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AERO MODELLER

MARCH 1984

Cover

Nationals past again this month we bring you the joys of past summers Aeromodeller has a soft spot for control-line scale where there's a lot more fun to be had than perhaps many aeromodellers appreciate Perhaps this picture of two Nationals entrants from Northern Ireland will spur on some of you to build one of your own Models are (left) Kawasaki Ki-61 Hien and (foreground) Republic P-47D Thunderbolt

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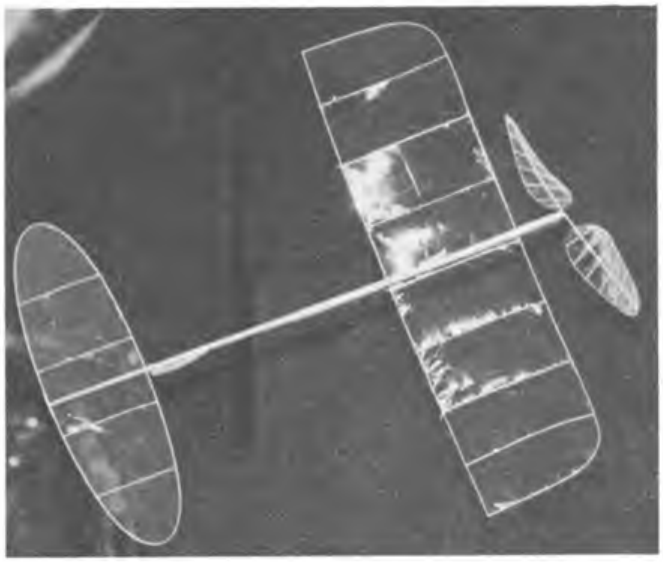
News, Comments and Events . . .



Above: Laurie Barr's Microfilm model at the Model Engineer Exhibition, Wembley. This model was previously flown in the Rumanian salt mines! Above right: Butch Hadland's 'Grapenut' - his 'Lacey' put up the greatest duration of the day - disappearing through the sound barrier in the ceiling! Right: Peter Capon, with a 'C' surveys his original (built in 1939) 'Krusader' with a 'K.' Peter, a multi talented man with, besides his model interests, is also a full size buff - having a terrific collection of photos from very early days. Peter's model has been donated for the 'National Model Museum' now being set up.

Below: Land Rover kindly provided this hard top Land Rover 3.9D for use in NSW Australia by the British Team at the World Free Flight Championships at Goulburn. Left to right: Dick Johnson, Stafford Screen and Ken Faux.

Indoor Fliers enthrall . . .

Aeromodelling in action has natural restrictions when presented at any national exhibition. For years we have enjoyed the thrills and spills of electric round-the-pole flying at the annual Model Engineer Exhibition. South Bristol Club put on a splendid show in January, using 20ft. lines and with minimum mishap, they flew a wide variety of models ranging from a flying pig to a speedster. But no matter how impressive the RTP, it was the introduction of a free-flight within the main auditorium of Wembley Conference Centre which became a highlight for 1984. In a series of one-hour sessions, several hundred spectators were treated to indoor flying at its best. Laurie Barr kept his E-Z Bee flying for most of the time, with no more harm done than to create a few cricked necks. Reg Parham did the same, except that his model flew tail first and Butch Hadland produced some spectacular flying with his scale models. His Lacey put up greatest duration of one day by disappearing through the sound barrier (in the ceiling) and flying around the superstructure out of sight before coming to rest on top of one said barrier. Luckily, the Stage Manager was able to tilt this particular piece of ceiling and so re-launch the 9in. span model for a perfect landing on the stage amid great appreciation from the audience. Now that it's firmly established that indoor flying is not dangerous in such circumstances, does not need safety barriers and can be flown over the heads of an audience inside such a hall, the prospects are opened wide for recruitment, especially when the SMAE PRO is available to give a good commentary. From the number of well satisfied viewers who posed many questions at the end of the sessions, it was clear that very few among the general public previously appreciated the charm and the possibilities of indoor flying.

Planes support boats . . .

It is always nice to hear that our sport can not only give all of us a great deal of fun (and frustration!) but also sometimes offer help on a wider scale. The Royal National Lifeboat Institution (RNLI) in their efforts to ensure lifeboat coverage around our coasts launched an appeal for a new rigid inflatable lifeboat the 'Modeller I.' On December 10 they reached the halfway mark and the Fund stood at £3,500. A large percentage of the latest boost to the Fund has been from the support received from modellers and model clubs. Not only from boat and railway clubs but also a number of aeromodelling clubs. Donations were raised with 'knock-out' competitions, sponsored flights and film shows. Why not get your club to hold an extra event to push the Fund up even higher . . . contact:

Des Newton, 29 Westminster Avenue, Bootle, Merseyside, L30 5QY for information ... or just send him a cheque for the Modeller I Lifeboat Appeal.

... Cars support planes

Aeromodellers are often bemoaning the lack of support from outside the modelling fraternity and although we are certainly not blessed with the governmental help that sister organisations seem to attract we are not totally without some friends!

The 109in. Hard Top Land Rover 3.9D kindly provided by Land Rover for the use of the British team at the World Free-Flight Championships at Goulburn, NSW Australia was a godsend. On the rough, swampy terrain on which the Championships were flown and in the capable hands of long-time Land Rover fan and top-placing British glider flyer Martin Gregorie, it served as shelter from the wind and rain, model box transport, landmark, recovery vehicle and de-bogging tractor for six or eight other teams.

At the close of the F1C fly-offs it even extracted the Argentiniar team bus from where it had been driven axle-deep into a particularly clinging bit of local swamp, to united British and Argentinian cheers.

Play it again SAM and again ... and again

New readers who have seen references to *SAM 35* may not be aware that the Society of Antique Modellers is 'dedicated to the preservation of vintage model aircraft.' Membership is currently around the 800 mark and is one of the most go-ahead specialist model groups in the UK. If you are interested in any way in old model aircraft why not join them. The subscription for 1984 is £8, send this amount and an SAE to *Peter Michel, Membership Secretary, 56 Lynwood Grove, Orpington, Kent.* You will be enrolled and receive the group's regular chatty magazine which is full of related information, plans, etc. Members renewing are asked to include their membership cards.

Kiddie-Kar danger

Many aeromodellers will have children who have had radio-controlled cars for Christmas. Many, like the Editor's young son will be over the moon with this wonderful 'thing' that they can control *themselves* at a distance. Just the thing to pound around the runway whilst dad is striving to get into the flyoff! BUT ... take heed, elsewhere on that same flying field a radio-controlled .60 powered 'Thunderer' is about to take to the air ...

A polite letter from SMAE Midland Area and Grantham DMAS has pointed out that this has been happening at Barkston Heath ... it could be happening where you fly too! If the car goes out of control it can cause *some* damage but what about 10lb of plane travelling at 60-70mph ... we leave it to your fertile imagination as to what havoc or loss of life this could mean ...

The same warning goes for illegal CB transmitters. Remember that any form of interference may not only cause an unnecessary accident but may well indirectly lose that site for flying altogether ... TAKE CARE.

† Air Commodore Allen Wheeler

If ever there was a Total Aviation Person it must surely have been Allen H. Wheeler, for so many years trustee of the Shuttleworth Trust, test and demonstration pilot, consultant to films and always having a keen interest in models. It was largely through his personal interest that we were first able to use the aerodrome at Old Warden for a scale model rally and since that beginning in 1965, the hallowed grass of Old Warden has become a Mecca, and not only for scale modellers, but also for kite flyers and vintage enthusiasts. Allen Wheeler had just passed his 80th birthday, he'd been flying his Auster within a few weeks of his death on New Year's Day '84 and, as the reggie spotters will recall, had his own rare Spitfire and many other well known aeroplanes he liked to think of as being his own. These included, of course, those magnificent aeroplanes he helped to organise for the *Those Magnicent Men in their Flying Machines* film. He qualified as an engineer in the RAF in 1925 and by 1933 was in charge of performance testing at the experimental centre of Boscombe Down. Always associated with experimental flying, his service career continued after the War and he became AOC at Cyprus and then in charge of Boscombe Down until 1955. The variety of aircraft in his logbook is legendary. It was through film consultation that he became closely associated with modelling. In fact he had to be convinced that radio control was reliable and airborne explosions made safe; but having seen how model simulation could be used, he recommended use of scale models and thus opened up a hive of industry at Pinewood and elsewhere. The aviation world will mourn his passing, for he was an exceptional man.

What's On . . .

February 18, 19 — **NORTH WEST RADIO CONTROL MODEL EXHIBITION**
Venue Queen's Hall, Victoria Road, Widnes, Cheshire Contact F G Aitcheson, 41 Hedge Hey, Runcorn Cheshire

February 19 — **SMAE WINTER OPEN MEETING OG, OR, OP, SLOW OP, VINTAGE**
Venue North Luffenham Contact M Woodhouse Tel 0603 57754

February 26 — **GRANTHAM GRAND PRIX. OG, OR, OP, COMBINED FAI, HLG**
Venue Barkston Contact P Ball, 17 Hernswood Drive, Spondon, Derby

March 4 — **LOW CEILING INDOOR CONTEST**
EZB, HLG, Peanut Durations Scale Starts noon Venue Colne Valley Leisure Centre, Slaithwaite, near Huddersfield Contact Bernard Hunt Tel 0484 862353 Special rules procedures etc. John O'Donnell, 061 427 3711

March 11 — **SMAE 1ST AREA MEETING — F/F F1A (KMAA — PLUGGE), O/P, (FROG SENIOR), O/R**
Venue Local area venues Contact Area Comp Secs OR SMAE 0533 58500

March 17, 18 — **SAMUEL WHITBREAD, PSA HOBBY AND MODEL SHOW.**
Wide range of models, wargames, handicrafts and trade stands Venue Samuel Whitbread School, Clifton Road, Shefford, Beds Contact Jim Bassett Tel 0462 811406

March 17, 18 — **HOBBIES FOR ALL — MODEL SHOW '84.**
Venue Belper Sports Centre Contact Christopher D C Thorpe Tel Ashbourne (0335) 70600

March 25 — **SHEFFIELD CLAMS CONTROL-LINE GALA — FAI T/R, FAI COMBAT, GOODYEAR**
Venue RAF Church Fenton Contact John James Tel 0709 588476

March 25 — **WHARFEDALE A COMBAT**
Venue Dewsbury, West Yorkshire Contact: Jeff Smith Tel Leeds (0532) 663432

March 25 — **SMAE 2ND AREA MEETING — F/F F1C (HALIFAX & PLUGGE), O/R (GAMAGE), O/G**
Venue Local area venues Contact Area Comp Secs OR SMAE 0533 58500

March 25 — **F3B LEAGUE EVENT**
Venue Church Fenton Contact Mike Proctor, 8 Church Rise, Holtby, Yorkshire Tel 0904 489386

April 1 — **1ST ROUND CLASS 'A' BRITISH DIESEL COMBAT CHAMPIONSHIPS**
Venue The Embankment, Peterborough Contact B Waterland Tel 0778 343722

April 1 — **SMAE INDOOR SCALE NATIONAL CHAMPIONSHIPS**
Venue Alumwell Centre, Primley Avenue, Walsall, Staffordshire 9am 5pm — Peanut, Open Rubber, CO_2 Pre entry in all classes by March 1 Registration fee £1 50 per event £2 00, spectators £1 00 Details and entry forms from Doug Sheppard, 13 Luckington Road, Monks Park, Bristol, Avon Tel Bristol (0272) 697595

April 7 — **'AERO JUMBLE'**
Venue Fleet Air Arm Museum Contact F R Veal, Publicity Consultant, Fleet Air Arm Museum, Yeovilton, Somerset Tel. Ilchester (0935) 840868

April 7/8 — **READING MODEL EXHIBITION**
Venue The Hexagon, Reading Contact A B Milne Esq (Exhibition Manager), 39 Springhill Road, Goring on Thames, Reading Tel Goring on Thames 872949 (Solely models - there are no trade stands)

April 8 — **SMAE CONTROL LINE MEETING — F2B, F2C, F2D, GOODYEAR, A COMBAT**
Venue Three Sisters Contact Bob Horwood Tel 0272 48769

April 8 — **SMAE HANDICAP SPEED**
Venue Bicester Contact R McGladdery Tel 01 994 6320

April 8 — **CONTROL-LINE SCALE OPEN DAY/FLY-IN**
Venue Broomwade SSC High Wycombe Contact Ron Truelove Tel Penn (0494481) 5300 evenings

April 8 — **CONTROL LINE AEROBATIC F2B AND NOVICE**
Venue Broomwade SSC High Wycombe Contact Glen Alison Tel Rickmansworth 772675

April 15 — **FIREBIRDS MC (SMAE) SPRING R/C FLY-IN**
Venue Fairthorne Manor, Botley, Hants Contact Lee Fryer Tel Southampton 550307

April 15 — **ODIHAM SPRING GALA — F/F FAI G/R/P, Cd'H, CO_2, HLG, SCALE**
Venue Odiham Contact Bob Taylor, 1 Engalee Cottages, Copthorne Bank, Sussex

April 21, 22 — **SMAE F/F EASTER MEETING OPEN AND FAI G/R/P**
Venue Barkston Heath Contact Trevor Faulkner, 4 Birchitt Close, Bradway, Sheffield S17 4QT

April 22 — **F3B LEAGUE EVENT (EUROPEAN CHAMPIONSHIPS TEAM TRIAL)**
Venue Southern venue Contact Geoff Dallimer, 36 Farthing Drive, Letchworth, Herts Tel 04626 78745

May 5 — **F3B LEAGUE EVENT (EUROPEAN CHAMPIONSHIPS TEAM TRIAL)**
Venue Cranwell Contact Norman Mitchell, 159 Windsor Drive, Wigginton, York Tel 0904 760991

May 6 — **SMAE MINI/VINTAGE F/F MEETING A1, Cd'H, A, HLG, CO_2, SOP VINTAGE**
Venue North Luffenham Contact Trevor Faulkner, 4 Birchitt Close, Bradway, Sheffield S17 4QT

May 6 — **SMAE CONTROL LINE MEETING — F2B, F2C, SPEED, A T/R, B T/R, A COMBAT CARRIER, GOODYEAR NOVICE AEROBATICS**
Venue Barkston Heath Contact Bob Horwood Tel 0272 48769

May 6 — **2ND ROUND CLASS 'A' BRITISH DIESEL COMBAT CHAMPIONSHIPS**
Venue The Embankment, Peterborough. Contact B Waterland Tel 0778 343722

May 6 — **TONBRIDGE OPEN THERMAL SOARING EVENT (BARCS LEAGUE)**
Venue Leigh Park Farm, Nr Tonbridge, Kent Contact K Miller, 18 Bounds Oak Way, Southborough, Tunbridge Wells, Kent £2 Pre-entry, frequency and alternate plus SAE

May 12, 13 — **BRISTOL AND WOODBURY WEEKEND**
Sat Champagne Event for OR OP OG. Vintage Rubber Sun OR, OG OP, All-in FAI Vintage Precision Venue Woodbury Common Contact Elton Drew, 2 Downsfield Close, Alveston, Bristol BS12 2NJ Tel Thornbury 415092

May 12, 13 — **SANDOWN PARK MODEL SYMPOSIUM EXHIBITION & DISPLAY**
Venue Sandown Park Racecourse, Esher, Surrey

A BEGINNERS GUIDE TO FREE FLIGHT SCALE

BY BILL DENNIS

PART 3

THE FUSELAGE of a scale model is always the most interesting part of the aeroplane to build, which is just as well since it usually involves the majority of the building time. Because of the effort put into it, it is vitally important that it can withstand the rough and tumble of landings — both normal and unorthodox.

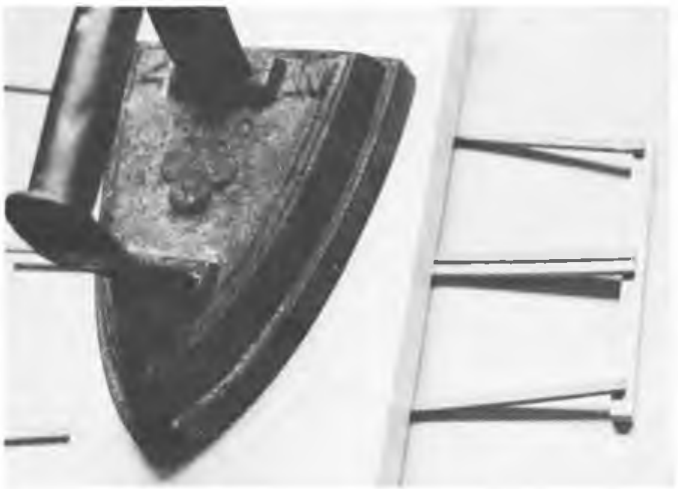
The types of structure we are likely to be simulating can be broadly divided into sheet covered and fabic covered, or something between the two. Metal panelling may also be required.

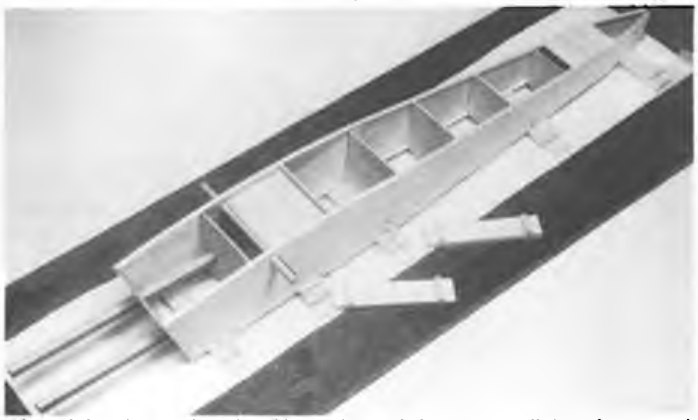
Fabric covered fuselages

These are rather more common than the previous type. In its simplest form, as exemplified by the *Fokker* 'Eindecker', it is just a basic square box with some sheeting around the front end. The more elaborate types simply involve the addition of formers and stringers to build up the shape. The half-shell method of construction is less suited to the power model as it is less strong and if broken, it is almost impossible to repair satisfactorily.

Where the fuselage is of large cross-section and liable to C.G. problems, for example the *Sopwith* 'Camel', then the use of balsa longerons is acceptable. Again I prefer the use of, say, 3/16in. square of a medium grade rather than hard 1/8in. square. Another type where I would use balsa throughout is the multi-stringered fuselage, such as the *Hawker* 'Hind'. Here, it would be advisable to use medium longerons but harder stringers of 1/8in. or 3/16in. by 1/16in. to avoid sagging. The strength of an all balsa structure can be improved locally around the cabane area by laminating the longerons on the inside with 1/8in. x 1/16in. spruce.

Hard balsa is preferred on the smallest models as a concession to weight but for most other types, spruce longerons must be used for reasons of strength and flexibility. Some of the weight can be recouped by using light section spacers which can be further apart, since spruce does not pull-in after covering as balsa does. The *Sopwith* 'Pup' is typical of this type of construction, so I will leave that subject for the moment.





Above left: where a sharp bend has to be made in spruce, split lengthways and glue the laminations. These are the tail ends of the Sopwith 'Pup's' fuselage sides. Above right: this example of an all-balsa sheeted box fuselage is John Coker's Spartan 'Arrow.' The use of simple jigs guarantees accuracy.

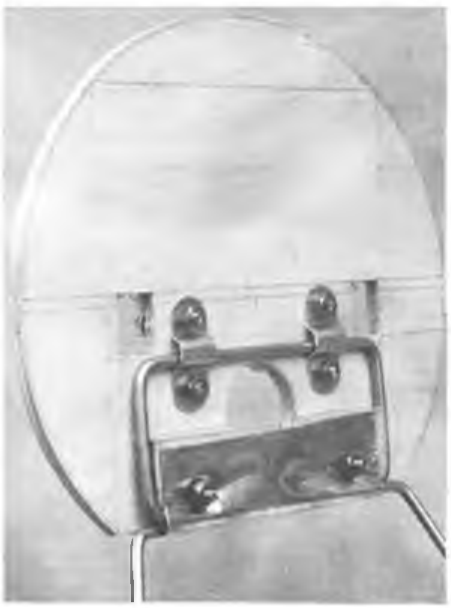
Sheeted fuselages

It is very easy to make strong fuselages, but care must be taken to keep the weight within bounds. A typical example of this kind of aeroplane is the *DH* 'Moth', which had a spruce box structure fitted with curved formers and the whole thing panelled in thin ply. On a model, this is easily represented using balsa throughout. I think it is better to use large section longerons and 1/16in. balsa sheeting of medium-light quality, rather than hard wood of smaller section.

Using this structure, the only likely area of difficulty is in sheeting a curved top decking. With a sharp bend it can be tricky getting the wood to follow the shape accurately. Soaking the wood and taping it down well usually works but can lead to sagging between the formers, like the proverbial starved horse. Use plenty of formers.

Faced with this problem on the *DH34*, I overlaid the sagging balsa with panels of 1/64in. ply, stuck with strategic applications of epoxy. This thin ply is very useful material indeed on a scale model. It is not too heavy and yet is very resilient when laid over soft balsa sheet.

The alternative to balsa sheet over a curved area is to plank with strips. Again, I prefer thick strips of softer wood which can be sanded down to disguise any errors. The extra stiffness afforded by the glue lines virtually eliminates sagging but obviously close-set formers are a great help. Planking must be used, of course, where double curvature is present.



Above: torsion bar u/c mounted on the Sopwith 'Pup's' front bulkhead before assembly. Below left: the first step in assembling the 'Pup' fuselage. Note gussets reinforcing the longerons where they have to be cracked. Below right: the firewall butts onto the front fuselage and the bearers glued to the sheet sides. Use Araldite for these joints.

Engine mounting

The basic fuselage structure is usually quite straightforward but there are three other areas that need to be given careful thought. The first is the engine mounting.

When the model is being trimmed, you will almost certainly need to make adjustments to the thrustline. Downthrust is easy but try to avoid piles of washers under the rear lugs by incorporating the correct angle when

putting in the bearers. The lower the thrustline, the more downthrust will be needed.

As for sidethrust adjustments, it is impossible to tell in advance how much will be needed and making oversized bolt holes in the bearers is very bad practice. Also, mounting the engine directly onto the bearers means you cannot fit a bigger engine with wider lugs when your aeroplane does not fly! Much better to mount it indirectly via a plate made from ⅛in. dural. Use engine bolts countersunk into the lower surface if you cannot place the bearers far enough apart to clear normal bolts.

The front fuselage bay is best filled with ⅛in. sheet and try to arrange it so that the bearers are glued to the sides, rather than just passing through the bulkheads. In this way, any shocks on landing can be dissipated throughout the whole structure.

width behind the other but this is easily disguised with careful fairing work.

The wire size to use is 12swg. If weight is critical, the rear legs can be cut off and replaced with lighter gauge wire soldered on. The rear legs are not fixed but are best restrained by bands on hooks, otherwise they tend to come out of the fuselage slots and go back in somewhere else.

Models less than 20oz. can get away with rigid, i.e. unsprung legs, relying on the sprung axle or big spongy wheels to absorb impacts. *Sopwiths* for example, had their axles hinged at the centre and held down to the undercarriage legs by bungee rubber and this can be simulated on a model by soldering the axle to the spreader bar at the middle and binding each end with rubber bands.

There are some very complex undercarriage structures to be tackled but in most cases main legs can be identified and built on the torsion principle, with the other legs arranged to collapse. Occasionally, however, you get a prototype where nothing can be done and the undercarriage must be made rigid and strong. In such a case, it is a good idea to make it in two halves which plug into brass tubes mounted in the fuselage. The halves will be held together by soldering cross-bracing but when they get bent beyond redemption, they can be unsoldered and replaced. One example of a necessarily rigid undercarriage is Michael Smith's large *Bristol* 'Fighter', which relies on axle springing alone. Wing mounted undercarriages can pose additional problems. Strength may be compromised since the point of impact is out 'on the limb' and how do you incorporate springing?

Cedric de la Nougerede's 1/10 'Tiger Moth' demonstrates its strongly built cabane structure. In this case, Cedric has soldered the wing dowels directly to the cabane. Right: Cedric's Me109 is built on the same lines as his APS 'Mustang.' Fuselage is a horizontal crutch structure sheeted over formers.

The front bulkhead should be of ⅛in. plywood, since it is heavily stressed. In addition to supporting the bearers, it is usually the site of attachment for the undercarriage and front wing dowels, either directly, or via a cabane structure.

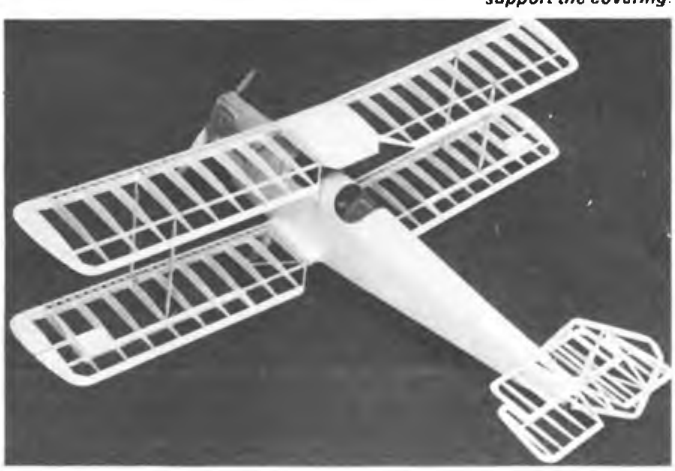
Undercarriage

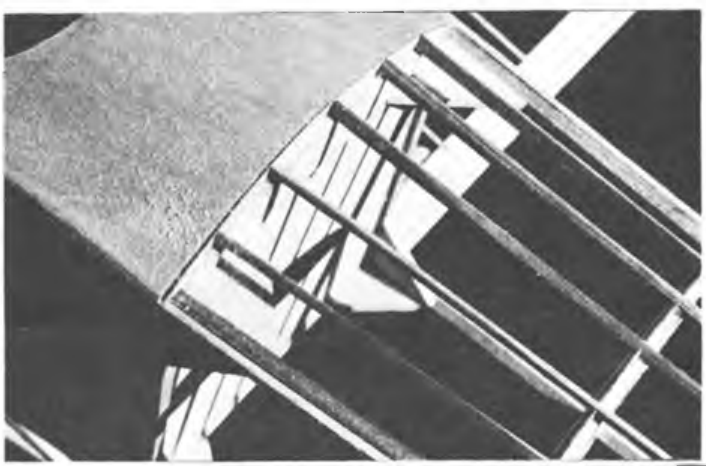
For a maintenance-free, shock absorbing undercarriage, the torsion bar system cannot be beaten. This relies on the twisting, rather than bending, of piano wire to absorb an impact and return to its original shape — like on a *Morris* 'Minor's' front suspension. The accompanying photograph is self-explanatory. The torsion box part is held to the bulkhead by J-bolts (Fig. 1) but as I never have any of these when I need them, I use a combination of commercial undercarriage clamps and a tinplate strap. It is inevitable that one leg will be one wire's

Above: here the rear cabane struts fall in the cockpit area, so they are mounted on the locally reinforced longerons. Below left: the 'Arrow' ready for covering. The shapes at the aileron tips are more complex than usual. Note tail surfaces are built on traditional lines. Below right: stringers on the 'Pup' are shaped to a knife edge. The supplementary 1/64in. ply full depth formers can be seen, also the strips glued to the longerons to support the covering.

