dad on the flying field. He had cut out the centre of gravity from the plan and stuck it on the model in the prescribed place, but even so the model appeared to be decidely nose heavy, although this may have had something to do with the wing on its single rubber band riding up to the tailplane.

Dad is mad about all this, and threatens to take the kit back to the manufacturer in person, and would have done so had he known what Mediterranean yacht he was on. Of course, Dad and Sonny could have joined a model club, but found the nearest one to be 30 miles away. Anyway it would have cost another 30 quid to have joined. Already the family budget is creaking under the strain of the outlay of the kit, the radio and the engine, and Mum is threatening to pack her bags if there is much more of it. In any case the club might be one of those sports flying affairs where they'd be lucky to find anyone at all on the flying field.

Still, Sonny remains loyal. As he says, "Better Dad than Red."

Win-tage

Someone has come up with the curious idea that the model competition of yesteryear was a relaxed affair compared with the supposedly highly disciplined event that we have in these days of grim, win or bust model contesting. This is all to do with the hazy, nostalgic mist through which the vintage buffs see our gloriously civilised past. Needless to say, it was not like that at all. If a modern contest flyer, used to all his personalised aids to tactical flying, plus the sympathetic timekeeping of his clubmate or girlfriend, were to be subjected to the same disciplines that governed the flying of those tubby vintage models he'd be crying blue murder. In those 'relaxed' days timekeepers were official, and they had blue and white armbands to prove it. What is more a model out of sight was a model out of sight. No waiting for it to make a re-appearance, nor to be given gratuitous seconds as a consolation. What is more, flight areas were roped off and barred to all but competitors and officials — and woe betide anyone who gave his model the teeniest push on the take-off board.

Odd thing about Vintage, which is claimed to be a fly for fun activity, is that most of the resurrected models you see around were the competition models of their day; the fly for fun models then produced being so grotty that the present day vintage fan would not touch them with a bubble machine pole.

Coupe de Grace

What I modestly refer to as aeronautics people who lead more complicated lives call aerodynamics. But whatever you like to call it I have always considered it an affliction from which only that archaic form of flyer, the free flighter, still suffers. I came to this conclusion overwhelmingly when trying to trim out a Coupe D'Hiver rubber model on the club field at a time when a succession of foam and slab radio models were being put through their paces. For some reason, known perhaps to a handful of top aerodynamics, the wretched Coupe would either throw itself into the deck or go into a tail slide. Now, whilst I was fiddling around with bits of packing on tailplane and noseblock and varying the CG position etc., the radio models were zooming around the sky as if aerodynamics was just a dirty word.

Seems, though, I was a bit hasty in my judgements, for I now read that radio flyers do worry about aerodynamics. Not, of course, on my simple basis of whether the model will fly or not, but more advanced anxieties such as the model failing to do vertical rolls, or a slight reluctance to snap out of the inverted position. Anyway, we are told that even full size pilots do not know much about aerodynamics, which may be flattering to the aeronautic dwarf.

Q-ing up

We no longer worry over what is U and non U. The in-thing to be concerned about in these days of all pervading yuk, is what is Q and non-Q. In other words what is quality and non-quality. You might say, but for your redeeming modesty, that everything you do is Q and everything the other bloke does is non-Q. Even so, there are things we can immediately slap a non-Q label on, and that is anything made of plastic. Balsa built up wings are very much Q but foam filled substitutes strictly non-Q. Kits, except for beginners, can safely be put down on the non-Q list, whilst own designs are very much Q. Dummy pilots are non-Q to the yukkiest degree; so, too, an obsession with vintage models. Most non-Q thing of all, though, is not to turn up on the flying field.

FLYING HIGH

with Ian Barrett

Ian describes how to build from plans and, suggests suitable designs available from our Plans Service.

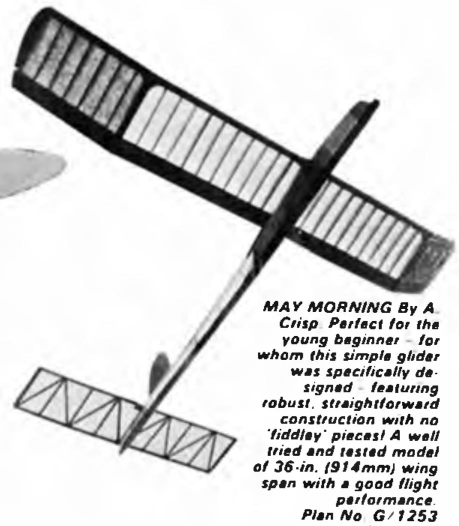
MOST AEROMODELLERS FOLLOW a natural progression in the types of models they build. Their first efforts are produced from simple commercial kits, and the construction and flying of these models has been covered in earlier Aero Aces articles. The kit building stage may last some time, with a tendency towards increasing complexity as experience and confidence is gained. The modeller may eventually wish to produce more specialised types, and the solution is to choose something from the large range available from the model press. This magazine has for many years been featuring designs that cover the whole model aircraft field, and these available from the Plans Service department. Many modellers will be content to stay at this level, enjoying the security of knowing that other designers have carried out the development work required in producing a reliable flying machine.

WHIZZLER by Captain K. Laumer. This is a perfect hand launch (throw) glider introduction to our fascinating hobby. It takes little money and skill to produce a Whizzler capable of providing endless fun. A real toughie 24 incher (610mm) Plan No. G/791 price 75p

The ultimate step, however, is to design one's own model and produce a successful performer. It must be admitted that the design of model aircraft is something of a black art; some people seem to have the knack to produce consistently attractive models, yet others never manage to make a machine that 'looks right'.

Regular readers of this magazine will know that nearly every month a new design of model aircraft is featured, and the range is from simple chuck-gliders up to large engine driven types. Even the occasional radio controlled model is included, although the more advanced radio models generally appear in the sister magazines dealing exclusively with this aspect.

The plans, if small enough, will be printed full size in the magazine, either across one or two pages, or as a free pull-out supplement. The larger models will have a reproduction of the plan to a reduced size, and a full size copy will be available from the publishers. In either case, there will usually be an accompanying article describing the method of construction of the model and its flying characteristics. A large number of designs have been published over many years, and a catalogue is available under the title Aeromodelling Plans Handbook No. 1, price 75p plus 25p postage. All the plans are described under their various headings viz — scale free flight and control line, gliders, rubber models, free flight power, unorthodox and all the varieties of control line models. Photographs show each model, and a brief description gives its major dimensions. Of greatest importance is the star grading system, which indicates how difficult the model is to build. The simpler designs have a rating of one or two stars, and these are the ones that should be considered by anyone with limited experience. In addition to the catalogue, there are a number of interesting and useful articles on various aspects of aeromodelling.

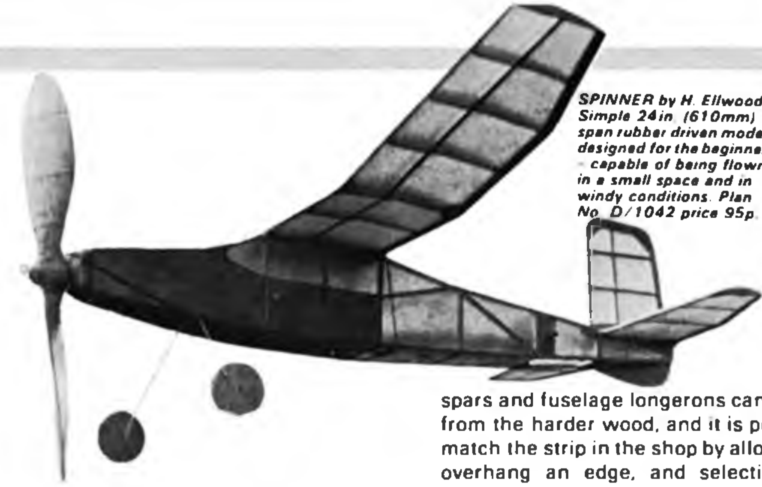


MAY MORNING By A. Crisp. Perfect for the young beginner – for whom this simple glider was specifically designed – featuring robust, straightforward construction with no 'fiddley' pieces! A well tried and tested model of 36-in. (914mm) wing span with a good flight performance. Plan No. G/1253 price £1.25

Let us consider what we should look for in selecting a free-flight design from the Plans Handbook. You will have already decided what class of model interests you, whether glider, rubber or power (you will neglect for the time being, I hope, the scale job). Turn to the appropriate section, and identify those designs which are nearest to your requirements. You should have an idea of the likely span of the model you wish to build, and this is governed in the engine-driven models by which motor you have available. Small models do not generally perform as well as their larger counterparts, but against this can be set the fact that they require less flying space and are cheaper to build.

A study of the illustrations can tell you a lot about the complexity of the models; parallel chord wings mean that all the wing ribs will be the same size, therefore a tracing need only be made for one, which then serves as a template for the others. Box shaped fuselages are easier to construct than streamlined beauties full of flowing curves, and if it can be seen that there are large areas of sheet balsa, rather than a built-up structure, then the construction time will be shortened. The use of sheet balsa, however, is more expensive than the use of a balsa framework, although not in direct proportion to the volume used.

Assessment of the probable flight performance is a little more difficult. In free-flight models, the general rule is 'the lighter, the better'. Designs with simple shapes probably have less supporting structure beneath the covering than their more elegantly shaped cousins, and are therefore lighter. Ultra-light models, however, are more demanding in constructional accuracy and also require careful selection of materials. Tail surfaces control the model in flight, and should be both large enough and mounted far enough away from the wings, to do their job effectively. Short dumpy models with small tail areas are therefore likely to be less stable than designs with long moment arms and generous tail areas. These general indications, however, do have their exceptions, and there are unlikely looking designs that prove very stable in flight. What can be relied on its that all the published designs have been flight tested and proven.

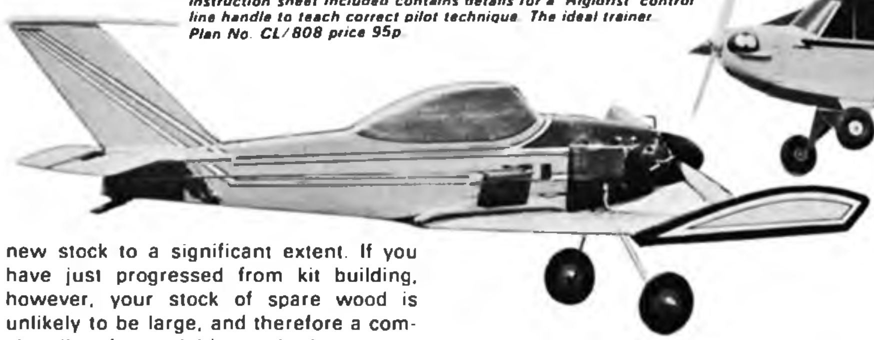


SPINNER by H. Ellwood. Simple 24in. (610mm) span rubber driven model designed for the beginner – capable of being flown in a small space and in windy conditions. Plan No. D/1042 price 95p.

Building from plans: preparing the material lists

Progressing from the kit building stage to the construction of models from commercial plans is a relatively simple step, but does involve the modeller in some new aspects of the hobby. Having selected the design and obtained a copy of the plan, the first job is to sit down and study it in detail. Familiarize yourself with all the components, and plan a logical building sequence. If you are fortunate enough to have a copy of the magazine in which the plan first appeared, then you will find that there are building instructions to guide you along the right lines. It is a matter of choice which components are built first, but it is sensible to start on the larger items, either the wings or fuselage, because these use the longest pieces of balsa, and off-cuts might then be used for the smaller parts. This will allow some saving in materials to be bought, and should be bourne in mind when preparing a material list.

The material list for the model should be prepared carefully. At one time it was common practice to include a material list on the plan, but these days it is not often seen. The reason is that most modellers collect spare material from previous efforts, and by judicious selection from the scrap box, can cut down the requirements for new stock to a significant extent. If you have just progressed from kit building, however, your stock of spare wood is unlikely to be large, and therefore a complete list of material is required.