Almost all aircraft featuring this type of undercarriage are low wingers, although some biplane types have their U/C legs mounted outboard on a lower centre section. The *HP 0/400* was like this and the only form of springing possible was of the floating axle variety. Luckily, the undercarriage legs were short in relation to the size of the model, which meant that the impact of landing was taken on the nose and dissipated through the structure.

If the undercarriage on a low-winger is mounted on a stub centre section, like the *BA* 'Swallow', then a torsion bar system can be incorporated, mounted on a reinforced mainspar. However, a type like this needs to be built light for realistic and safe flight and in this case a rigid undercarriage will probably suffice. My *APS* 'Swallow' weighed only 8oz. with its all-balsa structure and never suffered any damage to its





rigid undercarriage. Such types are great fun to fly in calm weather, when the possibility of a fast downwind U/C crunching landing is small!

The next type, as exemplified by the 'Hurricane' and 'Mustang', is where a retractable leg is mounted on the wing itself. In these cases, where flights are likely to be in the 'exciting' category, I think it is best to leave the undercarriage off altogether, for practical and aesthetic reasons. You can always use a plug-in type if you like to keep your models on the 'telly'.

If the wing mounted legs are fixed, as on a *Miles* 'Sparrowhawk', then the best guarantee against damage is to go back to the knock-off idea, using wing tongues — the section is invariably thick enough.

The third major component of the fuselage is the wing attachment, which I will deal with under the following heading, as it is common to most models.

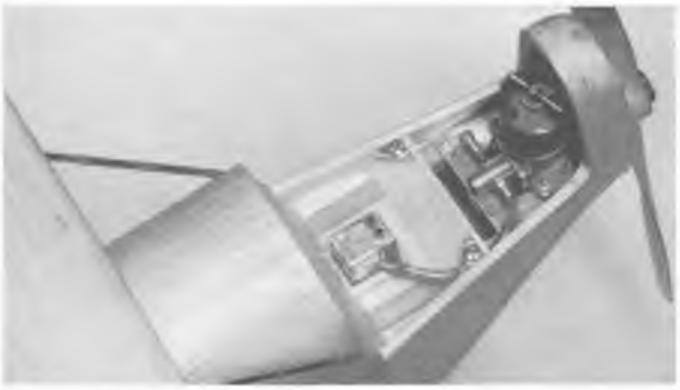
The lower wing dihedral dowels are spot-epoxied through the lower fuselage sides via their brass tubes. The angle of incidence of the wings is checked against the plan using balsa strips marked off at the leading and trailing edges. Finally, rather than trust your measurements implicitly, line up the leading and trailing edge on each side from the rear of the model by eye, just to be sure.

The rear cabane struts are something of a problem since they join the fuselage in the middle of the cockpit, and so to mount them across the fuselage would be rather obvious. The compromise used was to mount them via tubes onto the longerons, which were reinforced locally and bound with thread.

The bracing on the front cabane can be soldered in before gluing into the angle formed by the fuselage top and the bulkhead F1. The fore and aft bracing wires are now bound in place — but not soldered yet.

The centre section ribs must be slotted to

In the same way that wing spars should not show beneath the covering, on most fabric covered aeroplanes, the fuselage spacers were also invisible. This can be simulated on the model by glueing strips of 1/8in. x 1/32in. balsa along the longerons and down the sternpost to form a continuous sub-frame which will hold the covering away from the spacers. Rubbing the spacers with a candle helps prevent the tissue from adhering when doping. When using broad section longerons these narrow strips help to maintain the illusion of a delicate structure. Many light aircraft, such as the 'Puss Moth', have stringers running down the mid-line of the fuselage. While these will hold the covering away from the spacers, it is still important to employ a narrow — say 1/16in. x 1/32in. — strip along the longerons for the covering to adhere to, otherwise it will stick to the whole 1/8in. or 3/16in. width and look untidy.



Left: instead of bolting your engine directly to the bearers, mount it indirectly via a dural plate which allows easy thrustline adjustments. Below: on a Bristol 'Fighter' it is not possible to have the u/c legs swing back. Michael Smith has made a strong structure and relied on axle springing. Right: the tailskid on the Bristol is also built to last!

The Sopwith Pup

This model is a classic example of the square box fuselage. More complex shapes are simply an elaboration of the basic theme.

As with the wing and tail, the outline is fairly accurate, with a few adjustments needed to the undercarriage geometry and forward fuselage. The 1/8in. square balsa longerons are obviously inadequate and are replaced with spruce. The basic sides can be built up, with medium-light 1/8in. sq. balsa spacers and the front bay filled with 1/8in. sheet, together with the lower wing reinforcement. The top longeron is straight, so the sides can be joined together inverted, directly on the plan. The sharp bend aft of the cockpit is unfortunate since the longerons must be cracked, so use some hefty gussets. The curve at the sternpost can be tricky with spruce, as any attempt to bend it will probably distort the rest of the fuselage. What I did was to remove the rearmost spacers and split the curved part vertically with a knife. Glue is squeezed between the resulting laminations and the curve held while the glue sets.

At the front end, the undercarriage is fitted to the bulkhead before it is glued face-on to the fuselage. The addition of the bearers, Araldited to the 1/8in. sides, completes the basic structure.

Next comes the most difficult and important part of the model, namely setting up the cabane structure. In common with most free-flight models, the incidence used is +3° on the wings, with the tail set at zero. The easiest sequence to follow on this model is to set the bottom wings to the correct angle relative to the top longeron and then ensure that the top and bottom wings are at the same angle.

allow them to pass over the cabane cross pieces. By increasing the depth of the slots progressively and differentially, the height and angle of the top wing can be adjusted relative to the bottom. Check also that no yaw has crept in and that the gap at each tip is the same. When satisfied, spot epoxy the brass tubes to the centre-section spars and complete the soldering of the bracing. Check again and finish with Araldite.

It is all plain sailing from here. The top fuselage stringers are from 1/8in. x 1/16in. spruce to resist sagging. Realism can be greatly improved by shaving them to a knife edge. An unusual feature of the 'Pup' is that the stringer formers show through the covering. While it would be easy to use full depth slotted formers from 1/16in. balsa, the edge would be too thick. Instead, I glued the stringers onto formers reduced by 1/8in., and backed these up with false formers from 1/64in. ply cut to the full outline.

The forward decking is from 1/32in. ply. While heavier than balsa, it is near the centre of gravity and the strength gained is very valuable. Also, you do not need as many formers to support it, so weight can be saved here.

The fairing of struts always gives me a headache. They must be of a realistic thickness and yet the fact that the undercarriage and cabane are flexible to a certain extent means that the fairings tend to split away from the wire. Hard balsa, or spruce for varnished struts must be used and the wire sandwiched between the two halves whenever possible, rather than gluing the fairing to the rear edge of the wire. On the 'Pup', the interplane struts were sandwiched from 1/16in. sheet spruce, suitably grooved. The 12swg undercarriage legs are too thick to be sandwiched in a strut of scale thickness, so lengths of 1/8in. spruce were 5-minute epoxied to the wire, which must be scrupulously cleaned of flux and grime. This left a gap down the middle into which Araldite was scraped and the strut filed and sanded to shape. Since the undercarriage legs are painted, this 'filling' will be masked.

Unfortunately the centre section struts on all 'Pups' seem to be varnished, so an attempt must be made to get a wood finish. In this case, the gap between the main strips, either side of the wire, is filled with narrow strips of spruce, with a minimum of glue squeezing out onto the surface. All that should be left now are gaps at each end where the cross-bracing wires are soldered. Take a coarse sanding block and some obechi sheet and make a lot of sawdust. Mix this with PVA into a thick 'gunge' and use it to fill the gaps. This will set rock hard and can be sanded easily. When the strut has been sanded to section, it should be reasonably convincing.

The wheels shown on the plan are laid up in a mould from papier mache. Another, more common way is to laminate the whole thing, tyre and all, from balsa and ply (Fig. 2). This is fine for indoor and rubber models,

but useless for the outdoor power model, especially if runway take-offs are contemplated. It takes a lot of skill and patience to sand a tyre to a believable and consistent shape, only to see it scrubbed to pieces on landing.

The *Williams* scale wheels are quite realistic and their use is recommended for sport scale models. However, in some cases the diameter, or tyre section will be wrong, so you will have to make your own. You should always keep your eyes open for pieces of rubber tube of likely section. Someone usually has some at contests. It is a simple matter to cyano the ends together to make a tyre. Finding the tyres is the hardest part, since all that remains is to make the wheel from discs of 1/32in. ply and 1/4in. balsa, with spokes from 1/32in. balsa. The axle hole is best drilled on a stand to avoid wobble. Sand a hollow around the wheel, using

A home made wheel destined for Michael Smith's Bristol, note the 1/32in. balsa 'spokes.'

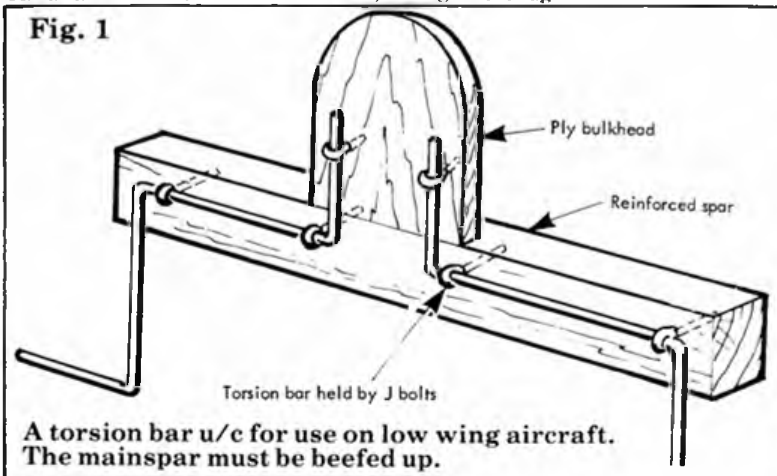
coarse sandpaper wrapped around some 3/8in. dowel and then Araldite the tyre on, reinforcing with headless pins pushed right through.

The original plan shows a fixed bamboo tailskid but a sprung skid is much more satisfactory. Where a skid is hinged inside the fuselage, epoxy a straight wire pivot through the skid and let it rotate in tubes fixed to the fuselage sides. Spring the skid with a couple of bands but adjust the tension so that the aircraft sits, rather than perches, on its skid.

The skid seen on most 'Pups' is hinged on a sternpost extension below the fuselage, and so calls for some delicate wire-bending to keep a scale appearance. I wrapped the skid with a 1/16in. wide strip of brass shim, then drilled through for the 18swg pivot tube. The wire hinge is bent in two separate halves from 18swg wire and soldered to a stout brass tube post.

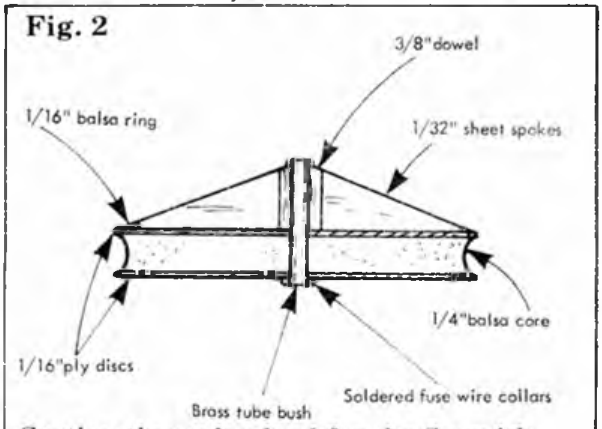
We are now at the stage where we can contemplate covering the model and this will be the subject of next month's article.

Fig. 1



A torsion bar u/c for use on low wing aircraft. The mainspar must be beefed up.

Fig. 2



Section through wheel for the Sopwith 'Pup.'

Scale Contest News

with Bill Dennis

During 1982 the FAI approved major amendments to the International C/L and R/C scale rules. The most important of these was a new static judging schedule which falls in complexity between the standoff and superscale classes, which it replaces.

The SMAE Scale Committee was very aware that our domestic rulebook was confusing, with many amendments, and different rules for almost every class. In 1983 we overhauled the rules, incorporating the new static schedule almost across the board and making many minor changes designed to streamline things and make life easier for judge and competitor alike. By the time this appears, copies of the new rulebook will be available from the SMAE Leicester office, although as I write, it is unclear whether you will have to pay £1 for it or not. This is not the place to go into details about the changes but one thing worth mentioning is that the minimum span for outdoor rubber scale models is now 60cm, so bear this in mind when designing your Nationals winner.

With the uncertain future of the SMAE newsletter, it is impossible to get information across to the competition scale modeller in a quick and reliable way. For this reason the Scale Committee is to set up an information service for SMAE members, which will work like this. If you are a contest flyer, send in five SAE's to the SMAE Leicester office, together with an indication of the classes in which you are interested, i.e. Indoor, F/F, C/L or R/C. Then, when relevant information needs to be disseminated, you will get it, without being subject to the vagaries of magazine publication dates, etc.

At the same time, those of you who are organising scale events, please send in details so they can be incorporated. You never know, if people realise your event exists, you might double your entries. Example — the Eddie Riding and Selby trophies, whatever happened to them?

Contests

It is some time since a contest was specifically run for the CO_2 electric class. It was last tried about seven years ago but support was so thin it was abandoned. There appear to be many more CO_2 models around now, so to test reaction, there will be at least one event this year. Don't forget, however, that CO_2 models can be entered in a 'power' event, including the Nationals but with the 30-second qualifying time.

Last year saw the introduction of a Control Line scale racing class, but the event at Abingdon received no entries. This may reflect zero interest but I hope that late publicity was the real reason. The idea behind the class is for simple but accurate models of racing aircraft, with an engine limit of 3.5cc, to be timed over ten laps, and the speed to be combined with the scale score. As no gadgets are required, it is hoped to attract those who would not normally enter Control Line scale events.

See Model Flyer, March 1983 for details. The address of the SMAE Leicester office: SMAE Ltd., Kimberley House, 47 Vaughan Way, Leicester, LE1 4SE.

PHOTO-PRIZE ~ MODEL NEWS ~ with Fliar Phil

Win a Cosina SLR Camera

All entries should be good quality black and white or colour prints. Your name and address should be on the back of the print. Details if possible should be given about the model and its construction. Send all entries to: Aeromodeller, Photo prize Feature, PO Box 35, Wolsey Road, Hemel Hempstead, Herts. HP2 4SS. Photos will be returned after publication.

FEBRUARY and March usually provide weather that is cold, wet and windy. However, we aerobods spend them happily building our 'masterpieces,' that in a few months time will soar up 'into the wild blue yonder.' At least we hope so! This month's collection have *already* had the wind under their wings.

Photo 1

Our first photo comes from Canada and displays the building expertise of Steve Gray (Ontario) and the photographic skill of Ian Henderson of Toronto. He took the photo at the Model Aeronautics Association of Canada 1983 Nationals. The model is the DH C-5 'Buffalo.' Power two *OS* .40's. Seven channel radio control and it took third place in Stand-Off Scale.

Photo 2

Most dramatically photographed by Don Eades (Chairman of Petersfield Aeromodellers) this *DH2* was built by Bob Howat of Petersfield, Hants. Scaled from 1/48th scale MAP plans, span is 54in. powered by a Merco 60. Bob has painstakingly detailed his model. He writes, "All rigging works, down to hand-made turnbuckles." In Fliar Phil's book, that is *real* scale modelling!


1


2

Photo 3

Wearing the attractive colour scheme of the Post Office 'Datapost,' is this Chris Foss 'Wot 4.' Sent to F.P. by Mr. J. A. Sidebotham of Gloustershire, details are: engine *OS40* FSR (silenced), foam/veneer wings and built up sheet fuselage and tail. Controlled by MacGregor radio on ailerons, elevator, rudder and throttle. If Flier Phil is a bit late sending in this feature, perhaps Mr. Sidebotham's Datapost model would help him out!

3

Photo 6

A fine 'in flight' photo of a *Fieseler* 'Storch,' modelled to 1/20th scale. Built by that master of the scale model, Ing Lubomir Koutny from Czechoslovakia, it is rubber powered, spans 700mm and has an average flight duration of 60 secs.

Photo 7

A rare subject for this feature. A control line autogyro, built by Keith Simms of Basingstoke, from an Aeromodeller plan (C/L 1272). The rotor span is 37½in., power an *Enya* 19 MkIV. In his letter Keith says it was very easy to build and has flown frequently. He adds that his college friend said Fliar Phil would not publish this photo! Well Keith, F.P. *has*! — but would prefer *not* to be around if you try looping it!

So whatever the weather, don't forget to get a photograph of YOUR masterpiece! Remember your photos make Fliar Phil's day!

Photo 4

And now permit Fliar Phil to introduce, on the right, that genius of the jet engine, Sir Frank Whittle, and on the left Peter Gatehouse, who built this superb R/C scale *British Aerospace* 'Hawk' from a *Fanjets* kit. Fliar Phil is indebted to Ray Holl of Surrey for this photo which he is sure will be of interest, not only to scale fans, but all aeromodellers.

Photo 5 (Winner)

To obtain this fine study of that much-beloved fighter, the *Gloster* 'Gladiator,' Tony Froggatt of Great Wyrley, says he got down to the pilot's level! F.P. feels that never did an aeromodeller "get down to it" with more success! Built from plans by Brian Taylor of Somerset, it uses conventional materials and trade accessories. Finished in the markings of 87 Sqdn. Your camera will be on its way to you Tony. All the best!

Electric Round The Pole Flying

with Brian Waterland

WHAT do control-line combat fliers do in the winter? Well, if they belong to Peterborough Model Flying Club, they fly Round-the-Pole Combat. When the club first started flying R.T.P. some years ago, the planes used were the well known *Harry Butler* kits. These are very quick to build, especially in their profile form and soon led to combat flying with the models trailing ½in. wide metallised film streamers. Towards the end of a session, streamers are abandoned and the object is to remove your opponents tailplane!

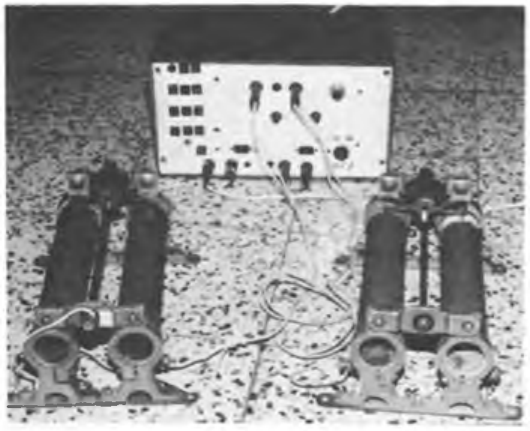
In fact, the rate of attrition is remarkably low. During a whole day's flying at a local hobby exhibition only one model was written off. Repairs with Cyano glue are so quick it is not worth removing the model from the lines to fix it.

It was for the above mentioned hobby exhibition that the club decided to fly bouts between reasonably likely adversaries, e.g. 'Spitfire' versus 'ME109', 'Fokker' versus 'Sopwith Camel'. To improve recognition the models were painted with car aerosols and paper markings applied. The idea was a tremendous success, cuts by 'Spitfires' being greeted with cheers and those by 'Messerschmitt' with boos and hisses. However, the most popular bouts were between a 'Sopwith' biplane piloted by an outsize *Snoopy* and a 'Fokker Eindekker' flown by the *Red Baron*. Alas, the *Red Baron* triumphed and it is his 'Fokker' that is the accompanying plan.

The Equipment . . . The Power Unit

The original club system had a transformer for *each* output — this was then rectified and passed via rheostats (old dimmer switches) to the pole. Perhaps more by luck than judgement, the equipment worked. Recently, however, the power unit has been rebuilt around *one* 25-volt 4-amp transformer feeding *both* outputs. (Fig. 1). The current is then rectified and smoothed with large (3000 microfad) capacitors. The system retains the original rheostats since not only are they more linear and capable of passing greater current than the hand-operated variety but they also permit 'hands-off' flying.

Heading: the Fokker 'Eindekker' in all its glory. simple felt pen markings make a considerable difference to the appearance. Below: power supply and control systems, box contains transformer/rectifier, wander plugs are used on cables to permit easy disassembly of system. Right: circuit diagram of power supply.



The Pole

The pole (Fig. 2) consists of four ballraces with metal cages which act as the slip rings. Perhaps the biggest problem is soldering the wires to the inner races. We found the best way was to clean the inner race and then pre-heat the unit on an electric hotplate prior to fluxing and soldering on the wires with a big (75 Watt plus) soldering iron. A copper ring bolted around the outer race collects the current which is then taken via a short length of flex to a miniature plug and socket.

Each *pair* of races is connected with a small piece of plastic. This is used to align the 'slip rings' and to take the flying load (see later). The ballraces are lubricated with *Rocket WD40*.

Lines

The lines used by Peterborough Model Flying club are 5 metres long and made from standard enamelled copper wire. Each *pair* of wires are sleeved at both ends with a piece of valve rubber tubing which is knotted through a paper clip. The paper clips fasten to the plastic at the pole end and to the tether hook at the model end — thus removing any load from the *Harry Butler* electrical plugs and permitting very quick model changes. The lines do need looking after, store them on a reel and avoid kinking them. Do not worry too much about line tangles, the models will still fly with the lines tangled (just like real combat!)

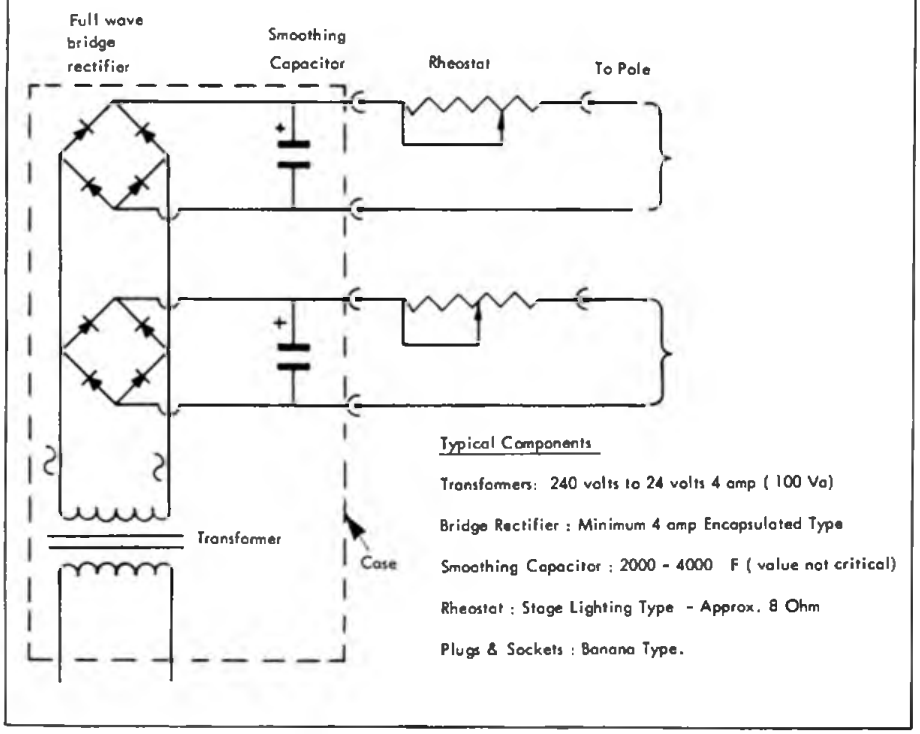
Motors

The favourite motors used are the *H.B.* 4551 (SP7) and 4549 although members have used larger and geared motors. Try not to run the motor flat out lap after lap — they are only rated for 12 volts and it is likely the voltage at the model is a bit higher than this. Using the full range of power improves the flying interest and preserves the motor. If you hit the ground cut the power immediately or the motor will burn out.

R.T.P. Alternatives

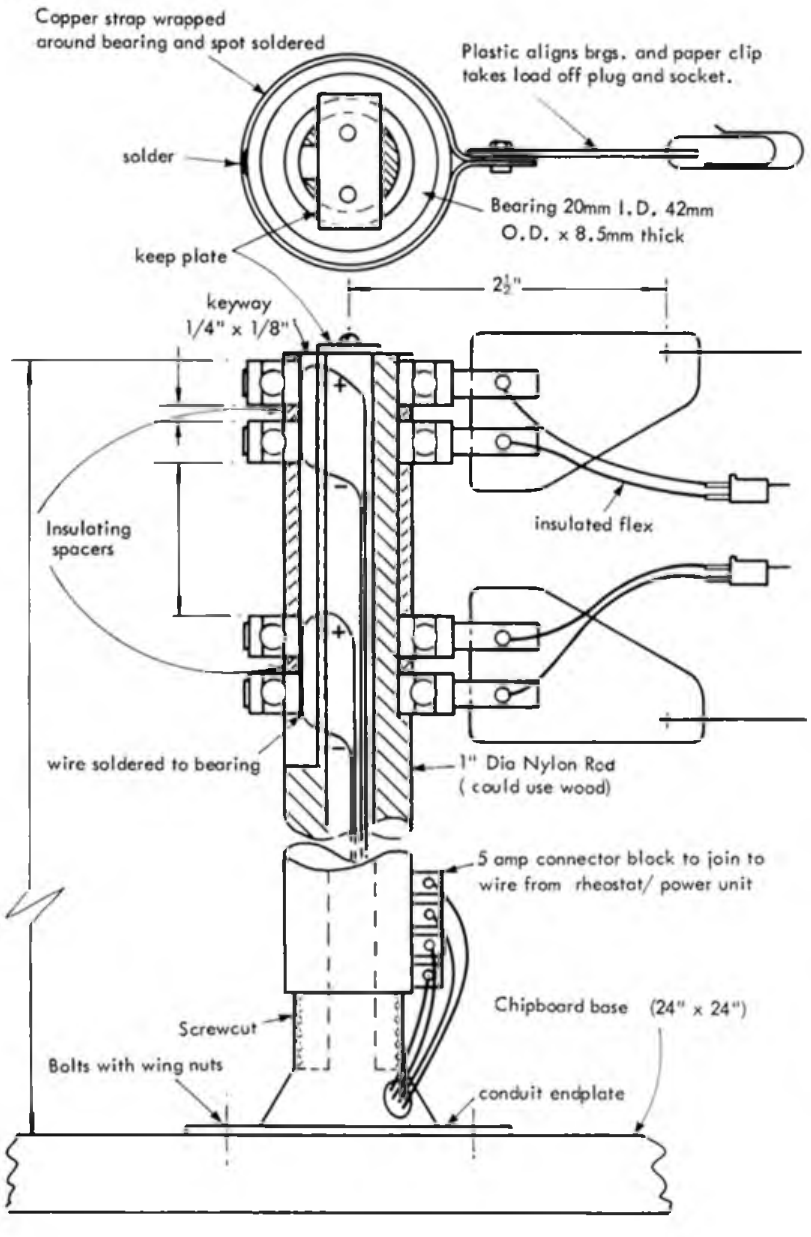
Having built an R.T.P. system you don't *have* to fly combat of course. You may like to try Super Scale, multi-engined models or Aerobatics. Our club has even run carrier deck landing competitions. Peterborough M.F.C. member Mick Page, perhaps better known for his free-flight and hand-launched glider models, undertook a study of the forces on an R.T.P. model. These are more complex than you might expect and Mick has built several models which will knife-edge, fly lap after lap with slack lines and loop with ease. His models have pronounced undercamber and are biplanes with lifting interplane struts (they lift to the outside of the circles) and a large degree of rudder offset. Since they fly on minimum power, however, they are not suited to combat flying where it is important that the model be able to use the full range of power available to it.