BOUNCER By P. Moir. As a first attempt at control line flying this 24in. (610mm) trainer for 1-1.5cc engines cannot be beaten. Full instruction sheet included contains details for a 'Rigidrist' control line handle to teach correct pilot technique. The ideal trainer. Plan No. CL/808 price 95p.

PIPER CUB by J. Headley. Realistic semi-scale model features sheet tail and fin, simple sheet box fuselage, which swallows R/C gear and flies like a dream. 52-in. (1320mm) wingspan two version plan for 1-1.5cc F/F or 2.5-3.5cc. For 2/3 function R/C. Plan No. R/C FSP/1357 price £1.25

Go through the design logically, first identifying where sheet balsa is to be used. Note the different thicknesses called for, and make an estimate of the number of sheets of each size required. Balsa sheet is sold in a good range of thicknesses, and in several lengths and widths. The commonest length is 915mm (36ins), with longer lengths available at 1067mm (42ins) and 1219mm (48ins), with widths varying in 22mm 61in) increments from 50mm (2ins) up to 127mm (5ins). The 76mm (3ins) width is the standard. The larger of radio models.

After determining the sheet requirements, similarly work out the quantities of the various strip sizes needed. Here again the standard length is 915mm (36ins). Only the more recent plans will give the sizes in metric units, so younger modellers will need to attune themselves to working in Imperial units.

Note also all the other materials, such as plywood (in mm thicknesses), piano wire for undercarriages, tow hooks, propeller drive shafts etc., and such odds and ends as tape for hinges, pins and rudder bands. Estimate the number of sheets of covering material (and the colour) you will wish to use. Clear dope and thinners should complete the list.

Do not be too worried about over estimating the material required, because any surplus can be put aside for use on the next model. It is most frustrating to have to make another trip to the model shop just to purchase one small overlooked item.

Off, then, to your local model shop, clutching your list in one hand and a wad of banknotes in the other. Modelling gets more expensive by the minute. Your retailer will very likely have his stock of balsa in a position accessible to you. This is to allow you to find the size you want, and, more importantly, the correct grade.

Grade selection is an art soon learned, but do not be afraid of asking the shopkeeper for assistance. Balsa is available in a range of densities, from the very light at under 8lb/cubic foot to the hard at 12lb/cubic foot or over. The soft, light balsa is obviously not as strong as the harder, heavier grades, and a judgement has to be made. Major structural items such as wing spars and fuselage longerons can be made from the harder wood, and it is possible to match the strip in the shop by allowing it to overhang an edge, and selecting those strips with equal deflections. Please do *not* gauge the hardness of the wood by squashing it with your fingers or by digging a thumb nail into it.

Soft balsa can be used for areas where there is little stress, and easy shaping is desirable; obvious areas are wing tips, fairings and nose cowlings. Medium grade wood is generally suitable for most remaining components. You might find that some sheet wood is stamped 'rib stock', this is a specially selected cut called quarter grain, identified by its mottled appearance, and it is ideal for making the wing and tail ribs.

If your model is to be rubber driven, then the correct propeller is vital. The plan may give details of a plastic commercial item, but the higher performance designs will be fitted with a hand-covered one. For a rigid two blader, a suitably sized block of balsa is needed, and should be of medium or hard quality. Single blade folding propellers can be carved from a lighter grade.

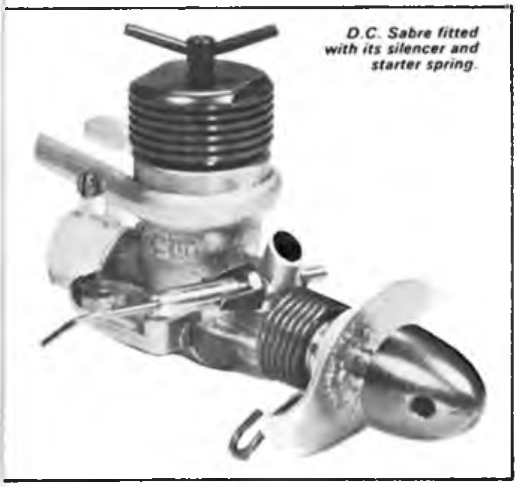
Accessories for your new model might be salvaged from earlier projects. Wheels in particular seem to be everlasting, and can even be borrowed temporarily from your semi-retired models.

You may, when you were building kit models, have elected to cover some components in coloured tissue, bought as an extra. Any white tissue thus saved might now be used to cover some of the new model.

One further item you will need, which is not part of the building materials, is either a sheet of carbon paper or tracing paper. This will be used for transferring patterns for ribs, formers, etc., from the plan to the sheet wood. This method will be described next time, when we use a new design as an example of building from a plan.

Engine Test Review

with Peter Chinn



D.C. Sabre fitted with its silencer and starter spring.

Davies-Charlton 'Quickstart' Sabre

Country of Origin: Isle of Man, UK

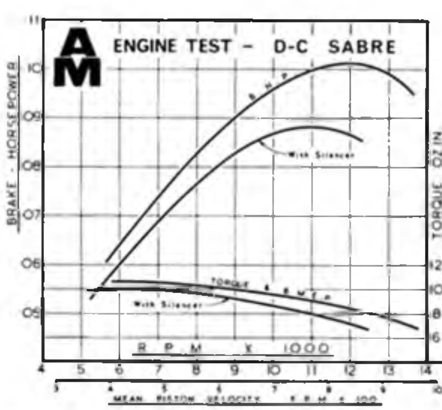
Type: Compression ignition, shaft rotary-valve with plain bearing. Optional fuel tank.

Bore: 0.525in. (13.33mm).

Stroke: 0.420in. (10.67mm).

Swept Volume: 0.0909cu.in. (1.490cc).

Weight: 3.2oz (bare engine); 3.7oz (with silencer, fuel tank and spring starter.



The 1.5cc Sabre is the largest engine in the current range of 'Quickstart' beginner's diesels made by Davies-Charlton Ltd. It is a very old-established design, having first appeared back in 1955. The engine was featured shortly afterwards in the MODEL AIRCRAFT test series, but these notes are based on a test report that appeared much later — i.e. in the July 1970 AEROMODELLER. Changes to the engine between 1955 and 1970 were few and modifications since that time appear to be minimal. Externally, these are limited to a simpler fuel tank, the use of a hexagon nut and washer instead of an anodised aluminium spinner-nut to retain the prop, and the replacement of the V-shaped tommy bar on the compression screw by a single lever. The latter is now used in conjunction with a vertical peg on the cylinder-head to limit contra-piston movement and thereby help the beginner avoid getting the engine excessively under-compressed or over-compressed.

Except for a differently coloured cylinder jacket, the current Sabre is almost indistinguishable from the 1cc Quickstart Spitfire dealt with in the July 1980 AERO MODELLER. These two engines are built around the same crankcase casting and they have the same stroke measurement. The Sabre is, in fact, a larger bore version of the Spitfire — or, to be more precise, since the Sabre actually predates the Spitfire by a couple of years, the Spitfire is a sleeved-down version of the Sabre. The Sabre's cylinder bore is exactly 0.10in. larger than that of the Spitfire and this is sufficient to increase swept volume by more than 50 per cent.

To briefly recap, the engine is assembled around a pressure die-cast aluminium alloy crankcase that includes the main bearing and extends upward to just above exhaust port level. The crankshaft runs directly in the crankcase material and induction is through an intake above the main bearing and then through the crankshaft in the usual manner. The plain cylinder liner, flanged at exhaust belt level, is located by an annular seating in the crankcase and is held in place by a loose fitting finned cylinder jacket which drops over the upper part of the cylinder and screws into the top of the crankcase — not the best way of conducting heat away from the cylinder, but acceptable for a sport type engine where simplicity of construction and low price is more important than ultimate power. Exhaust and transfer porting is via radial slits, one above the other, so that a very long (approximately 170deg.of crank angle) exhaust period contrasts with a very short (approximately 90deg.) transfer period.

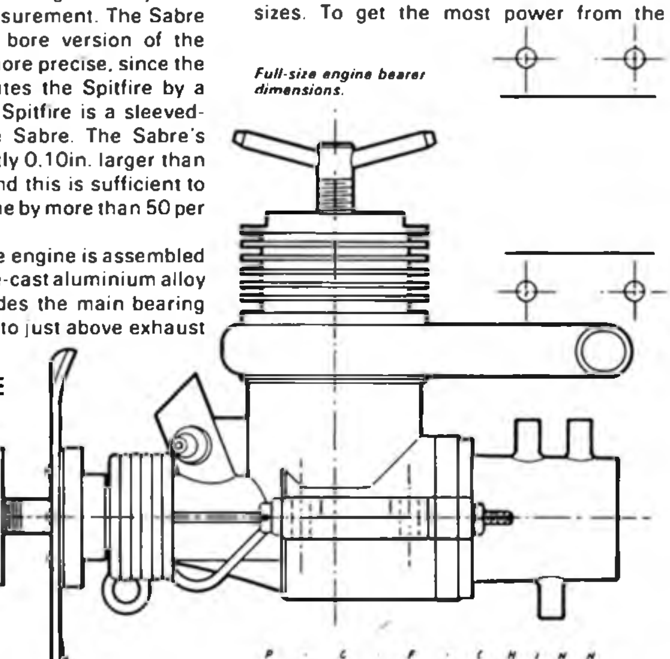
Like all the 'Quickstart' motors, the Sabre is fitted with a spring starting device. An optional extra is the usual D-C silencer. This is a U-shaped tube, cut away at the centre where it surrounds the upper part of the crankcase to cover the two exhaust outlets. It is secured with a 6BA screw and nut and the two tailpipes are packed with steel wool to form a simple absorption-type mufflers.

On test, the Sabre recorded a peak output of just over 0.10bhp at 12,000rpm without the silencer and just under 0.09bhp at 11,000rpm with the silencer fitted. Actual power loss due to the silencer is about 12 per cent, which is quite modest. This was with the silencer in clean condition and not too densely packed. when the steel wool packing becomes saturated with oil and especially if the engine is put aside for a while (which will allow the oil to congeal) this will increase back pressure and reduce power. Therefore, from time to time, it is a good idea to clean out the tailpipes and lightly repack them with fresh steel wool.

The Sabre will turn a useful range of prop sizes. To get the most power from the

Full-size engine bearer dimensions.

D.C. SABRE (Full-size)



engine, it would be necessary to use a medium pitch 7 or 8 inch diameter but, for bigger slower models, one could go up to a 9 or even 10 inch diameter of low pitch. For example, our test motor, with silencer, recorded 6,700rpm on a 10 × 3⅜ Top Flite, 7,300 on a 9 × 4 KeilKraft nylon, 9,600rpm on an 8 × 4 Top Flite nylon, 9,800 on 7 × 5 Trucut wood and 10,600 on a 7 × 4 Tornado nylon. There would be no point in using a smaller prop than 7 × 4 as this would allow the engine to run beyond its peak in the air, added to which the engine becomes less pleasant to start on the smaller props.

The Sabre was easy to start on all normal prop sizes, with or without the starter spring. It was helpful to prime the engine (directly into the exhaust port when the silencer was not used) for a first start from cold, but choking the intake for one or two flicks of the prop was adequate for an immediate warm restart. The needlevalve and compression control were easy to adjust and non-critical.

M.E. Snipe R/C

Country of Origin: Isle of Man, UK.

Type: Compression ignition, shaft rotary-valve with plain bearing. Optional fuel tank. Throttle type carburettor.

Bore: 0.505in. (12.83mm).

Stroke: 0.455in. (11.56mm).

Swept Volume: 0.0911cu.in. (1.493cc).

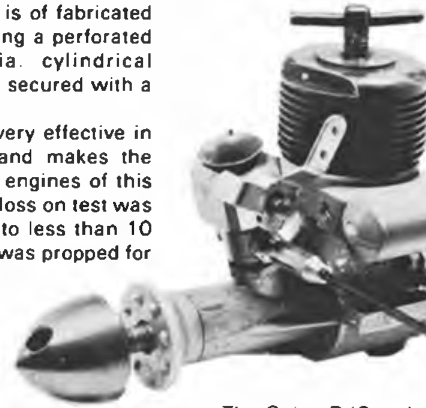
Weight: 4.0oz (less silencers and fuel tank). 5.1Oz (with silencers and fuel tank).