Fig. 1



Above: some of the many models flown round-the-pole at Peterborough MFC. Below: constructional drawing of pole components for 'two up' flying. Below right: the finished article ready for action.

Fig. 2



Fokker Eindekker

The model is very simple and quick to build. Remember to keep it light and get the balance point on the wing leading edge. As with all R.T.P. models the fin offset is essential. The undercarriage is very simple but adds a certain period feeling, it is also very strong. All three prototypes were painted with aerosol Pale Ivory *BL* AB55 (which gives a sort of linen appearance) and had felt penned paper markings applied. The motor used is the 4551 or the more powerful 4549.

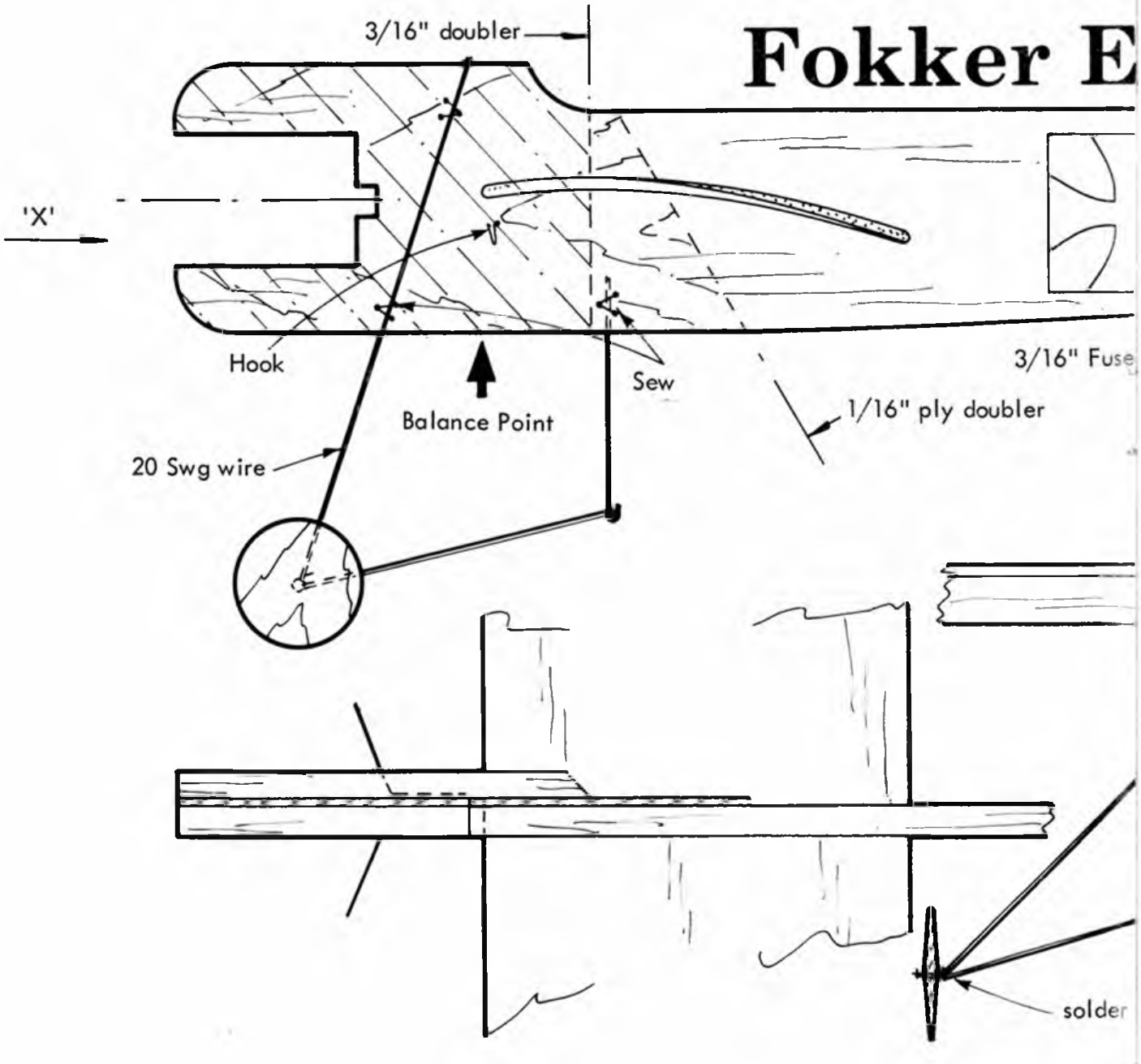
R.T.P. models are set up in a rather odd way, the negative tailplane incidence is very important since this permits a rapid increase in altitude if power is suddenly applied. Applying full power slowly will increase speed without a commensurate increase in height. If the model flies outboard wing *up* then bend the tether hook *down*; if it flies nose *out*, bend the tether hook *forward*; and vice-versa in both cases.

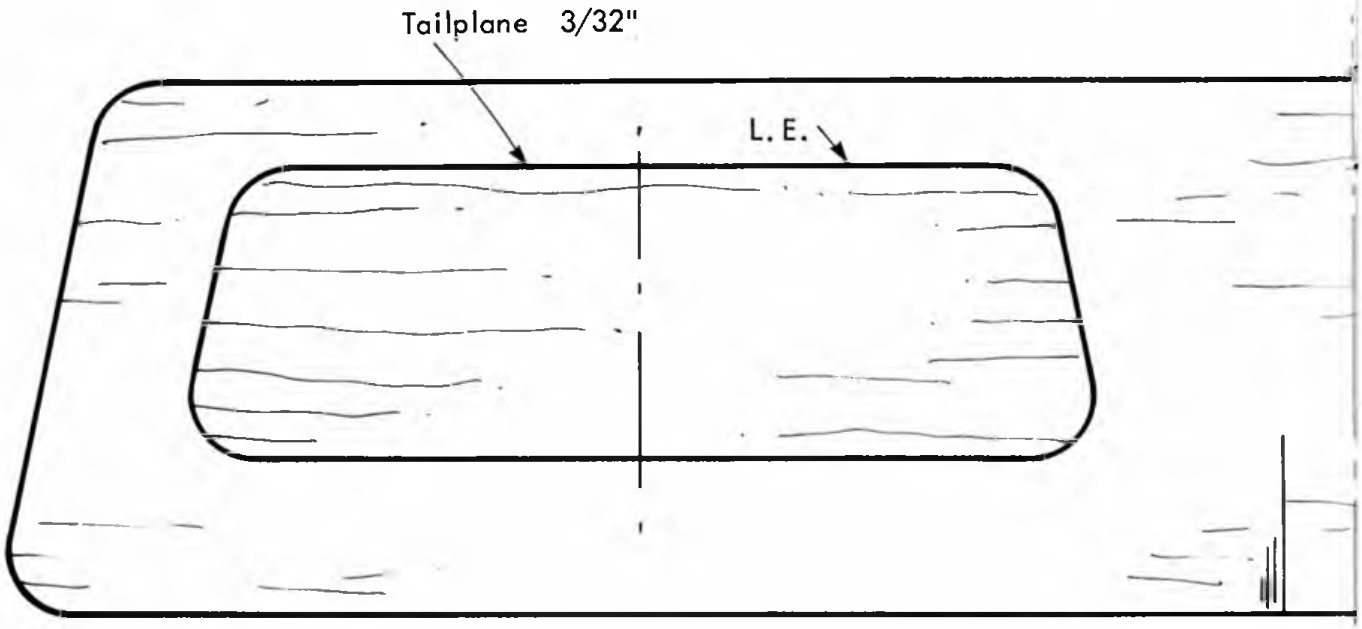
Combat Tactics

Unless you have a very high ceilinged clubroom then you cannot loop. This limits the tactics available to you but, if anything, increases the skill required in getting a cut. Fly higher than your opponent (by giving your model a quick jab of power) and then, when positioned virtually over him, cut the power and your model will dive through his streamer. If he has any sense he will be flying below his maximum speed and as you start to descend he will accelerate away. If he thinks you are badly positioned then he may cut his power at the same time as you, making you overshoot and putting him just behind you — well placed for a cut as he accelerates up and through your streamer. This nip and tuck can continue for minutes on end.

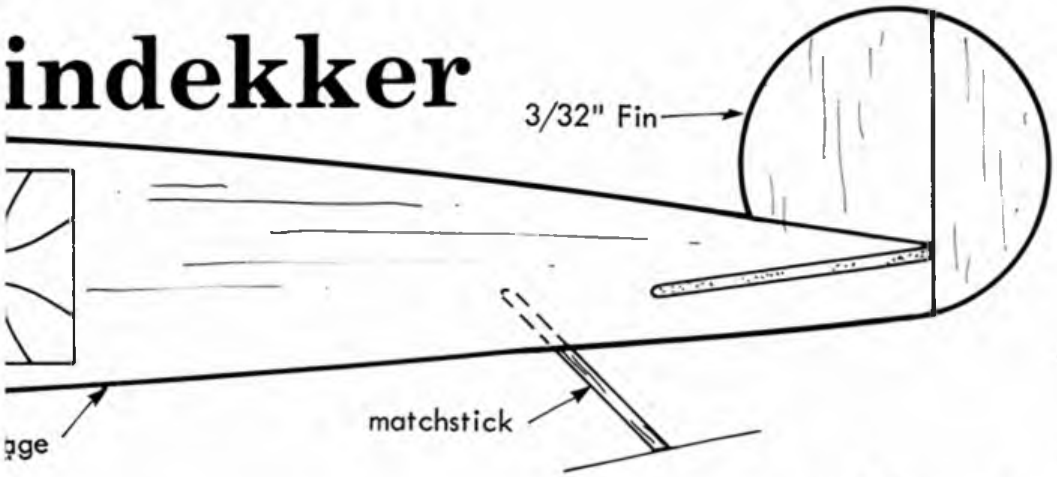
R.T.P. Combat flying is a great leveller, the club juniors often being much better than the senior members. With models costing 50 pence and motors less than £3.00 anyone can join in. Why don't you? Good luck.

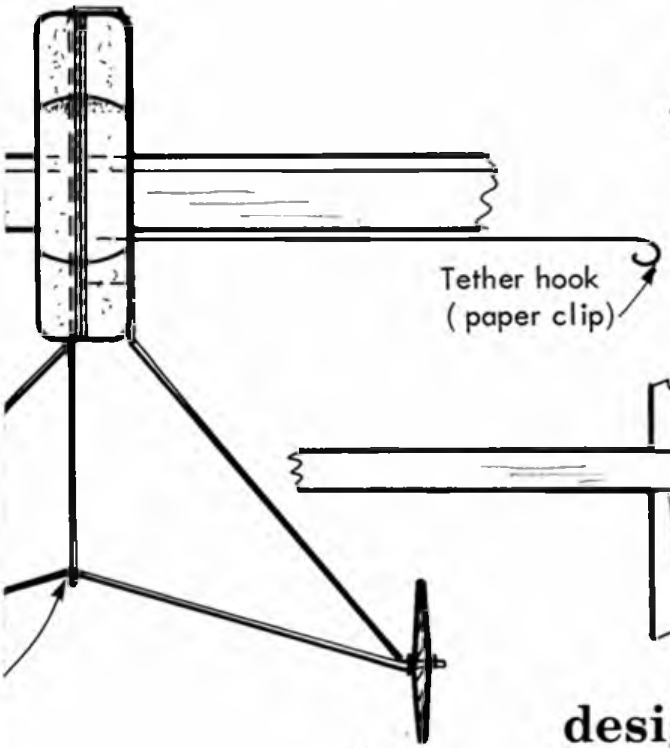
Fokker E

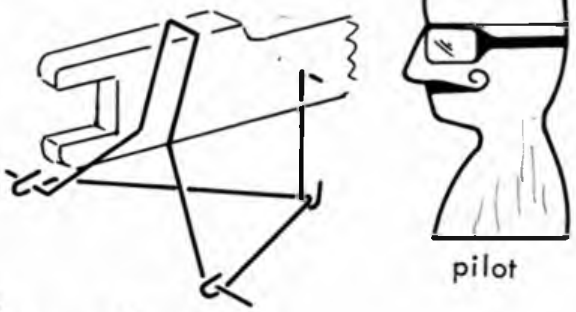




indekker







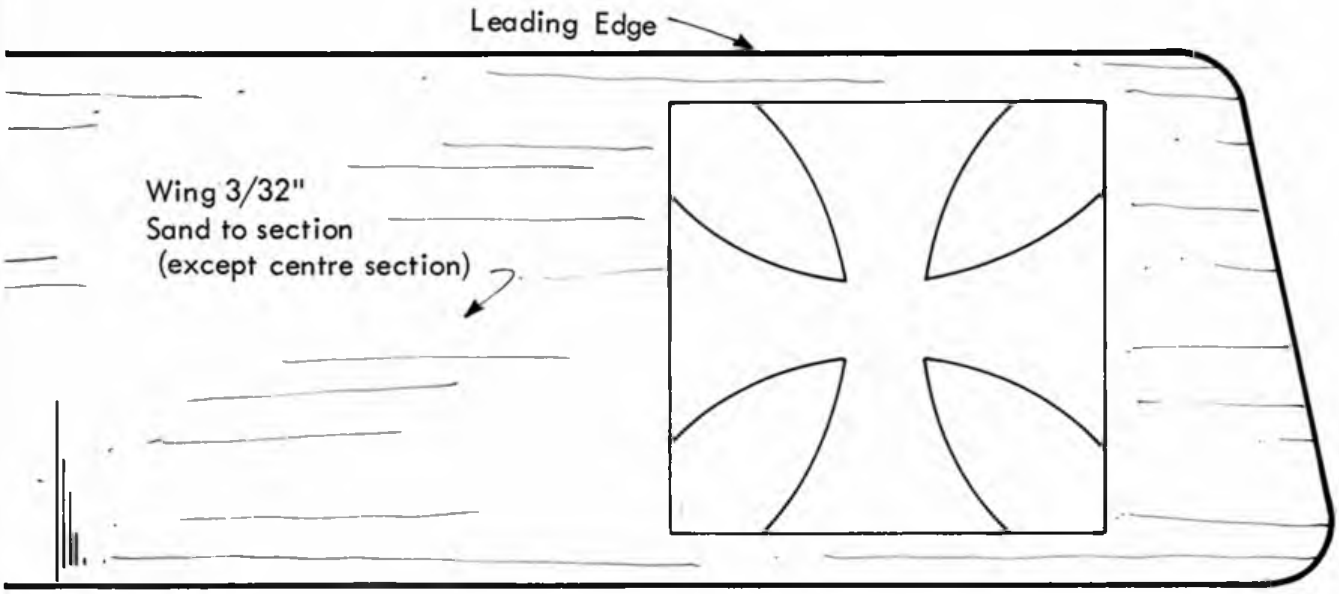
Tether hook
(paper clip)

undercarriage
assembly

1/4" rudder offset

'iew on 'X'

designed by
Brian Waterland



FREE FLIGHT SCENE

Dave Hipperson reports

Anglia Wakefield Day . . . Watton . . . 11.12.83

Bob Wells' annual Wakefield event has a record of calm weather — this year it excelled itself. By lunch time there was zero drift and observers were treated to the spectacle of all manner of vintage Wakefields spiralling up dead overhead and then circling down to land sometimes only feet away from the point of launch. Mike Evatt led F1B from the start by maxing on the first round when conditions seemed the most difficult and some slight drift still existed. Mike's model was gliding very well from climbs of only modest height, whereas in contrast Woodhouse who placed second exhibited an extraordinary high climb. Understandably his trim was knife-edge and one flight piled in on power but the re-fly was just as impressive. A 2:27 on the first round in a strange patch that coincided with the moment the wind died away ruined what should have been the winning score.

All day, conditions vertically were as neutral and stable as your reporter can ever remember which gave most of those flying pre-'51 models some trouble as it became increasingly obvious that even the best trimmed 'classic' Wakefield design is not able to max without lift. Long have the streamliner/slabsider arguments raged and Dick Korda was of course the subject of some controversy when he won the Wakefield Trophy back in '39. He was perhaps somewhat maligned with accusations of a 'lucky thermal.' However design may have had more to do with it than was realised at the time. Almost as much to his surprise as anyone's, Hipperson's replicas of the machine reeled off three flights all well in excess of 3½ minutes. The remaining entry in pre '51 were left sharing one max between them — that from Bernard Aslett flying his well proven 4oz rule 'Lanzo' into second place.

Hipperson also dominated the own design '51-'53 rule class once again with a full score but declined the organisers' suggestion that he should fly off against himself! Bob Wells and Jessica Nash did their customary job of providing authority spiced with the necessary humour to ensure that a good day was available to all those who attended. Perhaps the close proximity of the festive season kept some entrants at home coping with the increased domestic pressure that this time of the year brings and obviously the gales of a day or two before may have put others off. Certainly attendance was down on last year.

Results

F1B — (1983 Wakefield Rules) 10 flew four flights to a 3 minute max

1. M. Evatt	11.47
2. M. Woodhouse	11.27
3. R. Peers	11.17

Vintage Wakefield to '51-'53 Rules (3 flights to 3 minute max)

1. D. Hipperson	9:00
2. C. Hawke	8:00
3. P. Michel	7:30

Vintage Wakefield to Pre 51 rules. 12 flew (3 flights to 3 minute max)

1. D. Hipperson	9.00	Korda
2. B. Aslett	8.38	Lanzo
3. P. Michel	7.38	Isis

CO_2 Duration model by Phil Ball

Phil Ball was in at the start of CO_2. He won the first SMAE CO_2 event when it was simply a scramble at the Nationals. This model is the latest derivative of that more basic aeroplane he used then. It has proved itself in some very blustery conditions this year and a careful study of the structure will show much local reinforcement. We made these drawings straight from the actual model and were most impressed at the rigidity of the airframe despite its light weight. Most probably experience picked up as a senior engineer at *Rolls Royce Derby* has given him much of the thinking. Certainly anyone building a replica would do well to leave out none of the gussets.

Rather unusually Phil uses the *Humbrol* CO_2 unit when most others flying CO_2 duration opt for *Telco*. He has always used the *Humbrol* unit however and swears by them but has detected a tendancy for them to wear out, so he regularly changes components. The model flies a right/right pattern despite the slightly unorthodox washout on the starboard tip and of course the hand carved pine prop is a considerable improvement on anything available over the counter but much more susceptable to damage than a plastic one of course.

This duration class has been slower to take off than had been hoped and much of this has been traced to problems with the motors. I am sure all the manufacturers concerned would agree that a motor suitable for outdoor competition is not the exception but is the rule. If you have one that runs like an 'old nail' then let the makers have it back. In my experience both *Humbrol* and *Telco (Micro Mold)* are most concerned that their products work well and they will help you.

Senior Championships Table 1983

The status of this Aeromodeller/SMAE contest results analysis is growing if the efforts of the top ten this year are anything to go by. The points gained by the top ten this year — 180 — compared with 152 last year suggest people were trying and harder.

Four flyers tied at 15th. Baggott flying more than last year but not doing so well, the other three spreading their success over one 1st, 2nd and 3rd each. All Ferer's points were in Cd'H and Fantham's in glider including his winning of the Euro-Trails very late in the season and a hard fought 2nd in A2 at the Nats. Kaynes had success at the Nats too with his 2nd place in Tailless. His remaining scoring performances came with a win in F1B at Easter and a 3rd in the same class at the 3rd Area event.

John Bailey, always a consistent all round flier, concentrated most of his efforts and hence his success into power. He won the Halifax Trophy for F1C and placed 2nd at the Easter FAI meeting. He was 3rd in the individual results for Team Power and for good measure slipped in a 3rd place at the Nationals in the Open Rubber fly-off.

Three tie at 11th. Davitt and O'Donnell both had similar placings. The former relying exclusively on Cd'H — winning the Summer Mini, and placing 2nd at the Nats and the early season experimental three flight event. He went on to become the first person to ever have placed in the Caton Trophy for Open Rubber at the Northern Gala flying a Cd'H although in truth he did use an Open Model first but damaged it in the gale that shattered the event. Not quite such a good year for John O'Donnell this time. He too won a class at the Summer Mini — A1 and placed 2nd in CO_2 the same day. His other second place was in Open Rubber at the 1st Area event. He also placed in the Gamage a few weeks later. Many still regard John as one of the best ever glider fliers despite the recent advances made by others in this sphere. Perhaps his reluctance to build more A2's and get back on the top of this list is simply that he doesn't want to prove them wrong! Dave Greaves won Cd'H at the Southern Gala most positively but he will remember best his victory at the European Team Trials giving him a long overdue team place. He was also third in the same class at the Nats.

Consistency pays off

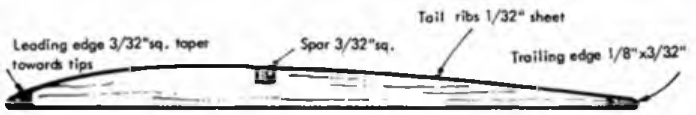
Both George Sharp and Pete Williams had a better year to place joint 9th. Pete's record is particularly impressive as from an extraordinary few events flown he won three well entered glider comps. A2 at Easter, Open Glider at the 2nd Area meeting and A2 for the SMAE cup at the 6th Area event.In contrast George won nothing but flew very consistently in the rubber classes. This gave him 2nd in the Nats in F1B after a fly-off and another 2nd in the same class at the 3rd Area meeting. His Cd'H flying was even better with an early season 3rd in the Experimental event, then 2nd at the Southern Gala and 3rd in the Autumn Mini. He was also 3rd in the Club Champs Open Rubber fly-off.

Trevor Payne slipped a bit this year, flying much the same Power events as usual; his main success came in Open. He was 3rd at the Nats, 2nd at Easter (same as last year) and 2nd in the windy Northern gala. He won the Short Cup at the Southern Gala and here he also found time to take 2nd in ½A. It was generally in this class that he failed to find last season's form despite his models being equally impressive.

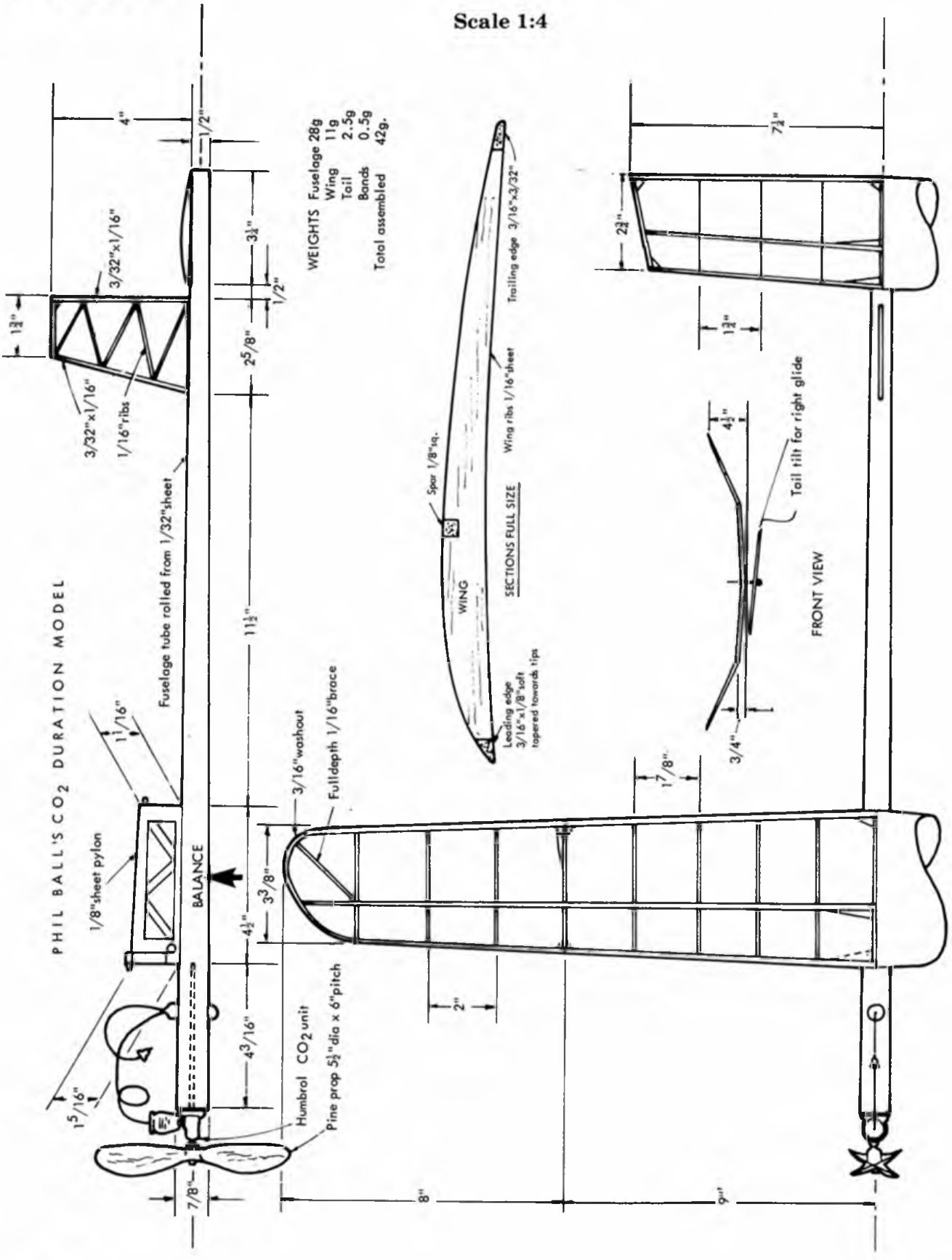
At 7th, this is Terry Dilks' first appearance in the top 20 after a very promising year in Open Rubber winning both the 1st Area meeting and the Club Champs. He also won A1 at the 5th Area meeting and placed 2nd in Vintage at the Nats. Many modellers will remember Terry from the 60's — he only returned to aeromodelling the year before last and now forms a vital part of the every effective Falcons Free Flight Club, two more members of which appear higher up!

CO_2 Duration Model

designed by Phil Ball



Scale 1:4



Peter Harris seems to fly in 22 events each year! This time he snatched some impressive ½A wins. The 6th Area event again and the Quickstart Trophy at the Southern Gala. He was also 2nd in the same class at the Summer Mini meeting. He won Open Power at Easter and placed twice more in FIC with a 2nd at the Nats and a very solid 3rd at the European Team Trials with just one dropped flight. Pete finished 6th this year.

John Cooper at 5th is the highest placed glider flyer — he was last year too. This time he has further improved and won outright three of the most heavily entered events of the year.

The KMAA for A2 at the 1st Area event, A2 at the Nats — the fly-off against Fantham — and individual top for Open Glider in Team Glider at the 4th Area meeting. He backed these wins with 2nds in A1 at the Nats and the Autumn Mini, Open Glider at the 2nd Area event and A2 at the 6th. His 3rd in the Thurston gave him the remarkable 1st, 2nd, 3rd at the Nats and comfortably the overall Nationals Glider award. He was also 3rd in A1 at the 5th Area meeting.

Another new name to this table and once again from Falcons is John Carter. There is no doubt that the top four on this table were fighting it out a bit towards the end of the season and it is under such pressure that John does his best. His season started excellently with a win in the Open Rubber fly-off at the February Experimental. About this time he produced his big Open Glider — (drawing in Aeromodeller a few months ago) and won convincingly at the 3rd Area Meeting. He was then 3rd in both Open Glider and Rubber at the Easter meeting and managed a useful couple of 2nd's at Driffield Summer Mini in A1 and HLG. After extensive repairs he scored enough in the very windy Northern Gala Open Glider for 2nd place and rounded the season off with the Flight Cup for Open Rubber at the Southern Gala, A1 at the Autumn mini and a 3rd in CO_2 at the same event. Anyone who wants to win the Senior Championship next year is going to have to beat John Carter — that won't be easy!

Falcons strike again

As contestants the Falcons Club are a fighting force to be reckoned with. This of course benefits the individual members immeasurably. Here we have another. Russell Peers' best season for years and again producing some of the form he showed around the early 70's. He too started with a win in February topping the Open Power fly-off. Then he won the Frog Senior also for Open Power at the 1st Area event. He managed 2nd in Open Rubber at the 2nd area event and had a good Nats with a 2nd fly-off place in ½A and 3rd in Tailless. The Summer Mini added somewhat to the points tally when he placed 2nd in Cd'H and 3rd again in ½A. He was then 3rd in the windy 5th Area meeting flying F1B and returned to the top again at the Club Champs in Open Power and the Northern Gala in the same event winning the coverted Hamley Trophy with a four minute plus fly-off in a gale. He was 3rd equal in ½A at the last Area meeting and 3rd too in Open Power at the Southern Gala. To end on a high note he took a comfortable 2nd in Wakefield at the Euro-Trials and so won himself an F1B Team place at his first try!

Runner up

Stafford Screen topped this list last year. This year he had a World Champs on the other side of the world to consider. This kept him away from the Southern Gala so his high position here is all the more noteworthy. His performance was steady through the year, but with none of the 'breaks' that enabled him to dominate the first part of last season. Nevertheless he just about cleaned up in F1C. Winning at Easter, the Nats, the 4th Area meeting for the Astral Trophy and of course the European Trials tieing with Alan Jack. His other firsts were in ½A at the Summer Mini and the same class at the Autumn Mini flying his faithful orange model retrieved intact over a year after its much grieved loss mentioned in this article last year. His only Open Power win came in fine style for the White Cup at the 3rd Area event. He only placed 2nd once and that in the experimental February meeting in Open Power. Open Power also accounted for 3rd's at Easter, the Nats and Club Champs. His only 3rd in F1C came at the 2nd Area event he had won all the rest! He had flown in only one more event than last year and once again placed in twelve of them with a performance worthy of the title Senior National Champ for the 2nd year, had it not been for the extraordinary efforts of one Phil Ball. Phil flew determinedly from the start and often in the smaller Mini events to earn points but even here his standard was unsurpassed. Very much back on form in HLG he was 3rd in the Nats but won both the Mini Meetings and the Southern Gala often requiring only five or six throws for his full house. He would have placed 8th in this list had he just flown HLG! Another class he has developed an uncanny knack for his CO_2. (Drawing of the model in this issue). With this pretty model he managed two 3rds, one at the Nats fly-off when a slight over-charge had the motor running very slowly for too long and at the blustery Driffield Mini. In even worse turbulence he managed a very impressive score to top this class at the final Mini meeting of the year. He is, some would say "thank goodness" still a little erratic in Cd'H with only one 3rd taken once again at Driffield. He even had the galling experience of losing his only model on a trim flight the week before the Southern Gala. A fate which incidentally befell a similar model last year! His hunch proved right when deciding on the Hi-Ho design for Vintage duration — he won the Nats with it, with the only full score and some very fast climbs. Not surprisingly now numerous people have built them!

Coasting home

As we all know the class at which he is the master is Open Rubber and there were nine events on the calendar this year. No one has ever placed in them all. As the season progressed Phil took 2nd in the opening event in February, 3rd in the poor visibility of the 1st Area Open Rubber then won the Gamage with a tremendous 10 minute plus fly-off. The 4th Open Rubber event of the season came at Easter where he made a remarkable 9½ minute fly-off with his tapered model, landed on the drome and won again! A solid flight at the Nats, once again with the same model, gave him another 2nd and in August he went on to place 2nd in the Open Rubber fly-off at the Club Champs then pieced together a sufficient total for 2nd at the windy Northern Gala. There were only two events left — Team Rubber and the Southern Gala. His tapered model produced the goods once again in the former with a seven minute flight to take 2nd individual place and guaranteed his Grantham Team the Farrow Shield. At the Southern Gala — always a bogey for him — he looked all set

The Seventh International Contest for Indoor Reduced Models of Aeroplanes or SICIRMA for short(!) was held on August 20 and 21, 1983 at Flémalle, Belgium and produced a nice international crop of nuts (planes not competitors). Below left: is a 'Stahlwerke.' Peanut Duration by S. Glöckner (Germany). Below right: a 'Scheibe Falke' placed fifth in PD, flown by A. Genther (Switzerland). This year the dates will be August 24, 25, 26, take note and book your passage now . . . categories will be F1D (microfilm), F1D (beginner), EZB, Penny-plane, Peanut Duration, Peanut Scale and Sainte Formule.

with a fine climb but there must have been a mix up in the air — the timekeeper must have watched the wrong model down. The official score read 5.17 from a flight that even his adversaries reckoned was nearer seven minutes. No one, not even Phil, will ever come that close again! To make amends, amongst other pots he took away from the SMAE prizegiving, he lifted the Senior Championship Trophy to confirm our forecast last year that he would top this table again!

Analysis of 1983 Free Flight SMAE Results

Name	Events flown	1sts	2nds	3rds	Points
1 P Ball	25	7	4	6	35
2 S Screen	17	7	1	4	26
3 R Peers	29	4	4	5	24 5
4 J Carter	23	4	3	3	21
5 J Cooper	15	3	4	2	19
6 P Harris	22	3	2	1	14
7 T Dilks	13	3	1	—	13
8 T Payne	14	1	3	1	10
9 C P Williams	6	3	—	—	9
9 G Sharp	13	—	3	3	9
11 D Greaves	12	2	—	1	8
11 J O Donnell	17	1	2	1	8
11 I Davitt	17	1	2	1	8
14 J Bailey	19	1	1	2	7
15 M Fantham	9	1	1	1	6
15 I Kaynes	6	1	1	1	6
15 G Ferer	6	1	1	1	6
15 R Baggott	17	—	2	2	6
19 R Pollard	9	1	1	—	5
19 R Cherry	9	1	1	—	5
19 M Chilton	8	1	1	—	5

Martin Dilly reports

Køster Electronic D/T Timer

The gremlins got into the July *Free Flight Scene* and as a result poor Tom Køster has been flooded with orders for his electronic glider D/T timer, enclosing $5. Even at the actual price of $50 plus $1.50 postage this well-engineered timer is very good value, especially as a rechargeable battery is included. Top-placing British glider flyer at the World Championships Martin Gregorie used several in his A/2s and they were D/T-ing consistently at 3:00.5 secs. Reliability like this can be most useful when downwind terrain is bad and it is useful to be able to tell the downwind recovery team on the CBs exactly when the D/T will pop, so they can position themselves in the best position to spot the descending model.

The lack of susceptibility to dust makes the electronic timer a good bet, too, while the fact that it can be set for fly-offs via the rotary switches and need not be checked (which can waste maybe five or six minutes while a clockwork timer runs down) is another useful feature.

Tom also has a trickle charger available in either 220 volt/50 Hz or 110 volt/60 Hz versions at $30. Write to Tom Køster at PO Box 54, DK-3400-Hillerød, Denmark, for details.

New Woodhouse goodies

Mike Woodhouse has some new items on his list of hard-to-obtain free-flight orientated materials and equipment. Carbon fibre cloth weighing 180gm./dm² is £20 per square metre, while 120gm./m² *Kevlar* cloth is £10; prices are pro rata for quantities greater or less than a square metre, post free in both cases. Laminating epoxy resin suitable for these materials is £4.25 for a ½ kilo pack. Mike also has D/T fuse at £2.00 per hank, *KSB* D/T timers at £4.95 and a copy of the Bob Wilder torque meter at £14.50. A stamped addressed envelope to Mike Woodhouse, 12 Marston Lane, Eaton, Norwich, NR4 6LZ will bring a list to you.

NFFS Symposium report

Now into its sixteenth year of publication, the 1983 National Free Flight Society's Symposium report from the United States is a good mix of articles on F/F technology, plans, nostalgia and the inimitable Will Nakashima cartoons. Specially timely in view of the CIAM decision not to ban electronic thermal detection systems is Fred Pearce's piece on recording thermal detectors; other topics covered include Wakefield Climb Energy Use, Aerodynamics of a P-30, Climb Stability of Symmetric Power Models, Indoor Guidelines and the results of low Reynolds number tests on four airfoils. The Hall of Fame section includes biographical material of interest to vintage fans and among the NFFS Models of the Year are Matt Gewain's '83 F1A World Champs winning 'Pacer 14,' '81 F1C Champion Andras Meczner's 'Delfin' and Alain Landeau's 'De Ch'val' that took second both at Burgos and at Zülpich.

For your copy write to *Free Flight News*, 7 Ashley Road, Farnborough, Hants., GU14 7EZ. The price is £8.50, including postage.

Information wanted

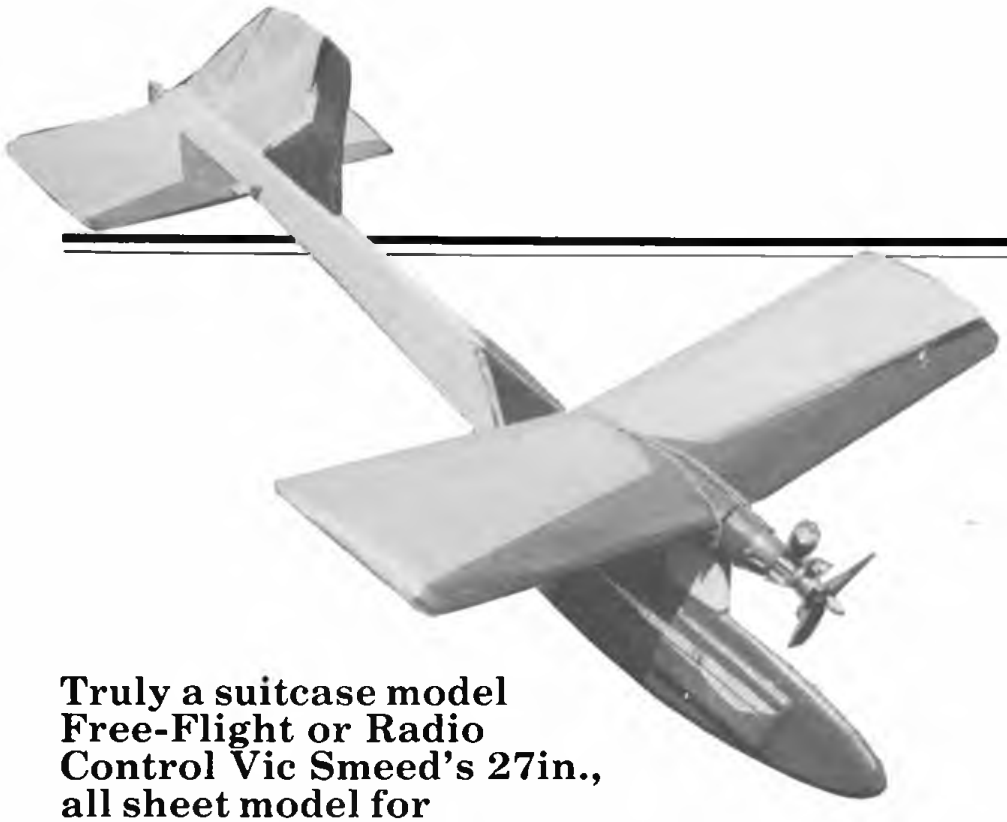
Is there anyone out there, an industrial chemist perhaps, who could provide some information on clear dopes, lacquers, thinners, shrinking and waterproofing qualities, compatabilities and so on as related to the cellulose finishes we use on free flight aircraft? It seems to me that we need to know more about how to get a good light, non-porous, non-warping finish with the wide range of materials available both for model aircraft and elsewhere. For example, my local car body finishing suppliers offered me various cellulose thinners varying in price by 4:1 in a single manufacturer's range; a major constituent of several is toluene, which no doubt thins but may not leave quite the sort of film on our wings that we actually want. If you have any knowledge to share on this topic, please write to this column, care of Aeromodeller.

1983 World Championships Planbook

As seems to be becoming current practice, a collection of plans of the models flown at the World Championships at Goulburn has been produced by some members of the New South Wales F/F Society. The draughting is to a high standard, unlike some other planbooks which have used the pretty rudimentary sketches sent by competitors on graph paper and old envelopes, with the original hieroglyphic data intact. No less than 98 plans or three-views are included, some with a lot of detail and there are also drawings of items like circle hooks, Wakefield hub assembles and F1C brakes. Biographical data and addresses of the competitors also appear in this useful addition to any model flyer's bookshelf. The dedication sums up some of the appeal of free flight quite well. "This work is dedicated to the few who participate in free flight aeronautics. Those of an international brotherhood who combine art with science, logic with intuition ... and give all nations an example of internationality that points towards peace for all mankind."

The Planbook, dedication and all, costs $10 Australian plus postage, from the *1983 World Championships Committee*, 50 Brown Street, St. Peters, NSW 2044, Australia.

More from Flemalle: left, first place in Peanut Scale was taken by A. Genther (Switzerland) with this magnificent 'Dufaux No. 4.' Below left: back to Peanut Duration with this 'Goupy No. 1' by B. Sabel (Germany) and finally, below: flown by proxy into fifth place in the Sainte Formule was this 'Wee Bee' by Mr. Wells (USA).

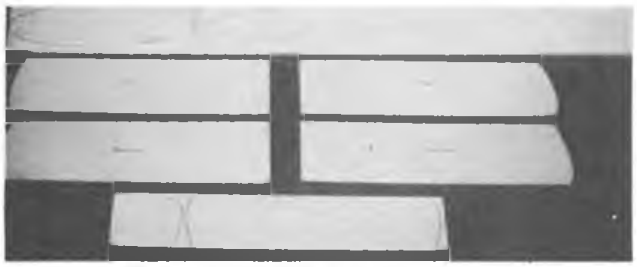


Truly a suitcase model Free-Flight or Radio Control Vic Smeed's 27in., all sheet model for 0.20cu.in. engines will provide hours of fun

PULSTAR

HAVE YOU EVER gone out for a flying session and broken some vital part or run batteries flat and wished you had something else to fly? Do you remember pulse? Here's a quickly-built miniature which takes up no room to speak of in the car, costs very little in time or cash but is capable of providing enormous fun. It can be flown with certain types of lightweight radio or as a free flight model; the original, flown manual pulse, was handed over to an enthusiast who literally wore it out with hours and hours of flying.

For those who've never heard of it, pulsing is a system of operating a relay radio receiver so that the relay blade is constantly swapping from the 'normally open' to the 'normally closed' contact and back again. The relay blade is negative and both contacts are positive but wired to a motor in a circuit so that the motor reverses direction continually as the relay blade alternately switches between the contacts. How long the motor runs in either direction is a matter of the dwell of the blade on either contact but normally something like 6-12 revolutions in



The following pictures will help the novice, when building Pulstar. Left: layout of major components, marked out ready for cutting. Below far left: fuselage is from ½in. sheet, easier to cut using a fretsaw than with a knife. Below left: sanding fuselage parts roughly to shape. Below: components ready for gluing.

either direction is likely at the neutral position, when the dwell (or mark) is equal on both contacts. You may have heard the expression 'mark/space ratio' which is how the relative switched-on/switched-off time of the contacts is expressed. In neutral, 50/50 means equal mark and space on both contacts, while 70/30 means one contact on for 70% of the time, with 30% 'silence', and vice-versa on the opposite contact.

If the motor is geared down around 50 or 60:1, a dozen revolutions of the shaft will give 70°-90° movement at the final gear, which can have an arm fitted to it. Alteration of the mark/space ratio will cause the motor to rotate more in one direction and thus bias the arm. The arm will always be moving and therefore if a rudder is connected to it (by the usual push-rod and horn) the rudder will be continually wagging. However, when the mark/space ratio is altered, the wagging rudder will be biased left or right, thus turning the model.

Pulsing, in its heyday, was created by mechanical or electronic pulse boxes which pulsed the transmitter signal on and off and could vary the mark/space ratio. Nothing other than the receiver, relay and actuator was needed at the model end, apart from batteries of course. Manual pulse simply substituted the thumb for the pulse-box, simply pressing a button on/off at about 1 pulse per second. It takes only a few moments to get the hang of varying the on/off action to influence the rudder left or right. There were refinements such as spring-biased output arms, to prevent the output arm making complete revolutions at moments of inattention and it was (is) possible to use a transistor switcher rather than a relay, but the simple system described works well.

On the original, a TO3 motor/gearbox was used as an actuator but any efficient, low-drain small motor could be used, with a couple of gears from a discarded servo. Alternatives are one of the very small rubber-driven escapements such as the Futaba (with the rubber run along the fuselage side), an American Rand miniature pulse unit, or even one of the modern very light miniaturised servos used conventionally.

Power is a *Cox* .010 (if you still have one!) or .020 but a free-flight version flew very successfully with a 'Wasp' .049. If you go to this size, use an inefficient prop, at least for initial flights. The model is rugged and should survive a few tumbles while trimming but if a hot .049 and efficient prop would be called for. Another suitable motor would be the *G-Mark* .03 'Humming Bird.'

In the beginning . . .

Construction is very straightforward but pick really soft balsa for the fuselage, if possible with a long grain pattern. White, grain-free wood could snap in a cartwheel. A join line is shown so that it all comes out of a 3in. wide sheet. Fit the wing platform after making the wing, to get the angle right. The only critical bit is the thrust line, though a couple of running-rich test flights will give the opportunity of shimming behind the radial mount to give more up or down thrust. The cut-outs for the pencells and receiver will depend on your particular equipment; a thick (.010in. or so) blister from a used accessory pack, or a plastic soap box, makes a container for the radio.

Make half the wing by pinning down the leading and trailing edges with dihedral braces cemented in place and the bottom sheet of soft 1/16in. Add ribs and tip block, sand and add top sheeting. Then prop up while the second half is built.

Tailplane and fin are softish 1/8in. sheet with the edges sanded round and the rudder is attached with nylon ribbon or film off-cuts, etc. The original model was sanded all over, given three or four coats of clear sanding sealer, decorated with colour dope lines and tape, then thinly varnished with polyurethane. Obviously thin fuel-proofer could be used. The tape was chrome Sellotape, which flashes when the model is very high and stays weathertight under the polyurethane.

Check for balance at approximately where shown after installing all the gear, adding a little ballast if necessary. Hand glides are safe enough — it's little more than a powered chuck glider anyway — and use a little wing or tail packing as necessary. The original didn't need any and the thrust line proved to be correct as shown on the plan.

Just one warning if you've fitted radio — everyone will want to have a go with it, so remember to take a spare set of cells along with you or you could get it back too late!

Left: showing the simple construction of Pulstar's wings, being all sheet they provide a durable, fairly crashproof structure but be sure to use light sheet. Below and below left: wing construction detail, note the use of adhesive tape to hold wing sheeting whilst glue sets. Far below: major construction finished, check alignment of wings and tail before continuing.

KIRIN

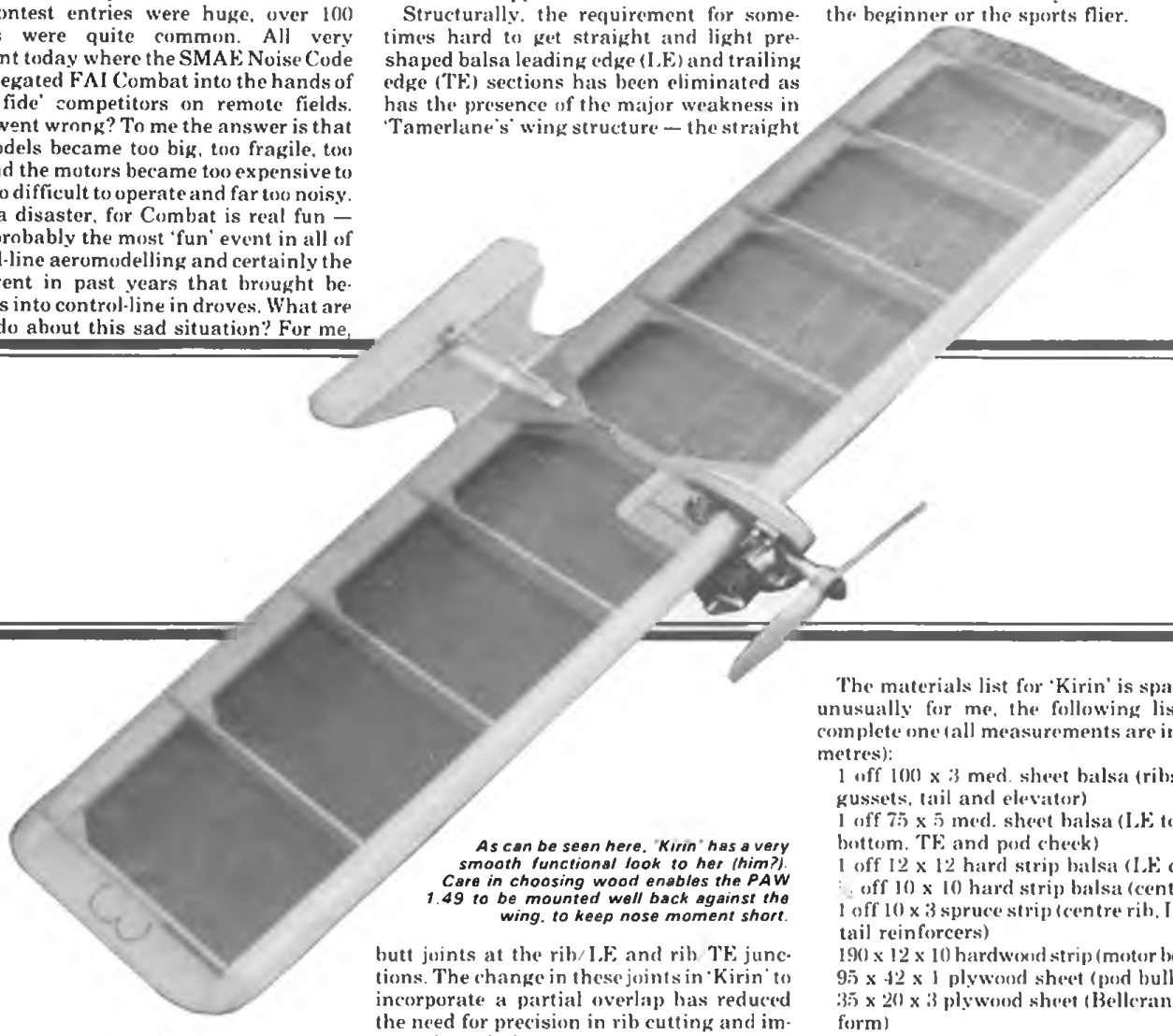
Build this ideal beginner's combat model, designed by Dave Clarkson for 1.5cc engines

BACK in the 'good old days' of the 1960s SMAE Combat, when I started my aeromodelling career, everyone but everyone seemed to fly combat models. The local club fields were full of them — 'Warlords', 'Liquidators', 'Cleavers', 'Dominators', 'Early Birds', 'September Warriors' etc. — and contest entries were huge, over 100 entries were quite common. All very different today where the SMAE Noise Code has relegated FAI Combat into the hands of 'bona fide' competitors on remote fields. What went wrong? To me the answer is that the models became too big, too fragile, too fast and the motors became too expensive to run, too difficult to operate and far too noisy. What a disaster, for Combat is real fun — quite probably the most 'fun' event in all of control-line aeromodelling and certainly the one event in past years that brought beginners into control-line in droves. What are we to do about this sad situation? For me, ½A Combat is the answer; cheap, quiet and fun — ½A Combat has it all!

'Kirin' has been developed from my *APS* 'Tamerlane' design. Features retained are the very low wing loading required for high manoeuvrability and a simple, conveniently sized structure for speed and cheapness of construction. New features are a thicker aerofoil of improved profile and increased tail moment and elevator area, all for increased manoeuvrability, plus a revised wing assymetry and lead-out rake combination, with the addition of tip weight, to give improved line-tension upwind and in sharp manoeuvres. Finally, a less angular outline has been adopted in the interests of appearance.

Structurally, the requirement for sometimes hard to get straight and light preshaped balsa leading edge (LE) and trailing edge (TE) sections has been eliminated as has the presence of the major weakness in 'Tamerlane's' wing structure — the straight butt joints at the rib/LE and rib/TE junctions. The change in these joints in 'Kirin' to incorporate a partial overlap has reduced the need for precision in rib cutting and improved crash damage resistance. One final point is that 'Kirin' is a totally metric design as opposed to 'Tamerlane' which was an Imperial design!

Direct flight comparison between 'Kirin' and 'Tamerlane' has shown 'Kirin' to handle a lot easier and to have greatly increased manoeuvrability which has resulted in a very effective combat model indeed. This high manoeuvrability when combined with 'Kirin's' cheap, simple and tough structure makes it an ideal model for beginners for it is easy to build *right*, has the manoeuvrability to get out of nearly any trouble imaginable and the toughness to survive impact with the ground when that cannot be avoided. Truly an ideal model for the beginner or the sports flier.



As can be seen here, 'Kirin' has a very smooth functional look to her (him?). Care in choosing wood enables the PAW 1.49 to be mounted well back against the wing, to keep nose moment short.

The materials list for 'Kirin' is sparce so, unusually for me, the following list is a complete one (all measurements are in millimetres):

1 off 100 x 3 med. sheet balsa (ribs, tips, gussets, tail and elevator)
1 off 75 x 5 med. sheet balsa (LE top and bottom, TE and pod cheek)
1 off 12 x 12 hard strip balsa (LE core)
½ off 10 x 10 hard strip balsa (centre rib)
1 off 10 x 3 spruce strip (centre rib, LE and tail reinforcers)
190 x 12 x 10 hardwood strip (motor bearers)
95 x 42 x 1 plywood sheet (pod bulkhead)
35 x 20 x 3 plywood sheet (Bellerank platform)
1 off std. roll 'Solarfilm' (wing, tail and elevator covering)
Moulded nylon bellcrank, horn and pushrod keeper
Bicycle spoke for pushrod
Heavyweight 'Laystrate' wire for leadouts
Needle and strong thread for tail reinforcers and hinges
Glass fibre cloth (or nylon cloth or cotton bandage) for pod covering

KIRIN

30 to 35cc 'Stunt' tank (or solder from tube and tinplate)
Brass tube for leadout guides
PVA and Epoxy glues (use slow curing type)
6BA bolts, nuts and washers for mounting motor and bellcrank
Fuelproofer for pod, tail reinforcers, elevator, hinging threads and for sealing *Solarfilm* edges.

Not a lot as you will see and will cause no big dent in your wallet.

A step-by-step construction description seems appropriate for a model which may be built by beginners, but rather than annoy you all with a long rambling account in which every other phrase is 'then glue . . .', I give below a numbered sequence of building instructions and hope that these make the construction crystal clear!