The original version of the M.E. Snipe 1.5cc diesel was introduced in the spring of 1962 and was tested and reported upon in the UK model journals shortly afterwards. In the summer of the following year, it was joined by a throttle-equipped R/C version and, a little later, in response to the SMAE's call for silencers for all engines, the makers introduced a pair of silencers for it. It was therefore re-tested in this form in 1965 — i.e. with throttle and silencers. It is on this second report that these notes are based.

The basic layout of the Snipe is not unlike that of the D-C Sabre just dealt with. This is not very surprising as the original owners of M.E. (Marown Engineering) were previously associated with Davies-Charlton Ltd., both firms being located in the Isle of Man. Since 1972, the M.E. diesels have been made by Moore Engineering Ltd.

Like the Sabre, the Snipe has an exhaust collector chamber formed in the upper part of the crankcase but, instead of having two rectangular outlets in the casting to discharge the spent gases, the Snipe csting incorporates an integral outlet stub each side. These have enabled the engine to be fitted with rather neat twin silencers. Each of the two M.E. silencers is of fabricated brass construction, featuring a perforated tube within a $^{7}/_{16}$in.dia. cylindrical expansion chamber and is secured with a grub screw.

The silencer system is very effective in muffling exhaust sound and makes the Snipe one of the quietest engines of this size on the market. Power loss on test was not excessive, amounting to less than 10 per cent when the engine was propped for

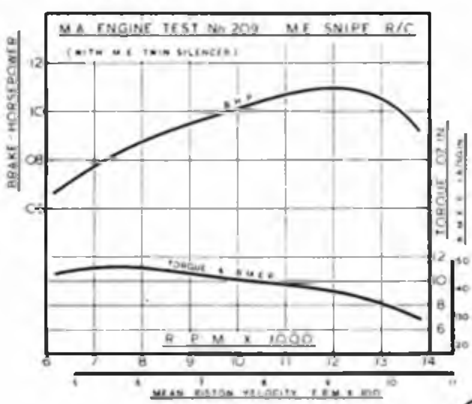


M.E. Snipe R/C with silencers fitted.

no more than 10,000rpm and about 15 per cent at 12,000rpm, where our motor produced its peak power output of 0.11bhp.

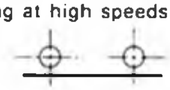
Incidentally, tests on the original standard model (free-flight and control-line) Snipe, with its larger air intake and running with open exhausts, had produced a lively 0.148bhp at 14,000rpm. In terms of prop rpm therefore, it is reasonable to expect that, without the R/C carb, but still with the silencers fitted, the Snipe should be 200-300 rpm faster — something worth bearing in mind if you do not need the throttle control.

Actual prop rpm figures recorded with the Snipe R/C included 6,850rpm on a 10 × 3½ Top Flite, 7,600 on a 9 × 4 Top Flite nylon, 7,900 on a 9 × 4 KeilKraft nylon, 9,200 on an 8 × 4 Tornado nylon, 10,000 on an 8 × 4 PAW Trucut and 11,300 on a 7 × 4 Tornado nylon.



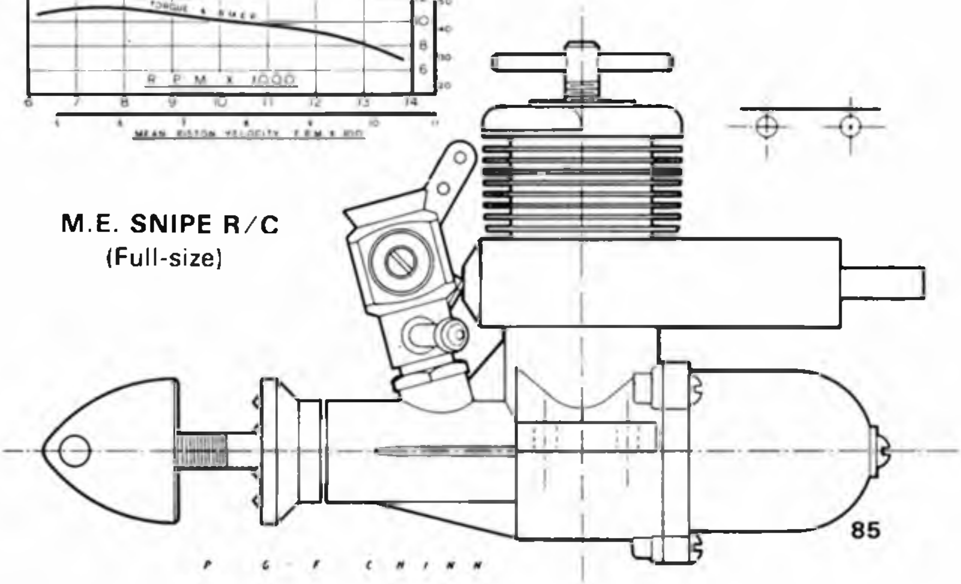
The Snipe R/C carburettor incorporates a simple butterfly throttle and an airbleed and will allow the engine to be safely throttled down to about half full throttle speed. For example, our engine could be brought down to around 4,200 on 9 × 4 props, to around 5,000 on 8 × 4 props and to 5,500 on a 7 × 4. It was possible to adjust for lower speeds but it was then found that the engine could be idled for only very short periods, otherwise the cooling off that occurred, during idling, resulted in an artificially 'under-compressed' condition when the full-throttle position was resumed, which would cause the engine to misfire and stop. Incidentally, to reduce the risk of the engine cutting out when slight under-compressed, it is helpful to have the needle-valve setting slightly on the rich side, at the cost of a hundred or two top-end revs.

Starting qualities of the Snipe were good. The needle-valve and compression screw were easy to adjust and held settings firmly. The contra-piston showed no tendency to seize in the bore when hot, or to run back as is sometimes experienced when diesels are running at high speeds under light loads.



Full-size engine bearer dimensions.

M.E. SNIPE R/C
(Full-size)



FROM THE HANDLE
CONTROL LINE NEWS

18-year-old David Owen, front, beating his teacher, Mack Henry, for first place in Slow Combat - in the adult age group at the U.S. Nationals. David says he is going into FAI.

Report of the 4th and Final Round of the 1980 British Diesel Combat Championships by Brian Waterland

The fourth and final round of the British Diesel Combat Championships was held on the Embankment, Peterborough, on November 10th. The weather was fine with a light wind which, for the morning session, blew straight into the sun. Before the event started it was worked out that Neil Gill (Peterborough MFC), the current champion, had to beat Mark Jarrett by at least two places to win the 1980 Championship.

In the first bout Charlie Windows flew his spare model (having destroyed his first-string "model" with an over enthusiastic pull test) against Neil Gill. Neil won that bout two cuts to nil whilst Peterborough junior Kelvin Cherry and his Fifth Revolution beat Rob Roy on ground time after a spectacular mid air collision. Brian Waterland flew a Fifth Revolt (that's a Fifth Revolution with two booms instead of the fish tail tailplane) against Mark Jarrett and his foam 6th Revolution. Mark was leading two cuts to one when his opponent trimmed his elevator and Brian won on ground time.

Mark Jarrett beat Rob Roy by two cuts to one in a very close bout whilst Brian Waterland went on to beat Charlie Windows. Much improved junior, Kelvin Cherry was beaten two cuts to one by the vastly more experienced Steve Turner. Hugh Jackson of Derby flying a PAW 19 powered own design nylon covered taper wing model was beaten three cuts to nil by Neil Gill.

To get the right number of people in the semi finals, it was decided to hold an Eliminator bout. Unfortunately Mark Jarrett and Neil Gill were drawn. These two were the expected finalists and so it was to be sudden death for one of them. In the event, Mark took all his opponent's streamer in one go but was then unable to get Neil off his tail. Neil took two cuts and then removed Mark's tailplane to win the bout.

In the Semi Finals Brian Waterland beat Kelvin Cherry and Neil Gill with his superior turning nylon covered Fifth Revolution beat Steve Turner and his nylon covered Egress — five cuts to one. Neil's pursuit was relentless and Steve just couldn't get away. However in the fly-off for third and fourth place, Steve Turner beat Kelvin Cherry 3 cuts to one, removing most of Kelvin's outboard wing in the process.

The final was between Neil Gill and Brian Waterland flying the planes they had flown throughout the competition — 5th Revolution and 5th Revolt. At the end of 4 minutes hectic combat, they were even on cuts and since only 6 seconds of ground time separated them they reflew. Neil's model bunted wider whilst Brian's looped tighter. By the final whistle neither pilot had any ground time but Neil Gill had two cuts to his opponent's one, making him the winner of the Fourth Round.

Neil Gill who gained first place in the British Diesel Combat Championships.

Results of 4th Round

1st Neil Gill
2nd Brian Waterland
3rd Steve Turner

Final Result of 1980 British Diesel Combat Champs

1st Neil Gill
2nd Mark Jarrett
3rd Brian Waterland

British Diesel Combat

Diesel Combat is fun, it's exciting in a way that sport control line or radio flying never can be and with only one model allowed per bout, it is not expensive. Peterborough Model Flying Club are prepared to run the Championship again in 1981, so if you have a diesel engine up to 3.5cc, why not dust it off and come and have a go.

Combat at the 1980 U.S. Nationals by Paul Smith

The contest was held at an inactive US Air Force base in Wilmington, Ohio, in the North Central part of the country. The site was one of the best ever for the Nats. The combat circles were walking distance from the barracks and practice area was unlimited. Several periods of light rain kept the ground soft, but did not delay flying. Wind was no factor. There were also very good areas for the racing, stunt, speed, and scale classes on the runways and ramps but unfortunately they were out of sight from combat, so we didn't get to see much of the other events. Overall, this would be a great site for a CL, scale or RC World championship.

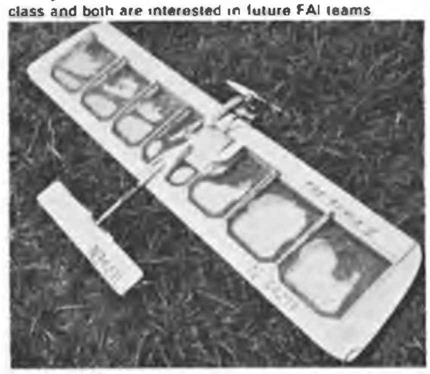
Due to the recent World Championship, none of our usual foreign contestants showed up. We were disappointed to miss our Canadian and Mexican friends who usually pick off a few trophies. In fact, the only other country entered was California!

Duke Fox of Fox Engines attended the entire contest. He brought along a supply of parts to support the contestants who were using his products. We have Mr. Fox to thank for making combat the great event it is in USA today. His engines have made it possible for anyone to run fast enough to be competitive without the need for special machining or expensive custom built motors. Unfortunately for Mr. Fox, the fast and slow events were won by a TWA and a custom K&B. However, neither of these exotic mills outran his engines, it was simply a matter of piloting and maybe a touch of luck.

Rily Wooten, many times National Champion, and designer of the *Voodoo Sneaker*, and several other top models, was also there all week. He was very active as a pit man and judge.

The week was a flurry of activity with *Slow* on Tuesday, *FAI* Wednesday, ½*A* Thursday, and *Fast* Friday and Saturday. The typical day was to get up at 6.00am, breakfast with the other contestants in the dining hall, followed by the pilot's meeting at 7.30. Fly Combat from 8.00am to 7.00pm, register for the next day's flying from 7.00 to 9.00pm, dinner, rules meetings, work on planes, drink beer, talk to friends, and bed at about 1.00am. To me, it seemed like the week was only one day long.

AMA has three age groups, *Junior* (under 14), *Senior* (15 to 18), and *Open* (over 18). As usual, the entry in Junior and Senior was so low that every entry got a trophy. Two Seniors who turned down the freebie and flew 'Open' were Dave Owen of Tennessee and Lou Scavone of Michigan. They were both able to win trophies in that class and both are interested in future FAI teams.



A George Cleveland 'Force' showing condensed moisture as a result of daily rainstorms at the U.S. Nats. George was 'forced out' by the author's Superstar.

Slow Combat — Tuesday

There were 44 entries and the contest was run with the FAI style elimination system, as were all other events except ½A, which involved double elimination all the way. Slows are (somewhat) realistic-looking airplanes with unpressurised .36 engines. The rules are five minute match, one point/second, 100/cut and a collision ends the match. This event is great for spectators because the planes are big enough and slow enough to see and the matches often go the whole five minutes. Fuel tank design is one of the key features, as is lightness and turning ability. The best planes approach 100mph, with 90 to 95 being the competitive range. After six rounds of combat the following winners emerged.

1 David Owen, Tennessee
2 Mack Henry, Tennessee
3 Richard Stubblefield, Texas
4 Paul Smith, Michigan
5 George Cleveland, Texas
6 Dan Scott, Ohio
7 Bob Burch, Illinois
8 Bud Bodzioch, Illinois

Owen and Henry used the custom K&B, while by my observation, all others used the Fox. Except for my 'Slow Superstars' all the top airplanes were wood. One or two

FAI Combat winners at the U.S. Nats. Richard Stubbelfield, 2nd, Joe McKinzie 1st, and Bob Burch 3rd, feel that balsa flies better. They all used Fox engines and "egg-shell" airplanes 2 ounces lighter than a good foamie.

Rich Lopez took 4th in U.S. Nats. FAI Combat with this 'Show Business' tapered foam model. Cox powered.

ounces can be saved with wood and turning ability is critical in this event.

FAI — Wednesday

The 23 entries did not include Phil Granderson (third in the World) because of some paperwork technicality with AMA. Team member Paul Curtis was the Event Director and did not compete in any events. By the way, Curtis did a good job, although it was obvious that he was running a combat event, not a popularity contest. In general, the number of entries was equal to past FAI Nats, but the number of quality entries was way up. Again, foam took only fourth place, with the remainder of the top eight opting for the lightness of balsa. A new name on the FAI scene, Joe McKinzie of Texas took first and 'Senior' Lou Scavone was sixth. Both of these flyers have expressed interest in the World Champs. The remainder of the list is familiar to combat buffs.

1. Joe McKinzie, Texas
2. Richard Stubblefield, Texas
3. Bob Burch, Illinois
4. Richard Lopez, California
5. Jordan Segal, Illinois
6. Lou Scavone, Michigan
7. Church Rudner, Michigan
7. Ron Colombo, Michigan

Both McKinzie and Stubblefield used the 'Force' type airplanes made familiar by George Cleveland. Lopez had a very advanced foamie with straight leading edge and swept forward trailing edge. Scavone and Colombo used a medium-size woodie known as 'Lite 'n Lemonie'.

½A — Thursday

This event was a pleasant surprise in that 200 very good flyers entered and competed quite seriously. The status of the event was improved as a result of participation by such big names as Granderson, Lopez, Sacco and FAI Champ McKinzie. Because this is still an unofficial event, the contestants had to help judge between their matches. Our ½A required an .049 engine and 35ft. lines. A kill (string cut) wins. The true double-elim system resulted in a marathon of flying that took almost eight hours to complete. In the end, the stone-hammer methods of the industrial North triumphed over the advanced technology of the West Coast as the first three places went to Illinois, Michigan and Massachusets.

1. Bud Boziach, Illinois	Mini Viper — wood	
2. Paul Smith, Michigan	Pawn — foam	
3. Steve Sacco, Mass	Fibreglass LE original	
4. Rich Lopez, California	Foam — similar to his FAI	
5. Tom Fluker, Texas	Wood	
6. Joe McKinzie, Texas	Wood	

Prizes were donated and personally presented by Mr. Dale Kirn of Cox.

Fast Combat — Friday and Saturday

Sixty entries for the big one. Pressurised .36s, kill wins, 120 mph top end. They call it fast because the planes are, and also the matches are over in a hurry. Foxes again dominated. Frequently we saw remote needle set ups mainly to get the fingers away from the prop. The new Super Tigre .36 was here, but as yet it didn't show enough power to overcome its heavier weight. For now, don't throw away the Foxes. A long series of great matches left us with George Cleveland/Phil Cartier for first place. George had a 'Force' with a Fox, Cartier a 'Bumblebee'-type foamie with a very special TWA. George got first in the air and a cut advantage. Throughout the match it appeared that George definitely had the lead, the better equipment, and the upper hand. But Phil saw the chance for a 'suicide kill' and dived through Cleveland's string and into the ground for the win.

1. Phil Carter, Pennsylvania	'Bumblebee' foam
2. George Cleveland, Louisana	'Force' wood
3. Mark Smith, Texas	'Force' (type) wood
4. Jordan Segal, Illinois	Wood with foam LE

Generally, this was a great Nats because of the good turnout from all parts of the country. Every area got a fair share of the prizes. After years of the Texans showing us how it's done, it looks like some of us are learning. But we can't count them out. In addition to the 'old pros,' we saw some new talent from that state. We hope to see more foreign entries again.

FOAM WINGS VERSUS BUILT UP CONSTRUCTION

News from Ted Fowler and Arthur Eves is that they have developed a combined style of wing construction using part balsa and part expanded polystyrene, which tries to capitalise on the advantages of each method, yet avoid the disadvantages, which they list as follows:

EXPANDED POLYSTYRENE

Advantages

1. Stronger if fully veneered.
2. Accurate hot wire cut aerofoil.
3. Resistance to handling damage.
4. Ease of producing good surface finish.

Disadvantages

1. High initial structural weight.
2. Finish weight is high.
3. Higher cost and difficulty in obtaining sufficient suitable quality 1.5mm balsa sheet for covering.
4. Undercarriage mounting is either heavy or weak.

BUILT UP

Advantages

1. Lighter using built up construction.
2. Cheaper less materials required.

Disadvantages

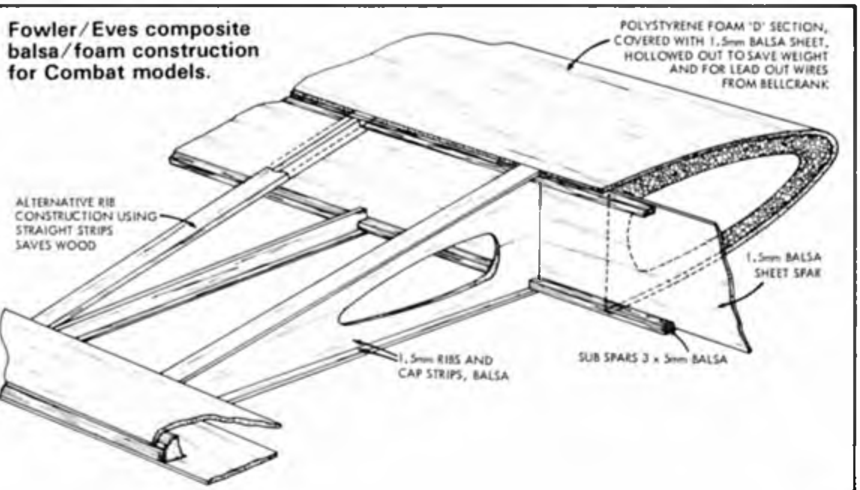
1. Prome to damage of unsupported covering.
2. LE sheeting ripples between wing ribs.
3. Complex to build using dozen of parts and prone to warping.
4. Taper sandwich rib production makes incorrect angles for sheet attachment.

It is not possible to eliminate all the disadvantages of each construction method, but a reasonable compromise can be made by the use of a foam covered 'D' section for the front with a build-up balsa rear section.

This method retains the accuracy of hot wire cut foam for the front of the wing section with the torsional rigidity required, yet is cheap and gives quick building.

The suggested order of construction is as follows:

1. make up 'I' section spars.
2. Cut foam 'D' blank, usual hot wire and template method.
3. Attach foam to half span spar.
4. Sheet the 'D' section overlapping spar as shown.
5. Hollow or 'core' the foam section.
6. Assemble rear of wing to main spar.



Fowler/Eves composite balsa/foam construction for Combat models.

1980 PIERRE TREBOD REPORT BY ROY MILLER

THIS, THE 16TH CRITERIUM PIERRE TREBOD, proved to be an exceptional meeting with good organisation, superb flying weather and a great sense of international camaraderie.

Entries from 14 countries had been received making it a truly international event. Many competitors were on their way to the European Championships in Yugoslavia due to start a few days later. On practice day (Friday) a steady breeze had been blowing, however, it appears that at Marigny no two days are ever the same and Saturday dawned calm and clear, permitting the Glider (FIA) event to take place in ideal conditions.

Towing in the light drift proved to be a hazardous business and there were many examples of crossed lines and tangles as fliers ran in all directions trying to find helpful air. Thermal activity was present throughout all the rounds but the accompanying downdrafts caused many to spoil their chances so that by Round Five only 16 of the 97 entries had maxed including Jack Williams (Peter), Oldfield, Tyson and Miller of the GB contingent. The last two ran out of luck in Round Six but the others circle towed to good effect to get through to the fly off.

The Glider fly off took place on the other side of the narrow field in an area of long undergrowth and the ten participants had to work hard to find any help from the damp evening air. Dulout of France did well to achieve 218 seconds to win while Alan Jack placed second with a score of 199 seconds after towing for the longest time. Dave Oldfield and Peter Williams achieved fourth and fifth place respectively.

The Wakefield, (FIB) and Power (FIC) events were flown together on Sunday starting at 8.00am. The early indications were that Saturday's weather pattern would be repeated. The British power flyers did well to max out during Round One but the Wakefield competitors did not find it so easy especially those who flew in the early part of the round. Ivan Taylor suffered misfortune when his Wakefield, looking well set for three minutes spiralled earthwards, later attributed to selecting the wrong tailplane.

Increased turbulence during Rounds Two and Three misled Peter Williams and Phil Uden to launch at the wrong moment and thus ruin their chances of a top place. The early success of the power contingent was not maintained and only Stafford Screen and Ken Faux survived through to the Fly off while all the Wakefield flyers found the conditions too treacherous to permit the chance of getting amongst the silverware.

For the fly off Ken Faux took the opportunity to use a new model built for the Euro Championship, but neither he nor Stafford produced their best form and so it turned out to be a successful day for West Germany who filled the top three places.

The two man Wakefield fly off was won by Fritz Gaensli of Switzerland with a fine flight of just over four minutes. He was followed by Champion of France who had placed third in the Glider fly off the previous evening.

Dave Rowsell of Canada gets his Wakefield away in the Pierre Trebod event, managing to gain 11th place.

Free Flight Scene

Dave Hipperson reports....

H. Stetz of Germany launches his FIC winning model in the 4th round of the Pierre Trebod competition.

The prizegiving ceremony took place later that evening and full printed results were distributed. Whilst the British entries had narrowly missed gaining first place in the three classes it was of great consolation to learn that Great Britain had won the Jean Magniette Trophy as a result of the efforts of our top competitor in each class.

RESULTS FIA

1. H. Dulout	France	1260 + 218
2. A. Jack	GB	1260 + 199
3. R. Champion	France	1260 + 194
4. D. Oldfield	GB	1260 + 181
5. P. Williams	GB	1260 + 159

OTHER GB PLACINGS

16. K. Proctor, 1219; 20. E. Tyson, 1207; 22. R. Miller, 1198; 25. B. Nicholson, 1183; 31. B. Baines, 1166; 40. L. Gray, 1134; 43. M. Fantham, 1132; 50. M. Dilly, 1118; 61. M. Gilmore, 1082; 63. S. Marriott, 1071; 65. B. Simms, 1062; 81. P. Hawkins, 939; 83. J. Williams, 841; 86. G. Higgins, 759; 87. J. Walton, 748; 88. D. Thompson, 738; 89. T. Levey, 492; 90. G. Levey, 354.