Stage by stage . . .

1. Mark rib positions at right angles across 75 x 5mm sheet. Trim sheet to length (reserve off-cut for tip thickeners and pod). Slice into TE and LE components.

2. Cut ribs, tips, gussets, tail and elevator from 100 x 3mm sheet (reserve off-cuts for tank surrounds). Drill 6mm dia. holes for leadouts through inboard ribs.

3. Laminate leading edge components together including spruce strip reinforcer (note assymetric reinforcer location).

4. Shape and laminate centre rib components including bellcrank platform. Bolt in place bellcrank with untrimmed leadouts and pushrod attached.

5. Glue all ribs to TE ensuring all ribs square to TE. Add all TE gussets with pushrod through its slot.

6. Glue all ribs to LE ensuring all square and that resultant structure is warp-free. Epoxy tip weight in position.

7. Glue 30 x 8 x 5mm thickener strips to fronts of tips. Sand these down to give fit into LE. Trim outboard tip to fit tip weight. Glue tips to wing.

8. Epoxy tank to centre rib and LE. Glue 12 x 3mm strips of scrap balsa around sides, rear, top and bottom of tank wedge for covering and tank support.

9. Glue spruce reinforcing strips to tail. Sew through tail around reinforcers at front of tail. Seal sewing with glue.

10. Shape pod components and laminate together. Dry-fit pod to wing and mark its location on wing.

11. Carve/plane/sand wing LE, TE and tip profiles leaving LE square at pod location. Sand rib edges to give smooth and symmetrical aerofoil sections.

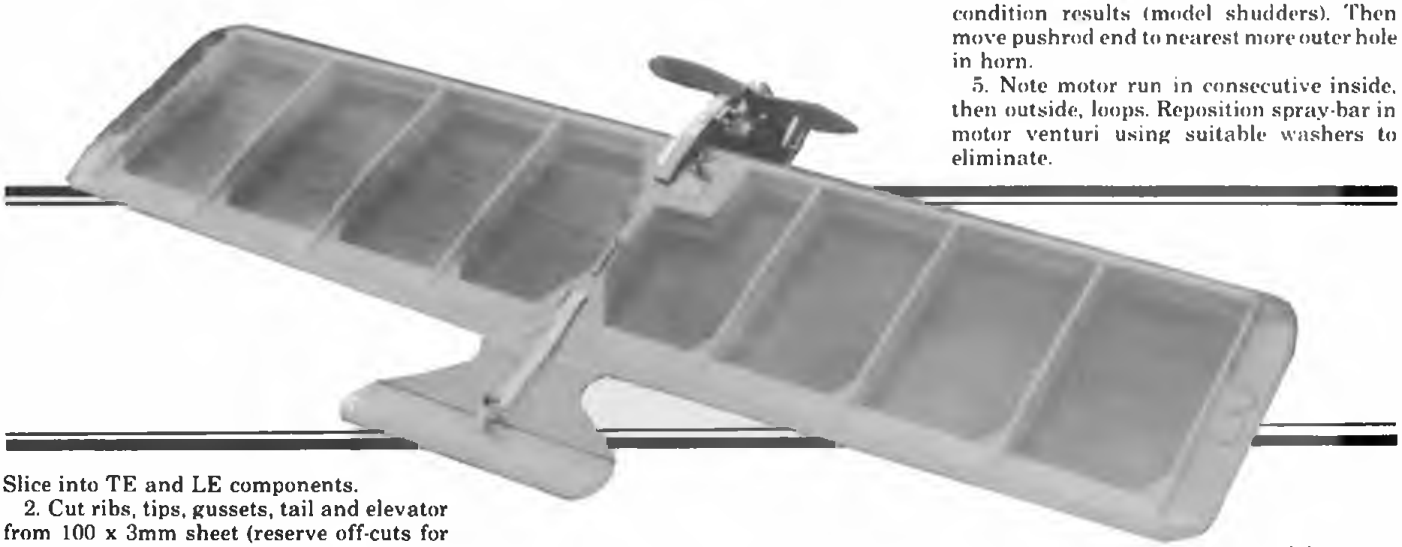
12. Cut/sand grooves on underside of inboard tip for leadout tubes and epoxy these into place. Insert lead-out wires through ribs and leadout tubes.

13. Cover separately wing, tail and elevator in transparent *Solarfilm*. Before covering, write desired numbers etc. on bare balsa using fibre-tip pen.

14. Dry-fit pod and tail to wing and cut around these through the wing covering. Remove 'Solarfilm' at these locations to reveal bare balsa.

15. Epoxy tail to wing ensuring it is square to and in-line with wing. Sew elevator to tail.

16. Bend push-rod end and trim. Fit horn and keeper to pushrod and mark horn mounting holes through elevator so that neutral bellcrank position gives neutral elevator. Screw and epoxy horn to elevator.



17. Bind and solder lead-out loops so that equal loop projection gives neutral bellcrank position.

18. Dry-fit pod to wing and position motor with prop fitted to give model CG 35 to 40mm back from front of wing. Mark through motor mounting lugs resulting motor mounting bolt locations.

19. Remove pod from wing, then drill for motor mounting bolts and counter-drill side cheek for bolt heads. Finish shape/sand pod and cover with cloth or bandage.

20. Epoxy pod to wing. Fuelproof pod, tail reinforcers, elevator hinging threads and *Solarfilm* edges.

All that is left to do is to bolt in the motor — a *PAW*149 does very nicely indeed, and the extra few pounds for the *contest* version is really worth it in terms of power and handling characteristics — and go out and fly! Not bad for about four evenings work.

Contrary to what some people may believe, control-line models do 'fly' and therefore require flight trimming. A basic set of trimming instructions follows. It is assumed that the model does balance as suggested, i.e. 35 to 40mm back from the front of the wing, a more rearward balance point (CG — Centre of Gravity) will give a virtually uncontrollable model. Perhaps if you are a beginner, a balance point 5 to 10mm more forward than this would be a good idea, for at the recommended CG position, 'Kirin' is a very lively model. Do your flight trimming on a calm day, since very little can be learnt about how a new model flies when a wind is blowing.

1. Critically examine model from rear and note any warps. Re-heat 'Solarfilm' whilst bending model to eliminate. Leave model for 48 hours and re-examine. If warps have reappeared, see step 2 below.

2. Fly model level both upright and inverted, looking hard for any 'tip-up' or 'tip-down' flight tendency. Epoxy scraps of 3 x 5mm balsa on appropriate surface of outboard tip to eliminate.

3. Fly model through outside and inside loops to check for any differing elevator response. Re-bend shallow 'Z' bend in pushrod to eliminate.

4. Fly model through consecutive 'full movement' horizontal eights. Move pushrod end to more inner hole in horn until stalled condition results (model shudders). Then move pushrod end to nearest more outer hole in horn.

5. Note motor run in consecutive inside, then outside, loops. Reposition spray-bar in motor venturi using suitable washers to eliminate.

Flight trimming as described here can transform what on its first flight appears to be a rogue model, so do not omit this step. If you are a beginner, such flight trimming is even more important and finding an experienced pilot to help you do it, will prove invaluable. For lines I use lightweight *Laystrate* wires of 12.80 metres from the axis of the handle to the thrust-line of the model. Longer lines should not be used since line-tension problems may well appear. Shorter lines down to 11.0 metres in length could be used, but beware of the action becoming unbearably fast if much of a wind is blowing.

Some of you may be wondering why the strange name of 'Kirin'. It is in fact Japanese for giraffe. However, since this word came into the Japanese language before knowledge of the true nature of the giraffe arrived, its general meaning is that of a strange and ferocious beast. No doubt centuries ago in Japan, Samuri warriors dreamt of fighting Kirins and in their dreams, frequently came to a horrible end. This 'Kirin' maintains that tradition!

Control-Line Model Launcher

by Brian Waterland

Who needs a launcher?

Well, it was originally designed so that I could go flying on Sunday mornings, without having to drag someone else along to launch for me.

However, it proved so successful that combat bouts are now possible when only two people are at the club field. It is also useful if during a competition you want to go off and do a quick flight to check motor settings.

Building the launcher

The original was made very quickly from odd scraps to the dimensions shown on the drawing. Fig. 1. There is nothing sacrosanct about these dimensions and they may be modified to suit your models. The original works very well with Combat Wings (Diesel 'A' and '½A'), Peacemakers, Mini-Slows etc. If you do modify it make sure there is plenty of clearance between the propeller tips and the restraining arms. Fig. 2.

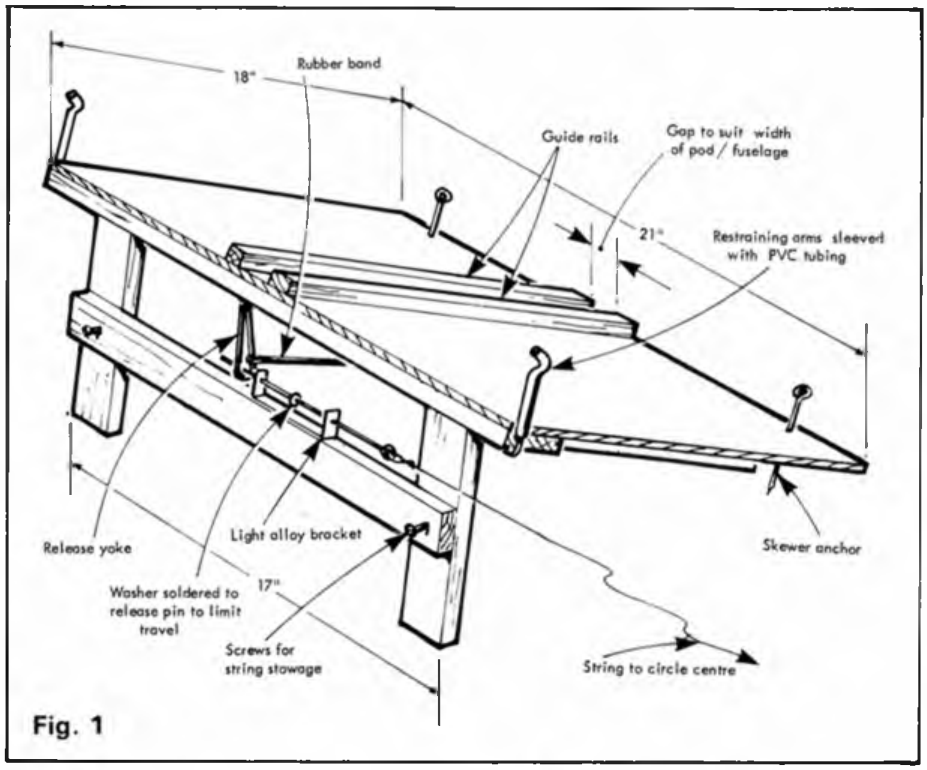


Fig. 1

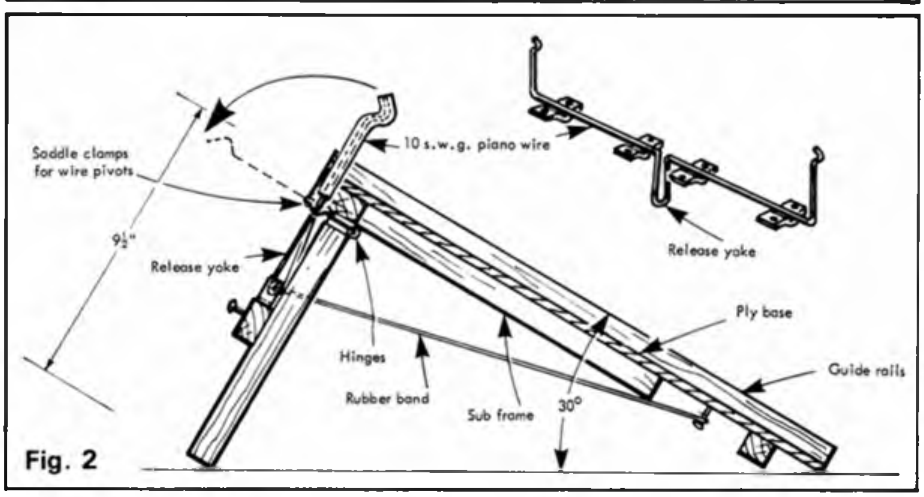


Fig. 2

Flying

Set up the launcher pointing slightly out of the circle. Anchor the unit by pushing skewers (or screwdrivers) through the launcher into the ground. Run out the release string to the circle centre. Insert the release pin to hold the restraining arms vertical, place the model (with lines attached) onto the launcher and fuel up. Start the engine, go to the centre of the circle ensuring that the string is underneath and not fouling the lines! Hole *neutral* elevator pull the string and the model is airborne!

Note, putting on up elevator increases the friction between the model and launcher slowing the model down. Also unless the motor is fairly powerful a stall may result.

On days with light wind position the launcher into wind as shown in Fig. 3. This coupled with the high angle of attack generates maximum lift at the minimum speed.

On windy days position the launcher as in Fig. 4. This permits the model speed to build up before going into the wind.

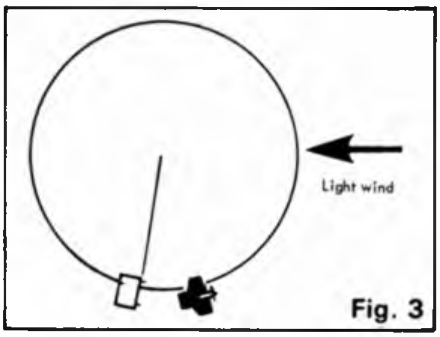


Fig. 3

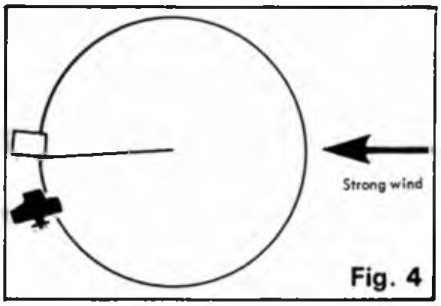


Fig. 4

Alex Imrie's VINTAGE CORNER

Warwick 1984

Sunday 24th June 1984 marks the 50th anniversary of the seventh Wakefield International Competition and plans are afoot to celebrate this in the appropriate manner by holding a Vintage Wakefield Competition on this day, on the same ground at Warwick Racecourse as used in 1934. Models should comply with the pre-1951 rules with the emphasis being hopefully on the older designs. Apart from general vintage flying on this day other competitions are being planned for compressed air models and gliders. It would be appreciated if the organisers of this meeting and of the planned events would let us have full details as early as possible in order that we can bring these to the attention of the readership and so help to "swell the gate".

Warwick 1934

Drizzle, heavy at times and low cloud were the conditions that some 45 Wakefield contenders had to face during the Eliminating Trials for the selection of six modellers to represent Great Britain in the 1934 Wakefield International Competition. There were plenty of incidents during these trials, one being when J B Allman's model broke its port wing, the organisers had seen fit to open the Tote building and it was to this shelter that Allman went to repair his model, the job took about 40 minutes and involved splicing wing spars re-covering and doping a section of the wing. Allman, who was one of the six selected, confided in his 13-year old assistant Horace Claymore that the weather was favourable for his geared model, which, with its 3 to 1 step up ratio had almost 3 minutes of motor run. Another successful entrant was W. P. I. Fillingham who had motored over from Nottingham in the Austin Seven 'Chummy' that he had bought for £15. Pat finished 5th in the competition and tells us: "The conditions were very poor, but despite the weather there was quite a large crowd of spectators. Most of the big noises like Bullock, Kenworthy, Rushbrooke and Rippon fell by the wayside and it became obvious that those with gears would easily win the day — Allman, Howse and Getsla etc. Allman's flights were all at very low altitude, just enough power to keep going and a long motor run. Models had to have a total weight of not less than 4 ounces and a wing area of 200 square inches, no D/Ts of course and only one model per entrant, the average duration of three flights made ROG (Rise Off Ground) would be used for judging and the model would be checked after the last flight. Most models had free-wheel propellers, and I did not use a winder at Warwick — just hand wound."

The meeting as reported on in *Flight* commented on the proxy flying of the American machines, ". . . flew beautifully, noticeable features being their extremely slow speed airscrews and beautiful landings due to their slow gliding properties." Mention was also made of the best performing models, ". . . Howse of Bristol, had a terrific initial climb after which it flattened out and held its height to such good purposes that had its third and last flight not terminated abruptly . . . the result of the contest might have been quite different. Then the most promising American machine (W Getsla) was unfortunately rendered *hors de combat*, due to its airscrew spindle pulling out, the sudden release of tension wrecking part of the fuselage. Its first flight was one of 116 seconds." Incidently this report is in error by using Getsla's name instead of Zaic's name as the third place winner!

Another report of this meeting was carried in *The Model Engineer* whose summary says, ". . . mention should be made of the flights of Allman, Howse (Britain), Getsla and Zaic (America), Allman's flights of 163 and 164 secs. were very fine, as were also the 123 and 124.5 secs. flights of Howse. Getsla's model, in its first competition flight of 116 secs., rose to a great height and those present thought he was going to win the Cup but bad luck intervened when his gearbox stripped whilst preparing for his second flight. Zaic's flight of 127.5 secs. was an achievement for a model weighing 8 ounces with a wing area of 200 sq.ins."

Note the different reason given for Getsla's failure, did his spindle pull out or did his gears strip? (See Denis Fairlie's comment in his Getsla model description).

Above: scaling up designs is more popular than ever. Big being Beautiful especially if you have large engines and R/C. Here is D. McDowell of Morton Derbyshire with his four-stroke powered two and a half times Veron Cardinal.
Left: Les Hoy with 'Co-axial' an unusual rubber model that was described in May 1942 Aeromodeller. This model designed by C. F. Hedges and R. V. Bentley features geared co-axial propellers and an automatic rudder. Seen at Old Warden on last Vintage Day.

In 1st place was J. B. Allman of the Leamington and Warwick Club with an average time of 111.8 secs., 2nd place was taken by R. T. Howse of Bristol, average time of 90.3 secs, and in 3rd place was Frank Zaic of New York City (proxy flown by R. N. Bullock) with an average time of 85.2 secs. So gears won the day thus reviving the old controversy 'to gear or not to gear'? Many of the lightweight thermal hunter types of model were eliminated by the severe soaking that many were subjected to, Howard Boys was one of those who found that his model had become water-logged and refused to perform.

Getsla (USA) 1934 Wakefield Entry

In keeping with the Warwick Wakefield atmosphere, it is appropriate to include the following details from Denis Fairlie about Walter Getsla's model. This machine was badly damaged during the 1934 event and Denis was given the remains by the then SMAE Competition Secretary, B. K. Johnson, who stated that Walter Getsla did not want the wrecked model returned. It so transpired that the remains of this remarkable model were lost during the 1939-45 war. However, just over one year ago Denis established contact with Walter Getsla and sends us this story:

"The outstandingly original nature of this model was so rooted in my memory that I was able to send Walter both a letter and a sketch of his model as I had remembered it. He was amazed that I had recollected so much of the model (so was I). He had not made drawings but was able to supply me with some additional details. But for the bad luck of his gearbox stripping and wrecking the fuselage I firmly believe he might well have won the '34 Wakefield, even when pitted against Allman's step-up geared entry.

As you can see from the sketches the model was a wire-braced midwing with octagonal section fuselage of unusual construction. A twin gear nose piece was fitted driving a choice of either a 16in. or 18in. diameter airscrew. The blade pattern was as the 1929 *Model Aeroplane Manual's* 'Chauviere' but with a straight leading edge and curved trailing edge. The airscrew(s) were cut from a balsa block of half diameter, which was then cut from corner to corner to make two triangular blocks. These blocks were then cemented together, back to back at the narrowest part of the triangles, thus making two blades of nearly identical grain and weight. The block was then carved in conventional manner (I've since made many rubber model props this way and found them most successful).

Peering down inside of WG's fuselage was as viewing an airship. The built-up octagonal frames did not touch the tissue covering. To compensate for the loss of stiffening every frame was diagonally braced with cotton thread from nose to tail!

The separate wing panels each spanned 18½in. by 5¼in. chord and used a hollowed out leading edge. Wire bracing permitted positive wing location yet retained the knock-off facility needed in crashes. I was most surprised at the light balsa stock used. All that clear white stuff usually seen on indoor models. It thus was not a surprise to have his recent confirmation that total airframe weight was 4.1oz of which 2.25oz was rubber . . . no wonder the model climbed so well! The twin gears each had eight strands of ⅜in. by ⅛in. rubber.

When I sent my sketch to Walter I asked him how he had built that fuselage. To me it seemed that he had either built one square section fuselage then added the second square, or built each octagonal frame separately, using perhaps a piece of longeron stock in each flat frame for the mitred corners; the scrap pieces of longeron stock being removed when assembling the proper longerons. Walter told me that he actually used a more complicated system: made a laminated octagonal nose former;

Jack Frost with a little known G. W. W. Harris design, the 1941 rubber driven 'Hobo.' Seen at Old Warden at the South Midland SMAE Vintage Meeting.

Below left: George Armstead all the way from Glastonbury USA was fourth in the Earl Stahl competition on last Vintage Day with his 'Hero of the Soviet Union' MIG 3. Below right: Caught in the act! Mark Hinton applying a slight twist to the rear fuselage of his Henry Struck flying scale 'Caudron' during trimming flights at Old Warden on last Vintage Day.

VINTAGE CORNER

Above left: R. N. Bullock releasing Frank Zaic's 1934 Wakefield entry at Warwick. After two flights of just over one minute each this model did 127.5 secs to make an 85.2 secs. average taking third place. Above: the winner! J. B. Allman lets his model go on the take-off board at Warwick Racecourse during the 1934 Wakefield International Competition. Below: Denis Fairlie's sketch from memory of Getsla's 1934 Wakefield, updated with information from the designer/builder.

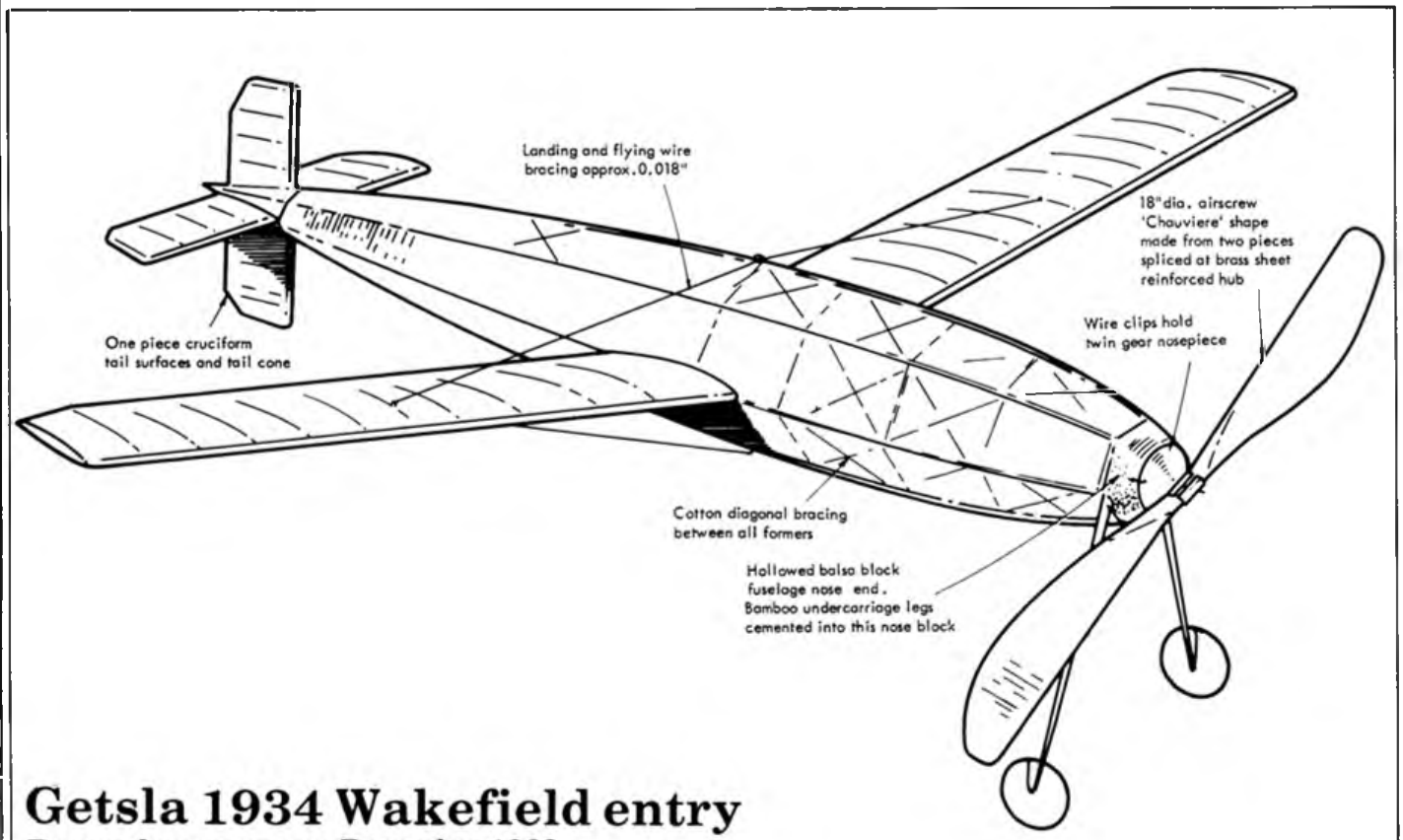
glued in four longerons 3 feet by 7/16 by 3/32 inch. With this lot wavering about he then glued in four pieces 1/8in. by 1/16in. at maximum cross section to produce a rectangular four longeron section and worked nose to tail. This gave a square section fuselage with four spare longerons to be glued at nose former. He now gathered in these spare longerons, starting at maximum section again and proceeded to make the 'second' square section finally finishing with an octagonal fuselage! Phew!

The fuselage was approximately 36 inches long plus noseblock and prop making the overall length about 39 inches, which was very long for those fuselage formula days.

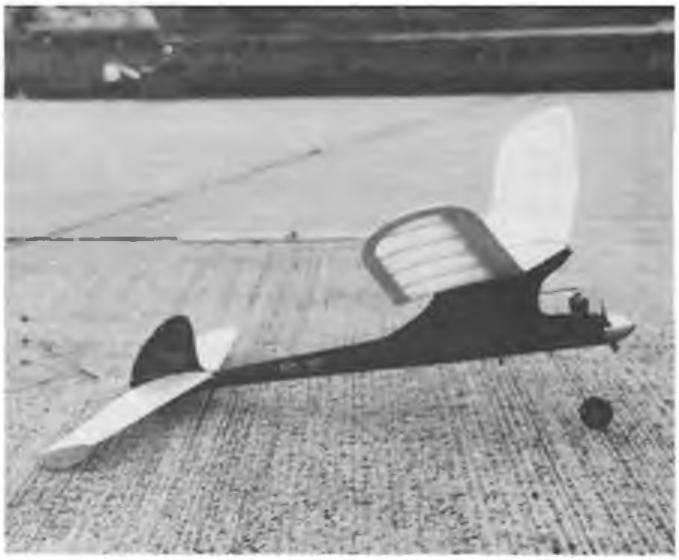
What let him down were the thin clock gears that he used. To my mind they were not thick enough to provide adequate soldering surface. The rubber was fixed to the gears by wire loops soldered to the face of the gears. Possibly it was this joint that gave way at the competition? The wheels were made from a loop of wire approximately 1in. in diameter, with a single spoke which was bound to the bamboo cane leg. Thus the 'wheels' were in name only, they did not revolve but acted as skids. The model was airborne within a few inches skidded run. A point of interest is that he did all his trimming tests indoors to measure the best gliding settings. Walter Getsla demonstrated throughout a remarkable originality in the construction of this high performance model.