FIB

1. F. Gaensli	CH	1260 + 240
2. R. Champion	France	1260 + 228
3. P. Lepage	France	1253
4. R. Miller	GB	1249
5. O. Viggiano	RA	1227

OTHER GB PLACINGS

9. P. Williams, 1183; 17. P. Uden, 1103; 19. S. Marriott, 1084; 28. P. Hawkins, 991; 29. I. Taylor, 947; 32. K. Proctor, 885; 38. J. Buskell, 713; 47. D. Thompson, 116.

FIC

1. H. Stetz	W. Germany	1260 + 240
2. T. Schwend	W. Germany	1260 + 180
3. G. Heidemann	W. Germany	1260 + 174
4. S. Screen	GB	1260 + 156
5. K. Faux	GB	1260 + 139

OTHER GB PLACINGS

8. P. Bond, 1198; 9. F. Chilton, 1180; 12. R. Johnson, 1144; 13. P. Rowledge, 1121; 22. R. Collins, 273.

SMAE Winter Mini ... Driffield ... 2.11.80

The final event of the 1980 SMAE contest programme produced weather typical of what we have had to endure most of the season — windy and none too warm even for November. The chill easterly at least kept skies clear and made for a dry sunny day with the wind dropping away completely at the end but just too late to affect the contest. Not surprisingly entries were rather low and consisting of the few hardies one sees at practically every contest and the locals to the drome one sees at practically none!

Brown (Jnr) opted to fly his Nats winning scramble model in Co2 and topped the results with consistent flights against a burst of late activity from two others which showed promise but came too late for them to catch him. In fairness these two, O'Donnell and clubmate Philpott had been busy during the day with a tussel in A1 during which they both dropped their first flights and then continued to max out — JOD having the edge by ten seconds. Third in this event was Kirby flying in his first glider contest.

Steve Philpott had a busy day as he emerged second in HLG as well. He and Laurence Gray who won, being the only two people with anything like respectable scores. This prompted some unconventional activity just before the close of the contest with Russel Peers 'throwing' his ½A model and breaking it and Ian Davitt somewhat more controlled chucking with his Coupe for some reasonable flights but not enough to place.

In contrast ½A provided a very high standard with numerous good climb patterns despite the wind. Steve Riley flying consistently apart from a poor launch on his last to total 9.00 and be pipped by Pete Harris with very nearly a perfect score. John Fletcher suffered model damage and had to be content with a third place flying a reserve model to three maxes and two clangs.

The wind most adversely affected Coupe d'Hiver with a number of useful looking totals being ruined by half minute flights. Winner Dennis Davitt however flew with a perfect pattern which seemed to hold its shape despite the wind and the large model. Admittedly his last flight was in a real calm patch but ironically this one actually came down very quickly after a very high climb.

It was still enough for a five second lead and a convincing win. Dennis's models are unique in the respect that he uses absolutely no dope or tissue on his nose block/prop assemblies. Only the blade edges are reinforced with a smear of glue. One wonders the effects of flying on a wet day!

A1

1. J. O. Donnell	Whitefield	9.15
2. S. Philpott	Whitefield	9.05
3. C. Kirby	Morley	7.51

Coupe d'hiver

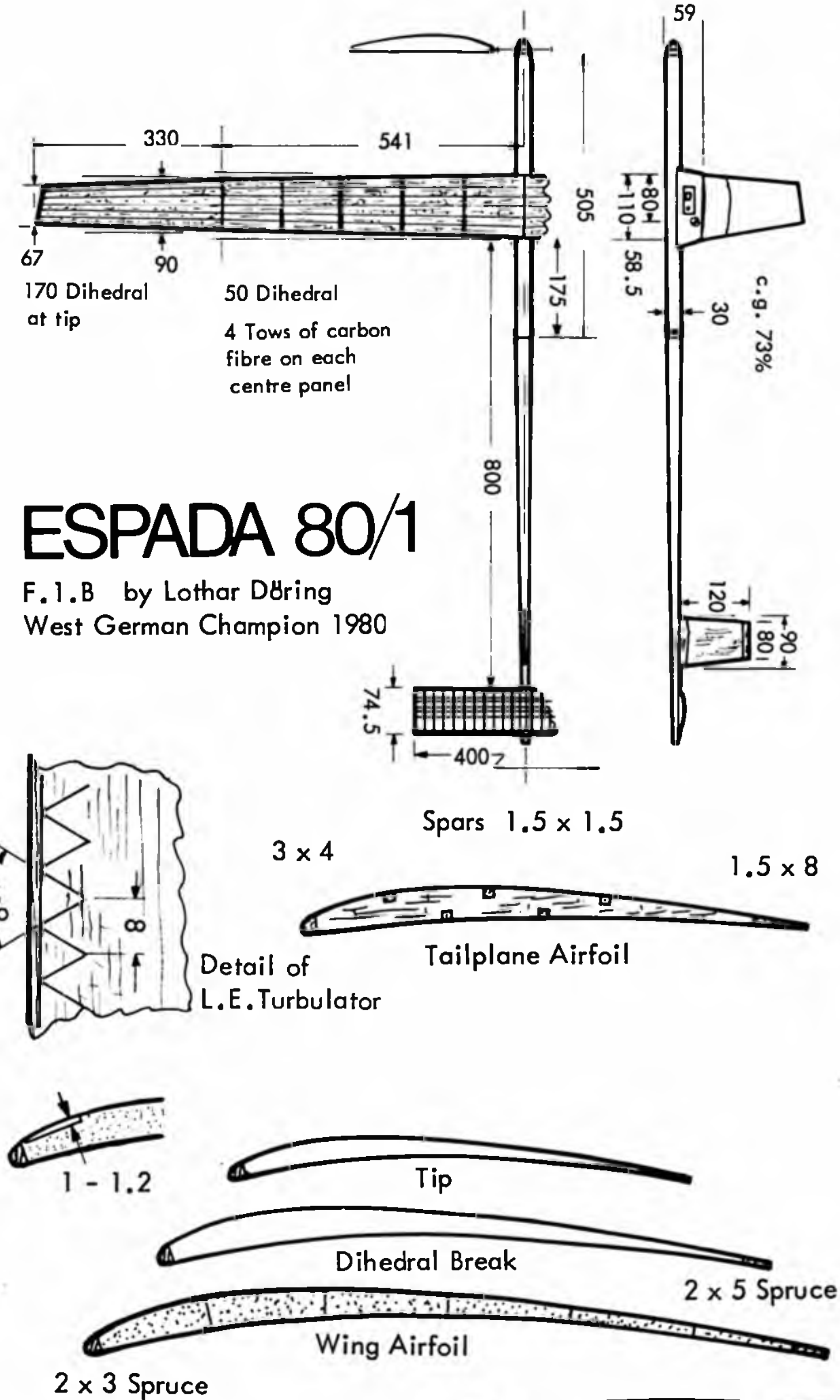
1. D. Davitt	Leeds	8.25
2. D. Hipperson	Croydon	8.20
3. J. Brookes	Louth	7.47

½A Power

1. P. Harris	Birmingham	9.47
2. S. Riley	Morley	9.00
3. J. Fletcher	St. Albans	8.32

Co2

1. Brown	Wharfedale	6.08
2. S. Philpott	Whitefield	3.54
3. J. O. Donnell	Whitefield	2.24



HLG

1. L. Gray	Falcons	2.58
2. S. Philpott	Whitefield	2.14
3. J. Godden	Morley	1.13

Martin Dilly reports....

WEST GERMAN CHAMPION WAKEFIELD

Lothar Doring, who flew in Britain while working here in early 1980, was the only Wakefield flyer to achieve seven maxes at the German Nationals in late October, and is thus 'Deutscher Meister'; he also placed first in the overall Wakefield results for 1979 and 1980 and thus has a place on the German F1B team at next year's World Championships, and was top-placing West German when he finished tenth at the European Championships at Mostar.

His model has some interesting features, his flying technique, using a twin pen recording thermister and anemometer, was described in the July 1980 F/F Scene. The solid balsa wing is carved from 70-80 kg/m³ wood, a suitable plank is first cut in such a way as to exhibit quarter grain on the larger faces, and a blank glued together with epoxy so the entire wing surface, made from six pieces of balsa, shows the same grain and thus has maximum resistance to chordwise bending. A spruce leading and trailing edge prevents nicking and adds stiffness. Carbon fibre tows are applied chordwise as shown, and the wing is covered with 12 gm/m² Japanese tissue. Only then, after covering, is the 3-D zig-zag turbulator carved into the upper leading edge; Lothmar says that, with the wing operating at Reynolds numbers between 20,000 and 35,000 this turbulator is absolutely essential. The wing is in three parts, the tips being attached with 2mm aluminium joiners and the two centre panels being permanently glued together.

The conventionally-built tailplane is covered with aluminised polyester film (actually Hostaphanfolie) weighing 16 gm/m², and heat-shrunk. Reasons for choice of covering are that it saves 0.5 gm compared with tissue, it does not warp in heat or moisture, it does not absorb moisture when flying in rain or landing on wet terrain, and it reflects light when descending after dethermalising, making it easier to spot the model. The only disadvantage is that field repairs are difficult in a case of covering tears or structural damage.

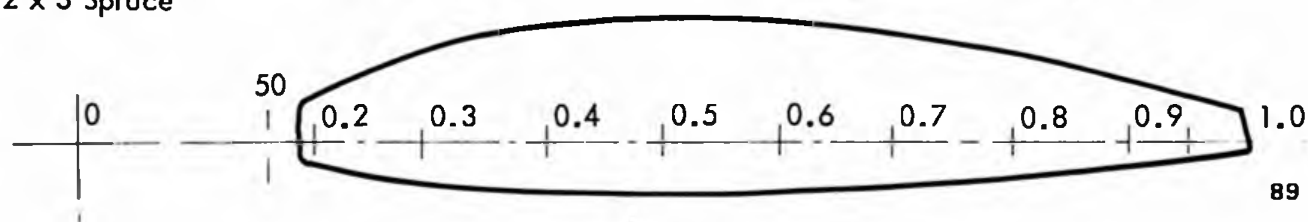
A flat-plate all moving fin is used, while the fuselage is in two parts, motor tube is 30mm diameter aluminium tube with 0.2mm wall thickness, and the tail cone is 1mm balsa covered with tissue. The propeller was calculated by Theodorsen's method, and made from two laminations of 1.5mm balsa moulded on a former, the carving being confined to the upper surface of the blades, thinned epoxy is used to cover them with 24 gm/m² glass cloth, with two layers near the blade roots.

Lothar uses 14-18 strands of 1 × 6 rubber for power, with a 43cm strand length, to give a power run of 33 seconds; a three-function Seelig timer holds the tailplane down by 3mm at the trailing edge for the first four seconds of the climb, and also operates the auto-rudder and D/T. Trim is right/right.

Propeller data: diameter 620mm — pitch 720mm at 200mm radius.

Outrigger attachment point at 50mm radius, airfoil Doring 5% with 0.4mm thread turbulator at 7.5% propeller chord.

Radius Index (see blade plan)	0.20	0.30	0.40	0.50
Radius in mm	62	93	124	155
Depth in mm	18.9	34.6	44.3	47.7
Radius Index	0.60	0.70	0.80	0.90
Radius in mm	186	217	248	279
Depth in mm	46.4	41.4	33.6	23.0
Radius Index	0.95	1.00		
Radius in mm	294.5	310		
Depth in mm	17.5	11.7		



½ Scale Blade

Electric Starter Box

An invaluable item for any power flier, that can be built at a reasonable cost. By David Abbot

USING THIS STARTER box you can start your model engines, diesel or glow, first time every time, with no more cut or sore fingers. Instant starts are possible for control line models, allowing you to make flights as soon as the circle is free; free flight enthusiasts can launch quickly into thermals as soon as they are detected, and R/C fans can get airborne as soon as their frequency is vacated. For everybody, this starter offers more flying, and less flicking.

Materials

The unit described here was built with materials that were to hand at the time, but the design is quite flexible and can easily be adapted to suit different motors and switches.

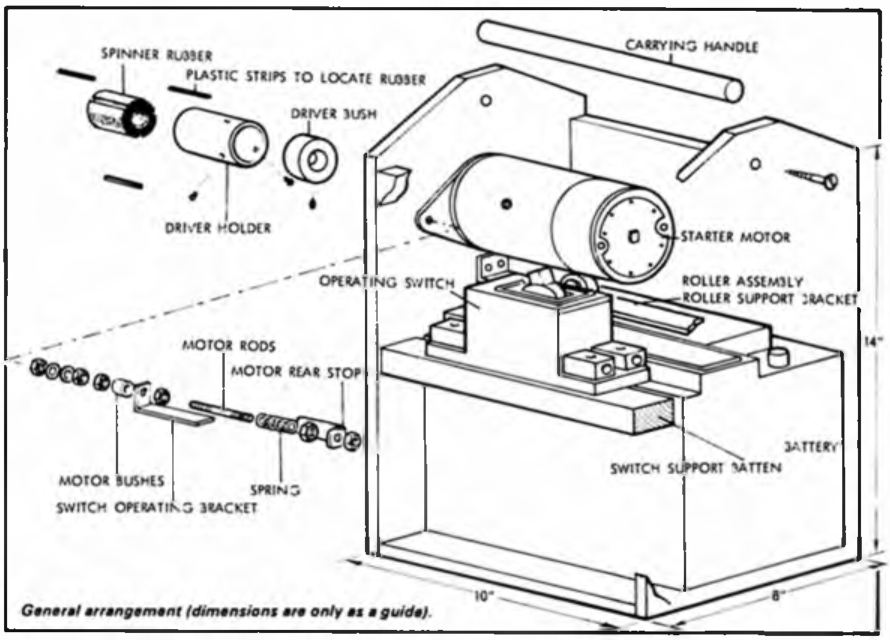
The first requirement is a **starter motor** from a car or motorcycle. A visit to the local car breakers provided a choice from about 30 motors at £4.00 each. As we do not want it for a particular car you may be able to get one even cheaper. Ask the dealer to connect it to a battery to make sure it runs before parting with your cash. Also hold the motor body and try to move the shaft up and down to test that the front bearing is not excessively worn. Whilst you are at the breakers yard you could also buy a **solenoid switch**, which you may need later, depending on the circuit you adopt.

You will also need a 6 or 12 volt **battery.** The old one from the family car is ideal. Although discarded because it wouldn't start the car it will have ample capacity for our modelling needs. If you do not have a suitable battery, a friendly neighbour or garage is sure to have one spare.

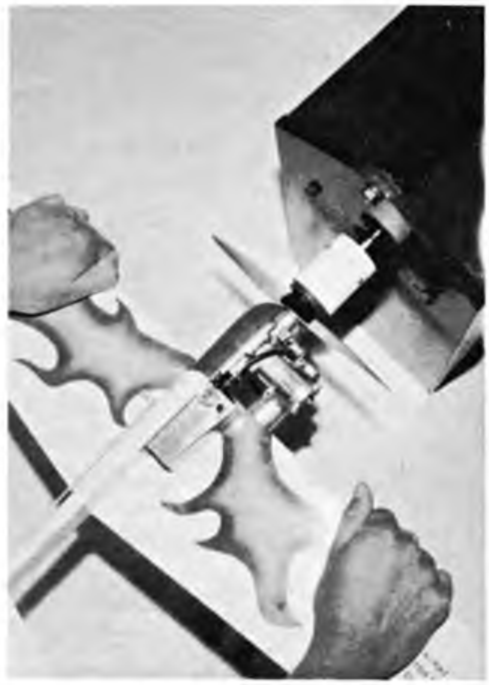
If you can obtain a motorcycle starter motor and 6 volt battery you will be able to build a smaller and lighter starter box which may prove more convenient.

Operation

The unit works like this; the spinner on the model is located into the rubber socket on the front of the motor. The motor is mounted on rods and is free to slide forwards and backwards but is normally held in the forward position by two compression springs, (see drawing). With the spinner engaged, the model is gently pushed forward against the pressure of the springs until an arm attached to the motor pushes the switch and makes the circuit. This switches on the motor, spinning the propeller, and if the engine's needle valve and/or compression is correctly set it will instantly burst into full song. As the model is withdrawn the motor will return to the forward position and switch itself off. All this happens much faster than it takes to read about it!



General arrangement (dimensions are only as a guide).



A starter box of this type is safer to use than the hand held starters that are commercially available, as it leaves you with both hands free to hold the model and keeps them well away from the spinning propeller and allows the modeller to stand behind the arc of the propeller blades.

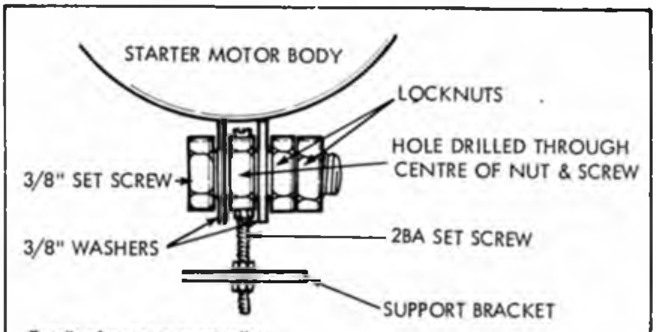
Construction

The dimensions given are for guidance only and may have to be adjusted to suit the particular motor and battery that you have.

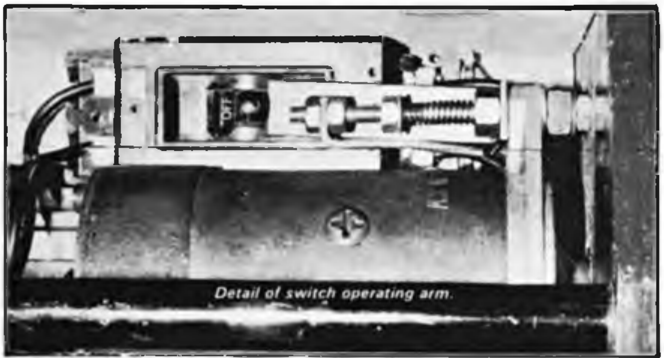
Begin by removng the bendix spring from the motor and then hacksaw off the shaft to leave a plain shaft as long as possible. The mounting holes on the end shield of the motor are used to mount it on the rods, but to ensure it slides squarely, bushes are fitted into them. These are made from short lengths of ⅜in studding or ⅜in set screws, with a ¼in hole drilled through the centre. Use a drill press to drill these holes squarely if you have one, or better still a lathe.

The rods are ¼in mild steel stock 5in long with a 1in long thread cut on one end, and a 1¾in one on the other. The actual thread you use isn't important as long as you can find some nuts to suit. The rods are cleaned up with emery cloth until they slide through the bushes with the minimum of friction. Using this method of allowing the motor to slide is not sufficient in itself, as the weight of the motor makes the bushes bind on the rods. We need some extra support at the back of the motor and this is achieved by making a simple roller from washers and mounting it below on a support made from 1in × ⅛in steel strap. The location of the washers on the motor body also helps to keep it running true on the rods. The method used to attach the roller to the steel support allows vertical adjustments to be made to ensure a smooth sliding action.

The case of the starter box is made from ¼ or ½in plywood pinned and glued together. A piece of metal tube or broom handle is used for the carrying handle. The lid is removable and is located by ½in square battens glued to the underside. To enable the battery to be removed for



Details of motor support roller.

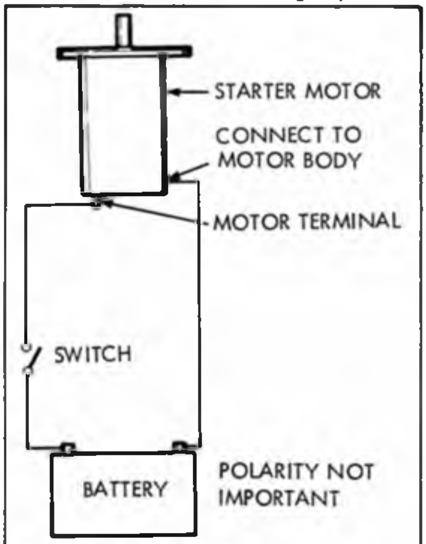

Detail of switch operating arm.

topping up and recharging, the bottom of the back support is removable and is held in place by three wood screws.

Some form of switch is needed to operate the motor and several alternatives are possible. As the motor draws a considerable current from the battery, (around 50amps, equivalent to 12 one kilowatt electric fires!), the switch must be capable of switching this load. If a switch rated at less than this is used, the contacts would be welded together on the first operation. I was able to purchase a second-hand earth leakage trip switch from an electrical contractor which is rated at 60amps. As this is a double pole switch, I used both poles, out of convenience, which effectively gives a 120amp switch.

The switch is screwed to a piece of 2in × 1in batten which is glued inside the box. A piece of 1in × ⅛in steel is bolted to the front of the motor and bent to shape so that movement of the motor operates the switch. About ⅜in. movement is all that is necessary. The backward movement is restricted by a further strip attached to one of the rods and adjusted to prevent the back of the propeller drive assembly fouling the case.

Another way of switching the motor is to use a car solenoid switch as mentioned earlier. A switch with a much lower rating can then be used as the operating switch, as the motor load is taken by the solenoid contacts. It should also be possible to make a crude form of switch using a piece of piano wire arranged to make direct contact with the motor body when using this form of switching. Wire the circuit up as shown in the diagrams.



Circuit using 60 AMP switch.

It is important to use cable of suitable rating for the high load involved. Any old piece of flex WILL NOT DO. Cable with a cross section of 6.0mm² is suitable, if you need to buy this ask for ref. 6491X cable.

Propeller driver

The propeller driver assembly is based on a replacement spinning rubber for a Sullivan Starter. These are available from model shops. Mine came mail order from Eltham Models, 54 Well Hall Road, Eltham, London, SE9. This is a push fit into the driver holder, which consists simply of a 1¼in plastic waste pipe connector, which can be purchased from builders' merchants. Ask for a Bartol Cat. No. SBW1 Connector. You will find this to be ideal; the inside diameter is perfect for the rubber and there is a stop in the centre which keeps the front protruding just the right amount. Cut three strips of plastic from another piece of waste pipe and glue these to the inside of the connector, equally spaced, using PVC/ABS adhesive. These will locate in the grooves of the rubber and prevent it from turning.

Spinners

Obviously, your model must be equipped with a spinner for use with this starter. Plastic spinners can be used, and the types that use two self tapping screws to secure the front are preferred. The smaller, less expensive types with screw on fronts cannot be used without modification, as the fronts would just unscrew and fly off. They can however be safely used if two 8BA countersunk screws are fitted to prevent it unscrewing. (See photo).

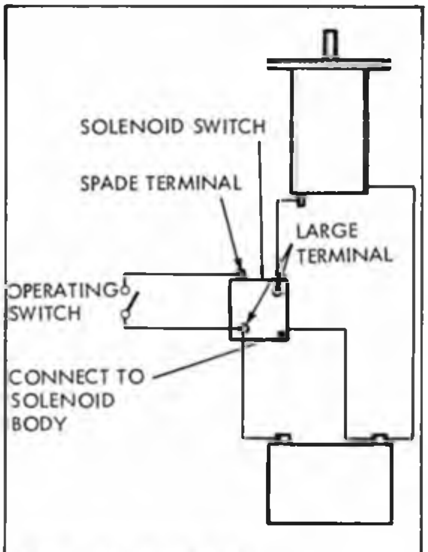
Finally, a few words of caution. In normal use this starter is perfectly safe and cannot damage your engines. It cannot however perform miracles. If your needle valve is set too lean or your glowplug is burnt out or disconnected, your engine will not start. If the engine fails to start after a couple of attempts, check to see your plug is glowing and the fuel settings are correct. Turning the engine over without fuel in the tank or with the needle set too lean will deprive it of the essential lubricant and could cause damage.