Even more help wanted

In a recent issue of *SAM 35 Speaks*, rubber specialist Mike Kemp stated in his avidly read column that, the report of the last Vintage Day in the November Aeromodeller was, ". . . very unbalanced, in that though it occupied four pages, the coverage given to the rubber events was miniscule." I agree with him entirely but wish to point out that unlike SAM 35 reporter members, who seem to hear and witness all worthwhile



Getsla 1934 Wakefield entry
Drawn from memory, December 1982 by Denis Fairlie

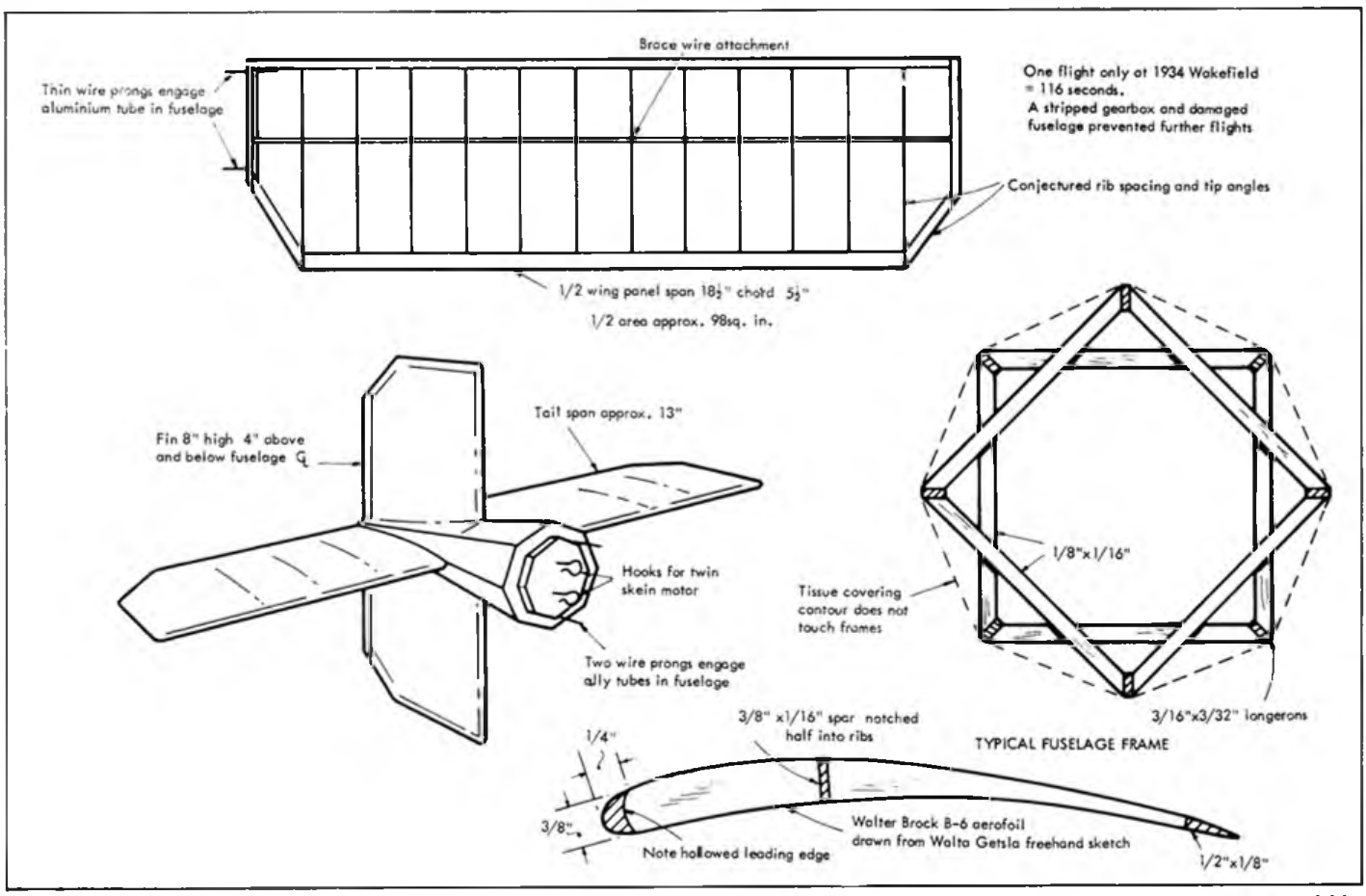


Above left: Mike Johns with his Earl Stahl Blackburn 'Skua' at last year's Vintage Day meeting, only 'Skua' in the competition winning eighth place. Above right: neither warped nor dusty, this is Roy Collins' original Flamingo, out of retirement to fly again at vintage meetings, just as it was flown 34 years ago. Powered by K&B Torpedo ignition engine, this 'hot stuff' 60 inch wingspan pylon model was described in May 1950 Aeromodeller, plans are still available as PET 377X price £2.10 plus 50p postage. Below: detail sketches of the Getsla model by Denis Fairlie from information and measurements supplied by Walter Getsla.

happenings, which they immediately transmit to Big Brother for inclusion in the well presented accounts in *SAM 35 Speaks*. I, being a one-man-band am not able to see and report everything that is going on at a meeting. (The fact that the processing lab lost one of my Vintage Day films last year, did not help on the occasion in question!) Now this is not sour grapes, I honestly do not have any regular source of competition results, or lists of entrants/models in SAM competitions. Reporting an event in accurate detail, can only do the vintage movement good in general and SAM 35 in particular will benefit from such write-ups. While not wanting to steal any of SAM 35's thunder, if Mike or any other enthusiast would care to submit some details of such competitions/meetings in the future we would welcome the input and most certainly make use of it in Vintage Corner, where hopefully, it would appear sufficiently early to have some news value.

SAM 35 Yearbook Number 2

This 150 page 'Annual' is to hand and once again a whole bevy of vintage subjects are pleasingly presented. There are over twenty dimensioned plans of models as varied as ornithopter, control-line, Wakefield, pylon, glider, baby ROG, twin pusher, stick tractor and even a canard HL (Hand Launch) glider. Articles are just as diverse and include stories on engines, rubber, control line, radio, free flight, glider and Wakefield; here are Bob Copland's streamline thoughts, early diesel engines described by Jim Noonan, a nostalgic look at pre-war *Frogs* and *Megows* by Derek Moore and the Bob Woollett story. For the benefit of younger readers Bob is the designer of both the 'Wren' and the 'Phoenix' free flight power models but for me he is better known as the originator of that classic three-quarter rear flying view of his 'Hurricane IIC'. That study was perfection indeed and it must have made an impression on every reader when it appeared as a frontispiece in the December 1942 *Aeromodeller*. It certainly made a marked impression on me . . . and in the Yearbook is the story of how Bob took that picture. Readers might wonder why there is nothing on CO_2 models or flying scale rubber? However, their thoughts are nicely taken care of by the inclusion of a request in the book asking for help in redressing the balance of material, by getting readers to write-up suitable articles on the missing subjects for inclusion in Yearbook Number 3! Long may the issue of the *SAM 35 Yearbook* continue. All copies of Number 1 have now been sold, if you are reading this there is a good chance that 'Vintage is your thing', in which case get a copy of Number 2 now! The cost is £3 plus 50p postage and packing, order direct from Tony Hogan, 30 The Courtway, Carpenders Park, Herts.



EXPERTS FORUM

OPEN RUBBER with
1983 SMAE Senior Champion Phil Ball

MY INTRODUCTION to aeromodelling came as an eight year old when I received a *Frog* 'Mamba' rubber duration model for a present. From that moment on all my pocket money and spare time was spent making any type of model aircraft that caught my fancy.

During the time from eight to twelve years of age aeromodelling consisted of many enjoyable hours building and very little time spent actually flying. Most models were flown down a small hill at the back of the tennis courts on the local park and on a good day one occasionally reached the bottom.

At the age of twelve a newspaper advert caught my mother's eye, a new model club was being started at a Youth Club in Derby, so the following Friday saw me arrive at the club for my first contact with other modellers.

For the next year or so the model club expanded, Friday nights saw models constructed under the watchful eye of the club organiser, Gordon Edwards. Diesel engines were run at one end of the club room which was a school class-room by day. I don't know what the teacher thought the following Monday when the table which the engine test stand was attached to and the wall behind it were covered with Castor Oil but we never seemed to get any complaints.

Gordon Edwards continued to run some form of Youth Club Model Aircraft section for many years and had a great effect on all the young lads who attended his club. Club nights were just the thing to keep 12-15 year olds interested, contests were held to see who could start the club *E.D.* 'Bee' 1cc. diesel in the shortest time, we flew round-the-pole models and had model building contests, a popular club night event was to build and fly a model made entirely from a piece of $\frac{1}{16}$in. sheet, 12in. long, marks were given for flying ability, ingenuity, etc.

In the Spring of the following year (1959 I think) a coach trip was organised to the Nationals at Scampton, this was my first experience of contest model aircraft. It was here that I had my first contact with contest models in general and Open Rubber models in particular. I must admit that the sight of these fragile looking models had a fascinating effect on me, the flyer piling on the turns with the motor stretched and the propeller still attached, then launching the model for a seemingly endless propeller run followed by a long floating glide. I don't think any other day in my aeromodelling career had such a big effect on me.

At the time Open Rubber seemed to be beyond my pocket-money and ability, so gliders became my number one interest in modelling, a couple of A1s followed, an *APS* 'La Mouett' being the first, the second a modified version. At this time I heard that several active contest flyers could be found at the then number one club in Derby, (there were three in those days). The following week saw me arrive at the club where I found myself sitting in front of the committee being questioned about my experience and critical eyes passed over my latest creation. I was told I could join the club but if I didn't shape up I would be out. To be fair the club had had a lot of trouble from young members who talked a lot, caused trouble and didn't do much in the way of modelling.

Below: Phil Ball just before the fly-off at the SMAE Club Championships in which he placed second. Above right: son, Anthony following in Dad's footsteps, a textbook launch with Open Rubber Model in the Frog Junior Contest at last year's Nationals.

During the next two years I flew in about a dozen competitions, placing 3rd and 5th in the Frog Junior Trophy (my big event of the year) then for no apparent reason interest fell within the club and the free-flight members either stopped flying or left the club. There I was, a keen 15 year old with no means of transport to enable me to attend competitions. During the next five years I managed to go to the odd competition when I could get a lift but I then stopped completely for about five years, during which my only contact with 'Free Flight' was through *Aeromodeller* magazine.

Those days are now long past but were very much the foundation for my continuing interest in aeromodelling and rubber powered models in particular. In this hobby there are many things which motivate me; I enjoy building models and like to make a reasonable job of the construction and so this could be said to be a motivating force but I also think it is a waste of time to aim for a concours finish, as flying a model built to these standards in the typical British weather can be soul-destroying.

Around 1972 I started building again and decided that now was the time to start flying Open Rubber. I still had a couple of A2's left so I could continue flying these without spending much time on them and could therefore concentrate on rubber.

My first couple of attempts flew quite successfully but proved to be much too light

and fragile for flying in normal conditions and were constantly being repaired. This was the first lesson that I learnt, although Open Rubber models fly best with a light wing loading the airframe has got to be strong enough to withstand the rough and tumble which it will be subjected to, indeed after a few repairs a lightweight model can soon become heavier than a stronger more rugged version.

Success motivates me the most, when I started Free-Flight seriously in 1973 my main aim was to qualify for a fly-off which I soon did. As soon as I started qualifying for fly-offs regularly I was then motivated to win. I now try to win every contest I fly in.

Every year I like to set some targets, this year it was to win all the SMAE Open Rubber trophies and to date I have won the Gamage Cup, placed 2nd in the Model Aircraft trophy (at the Nats) and 2nd in the Caton trophy (at the Northern Gala) but I did not place in the Flight Cup, so I can use that target again. I also want to succeed at Wakefield flying but after a promising start in 1981 and 1982 I seem to have lost my way and need to develop a more consistant style of flying.

At the height of the contest season, i.e. in the spring and autumn I never build any models but spend my time repairing and preparing for contests. I suppose at this time of year I spend about 10-15 hours a week on average. In the summer and winter when there are fewer contests I tend to build new models and overall spend a similar time.

In general I put the most effort into SMAE events with only certain other events, i.e. The Open Rubber Trophy and the Aeromodeller Cup competition having equal status in my mind.

Design

All of my models to the present day have been designed around a simple set of rules, I make no claims to their originality as they are a result of experience and the study of published successful designs by other fliers. A model built to these rules whether it is a 220sq.in. model designed to fly in rough conditions or a large fly-off model should have every chance of being successful.

It has often been said that the most important aspect of any rubber model is a good propeller/rubber combination. I use a large diameter high pitch propeller powered by a short thick motor, other flyers are very successful with smaller diameter and pitch propellers with longer thinner motors. The permutations that can be successful are endless, what is important is that the rubber motor and propeller are well matched. This can mean adjusting the propeller diameter and pitch to suit a given size motor or adjusting the motor length and number of strands to suit a particular propeller.

Trimming

I favour a right climb and glide on my models as it is less likely to fly out of lift than is a right climb left glide model. A lot of trimming can be done at home, the warps can be set and checked (as design sketch), about 2° right side thrust can be added to the propeller. For glide turn I use a combination of tail tilt and rudder, both of these can be roughly set at home, raise the tail about ¼in. to ⅜in. on the right side when viewed from the rear and add a trim tab to the fin of approximately 1½in × ⅜in., set about 15° to the right. With the wing set at 3° and the centre of gravity at 75% of the wing chord the above trim should result in a model which should fly safely with no adjustments and need only minor alterations to achieve perfect trim.

Competition Flying

One of the most important factors in competition flying is having the confidence to fly your models in the competition without having any trim flights beforehand. To give myself the confidence that my models have not changed trim and will fly the same as they did last time out, I record all the warps, incidence angles and propeller pitch. These are then checked the evening before a competition and adjusted if necessary. This data is also helpful if the model is badly damaged and needs extensive repair between contests, it then enables me to set the model up so that it will hopefully retain its trim. Because the fly-off is all important in the Open Rubber class and you are only allowed two models in the contest my aim is always to try and complete my three 3min. flights, with one model. This then gives me the option to use any of my models for the fly-off, if two models are used to qualify for the fly-off you will then have no choice but to use one of these models.

When setting the dethermaliser fuse for a fly-off I always try to estimate the likely visibility duration and then add a couple of minutes to this for luck. This way if the model disappears into the haze if you keep walking in the right direction you should find it. I only fly without a DT if the competition is important enough, i.e. an SMAE Trophy event and also if the wind speed is low enough for me to keep up with the model.

Construction methods . . .

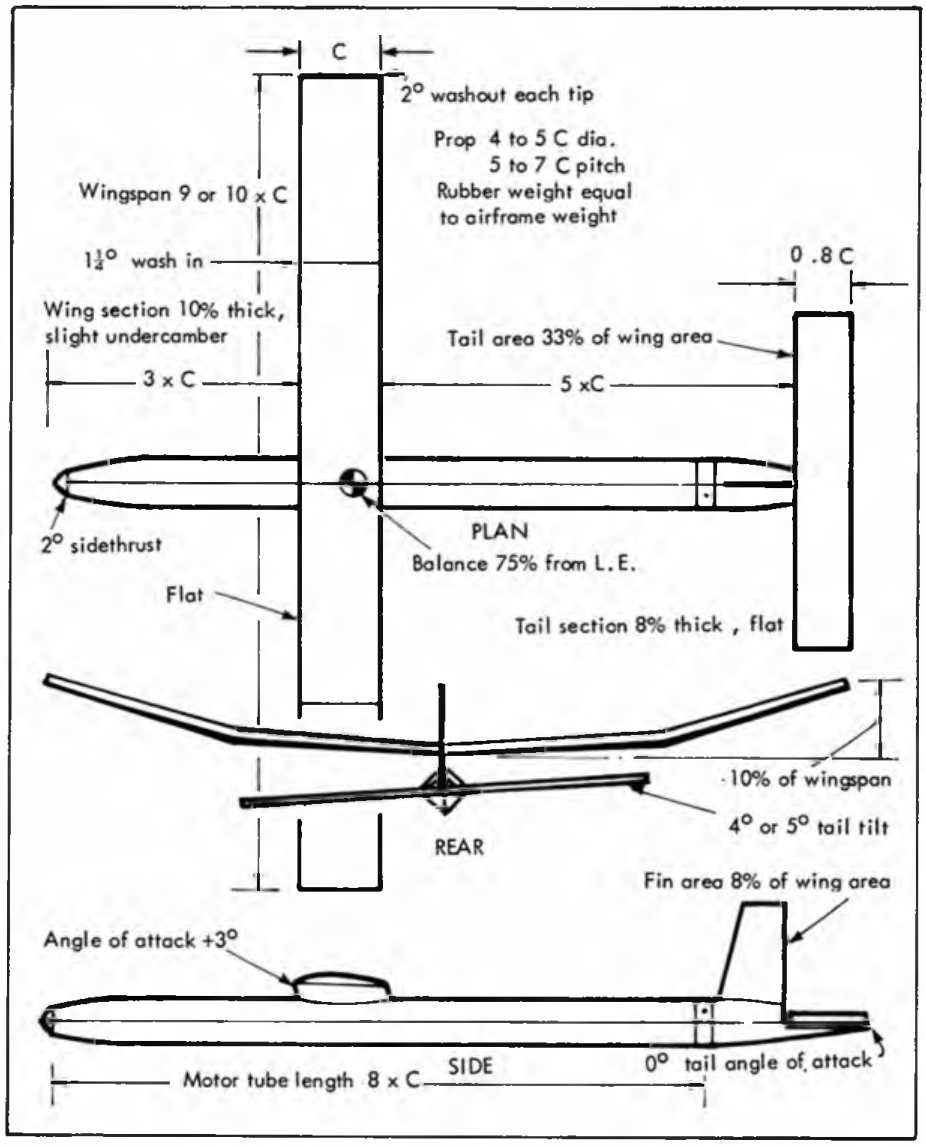
Wings

I always construct my wings with a simple 'I' beam spar (Fig. 1), I find this gives me a good combination of strength, simplicity and ease of repair, the latter being very important when faced with a field repair. On rough weather models I substitute spruce for balsa on the inboard panels with a slight weight penalty of approximately 4 grams on a Wakefield size model.

Fuselages

Because I rarely make two models which are identical I find the traditional jig construction used in conjunction with diagonal longerons gives me the best of both worlds,

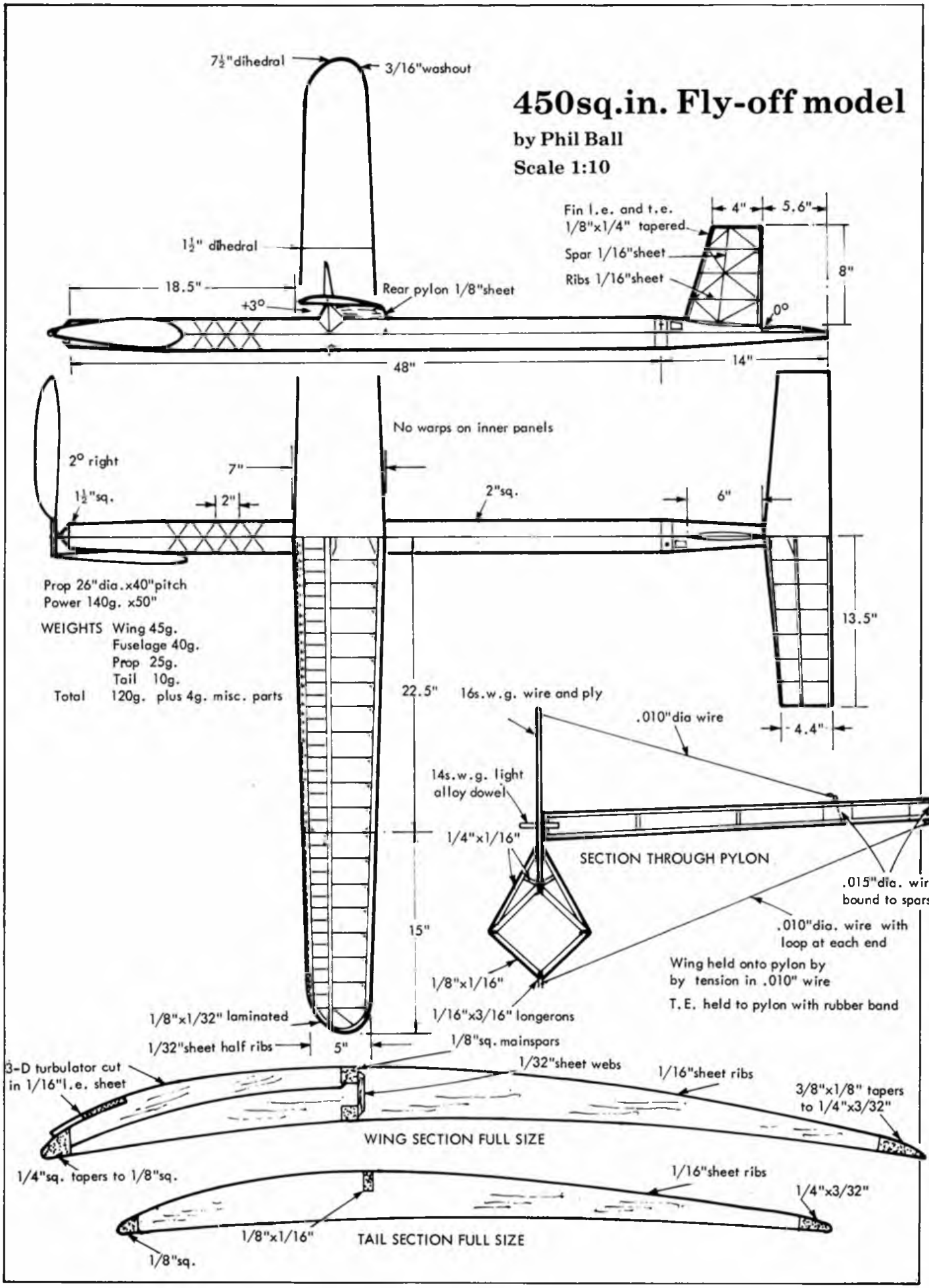
Basic design features for an Open Rubber Model. All measurements are related to the chord of the wing (C) . . . see you in the fly-off!



450sq.in. Fly-off model

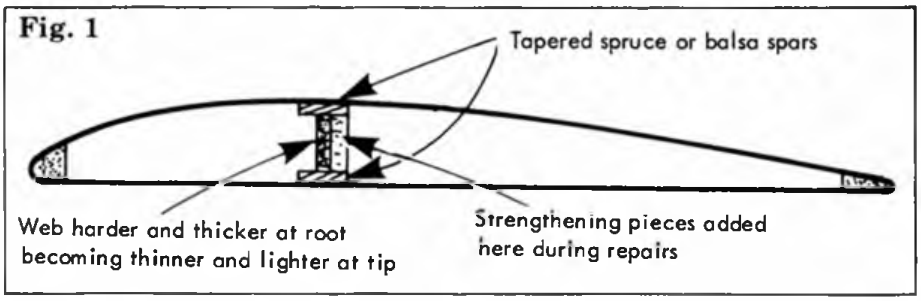
by Phil Ball

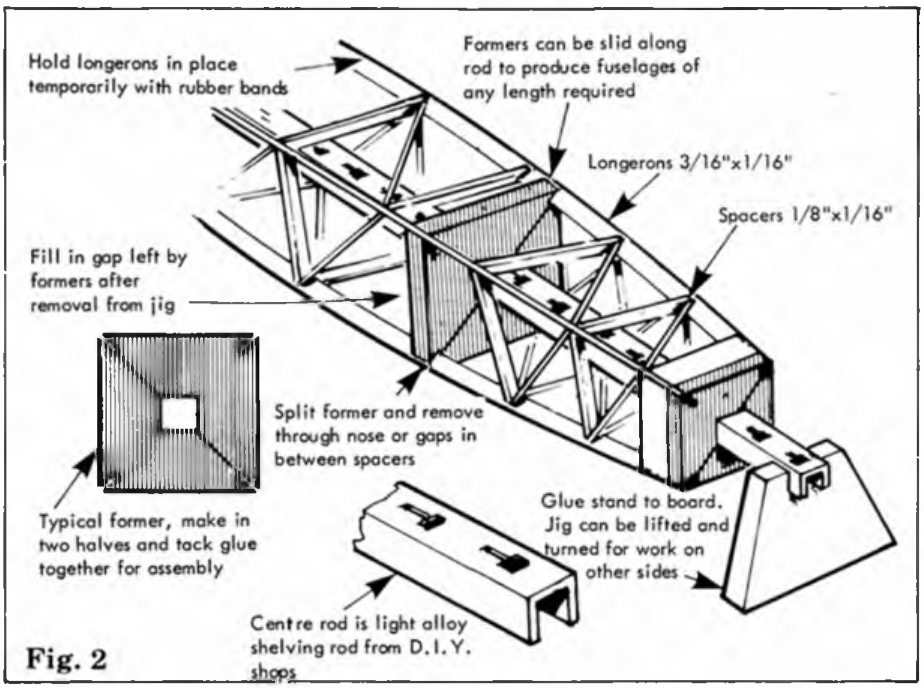
Scale 1:10

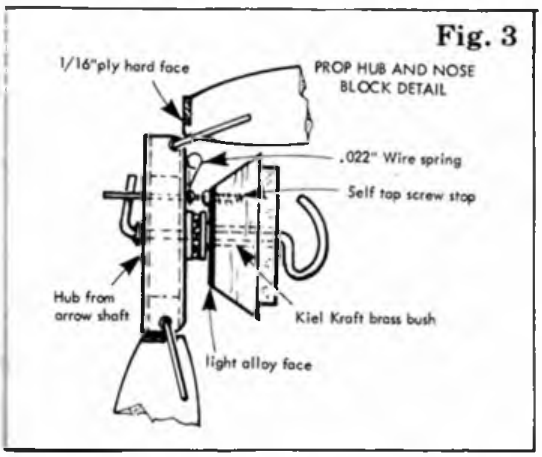


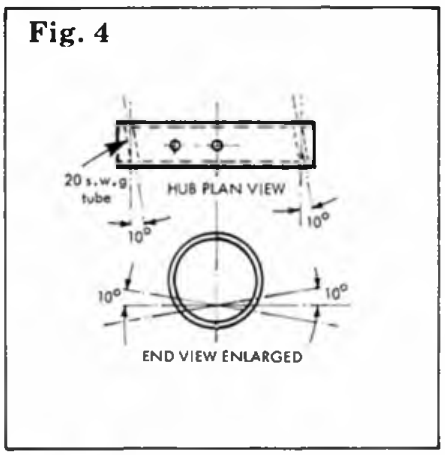
i.e. rapid construction and infinite variability in length by simply sliding the formers up or down the centre rod.

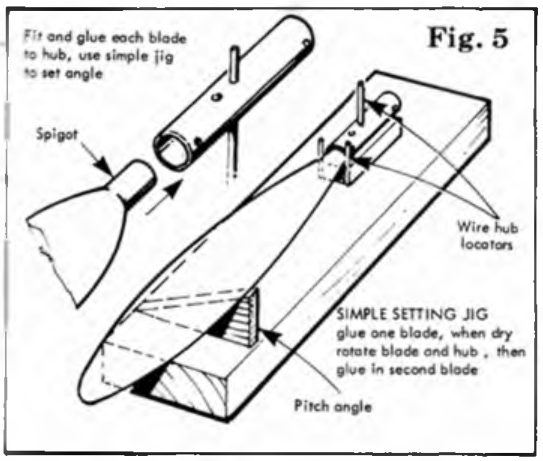
The centre jigging rod is a piece of shelving rail available from most DIY shops. All formers are made from 1/4in. sheet with 1mm ply facing, the formers are split diagonally and tack glued, this enables them to be split on completion of the fuselage and removed either through the nose or spaces in the fuselage sides. See Fig. 2.

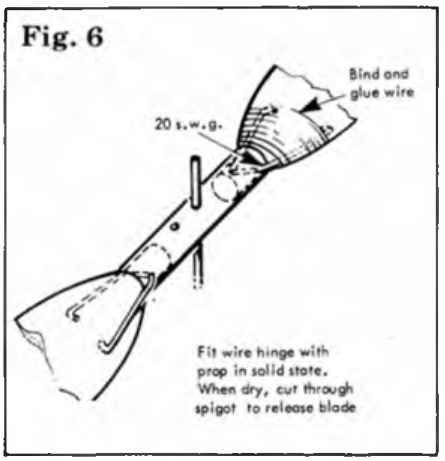












Covering

When talking to newcomers to Open Rubber, one problem which seems to crop up is covering and doping. Because of the light and relatively fragile structure of this type of model I find that the minimum amount of dope should be used whilst still making the model waterproof. I tend to use two very thin coats of dope to tighten the tissue and then use further coats of plasticised dope to make it waterproof (castor oil can be used at the rate of about 20 drops per 2oz. of dope) this results in a covering which is tight enough for flying but not tight enough to stress the structure and cause sagging longerons and buckled ribs.

Propellers

For the last six years I have used the Montreal type propeller assembly Fig. 3, I find the advantage of consistent operation with a motor stretched tightly between the anchorages worth the extra constructional effort which is involved.

I start construction by drilling all the holes in the arrow shaft material that I use for the hub (Fig. 4). All holes should be drilled smaller than required to allow alignment to be checked and any adjustments are made with a pointed needle file. When all the holes are correctly aligned they can then be opened out to the correct diameter by carefully rotating a round needle file in the hole.

The propeller blades are carved in the normal way but have a spigot carved on at the root end to the same internal diameter as the hub tube. Both blades are glued onto the hub using a simple jig to align them (Fig. 5) the result will then look like a free-wheel propeller.

At this stage the 20swg brass tubes should be glued into the hub and the wire hinges fitted, bound and glued to the propeller blades. Because these operations are carried out with the propeller in a rigid state good alignment should result (Fig. 6). The propeller blades are then freed to fold by cutting through the hub spigot, a 1/16in. ply hard facing is also added at this stage.

Future developments

You can see from the plan of my latest fly-off model that although the model looks extreme it still basically follows the rules set down earlier, the only difference being the 13 to 1 aspect ratio wing.

Any future developments are unlikely to be any larger as this model has only been used on six occasions since it was built in the late summer of 1981.

Any changes will be confined to the wing sections, structures and propeller design, but because any changes can only be made on a trial and error basis . . . don't expect anything dramatic in the near future.

From Control Line News

THE HANDLE

RACING with Jim Woodside

Construction Techniques — Part 3
Covering Wings with Glass Cloth and Resin

It was the introduction of glass-fibre covering that ushered in the era of the light *and* robust team race models. Previously the only way to build a durable wing was to use strong and therefore heavy wood. Of course, covering with tissue and dope is easy, but some of the following techniques are just as direct.

The weight of cloth required is about 0.6oz. per sq. yard or its metric equivalent. Some builders substitute 1.0oz. per sq. yard for covering the outboard span to strengthen the catching wing.

Sharp scissors are a *must* as are clean hands, in order to prevent distortion of the weave. In all cases the wing is covered before installing into the fuselage.

Method 1: *Tuf-kote*. Cut two panels of cloth just wider by about 1 inch than half the span of the wing and wide enough to cover both upper and lower faces with about a 1in. overhang. Hold the wing vertical and drape a panel over a half-span. Now with a soft brush paint *Tuf-kote* through the cloth, working from leading edge to trailing edge. Make sure there are no air bubbles under the covering. As soon as this panel is touch-dry cover the second half overlapping at the centre by one inch. When dry remove the flashing with 320 grade wet and dry emery paper.

This method is also the best for applying cloth to fuselages. Apply a second coat after a light sanding.

Method 2: — as in method one, but using slow set epoxy such as *Araldite*. Mix 5cc of epoxy and add 10cc of methanol. After about 15 minutes the epoxy will dissolve in the methanol. Paint the mixture through the cloth. Although normally the epoxy takes hours to dry, this mixture is touch-dry in about only 30 minutes.

Although this method is slightly stronger overall than *Tuf-kote* it is debatable if it is worth the added trouble.

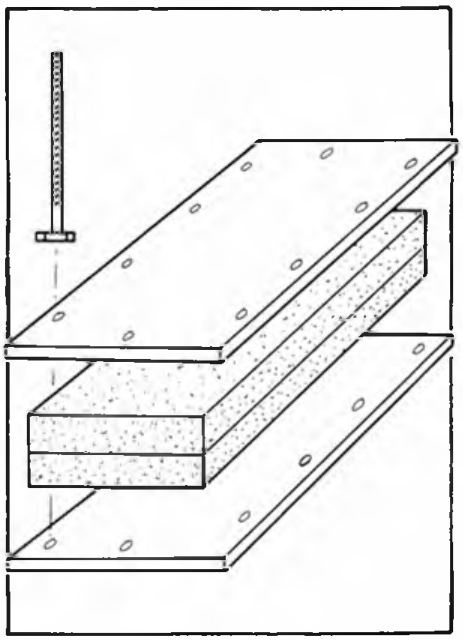
Method 3: — Pressing. The essence of this approach is that cloth and epoxy are bonded to the wing's surface under pressure. The advantage is that a minimum of weighty epoxy is used and a mirror-like finish is gained as a by-product of the process. The disadvantage is that some special equipment needs to be made, although it is of a simple nature.

For the press you will need two sheets of high density chipboard of 1in. thickness, two sheets of foam seating 2in. thick and ten bolts of at least 7in. length which are threaded for most of their length. Calculate your dimensions by reference to the size of the wing to be pressed.

Foam is about 4in. larger than wing in both directions. Chipboard is about a further 4in. bigger.

Having made the press, it is now time to cover the wing. Obtain sufficient *Mylar* or *Melinex* sheet to cut two pieces equal in size to the foam pads. Retailers of fibre-glassing materials, such as *Strand Glass* sell *Melinex* for about 50p a square yard.

For the epoxy, buy a low viscosity type such as is now obtainable in model shops. *Irvine Engines* distribute 'Superpoxy' as well as suitable glass cloth. *Sailplane International* can supply a thin *Araldite* (XB2878A. XB2878B), which I have used with success. Again this should be obtainable through good model shops.



Above: general layout of 'wing press' as described in Construction Techniques. Below left: plan view of 'press' indicating the size of seating foam in comparison with the wing, note that the bolts butt up against the foam. Below right: the 'press' in action, note the compression of the foam! Nuts have been tightened (evenly please!) so that only a ¾in. gap is left between the chipboard top and bottom.

Pass the bolts through the base board and place the lower foam layer in place, noting that it is retained in place by edge contact with the bolts. Place this on an open work surface. Cut panels of glass cloth and put these to one side. Mix about 12cc of resin and hardener, which is sufficient for one side. Place the wing on a clean flat surface, wipe away any dust from its surface and position the glass cloth on the upper surface. Using a flexible plastic scraper begin to work the epoxy into the glass, working from the centre to the tips and from middle chord towards the leading and trailing edges.

Use no more than the mixed amount and aim for an even spread over the whole surface. When satisfied with this, carefully place a sheet of *Melinex* over the wing and press with light hand strokes onto the epoxy-glass covering. Using the scraper, exclude any air bubbles from beneath the *Melinex*.

Turn over the wing and repeat the process using a fresh mix of epoxy.

Take the 'sandwich' to the press and place on top of the foam layer. Place the second foam sheet over, followed by the top sheet of chipboard.

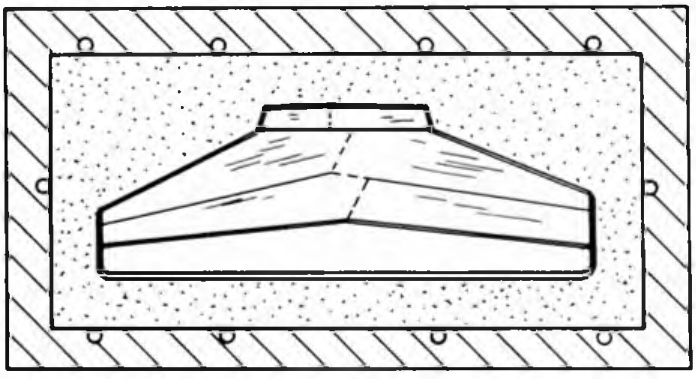
Now for the worrying part. Evenly tighten the nuts until a ¾in. gap remains between the sheets of chipboard. Two strips of ¾in. timber front and back is an easy way to gauge for even tightening. Leave for 48 hours to fully cure. When you finally peel the *Melinex* from the wing you should have a flat wing with a highly polished surface which only requires de-flashing before installing into the fuselage. Despite the apparent potential for destruction I have not, so far, had any disasters. Good luck with *your* attempts!

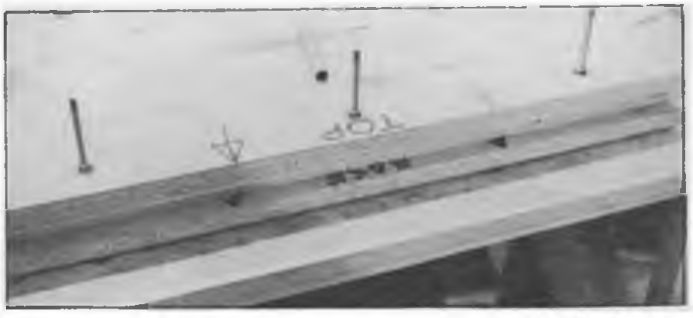
Notes:

1. Plug the lead out holes with 'Blue Tac' to prevent epoxy blocking the channels.
2. A variation on 'pressing' is to place the wing in a sealed polythene bag and evacuate the air with a vacuum pump.
3. Adding pigment to colour the resin is a help in checking for an even spread of epoxy over the wing.
4. Some builders apply the cloth with the weave at 45° to the leading edge as they feel this gives more strength.

F.A.I. F2C Final at the 1983 Nationals

I am not given to using this column for personal advantage, but I cannot resist on this occasion! It was disappointing to end up in second place in the 1983 Nats, but when the *Aeromodeller* report credits me a slower time — well it is more than flesh and blood can stand! So — just for the record:





Aeromodeller

1. Smith/Brown 7.26.0
2. Heaton/Woodside 7.26.8
(7.28 previously published)
3. Wilson/Gardner 7.44.8

The 1983 UK Racing Scene
John Horton's League Table

One of the most notable features about the 1983 season was, that despite generally good weather which gave us some memorable events, no less than five contests were lost through wet, windy Sundays. Two further meetings were cancelled through the lack of a venue and an organiser. This means that six FAI, two ½A, five Goodyear and two B races were lost, representing a total of 350 points. Hence the scores for the season were generally low. For example 38 points was enough to top the Goodyear table as compared with 63 in 1982.

Bearing in mind the basic scheme of: 1st, 6 points; 2nd, 5 points; 3rd, 4 points and 1 point for a place in the semi-finals, let us look at the various events.

½A Teamrace

Six events, 15 teams.

As noted in an earlier column ½A witnessed a marked increase in performance, with the British nationals bringing out a rash of sub-four minute races. As the engines and designs used remain substantially the same as in the past few years I can only suppose that the racers are giving the event a little extra in terms of preparation. It is now several years since a ½A design was published and perhaps the time is right for a publication to keep interest high.

	1st	2nd	3rd	Pts.
1. O'Neil/Bollen	—	3	1	16
2. Hill/Metcalfe	1	1	2	16
3. Nixon/Campbell	2	—	1	10½
4. Langworth/Broadhead	—	—	2	7
5. Davies/Banks	1	—	—	6

Class 'B' Teamrace

Two events, 9 teams.

Next month's *Racing* column will run a feature on class 'B' in the hope of gingering up interest in this 5cc event. It does look as if the rules, introduced in good faith by the Control-line Sub-committee, to curb noise and speed have had a detrimental effect on interest. Perhaps the committee might consider some reversal or revision of the current rules. An example of this might be to allow 0.35mm lines for 0.20 engines.

	1st	2nd	3rd	Pts.
1. Tribe/Yeldham	1	—	—	6
2. Wilson/Gardner	—	1	—	5
3. Horton/Haworth	—	1	—	5
4. Fitzgerald/Williamson	—	—	1	4
5. Allcock/Myska	—	—	1	4

Goodyear Teamrace

Eight events, 33 teams

The high spots of 1983 were definitely the achievement of sub-four minute heats. The power of the *Nelson* 15G(D) obviously has played its part, although pressure fed *Rossis* are still in the picture, (it is just amazing how long the *Rossi* has been delivering the goods). The other side of the coin is light, well made models with the type of systems that give quick fills and reliable starts. The 1984 season holds the prospect of *FAI* type times when some team ventures into a pressure system for the *Nelson*, especially if the big tank dodge of carrying enough fuel for 100 laps is employed; here pitstops are 'simply' resetting the fuel stop.

	1st	2nd	3rd	Pts.
1. Catlow/Jephcott	4	2	1	38
2. Andrews/Horwood	1	2	1	17
3. Millar/Schofield	1	1	1	15
4. Clarkson/Needham	1	1	—	13
5. Green/Malcolm	—	—	2	8

FAI Teamrace

Eleven events, 29 teams

I must admit this is a hard one to review with objectivity. However I am left with the impression of a slightly flat year. I think many teams were feeling uncertain about the state of the rules. Some notable teams, like Gray/Haycock, competed hardly at all and others spent part of the year re-shuffling and re-grouping. However on the plus side some very good times in the low 3.30s were recorded and Smith/Brown bagged third place in the European Champs. Moreover a turnout of 29 teams must be the envy of some nations, who can muster only enough for a couple of heats.

	1st	2nd	3rd	Pts.
1. Heaton/Woodside	4	3	1	43
2. Langworth/Broadhead	1	—	6	29
3. Wilson/Gardner	—	3	2	23
4. Smith/Brown	3	—	—	18
5. Fry/Thorpe	1	1	1	17

★ ★ ★ ★

Best teams based on 4 classes

	Points total
1. Heaton/Woodside	45
2. Langworth/Broadhead	40½
3. Catlow/Jephcott	38
4. Wilson/Gardner	30½
5. Nixon/Campbell	29½

Best clubs

1. Wharfedale	61½
2. Tynemouth	56½
3. Feltham	53½
4. Loughborough	38
5. Stockport	36½

All Time Greats 1975-1983

½A Teamrace

1. Horton/Haworth	118
2. Langworth/Broadhead	86
3. O'Neil/Bollen	62

Class 'B'

1. Wilson/Gardner	146
2. Nixon/Campbell	84
3. Heaton/Ross	74

Goodyear

1. Horton/Haworth	183
2. Catlow/Jephcott	167
3. Jarvis/Needham	162

FAI Teamrace

1. Smith/Brown	210
2. Wilson/Gardner	173
3. Langworth/Broadhead	171

Best All-rounder

1. Horton/Haworth	402
2. Wilson/Gardner	374
3. Langworth/Broadhead	269

Right: seen at the Peterborough MFC ½A competition, David Wild with beautifully constructed ½A version of Russian Doroshenko's FAI model.

Another year over and again, our thanks go to John Horton for his painstaking collection of data. Good luck to *all* for the 1984 season.

Tailpiece

Early in 1961 Kevin Lindsey, then P.R.O. of Hayes M.A.C. sent a letter to *Model Aircraft* regarding the running of F.A.I. teamrace at that year's Nationals.

Heats were to run as four up affairs: However the thing which caught my attention was the following: "If entries do not exceed *110* the final will take place at 4 p.m." Now that's a contest I would like to have attended — I am of course far too young... Nowadays we seem to have entries of fifteen with the final at dusk!

The event, by the way, was won by Ken Long (Wharfedale) using an *ETA* 'Elite' in a 'Tigress V' model. Heat was 4.48 and the one hundred lap final covered in 4.52.

COMBAT with Brian Waterland

Diesel Combat

Peterborough Model Flying Club who run the British Diesel Combat Championships have decided to introduce a rule change for the 1984 season. This is only the second change in the rules since the inception of the competition and refers solely to the engine size.

The organisers learned that some entrants were planning to convert .19cu.in. and 3½cc racing glo-motors to diesel operation. It was felt that this would rapidly lead to the class becoming the preserve of those with money and/or machining facilities.

This would be directly contrary to the spirit of the event. Diesel Combat is the ideal way for control-liners to start competition flying.

Simply limiting the engine size to 2.5cc would have eliminated the *P.A.W.*19, probably the cheapest way of entering the class.

Accordingly the rule regarding engine size will now read: "*Engine capacity up to and including 2.5cc for ball roller race motors, up to and including 3.5cc for plain bearing motors.*"

½A Combat

We like to think that combat flying appeals to all ages and at the last ½A Combat Competition run by Peterborough M.F.C. the entrants ranged from ten to forty-eight years old!

The ten-year-old was David Wild from Saffron Walden. He flew very well, taking a good cut-off a senior and will no doubt return for another go.

Not much older was Martin Donald from Leicester. Martin (and his father John) fly beautifully built wings incorporating some neat ideas.

One of their models was a ½A version of Russian, Doroshenko's F.A.I. model which featured ⅛in. spruce trailing edge aluminium angle bearers, a beech (fretted out) centre rib and a transparent bag tank made from a heat-sealable plastic called *Tedlar*. *Tedlar* is apparently a relative of *Mylar* and is impervious to hydrocarbons.

TISSUE UPDATE . . .

Film or Tissue?

Bringing back to the boil the controversial question of which material to use on our models

. . . Vic Smeed

IN A RECENT REVIEW of a kit model I made the remark (re film v.tissue) that a tissue-covered model has better overall structural strength. In this I confess that I was simply repeating a statement made frequently in model magazines and books from various countries without thinking it through. We all of us tend to accept at its face value something repeated sufficiently often and it was not until a query arose that I examined this particular 'fact' in detail and was forced to the conclusion that it is quite wrong.

Structural strength is closely tied to the tensile strength of materials used in the structure and especially in the case of stressed skin components, the elasticity of the materials. An egg is a splendid example of a monocoque structure using a skin of low tensile strength and elasticity and say, a tennis ball which typifies a monocoque skin of greater strength and very much greater elasticity. If a shock load is encountered we all know what will happen. The egg, however, is a very much stiffer structure in its normal state; if you take a (blown) goose egg, which is similar in volume and (probably) weight to a tennis ball, it may very well appear to be stronger. Which would you bounce on the ground?

It seems clear to me that this is where the confusion has arisen. A tissue-covered wing or fuselage will be stiffer than one covered in film, the doped tissue having only a small degree of elasticity compared with the film and thus providing more torsional stiffness to a flexible structure. The limitations on deflection, however, have the disadvantage of overstressing the skin at a modest displacement, i.e. a wing cannot bend or twist far before the tissue splits or tears. The same wing covered in film will not be so rigid in normal circumstances but will deflect much further without the covering rupturing. In fact some of the heavier films will remain intact when all the internal structure is crushed — the 'bag of balsa' previously associated only with nylon.

Thus talk of 'overall strength' is erroneous and what is really meant is torsional stiffness, which is what tissue contributes. This is important for, say, lightweight rubber model construction, where the light weight itself lessens the shock loads on landing and the structure, by virtue of its minimum size members, will be very flexible in its uncovered state. Film, however, is not normally used on under medium weight, medium size models, where the possibility of using stiffer, anti-flex basic construction exists, so that when a model is described as suitable for film *or* tissue, it should be safe to assume that the structural design has taken into account torsional stiffness and flexion. Comparisons of weights may tip the balance in deciding which to use bearing in mind the other factors such as puncture resistance etc. Published and/or manufacturers' figures appear to be approximately in the following area:

Lightweight tissue, adequately doped	12gm/m²
Heavyweight tissue, adequately doped	23gm/m²
Solarfilm	45gm/m²
Solarfilm-white (due to pigment)	60gm/m²
Micafilm (plus adhesive)	50gm/²
Nylon, adequately doped	60gm/²
Solartex	85gm/m²

Tissue Test

A new replacement for that 'old faithful' — Modelspan, is put through its paces

. . . P. D. Freebrey

OVER THE PAST FEW YEARS it has been increasingly difficult if not impossible to get coloured tissue paper. Various rumours floated around as to why this was so. Stories of pollution in the streams used for its production came from Japan, increasing and unacceptable costs of dyes from producers elsewhere. Whatever the reason, our choice at the local model shop has been reduced to white or white! Recently some coloured Japanese tissue has re-appeared and now *The Balsa Cabin* in Essex has obtained supplies of two grades of tissue, closely resembling *Modelspan*, that have been available only in Europe.

Many modellers must have come across new varieties of tissue in gift shops and the like and bought some in the hope that it will replace fast disappearing stocks of ancient *Modelspan*. Almost without exception, those tried have failed dismally! Usually, instead of shrinking they go all floppy on the application of dope and stay that way even when the dope has dried!

So . . . this latest offering from *The Balsa Cabin* . . . what is it like . . . does it come up to our expectations?

The 'new' tissue comes in a number of quite strong colours, those supplied were red, yellow, green, blue and orange and I understand black is now available. Two grades are available lightweight and heavyweight. Both have the appearance of a coarser 'weave' than the old *Modelspan* and both have a 'smooth' and 'rough' side. Sheets come in a standard size of 20in. x 30in. and both grades are slightly heavier than 'old' grades. There are variations from sheet to sheet (true also of older offerings). Undoped lightweight averages out per sheet at about 5gms and the heavyweight at about 8.5gms per sheet. This compares with 'old' tissue weighing in at about 4gms and 6.5gms respectively. A number of frames 3½in. x 3in. with ⅛in. x ⅜in. sides were made, these were covered on one side with samples of 'new' and 'old' tissue, the smoother side on the outside. One sample of each was water-shrunk and then all samples were given coats of dope thinned with 50% thinners.

The 'new' tissue required more coats of dope to fill them and initial shrinkage was less. The 'old' giving a healthy 'ping' when tapped after two coats, the 'new' needing four coats to give the same apparent effect. After six coats there was no apparent difference in tautness, although neither light or heavy 'new' tissue were filled to the same extent as the 'old'. On the plus side the 'new' tissue did not sag to anywhere near the same extent when dope was applied, appears to dry more quickly and the dope seems to 'fill' more evenly indicating a more consistent paper structure. Water shrinking did not appear to have any marked effect on the final results but the 'ping' test seemed to give a slightly higher note (tauter) on the water-shrunk samples — or was this wishful thinking! Altogether these new coloured tissues are going to provide us with a good covering material which in some respects is slightly easier to use, albeit with some small increase in weight . . . nowhere near the additional weight that is incurred by use of any of the plastic film coverings but on the other hand they have other advantages as set out above.

Available from *The Balsa Cabin*, The Street, Little Totham, Essex. CM9 8JQ (see page 151) for their advertisement. Trade enquiries would also be welcome!

SHOP TALK

NEW MODEL HOBBY PRODUCTS REVIEWED

Fancy Flier from DPR

DPR Models are well known for their range of balsa-wood chuck gliders and rubber powered models. Many young aero-modellers have begun to learn the basics with these popular models. Now they can take a further step forward with 'Hyper Cub' an attractive, scale like, rubber powered free-flight sports model. The 'Hyper Cub' is 30in. wingspan and is designed for either rubber power or CO_2 (Turbo Tank 6000). To enable a scale like propeller to be used and to produce a longer 'smoother' run, DPR Models have incorporated a lightweight gearbox.

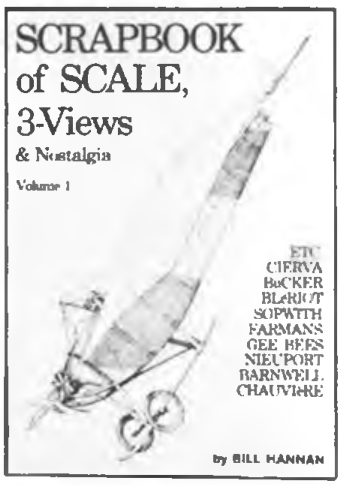
The contents of the kit are pretty comprehensive with die-cut balsa and ply parts and pre-formed wire undercarriage and motor hook. Even balsa cement, sandpaper, rubber bands and the rubber strip for the motor are included. Price £11.95 from your local model shop shortly. The gearbox, including propeller, spinner and motor hook will also be available separately at £3.95.

Performance Kits . . . New 1cc diesel engine

Performance Kits of the Isle of Man have just introduced a new diesel engine the 'F-100' weighing in at 0.976cc (.059cu.in.) as reported in last month's *Engine News*. It is aimed at sports/scale/vintage free-flight models and is said to have flexible and easy handling characteristics. Weight is 3oz (including tank) and a silencer is available for an additional £2.00. As can be seen from the picture the 'F100' has quite a smart appearance with black crankcase and polished spinner. If it comes up to its specifications we should see a good number of these motors around our flying fields in the future. Look out for them in your local model shop at £13.99.

Mail order goodies

SAMS, 2 The Drive, Wheathampstead, Herts., are now selling MRL Boron Filament in 100ft. spools for £6.99 larger quantities get cheaper per unit length 1,000ft is only £19.75. This .004in. Boron filament is said to be equivalent to .02in. piano wire but of course very much lighter. The surface is textured so all model adhesives will work well with it. Very light, rigid spars can be formed by layering a number of strands. Totally replacing a spar with Boron could prove expensive but local applications of one or two strands could improve stiffness of light structures (such as indoor models or lightweight tailplanes) considerably.



Also from SAMS is Bill Hannan's latest book 'Scrapbook of Scale, 3-views and Nostalgia — Volume 1' at £8.95 for 56 pages this may seem expensive but with a number of three-views, some excellent articles and four full size plans — a very good read.

Coverite 'Pre-Primed Micafilm'

Coverite have developed a revolutionary iron-on film that actually comes with its own factory applied primer coat. It's called 'Pre-Primed Micafilm'. The unique advantage of this film is that now you can achieve a smooth surfaced finish without any filling, sanding or base coats. All that is required is that you iron it down, then apply only one or two coats of paint. The result is claimed to be a quick, easy paint job equivalent to one that used to require hours of preparation before the colour coats could be applied.

Compared to conventional painted finishes, a 'Pre-Primed Micafilm' finish is claimed to be less than 1/3rd the weight.