To prevent the motor from switching on in transit, a wooden dowel is inserted between the motor end shield and the rear stop to lock the motor in place.

If there are any children about when you are using this starter, be very careful not to let any little fingers poke the propeller driver.

It's surprising, after just a few weeks use at the club field how many of your clubmates' models sprout spinners!

To fit this assembly to the motor shaft you will need to make a suitable bush. I am fortunate to have access to a lathe and was able to turn one from mild steel bar. The outside diameter is 1¼in with a ⅝in hole bored in the centre to suit the motor shaft. If you do not know anyone with a lathe, a suitable alternative can be made from a cast aluminium pulley. Purchase a pulley with a ⅝in bore and carefully mark out 1¼in diameter on the face. Now saw and file nearly to this line as accurately as you can. Then mount the pulley securely on the shaft using a grub screw. Clamp the motor in a vice and connect it to your battery to produce an improvised lathe. Use a large file held against the revolving work to reduce it to the required diameter. Care should be taken to keep the circumference square to the face. You may be lucky enough to find some sort of metal wheel of suitable diameter, which only needs the centre to be drilled out; hunting around for the bits and pieces is half the fun isn't it? Whatever form of bush you use, it is important that it runs true. Drill three holes around the circumference and tap 6B.A. The driver holder is pushed onto the bush as far as the centre stop and is attached with three 6BA round head screws.



Circuit using solenoid switch.

The latest in products for the modelling scene.

LOCKING GLOW PLUG CONNECTOR

One of the most annoying things to happen when you are starting glow engines, is for the plug connector to fall off, which can also be dangerous if the lead falls into a spinning propeller. To remedy this situation a new locking glow connector is being imported by MacGregor Industries. This connector has a spring loaded barrel which you squeeze together before connecting to the plug. Once on the plug, the barrel is released and the connector is held firmly on the plug. The assembly comes complete with 3ft. of wire and two crocodile clips. Available from model shops price £3.95.

POWERMAX FIBREGLASS REPAIR KIT

With the popularity of fibreglass fuselages and foam core type wings established, there is occasionally a need for repairs. Harden Associates offer their Fibreglass Repair Kit with this in mind. This kit contains 500mm of woven glass tape, a sheet of chopped strand matting, a quantity of polyester resin and catalyst together with full instructions on how to repair broken fuselages, and also joining foam wings. A useful item to have as a 'standing by.' Price £3.25.

FIBRE OPTIC LIGHT PROBE

Edward Fletcher and Partners announce a new, British-made, Light Probe. Comprising a small hand-held torch and 9" long, 3mm diameter, flexible Fibre Optic Light Guide, the Light Probe can be used for illumination and inspection in inaccessible areas, or wherever a direct light source will not penetrate. By using Fibre Optics, the light from the torch is transmitted along the fibres and can be 'bent' round corners as required. If necessary, the Fibre Optic Light Guide can be detached and the torch used in the conventional manner.

The Light Probe is only available from the manufacturers: Edward Fletcher & Partners, 25 West Park Road, Kew, Richmond, Surrey TW9 4DB. The price of the Light Probe is £1.99 including post and packing and VAT. Batteries 2 HP7 type — are not included. Allow 7/10 days for delivery.

HUMBROL AUTHENTIC COLOURS

Humbrol have added some more colours to their already huge range of paints. The new set of 36 Authentic Aircraft colours comprise 16 USAF Navy & Marine Contemporary, four USA WWII, seven Luftwaffe, four Israeli Contemporary, and five Swedish Contemporary. As ever, these popular little tinlets should be available at most model shops now. Price 30p each.

HUMBROL AIRBRUSH

Humbrol have recently introduced a new, improved, Modeller's Airbrush. The improvements in design from the previous Modellers Airbrush are firstly that the simple 'on-off' air control for power unit use has been replaced with a Variable Air Volume Control. This allows the operator to vary the volume of air delivered without interrupting the spraying to make adjustments to the airbrush itself. Secondly the Paint Control Jet adjustments are made much easier by the new design Jet Control which is fitted with an adjustment ring that allows even the smallest fingers to make those micrometer adjustments to the paint flow (so essential to achieving the best results) quickly and simply. Thirdly, the Air Jet can now be adjusted to vary the distance between it and the Paint Jet, giving more positive control of the line thickness and paint density. Blister pack price £7.50. Box pack £9.95.

Also available is a new, large jar for use with the new airbrush. Capacity is 175ml.

This should be useful, enabling larger areas to be painted without having to refill. Price £1.66.

SIG COVERALL

If you suffer from baggy nylon, Coverall, the heat shrinkable covering fabric from SIG, might be just the answer. This is a polyester based material that is applied in the same fashion as silk and nylon, but can be shrunk with either an iron or heat gun. It is only available in white and is sold in two sizes, 36" × 48" at £1.95 and 48" × 72" £3.25. Henry J. Nichols & Son are the stockists at 308 Holloway Road, London N7.

MAPLE ADJUSTABLE C/L HANDLE

The main feature of this new control line handle is the facility to adjust the lines in flight. This is achieved by an internal screw jack which increases the length of one line and at the same time decreases the other. Operation is simple with the control knob at the top; it is simply rotated by the thumb. The body is cast in glassfibre and it incorporates a hole for fixing a safety strap. The price is £6.95 plus 40p P&P from Maple Models, 16 Maple Road, Luton, LU4 8AE.

MASTER AIRSCREWS

To compliment their range of larger R/C glass filled nylon propellers, Master Airscrew, the manufacturers, have added some smaller sizes to their range. **Micro-Mold** who import these propellers from America, have sent us the following sizes 5.5" × 4", 5.5" × 4.5", 6" × 3", 6" × 3.5" and 6" × 4". The props should suit engines around the .049 size and should be available now at 53p each.

MICRO-MOLD PUSHROD KEEPER

Micro-Mold also sent us a sample of their useful little pushrod Keeper. This is used for securing the metal rod ends of push rods where they go through servo output discs, and also control surface horns. They are push on, turn to lock, and allow much easier connecting and disconnecting of the pushrod. Moulded in nylon, they are available in packets of four for 31p and ten at 64p, from all Micro-Mold stockists.

KEELER BINOMAG

Keeler Optical Products have manufactured instruments and optical products for the medical profession for over sixty years. A number of items in their range have now been adapted for alternative use and of particular interest to modellers and hobbyists is BINOMAG, a binocular magnifier ideal for use when working on tiny parts and components, such as microfilm models, electronic printed circuit boards etc.

Comfortably supported on an adjustable, wide section elastic headband, BINOMAG gives 2X magnification with an excellent depth of focus over a wide field of view, leaving hands free for delicate manipulative work. There is no need for the wearer to remove BINOMAG during periods when magnification is not required, as the whole lens frame 'flips-up' out of the line of sight on a clearly designed hinge.

Supplied in a strong, compact pocket case, BINOMAG is especially suitable for spectacle wearers who should use them as normal. Price £13.70 + VAT. Available direct from: Keeler Optical Products, Ltd., Clewer Hill Road, Windsor, Berks SL4 4AA.

AVICRAFT BALSA STRIPPER

Perhaps you are the type of modeller who prefers to cut his own balsa strip from sheet. If so the Avicraft balsa stripper might be of interest. Nicely made in aluminium, this handy tool will cut strip up to about 1" wide. Price £7.00. Available from Avicraft Ltd., 15 Chatterton Road, Bromley, Kent.

LOCTITE GLUEMATIC

Getting cyanoacrylate or 'super glue' on your fingers and having that 'stuck up' feeling, is probably not new to most modellers. So when a manufacturer produces a safer method of applying this notorious liquid, it must be of benefit to us all. *Loctite* have recently introduced their Gluematic. This is a sealed dispenser, containing super glue, with a special spring loaded applicator tip. This enables the flow to be controlled as required. Light pressure on the tip will deposit a pin head of glue but when the tip is fully depressed, the amount dispersed can be increased to a sizeable drop. Price £1.49 per pack.

Club News... Club News...

A REMARK I MADE in these columns concerning the near non-existence in the East European countries of that valued Western institution, the model shop, elicited from well known modeller and fellow columnist, Martin Dilly, some enlightening facts concerning the way model flying is organised in the alternative societies. There are many lessons we could well take to heart; not least a more serious, less commercialised approach to our hobby. Perhaps where, by comparison, we have become deficient over the years is in the recruitment of young people into our movement. There are many reasons for the thinning out of our junior ranks, not least the unequal degree of mobility enjoyed by the mature model flyer in a society where almost any interest, apart from stamp collecting, requires personal transport.

Much, though, can be done through that other valued institution of ours, the model club, to open up the possibilities of an exciting and fulfilling hobby to our young people. If only we could establish closer relations with the schools, and to bring home to the education authorities the benefits that model building and flying can bring to the young mind, our movement would be greatly enriched.

We open with a letter from Mr. J. S. Patton, the PRO of the **Anglia MFC.** He replies to comments I made the other month on the marked under-use of the flying facilities in so many high membership model clubs. He points out that even before I made those observations that Anglia club had already changed the membership policy from a numerically restricted one to one of an open welcome to any prospective member. This, it is felt, will give more fulsome use of the club's excellent field. Let us hope that anyone who may have been dissuaded from applying for membership will now duly take note of the new arrangement. Another factor calculated to liven things up on the club field is a readiness for members to get out of their particular ruts, mainly in an interchange of interests between the R/C Power and Glider sections. The difference between the two groups at present is that the Glider flyers are well into the competition scene whereas R/C Power is taken up mainly in Sports flying, though not overlooking the fact that the glider is a more viable competition model. And still on the Thermal Soaring scene there is a mention in the club's neat and informative magazine, 'High Flyin',' of a number of Open Thermal Soaring meetings put on during 1980 by the club. Very successful they have been, too, with entries up in the 60 region. On the free flight side, Bob Wells has flown in his first contest since his accident. He was accompanied by another five members; proving that the F/F section is still very much alive. *Anglia MFC, Sec: C. J. Goodley, Chase Farm, Woodham, Nr. Timer, Waldon, Essex.*

Mr. R. K. Gulliver, PRO of the **Crawley & DMAC,** writes to apologise for not being in touch with us for some time, and makes amends by sending along the latest issue of the Club magagazine, 'Turbulator 80.' He is pleased to inform us that the fre flighters have been doing well and that radio is as popular as ever. Club meetings are held in the Ifield School Gym, where, in spite of parallel bars and other body racking devices, the members do nothing more strenuous than wind up indoor models. The hall must be of reasonable size for they fly microfilm. Reading through the newsletter it seems that the Crawley flyers are discarding high priced balsa wood for deliciously cheap cardboard, so if you see what appears to be a flying shoe box over Crawley . . . It is many years since Pete Cameron appeared on the model scene, but he was going down Memory Lane in the more fullsize sense when he recently paid a visit to Croydon Airport, for it recalled another trip to that historic field way back in the thirties when he saw such wonders of the age as the Handley Page Biplanes of Imperial Airways and the corrugated metal Junker 52's of Lufthansa. Perhaps a less happy memory, albeit an exciting one, was of a Luftwaffe attack on the airport when it was a Battle of Britain base for Hurricanes. On his more recent visit he met up with the present incumbants of the field, the Three Kings Aeromodellers who, at the time, were putting some scale models through their paces. And it was the Thirties all over again at the sight of a tri-engined Saviou Marchetti Airliner. Back to club matters, preparations are going ahead for an indoor CO_2 Mini Mouse Race. All pukka team race stuff, with pilots in the centre and a 50 lap schedule. *Crawley & DMAC, Sec: M. W. Harvey, 16 Fox Close, Lancing Green, Crawley, Sussex.*

Writing in the middle of a very no-November, Mike Roedal, Editor of the **Enfield MFC,** newsletter, wonders what on earth he can, in fact, write about. And 'what on earth' might well be the operative phrase, because in that sort of dreary, anti model weather you are not likely to find much flying above it. Some hardy folk do fly in the cold, though, even if there are hazards other than a freeze up of the digital manipulators. We are told, for instance, that dry-cell batteries go as flat as cod fillets, although ni-cads are not so affected. Much of the newsletter is taken up with another quite hilarious offering from Paul Levene.

The **Loughborough MFC** newsletter has a word or two to say about the clubroom facilities available at the Burleigh Community Centre. Seems they are exceptionally good, with access to a wide range of workshop amenities. And, available on a monthly basis, the use of the College Hall for indoor flying. The trouble is that, after an initial enthusiastic response, members have not been making fulsome use of all the centre has to offer. No doubt the reason is just the end of season doldrums — a common enough malaise.

It's a funny thing, but whenever I pick up a copy of the **Sittingbourne & DMAC,** newsletter, 'The Bourne Flyer,' there is always to be found congratulatory notes on additions to members' families. Perhaps they should rename the mag, 'The Born Flyer.' Still, with all that going on it is little wonder that not much building is getting done. A fact which is highlighted in a quasi humorous article on the glut of armchair flyers in the club. Not that they fly armchairs, nor, come to that, are they all particularly chairbound, for the various non-flying species appear to be heavily involved in gardening, do-it-yourself, wine making and other anti-modelling activities. Most to be pitied is 'Skintus' who may have the get up and go but lacks the monetary means. Lots of members at the AGM, too, it seems; at least 50 per cent of the senior membership. Oddly enough there is published a somewhat paradoxical complaint over the decision made at the AGM, to affiliate to the SMAE, suggesting that the issue should have been put to all the members and not to those who were interested

CAPTION CONTEST

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enough in club affairs to turn up. Not easy to do this, though, and what would they know about the arguments for and against? *Sittingbourne & DMAC, Sec: D. J. Chamberlain, 100 North St., Milton Regis, Sittingbourne, Kent.*

In the **Grantham & DMAC,** newsletter, 'Hot Air,' there is a kit review of a very highly aerodynamised A/2 free flight glider. The reviewer suggests that, as in our climate, a model rarely has the opportunity of relying for performance on its intrinsic aerodynamic qualities, it being either up in lift or down in the dumps. Contintenal weather can be different, though, giving more scope to the rariefied model. You may not get much use for it in these windswept islands, but as the reviewer points out, it's nice to have one in your model box. A report on a club F/F contest reminds us that Grantham have the use of spacious Barkston Heath for its weekend activities. Little wonder, then, that they have built up one of the strongest F/F groups in the country (1980 Free Flight Champions). Fancy having the Nationals flown on your club field! Anyway, in spite of high pressure participation in the major events the top club flyers have been loyally plugging away at the 'Club Contest 80.' Final results show the unbeatable Phil Ball emerging as the holder of the Club Championship Trophy, and John Ashmole taking the Arthur Percival Trophy. *Grantham & DMAC, Sec: John Ashmole, 8 Harrox Rd., Moulton, Spalding, Lincs.*

They have been carrying on with those horrible engine puns in the **Leicester MAC,** bulletin, getting even more outrageous. For example, "I am going to fly Webra it's windy or not," and "That's an Arden to start." In more serious vein the editorial questions whether our eagerness to Buy British is not a little blunted by the poor comparison the British kits make with the overseas competition. Never having built a kit myself I cannot say that I am all that *au fait* with the finer nuances of kit refinement, but it seems we fall short on such things as die cutting and wood selection. The upshot of all this is all too often a Japanese kit, engine and radio. Ah well, at least we're good at making puns. On the airfield situation it is all fingers crossed for the Wymeswold concession to be extended beyond 1980. It is true that they may use the place to dump nuclear waste, but as that is not likely to happen for another 20 years it is equally possible that it won't become a housing estate. And, anyway, by that time those of us who are left will be flying space craft. *Leicester MAC, Sec: I. McKeggie, 12 Pochin Drive, Burnhill Park, Mkt. Harborough.*

The **South Bristol MAC** is a club with a strong free flight section; an interest that has been sustained throughout 1980 by a very full club contest programme, culminating in a splendid line up of free flight trophies — no less than twelve in numbers covering all possible F/F type events. Man of the year, though, is G. Bunney, the club F/F champion. Most of the F/F events were held at Merryworth, the Area venue, with the P30 Rubber and other small model events at Whitchurch. For Control Line, again with a well stocked club programme, events have been mainly held at Colerne with Combat at Whitchurch. Fifteen members were involved in the Club Championship C/L table, with Chris Coote topping the list. *South Bristol MAC, Sec: Gordon May, 4 Burchells Av., Kingswood, Bristol.*

The newsletter of the **South Eastern Area, 'Seadog'** touches a pessimistic note for 1980. In resigning, the Editor recalls the atrocious weather during the year, and deplores the lack of support given to his and other newsletters. We can only hope that the weatherman tries to redeem his tarnished reputation during 1981 and club members shake themselves out of their apathy. No sign of aparthy though in some of the well supported events reported in the newsletter, such as the Towner Trophy for Thermal Soaring held at Golden Cross. No less than 60 entrants. Another well attended occasion was the Southern Gala at Odiham. We are reminded by the end of season trophy tally that the free flighters have been hard at it on Ashdown Forest during the year in spite of the appalling weather. The RAFA Shield has been retained by East Grinstead, with Ken Taylor of the same club becoming Area Champion. Nice to see our old friend, Pete Cameron of Crawley, topping the Individual Glider list.

Our next newsletter comes from an old clubmate of mine, Barrie Wade, who is now very much involved with a club new to our lists, the **Chelmsford MFA,** of which he is the PRO. The club is about 70 strong with a goodly weighting in the main three flying categories: R/C, C/L and F/F. Members use a number of sites around this inner area of East Anglia, but are hoping soon to settle down on their own exclusive field — trouble is finding one. The Vicarage Road Hall where the club meets offers some facilities for indoor flying, although the turning circle is rather tight. Most popular event is Easy B flown on 'standard fuel,' that is .5 gramme rubber band selected at random from a large box. Times are getting on for two minutes, but a few expert eyes are targetted on a round five minutes.

Stuart V. Tucker, Hon. Sec. and Treasurer of the **Leatherhead MFC,** asks us to see what there is of interest in the Autumn 1980 issue of the club newsletter. Well, the central issue in the club seems to be the saga of Effingham Common. The usual noise complaints have been received, and the situation is a delicate one with all sorts of possible corns — and corn — to tread upon. Like so many commons whose rights and entitlements have been lost in antiquity, the legal situation is vague with nothing definite about model flying. For the time being the club is limiting its operations to Saturday afternoons with members flying to a very strict, self-protective code. Naturally, the club is looking around for less inhibited pasturage, with an eye open for that friendly farmer. *Leatherhead MFC, Sec: Stuart Tucker, Fairways, The Warren, Ashtead, Surrey.*

J. Smith, PRO, of the **Wharfedale & DAC,** sends along both a copy of the club's 'Circle' newsletter and the Northern Area News. Plenty of control line contesting reported in both, with particular emphasis on Goodyear. Good attendances at the Northern Area Rally and Northern Gala. Mr. Smith says it's a case of 2.5cc. Diesels rule OK. *Wharfedale & DA, Sec: John Broadhead, 3 Low Fold, Settle, N. Yorks.*

We have to hand a short report Mr. T. C. Lawrie of the **Paisley MFC.** This small but keen Scottish club has enjoyed a good year both financially and competitively. Club events have been strongly contested and there have been a few useful wins in SAA, free flight events. Club trophies are growing. There are now three F/F awards, a C/L trophy, a Junior prize and three Mini Shields. *Paisley MFC, Sec: Thomas Lawrie, 2 Durward Way, Paisley.*

'Flying Information,' the newsletter of the **Northampton MAC,** sums up the 1980 Competition results. The overall impression is highly satisfying, with about one third of the membership taking part in club contests throughout the year. The competitions were mainly of the type, no doubt to encourage a wide participation, but there appears to be a number of more serious events. Trevor Heasman topped the Championship list. One thing the club members will be looking forward to in 1981 is another camping visit to Diss in Norfolk over the Spring Bank Holiday. *Northampton MAC, Roger Brow, Warwick House, Church End Rd., Northants.*

That's about all for this month. Apologies for any omission.

Clubman

DECEMBER WINNER - BOB BROWN, NEWBURY

Hats off to our runners-up in the December Caption Contest. J. Green, Suffolk "BLASTED BALSA DUST, I'LL HAVE TO BLOW MY HOOTER" David Scott, Lancashire "AND THE HORN IS TO LET PEOPLE KNOW WHEN TO DUCK" Steven Evans, Telford "MAKING PLANES SURE BLOWS YOUR MIND"

The photograph appeared in the June 1960 Aeromodeller World News, and depicts a member of the Chicago Aeronuts who had been awarded the Boo-Boo hat, given to the modeller who makes the biggest bloomer each month. It was painted bright pink!

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Open Mon.-Sat. 9 am-5.30 pm

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H. A. BLUNT & SONS LTD
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NW7 4RN
Open: 9 am-6.30 pm Mon.-Fri.
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Closed Thursday

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PORTLAND ROAD, SE25 4UD
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2.30-6 pm Mon.-Sat.
Early closing Wednesday 1 pm

LONDON Tel: 01-228 6319 *
E. F. RUSS
BATTERSEA RISE, SW11
Open Fri. till 7 pm
Other days 9 am-6 pm
Early closing Wednesday 1 pm

LONDON EAST

LONDON Tel: 01-520 7397
ARNOLD'S GIFT CENTRE
132-134 HOE STREET, E17
Open 9 am-6 pm Mon.-Sat.
Closed Wednesday

PLAISTOW Tel: 01-472 2471 *
A. G. HERMITE
633 BARKING ROAD, E13
Open 9 am-6 pm
Closed all day Thursday

MIDDLESEX

HARLINGTON Tel: 01-897 2326 *
RADIO CONTROL MODEL CENTRE
214 HIGH STREET
Mon., Tues., Thurs. & Sat. 9.15 am-6 pm, Fri. 9.15 am-7.30 pm
Closed Wednesday

HARROW Tel: 01-863 9788
THE MODEL SHOP
190-194 STATION ROAD
Mon.-Sat. 9.30-6.00
Wednesday 9.30-5.00

ISLEWORTH Tel: 01-560 0473 *
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Open 9 am-6 pm. Fri. 9 am-8 pm

MIDDLESEX

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WALLY KILMISTER LTD
6 & 7 NEELD PARADE
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Closed Wednesday

NORFOLK

KINGS LYNN Tel: 63164
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SOUTH EVERARD STREET
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NORWICH Tel: 0603 42515 *
GALAXY MODELS
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Open 6 days a week

NORTHANTS

NORTHAMPTON Tel: 31223 *
THE MODEL SHOP
230 WELLINGBOROUGH ROAD
Open 9 am-6 pm.
Half day Thursday

NORTHAMPTON Tel: 35718 *
STAGG MODELS
22 BRIDGE STREET
Open 9 am-5.30 pm
Early closing 2 pm Thursday
Late night opening Friday until 7 pm

NORTHAMPTON Tel: 27726
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GROSVENOR CENTRE
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Fri.-Sat. 9 am-6 pm

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NEWCASTLE UPON TYNE Tel: 22016 *
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18 BLENHEIM STREET
Mon.-Fri. 9 am-5.30 pm
Sat. 9 am-6 pm

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GEE DEE MODELS LTD
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Open Mon.-Sat. 9.30 am-5.30 pm
Thursday 9.30 am-1 pm

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HOWES MODEL SHOP
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Open 8.45 am-5.30 pm
6 day week

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Tuesday closed all day

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DUNNS MODELS *
26 GLASGOW ROAD
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Tuesdays closed

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DUNNS MODELS *
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Wednesday Closed

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J. & N. MODELS
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Closed Wednesday

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Early closing Wednesday

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9.30-5.00. Closed Thursday

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021-373 3536
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Sat. 9 am-6 pm
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Closed Thursday

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Closed Wednesday

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