With the addition of new 'Pre-Primed', the 'Micafilm' line now encompasses four translucents (red, blue, yellow and newly released orange), pearly white, and a realistic Aluminium. 'Micafilm' is available in two sizes: 29 × 65in. and 29in. × 16.4ft. Available from your favourite dealer.

Comet 'Cloudbuster' beginners rubber model kit

There is no doubt in our minds that small rubber powered models such as this 21⅜in. span duration style model 'Cloud Buster' from *Comet* make an ideal introduction to the art of building and flying free-flight model aircraft.

Comet's kit employs entirely conventional construction methods with die-cut balsa parts, strip balsa, rubber motor, wheels, propeller formed wire parts, sandpaper and tissue for covering. Instructions are comprehensive and, along with photographic illustration, are printed on the plan. The finished model is big enough to give a satisfying flying performance, with constructional methods which should not tax the beginner unduly. *Comet* kits are distributed by J. Perkins Wholesale and the 'Cloud Buster' costs £4.95.

SHOP TALK

MAIL ORDER ADVERTISING

British Code of Advertising Practice

Advertisements in this publication are required to conform to the British Code of Advertising Practice. In respect of mail order advertisements where money is paid in advance, the code requires advertisers to fulfil orders within 28 days, unless a longer delivery period is stated. Where goods are returned undamaged within seven days, the purchaser's money must be refunded. Please retain proof of postage/despatch, as this may be needed.

Mail Order Protection Scheme

If you order goods from Mail Order advertisements in this magazine and pay by post in advance of delivery RCM&E will consider you for compensation if the Advertiser should become insolvent or bankrupt, provided:

(1) You have not received the goods or had your money returned; and

(2) You write to the Publisher of this publication, summarising the situation not earlier than 28 days from the day you sent your order and not later than two months from that day

Please do not wait until the last moment to inform us. When you write, we will tell you how to make your claim and what evidence of payment is required.

We guarantee to meet claims from readers made in accordance with the above procedure as soon as possible after the Advertiser has been declared bankrupt or insolvent (up to a limit of £2,000 per annum for any one Advertiser so affected and up to £6,000 per annum in respect of all insolvent Advertisers. Claims may be paid for higher amounts or when the above procedure has not been complied with, at the discretion of this publication, but we do not guarantee to do so in view of the need to set some limit to this commitment and to learn quickly of readers' difficulties).

This guarantee covers only advance payment sent in direct response to an advertisement in this magazine (not, for example, payment made in response to catalogues etc., received as a result of answering such advertisements). Classification advertisements are excluded.

Model Shop DIRECTORY

READERS PLEASE NOTE: Due to soaring postal charges many retailers are unable to answer postal enquiries unless accompanied by a stamped addressed envelope. ★ **Mail Order Welcome.**

AUSTRALIA

MELBOURNE 3000 Tel: (347) 8029
RIVERSIDE HOBBY CENTRE ★
16 LITTLE LATROBE STREET
9 am-5.30 pm Mon.-Fri.
9 am-12 noon Sat.

AVON

BRISTOL Tel: (0272) 694541
THE MODEL AIR PORT
134 GLOUCESTER ROAD NORTH, FILTON
Open 9.00 am-5.30 pm Tues.-Sat., Thurs. to 6.30 pm, Closed Monday

BERKSHIRE

WINDSOR Tel: (07535) 56321
WINDSOR MODEL SHOP ★
45 ALBANY ROAD
Open Mon.-Sat. 9 am-6 pm
Late night Fri. 7 pm
Half day Wed. 1 pm

CAMBRIDGESHIRE

CAMBRIDGE Tel: (0223) 359620
MODEL MANIA ★
17 KING STREET
Open 9.30 am-5.30 pm
Mon.-Sat. Inc. Lunchtime

CHESHIRE

MACCLESFIELD Tel: (0625) 29467
HOBBYCRAFTS (MACCLESFIELD) LTD
PARK MILL
HOBSON STREET
Open 9.30-5.30 Mon.-Sat.

SALE Tel: (061 962) 4561
HOBBYWORLD ★
200A MARSLAND ROAD
Mon.-Sat. 9.30-6.00
Closed all day Wednesday

DEVON

PLYMOUTH Tel: (0752) 263133
RUNWAY SOUTHWEST ★
22 FRANKFORT GATE
CITY CENTRE
Mon.-Sat. 9 am-6 pm

TORBAY Tel: (0803) 521767
MANSEL'S MODELS ★
PALACE AVENUE, PAIGNTON
Open 9.15 am-5.30 pm Mon.-Sat. inclusive. Closed all day Wed.
Late night Fri. 7 pm

DORSET

BOURNEMOUTH Tel: (0202) 424038
R. F. AUSTIN — MODEL SHOP, 156 SEABOURNE ROAD ★
SOUTHBOURNE BH5 2JA
Open 9 am-5.30 pm Mon.-Sat.
Closed 6pm Thurs. Fri. Half day Wed.

ESSEX

CHELMSFORD Tel: (0245) 352553
CHELMSFORD MODEL CO. LTD
204 MOULSHAM STREET
Mon.-Sat. 9.00am-5.30pm

COLCHESTER Tel: (0206) 572094
JIM'S MODEL CENTRE
159 NORTH STATION ROAD
Open: 10-5.30 Mon.-Sat.
Closed Thursdays

HORNCHURCH Tel: (040 24) 40016
RADIO ACTIVE ★
94 ARDLEIGH GREEN ROAD
Open: Mon., Tues., Thurs. & Sat. 9 am-6 pm, Fri. 9 am-7 pm
Half day Wednesday

HAMPSHIRE

FAREHAM Tel: (0329) 234136
G. M. H. BUNCE & CO LTD ★
206 WEST STREET
Open 9 am-5.30 pm. Closed Wed

SOUTHAMPTON Tel: (0703) 617849
EASTLEIGH MODEL CENTRE
2e HIGH STREET, EASTLEIGH
Open 9 am-6 pm. Half day Wed.

HERTFORDSHIRE

ROYSTON Tel: (0763 45375)
MODEL WORKSHOP ★
31 KNEESWORTH STREET
SG8 5AB
Open Tues.-Sat. 9.30 am-6.00 pm
Late night Friday 9.30 am-8.00 pm

HONG KONG

HONG KONG Tel: 3-680507
RADAR CO LTD ★
3 OBSERVATORY ROAD
TSIMSHATSUI, KOWLOON
Open 10 am-7 pm. Closed Sundays

HONG KONG Tel: 3-684184
WINNING MODEL & HOBBY SUPPLIES
2a AUSTIN AVENUE
KOWLOON, HONG KONG
Open 10 am-7 pm. Closed Sundays

KENT

BEXLEY Tel: (0322) 522308
BEXLEY MODEL CENTRE
18 BOURNE ROAD
Mon.-Sat. 9.00-5.30
Thursday closed all day

TUNBRIDGE WELLS Tel: (0892) 31803
BALLARDS ★
54 GROSVENOR ROAD
Open Mon.-Sat. 9.00-5.30
Wednesday 9.30-12.30

TUNBRIDGE WELLS Tel: (0892) 36689
E. M. MODELS ★
42 CAMDEN ROAD
Mon.-Sat. 9 am-5.30 pm
Closed Wed.

LANCASHIRE

FARNWORTH Tel: (0204) 74688
JOYCRAFT ★
3 BOLTON ROAD, MOSES GATE
Open Mon.-Sat. 9 am-6.30 pm
Closed all day Wednesday

LIVERPOOL Tel: (051 709) 8039
STAN CATCHPOLES ★
MODEL WORLD
85 BOLD STREET
9.30 am-5.30 pm. Six days

MANCHESTER Tel: (061-834) 3972
THE MODEL SHOP (MANCHESTER) ★
209 DEANS GATE
Mon.-Fri. 9.30 am-6 pm.
Sat. 9 am-5 pm

PRESTON Tel: (0772) 51243
PRESTON MODEL CENTRE LTD ★
(Opposite Polytech.)
2 FYLDE ROAD
Open: 9.30 am-6 pm Mon.-Sat.

WIGAN Tel: (0942) 45683
G. FORSHAW & SON ★
58 MARKET STREET
Open 9.15 am-5.45 pm
Early Closing Wednesday

LEICESTERSHIRE

HINCKLEY Tel: (0455) 30952
PUNCTILIO MODEL SPOT ★
6 WATERLOO ROAD
Mon. 9.15 am-7 pm Tues., Wed., Thurs. 2 pm-7 pm Fri. 9.15 am-7 pm Sat. 9.15 am-5 pm

LONDON

CAMDEN TOWN Tel: 01-485 1818
AERONAUTICAL MODELS ★
39 PARKWAY NW1
9.15 am-5.30 pm Tues.-Fri.
9.15 am-5 pm Sat.
Closed all day Monday

ELTHAM Tel: 01 850 4324
ELTHAM MODELS ★
54 WELL HALL ROAD SE9
Mon.-Sat. 10 am-5.30 pm
Closed Thursday

LONDON Tel: (01-228) 6319
E. F. RUSS
BATTERSEA RISE SW11
Open 9 a.m.-6 p.m.
Early closing Wednesday 1 p.m.

LONDON Tel: 01-703 4562
MODEL AIRCRAFT SUPPLIES LTD
207 CAMBERWELL ROAD, SE5 ★
Open Mon.-Sat. 10 am-6 pm
Fri. 10 am-7.30 pm
Closed all day Thursday

LONDON Tel: 01-607 4272
HENRY J. NICHOLLS & SON LTD ★
308 HOLLOWAY ROAD, N7
Open Mon.-Sat. 9 am-5.30 pm

MIDDLESEX

HARLINGTON Tel: 01-897 2326
RADIO CONTROL MODEL CENTRE 214 HIGH STREET ★
Mon., Tues., Thurs. & Sat. 9.15 am-5.30 pm, Fri. 9.15 am-6.30 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

NORFOLK

KINGS LYNN Tel: (0553) 63164
BARNEY'S MODEL SHOP
1ST FLOOR, 29 ST. JAMES STREET
PE30 5DA
Opening hours 9.00-5.30 Tues.-Sat. Closed Monday.

NORWICH Tel: (0603) 42515
GALAXY MODELS ★
88 CATTON GROVE ROAD
Open 6 days a week

NORTHANTS

NORTHAMPTON Tel: (0604) 35718
STAGG MODELS ★
22 BRIDGE STREET
Open 9 am-5.30 pm
Early closing 2 pm Thursday
Late night opening Friday until 7 pm

NOTTINGHAMSHIRE

NOTTINGHAM Tel: (0602) 412211
GEE DEE MODELS LTD ★
19-21 HEATHCOTE STREET
OFF GOOSEGATE
Open 9.30 am-5.30 pm
Early closing Thursday

NOTTINGHAM Tel: (0602) 412407
NOTTINGHAM MODEL CENTRE ★
85 MANSFIELD ROAD
Open Mon.-Sat. 9.00-5.30 pm including lunchtime

OXFORDSHIRE

OXFORD Tel: (0865) 42407
HOWES OF OXFORD ★
9-10 BROAD STREET OX1 3AJ
Open 9.00 am-5.15 pm
6 day week

SCOTLAND

GLASGOW Tel: (041 221) 0484
DUNNS MODELS ★
3 WEST NILE STREET
Open: Mon.-Sat. 9.00 am-5.30 pm

PERTH Tel: (0738) 24540
DUNNS MODELS ★
29 SCOTT STREET
Mon.-Sat. 9.00-5.30
Wednesday Closed

STAFFORDSHIRE

WOLVERHAMPTON Tel: (0902) 26709
WOLVERHAMPTON MODELS & HOBBIES ★
BELL ST., MANDERS CENTRE
9 am-5.30 pm Mon.-Sat.
Early closing Thursday

SUFFOLK

IPSWICH Tel: (0473) 79279
GALAXY MODELS ★
160 FELIXSTOWE ROAD
Open 6 days a week
Closed all day Wednesday

SURREY

ADDLESTONE Tel: (0932) 45440
ADDLESTONE MODELS LTD ★
63 STATION ROAD
Open 9 am-6 pm. Closed all day Wed. Late night Fri. 6.30 pm.
24hr Answerphone service

NEW MALDEN Tel: 01-942
MICK CHARLES MODELS 0012
33 COOMBE ROAD
Mon., Tues., Thur., Sat. 9.30-5.30
Fri. 9.30-8.00
Closed all day Wednesday

WORTHING Tel: (0903) 207525
SUSSEX MODEL CENTRE *
10 TEVILLE GATE
9 am-5.30 pm. Open six daysa week
Monday to Saturday

WEST MIDLANDS

BIRMINGHAM 10 Tel: 021-772
BOB'S MODELS 4917
520-522 COVENTRY ROAD *
SMALL HEATH
Open 9.30 am-6 pm
Early closing Wed. 1.30 pm

KEIGHLEY Tel: (0535) 65662
AIREDALE MODELS *
156 STATION BRIDGE
BRADFORD ROAD.
Mon.-Sat. 9.30-6 Tues. closed
Thur. 9.30 am-7 pm

SUSSEX

BRIGHTON Tel: (0273) 418225
HARRY BROOKS *
15 VICTORIA ROAD
PORTSLADE
Open every day except Sun.
8.30 am-5.45 pm (no half day)

TYNE AND WEAR

NEWCASTLE UPON TYNE
Tel: (0632) 322016
THE MODEL SHOP *
18 BLENHEIM STREET
Mon.-Sat. 9am-5.30pm
Closed all day Wednesday

WILTSHIRE

MELKSHAM Tel: (0225) 703311
MELKSHAM MODELS
19 BATH ROAD
Mon., Tues. and Thurs. 9 a.m.-5.30 p.m. Wed. closed all day. Fri. 9 a.m.-6.30 p.m. Sat. 9 a.m.-5 p.m.

LEEDS Tel: (0532) 646117
FLYING MODELS *
88 CROSSGATES ROAD
CROSSGATES
Mon.-Sat. 9 am-6 pm
Sun. 8 a.m.-1 pm

CRAWLEY Tel: (0293) 21921
HEATHER CRAFT *
9 SOUTHGATE PARADE
SOUTHGATE RH10 6ER
Open 9 am-5.30 pm Mon.-Sat.
Closed all day Wednesday

WALES

CARDIFF Tel: (0222) 31367
THE CARDIFF MODEL CENTRE *
34 LLANDAFF ROAD
CANTON, CARDIFF
Open 9.30-5.30 six days a week.
Late closing Friday 7.00 pm

YORKSHIRE

BARNSLEY Tel: (0226) 43561
DON VALLEY SPORTS *
28 NEW STREET
Open 9 am-5.30 pm Mon.-Sat.
Closed Thursday

YORK Tel: (0904) 34281
DAVE SMITH MODELS *
17 DAVYGATE CENTRE
DAVYGATE
Open Mon.-Sat. 9 am-6 pm
No half day

EAST GRINSTEAD Tel: (0342)
SOUTH EASTERN MODELS 21750
5 THE PARADE
LONDON ROAD, FELBRIDGE
Open: Mon.-Sat. 9.30 am-5.30 pm
Closed Wednesdays

CARDIFF Tel: (0222) 29065
BUD MORGAN *
22 CASTLE ARCADE
SOUTH GLAMORGAN CF1 2BW
9 am-5.30 pm

DONCASTER Tel: (0302)
EVANS MODEL CENTRE 27255
D. C. EVANS & CO. (HOLDINGS) *
LTD., 65 SILVER STREET
Open Mon.-Sat. 9 am-5.30 pm
Closed all day Thursday

NORTH YORKSHIRE

KNARESBOROUGH Tel: (0423)
JH AERO MODELS 866096
57A HIGH STREET
(above Kitchen Centre)
Mon.-Fri. 9.30 a.m.-5.30 p.m.
Sat. 10.00 a.m.-1.00 p.m.
Late night Friday till 7.30 p.m.

You can buy with confidence from the shops in this Shop Guide

** Shops offering a mail order service are denoted in this Guide by an asterisk.*

AERO MODELLER

CLASSIFIED

Private and trade rate 25p per word; minimum £5.00. Box Number £1 extra. Display box rate £6 per single column centimetre (minimum size 2.5cm £15.00; maximum 5cm £25). All advertisements are inserted in the first available issue, unless specified otherwise. Box replies to be sent care of Advertisement Department, Model & Allied Publications Ltd.
Write your advert in **BLOCK CAPITALS** in the grid below, ticking the section you wish it to appear under, **INCLUDING YOUR NAME AND ADDRESS IN THE WORD COUNT** and send it to: **AEROMODELLER, ADVERTISEMENT DEPARTMENT, P.O. BOX 35, WOLSEY HOUSE, WOLSEY ROAD, HEMEL HEMPSTEAD, HERTS. HP2 4SS.**

☐ FOR SALE ☐ WANTED ☐ GENERAL ☐ SERVICES ☐ BOOKS & PUBLICATIONS

advertisements

ALL CLASSIFIED ADVERTISEMENTS MUST BE PRE-PAID. THERE ARE NO REIMBURSEMENTS FOR CANCELLATIONS.
I enclose my Cheque/Postal Order* for £_____ for _____ insertions, made payable to Model & Allied Publications Ltd.
(*Delete as necessary)

Name .....
Address .....
.....
.....Post Code.....
Signature.....Date.....

IF YOU DO NOT WISH TO CUT YOUR MAGAZINE PHOTOCOPY THIS FORM

CLASSIFIED advertisements

Private and trade rate 25p per word; minimum £5.00. Box Number £1 extra. Display box rate £6 per single column centimetre (minimum size 2.5cm £15.00; maximum 5cm £25). All advertisements are inserted in the first available issue, unless specified otherwise. Box replies to be sent care of Advertisement Department, Model & Allied Publications Ltd.
Write your advert in **BLOCK CAPITALS** indicating the section you wish it to appear under, **INCLUDING YOUR NAME AND ADDRESS** and send it to: **AEROMODELLER, ADVERTISEMENT DEPARTMENT, P.O. Box 35, WOLSEY HOUSE, WOLSEY ROAD, HEMEL HEMPSTEAD, HERTS. HP2 4SS.**

For Sale

Aeromodeller and Model Aircraft back numbers 1946 to 1963. Annuals and other books. SAE for list. Jones, 79 Slinn Street, Crookes, Sheffield S10 1NY. D

Petrol, glo and diesel engines for sale. Conquerer '60' £79. Brownie 29 £79. Ohlsson 60, O.K.60 Rocket 46 all at £69 each. McCoy 49, Nordec ign., Mechanair, Whirlwind 6cc at £59 each. Nordec Glo, Ohlsson 23, Rogers 29, Mills 2.4 at £49 each. K. Vulture, Yulon 30, Amco .87, Mills 75 Mk.I at £39 each. Elfin 1.8, Mills 1.3, Comp Spcl., Frog 250, Amco 3.5, Frog 100, Frog 180 all at £29 each. ED Bee Mk.I, Mills 75, Elfin 1.49, ED.46 at £19 each. Tel: 01-642 9861 CD

General

We are the officially approved service agents for Austro-Webra, Cox, Davies-Charlton, Enya, Fox, Fuji, HB, HGK, HP, Kavan, ME, Merco, PAW, Thunder Tiger. Retail dealers for OS Irvine, ED, G-Mark. May we estimate for spares, accessories, repairs, overhauls, new motors, part exchanges? For express delivery quote your Access or Barclaycard number. John D. Haytree, The Haven, Rixey Park, Chudleigh, Devon, TQ13 0AN. Tel: (0626) 852330. Callers by appointment please. T/C

Letchworth. At last an expanding Model Shop. Call in and discuss your needs. Model Images Retail, 56 Station Road. Tel: 046-26-4859. T/C

THE BALSA CABIN
THE MAIL ORDER BALSA SPECIALISTS CONTEST BALSA
Try us for your requirements. We will select your grades
S.A.E. for Price List and Order Form
Write to: **THE BALSA CABIN**
THE STREET, LITTLE TOTHAM, ESSEX CM9 8JQ. Tel: Maldon (0621) 891971

INDOOR/FREE FLIGHT SUPPLIES
NEW 43 page 'RED' catalogue now available FREE with long S.A.E.
SAMS, 2 THE DRIVE, BLACKMORE END, WHEATHAMPSTEAD, HERTS. TEL: (0438) 832011

RUBBER STRIPPER
BORON FILAMENT
Micrometer Balsa Stripper.
Indoor Beam Scale.
Large SAE for details:
SAMS
2 THE DRIVE, WHEATHAMPSTEAD, HERTS.

Wanted

Wanted — Ready-built model aircraft, boats, yachts, cars, steam-driven models, also engines, kits, radio control equipment etc. If you are selling up, Tel: Godalming 21425. T/C

Gliding

KENT GLIDING CLUB
Challock, Nr. Ashford, Kent
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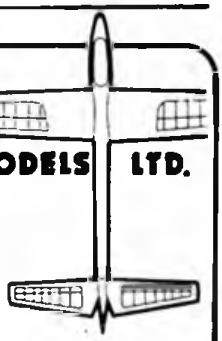

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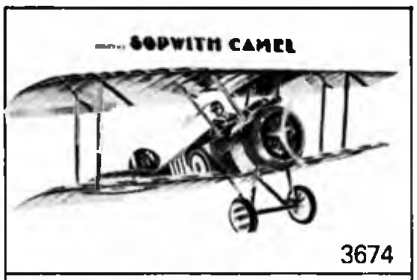

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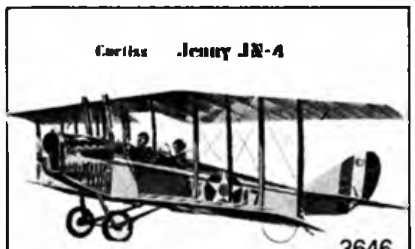

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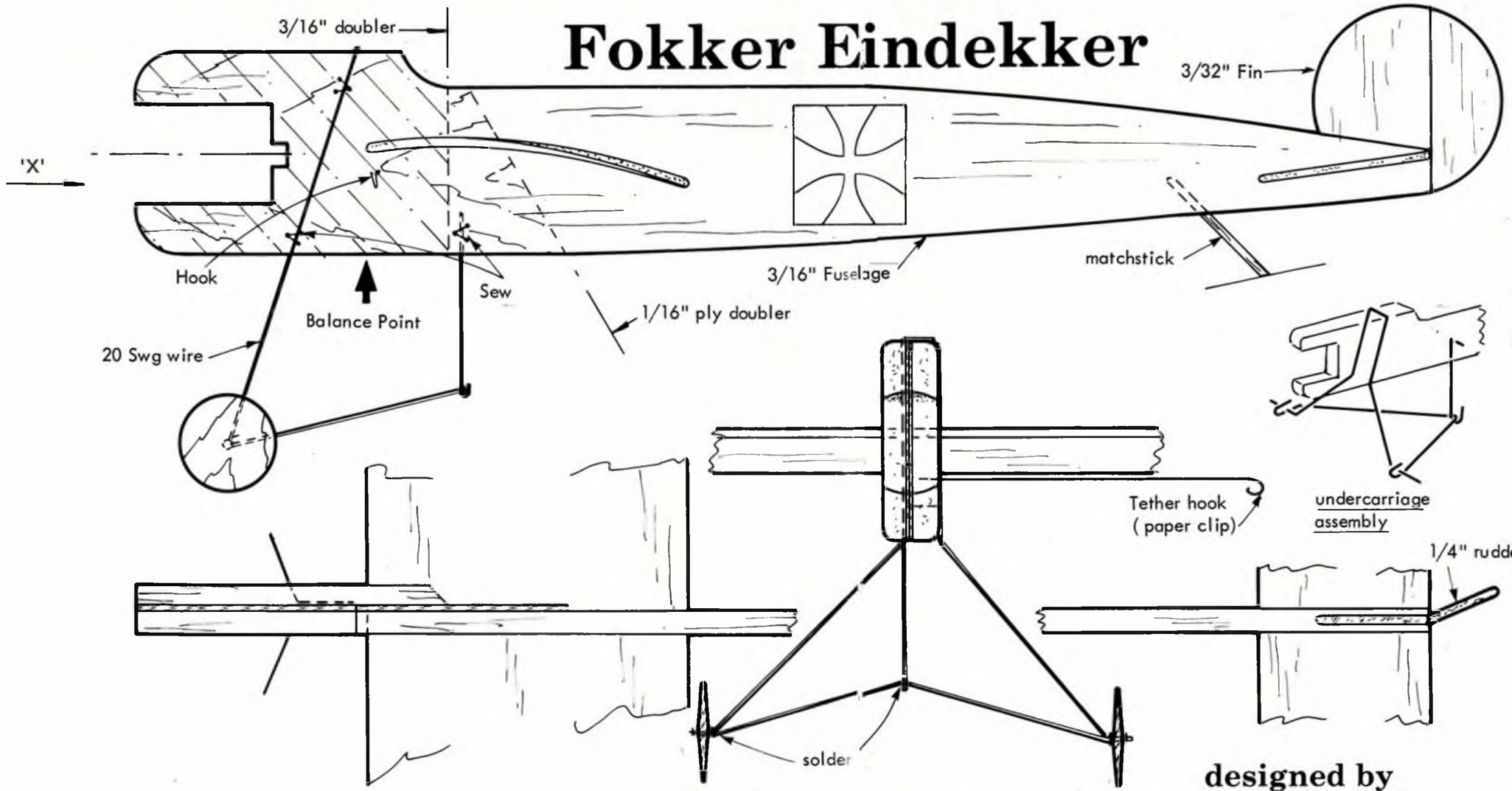

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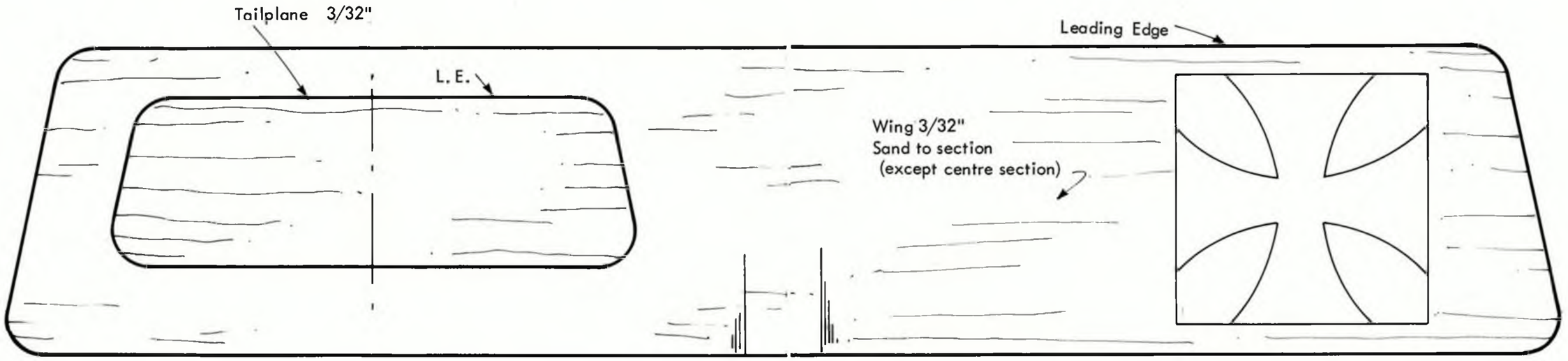

APPENDIX: LINKS TO Plans

The magazine contains two free plan (Pulstar, Kirin) printed front/back on a folded pull out banner of four sheets. The banner is not included in the document.

Fokker Eindekker by Brian Waterland
Electric R.T.P.
Page: 46

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